

66th Anniversary



**Connecticut
Science &
Engineering
Fair**

March 11 - 15, 2014

Student Abstracts

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Introduction

These abstracts provide an opportunity to review the projects prior to the fair. Please note the following:

- **The abstracts are the work of the students who are participating in the 2014 Connecticut Science & Engineering Fair. The CSEF reserves the right to withdraw an abstract at any time for modification.**
- **The abstracts are sorted by project number.**
- **In filling out their project registrations, the students identified the Special Categories (Scientific Disciplines) that relate to their project. Those Special Categories (Scientific Disciplines) are indicated in a field below the body of the abstract.**
- **The Fair Categories and Scientific Disciplines are defined in a table that precedes the start of the abstracts.**
- **A listing of the projects associated with each Scientific Discipline is provided at the end of this document. Keep in mind that the list of projects in each Scientific Discipline may involve more than one page.**
- **Bookmarks have been added as an aid in navigating within this file.**
- **The abstracts will be available in book form at the Fair.**

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Fair Categories

	Life Sciences	Physical Sciences
7 th & 8 th Grade Team	LT (1001 - 1999)	PT (4001 - 4999)
7 th Grade	L7 (2001 - 2499)	P7 (5001 - 5499)
8 th Grade	L8 (2501 - 2999)	P8 (5501 - 5999)
High School	LS (3001 - 3499)	PS (6001 - 6499)
High School Team	LST (3501 - 3999)	PST (6501 - 6999)

Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
BE = Behavioral & Social Sciences	EV = Environmental Analysis
BI = Biochemistry	EM = Environmental Management
CB = Cellular & Molecular Biology	MA = Mathematical Sciences
CH = Chemistry	ME = Medicine & Health Sciences
CS = Computer Science	MI = Microbiology
EA = Earth Science	PH = Physics & Astronomy
EN = Engineering: Materials & Bioengineering	PS = Plant Science

Scientific Discipline Composites

Biotechnology	AS, BI, CB, EN, ME, MI, PS
Environmental Sciences	EV, EM
Engineering	EN, EE
Sustainability	EA, EN, EE, ET, EV, EM

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Plants require certain nutrients to grow and develop. One such nutrient is calcium, which is taken up from soil by the roots. Plants use calcium to make and strengthen their cell walls, for enzyme function, metabolism and to absorb other minerals. A stronger cell wall makes plants less susceptible to attacks from pathogens. People who grow their own plants and gardens often like to use organic waste from their kitchens as fertilizer. It is healthier and better for the environment than chemical fertilizers. Many like to compost as a way of reducing the waste they produce and send to landfills and to benefit the soil. We wished to test whether eggshells, which are rich in calcium, can benefit plants. We used *Ficus pumila* plants because they are fast growing. We kept all conditions constant except for the following: to three plants, we added soil only (negative control); to another three, we added soil and ground eggshells; to the last three, we added soil and commercial fertilizer (positive control). We measured plant height and recorded observations. Our results show that plants grown in the presence of ground eggshells grew taller and faster than plants grown without. We conclude that adding eggshells to plants benefits them, probably because of the calcium they provide. Eggs are a staple of many diets and commonly used as a breakfast food, or baking, and grinding the eggshells and adding them directly to soil is a simple enough process that can benefit gardeners and the environment.

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This project investigates the potency of four different commercial antacid products (Rolaids, Alka-Seltzer, Tums, Equate) compared to a control (Baking Soda). Our hypothesis was that Tums would be most effective because it is the most popular antacid. We dissolved the recommended dosage of each base (for Baking Soda we used 1 teaspoon) in water. Then we added drops of each liquefied base into a solution of lemon juice and water until the solution was neutralized. We recorded the number of drops required for each base. We did four trials. The experiment showed that Baking Soda was the most potent, requiring an average of only 50 drops to neutralize the lemon juice, and Equate was the least potent, requiring 737 drops. Our hypothesis was incorrect because Tums was second to last, requiring 512 drops on average.

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CSEF Official Abstract and Certification

Fair Category

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Purification Possibilities is a project to determine whether different methods of purification can kill bacteria effectively, and if so, which method works the best. We tested a Brita Water Filter, a home made water filter, evaporation, boiling, iodine, or cloth with different types of water such as stream, tap, and lake. We predicted that evaporation and boiling would work most effectively. We tested the Brita Water Filter by pouring the different water samples into the filter and collected the clean water in a clean beaker. Then we tested the boiling method by boiling water. We did the same thing with the evaporation but after we cooled down the boiling water. For the iodine we poured drops (3) of iodine into the water and hoped that would kill the germs. Then we poured water through a paper towel and collected the water. We tested each newly purified water by swabbing it with a sterile swab onto a sealed Petri dish. After testing we concluded that our hypothesis was proven correct and that evaporation and boiling were the best methods, due to the fact that these samples had no bacteria colonies present. We also found that stream water was very clean while the lake sample was not, and tap water is very clean.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

A study conducted by the Intelligent Systems Institute in Tsukuba, Japan, showed that a social robot improved elderly citizens' social health and feelings. The objective of this research was to determine if humans could develop emotional bonds to social robots. It was hypothesized that if humans spend at least 60 minutes with a social robot, then they would develop an emotional bond with the robot. To test this hypothesis, participants were administered a pre-survey measuring how they felt about robots. After completing the pre-survey, participants were given one of a variety of different social robots, such as WowWee RoboMe, Furby Boom, Keepon, WowWee Robosapien, and Zoomer and instructed to spend one hour interacting with the social robot. After spending an hour with the robot, a post survey designed to measure if a emotional bond was formed between the human and the robot was administered. The results indicate that humans can develop emotional bonds with social robots. The data shows that a majority of the participants formed emotional bonds with their robots. However, the sophistication and appearance of each robot impacted how strong of a bond was formed. For example, the more controls the robot had, the stronger the emotional bond recorded. The findings from this experiment suggest that it is possible for humans to develop a relationship with social robots and that with more functions, the bond will become stronger.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Num Title:

Student Name(s):

Fair Category

Abstract:

ABSTRACT We have found a natural way to “Delay the Decay” of a variety of common woods used in many outdoor structures exposed to nature’s impact. Simulating environmental conditions, we used varied solutions with each wood and discovered all samples eventually showed evidence of cracking and splintering. We then used two different possible decay retardants added to outdoor paint. Our results were positive: •Extract of Cedar heartwood: Only Cedar wood showed eventual signs of discoloration and minor fiber breaking. •Extract of Yew heartwood: Only Cedar wood showed eventual signs of discoloration. •Poplar, Bamboo, and Pine were especially decay resistant. In short, Yew and Cedar extracts mixed into paint will preserve your wood. Also, they are both natural, unlike a chemical wood preservative (as arsenic compounds). So we can “Delay the Decay”.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of our project was to test our knowledge about genetics, and combine that with our favorite fruit: strawberries. We tested a number of strawberries in different stages of ripeness, and tried to determine which would yield the most deoxyribonucleic acid (DNA). We hypothesized that the ripe strawberry would yield the most DNA. We formed a makeshift extraction liquid using dish detergent, salt, and water; which would help extract the DNA. Then, we added this liquid to the hand-crushed strawberry (under ripe, ripe, or overripe) in a plastic bag and stirred the mixture. Afterwards, we filtered the crushed strawberry mixture using a coffee filter, and added rubbing alcohol to make the DNA strands more visible and separate them from the juice. The results of our project showed that our hypothesis was accurate because the ripe and fully grown strawberry extracted the most DNA. The under ripe strawberry produced the average amount of DNA, and the over ripe strawberry produced the least amount of DNA. The effect this experiment had on the outside world was that now we know which type of strawberries have higher amounts of DNA. This information is an introduction to using genetics in daily life; such as solving crimes and learning more about living cells and DNA.

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CSEF Official Abstract and Certification

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Student Name(s):

Fair Category

Word Count

Abstract:

Our lab was focused on finding the effects of commercial de-icers on grass growth. We chose this topic because of how often de-icers have been in the news for their effects on the underbodies of cars. That led us to the question: What could these chemicals be doing to our grass? We tested the effects of two different de-icers: rock salt and potassium chloride de-icer. Those two de-icers were chosen because the rock salt is used by the Connecticut Department of Transportation on the highways and state roads, and the potassium chloride de-icer is similar to what is used by our town. We thought that the potassium chloride de-icer would have the greatest effect on the grass because it contained the most chemicals. We tested the growth of the grass over a two week period. At the end of our test, we found that both deicers caused the growth of the grass to have a slower rate of growth and eventually the grass completely stopped growing. This effect happened the fastest in the potassium chloride de-icer grass plot, which proved our hypothesis to be correct. Even though only a small amount of grass comes in contact with de-icers, that small amount can add up to a large amount of damaged grass, considering how many and how often states apply de-icers. After seeing our results, we propose that extreme caution be used when applying de-icers and alternative environmentally friendly de-icers should be considered when applying near grass, trees or plants.

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CSEF Official Abstract and Certification

Fair Category

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

For a Science Fair experiment, we tested decided to test how Carbon-Dioxide affected plant growth. We wanted to test this because we believed that the amount of Carbon-Dioxide in the air today is harmful to plants and nature in general. Doing this experiment could possibly confirm our thoughts. To test this, we set up a small light box and put 4 plants inside it--two exposed to Carbon-Dioxide and two exposed to the normal air around us. To create the Carbon-Dioxide, we put a large clear container over two plants and a smaller container inside the unit filled with baking soda and vinegar. The chemical reaction created by mixing these two ingredients results in Carbon-Dioxide being released into the air. Every week we checked on the plants and recorded their height. The average for the plants exposed to Carbon-Dioxide on week 3 was 6.3 cm, while the plants that were not exposed had a week 3 average of 5 cm. From this data we can conclude that plants are actually helped by Carbon-Dioxide. This is because it is what plants feed off of. We had believed that since plants pores shrink when exposed to Carbon-Dioxide, they would not be able to get enough of the gas, but we were proven wrong. This is what we learned from our experiment.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose for our experiment was to test whether compost would work as the fuel source for the bacteria which power a microbial fuel cell (MFC). We also tested to see how the size of the MFC would affect the productivity of the fuel cells. Nine reactors were made of four different sizes and two different designs. Three different sized reactors were made out of PVC pipe and the largest reactor was made out of plastic boxes with lids. We believed that compost would work as a fuel source for a microbial fuel cell, and that as you increase the size of a microbial fuel cell, the power output would increase linearly with the size of the reactors. Every day in the trials, we measured and recorded the instantaneous power output. At the end of the trials the average instantaneous power output of the four different types of reactors varied greatly. After further analysis, the data was proven to be inconclusive and we could not support or reject the hypothesis that power output increases linearly with reactor size. We found that as the reactor volume increased, the MFCs were more dependent on air added from an aquarium pump to complete the reaction. Since we were not adding air to the small and medium sized reactors, we cannot compare that data with that from the largest reactor. If given time for further study, we would run the small and medium sized reactors with proportional air addition.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Farmers grow plants to feed the whole world. They want to produce as much food as possible and to do this, it would be helpful to minimize the time it takes for a plant to grow. Will natural or unnatural additives help speed up plant growth? Watering plants with water, producers can make their food natural and better to eat, however, watering a plant with different liquids could speed up the growth process. In this experiment bean seeds were placed in a damp paper towel, inside a plastic bag, for 5 days to be germinated. Then the seeds were planted and watered with water for 5 days. After the five days, use coffee to water three of the beans plants. Water another three plants with orange juice. The last three plants with Diet Sierra Mist. After growing the beans for 30 days the average height of the plants that received Diet Sierra Mist was 24cm. Plants that received orange juice grew an average of 20cm and coffee plants grew an average of 18cm. The plants that received that water grew an average of 23cm, did not enhance the growth of a plant in any way. Although water is a more natural way of growing plants, Diet Sierra Mist minimized the amount of time it takes to grow a plant.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Effects of Ethanol, Citrus limon, Mentha piperita, and Zingiber officinale extracts on Escherichia coli

Student Name(s): N. ashraf, A. Mohammed

Fair Category

Word Count

Abstract:

Although many bacterial strains are beneficial, many can be harmful to humans. Thus, we have to find ways to rid of these harmful bacteria. Products such as bleach are very good ways to do so but are very toxic. In fact, 28% of all household accidents are bleach-related. Many people are looking for alternatives to bleach for cleaning and use “greener” mixtures such as vinegar and tea tree oil. We compared the effectiveness of three plant extracts which are known to have some antibacterial properties. We used a bacterial kill zone experiment to test how much our lemon, ginger and peppermint extracts would prevent the growth of Escherichia coli bacteria. Ten and fifty percent dilutions were made to test which would be more effective. We used ethanol and water as our positive and negative controls, respectively. All conditions were repeated in triplicate. Our results indicated that lemon was the most effective anti-bacterial of the three. This was followed by ginger and finally, peppermint. Ginger and lemon extracts were effective at a 10% dilution, which suggests that they can be used to make large amounts of antibacterial solution for use in our homes without the need for a large amount of extract. This is exciting because lemon is safe enough for human consumption and not harmful to the environment. In the future, we would like to test how combining these different extracts would affect bacterial growth to see if we can produce a more efficient, safe and green, antiseptic product.

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In our experiment we tested the different kind of acid against the Jolly rancher. The purpose of this experiment was to see how the different acids reacted to the sucrose in the jolly rancher. To find the answer, we put a jolly rancher inside pineapple juice, egg whites, and water. We timed how long the candy took to dissolve. The water dissolved the jolly rancher the quickest with its hydrochloric acid taking about an hour. The citric acid in pineapple juice came in second taking 2-2.5 hours. The egg whites came in last time wise taking over three hours with its amino acids.

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Word Count

Abstract:

Abstract The purpose of this project was to determine what environmental factor has the greatest effect on wood decay. The question was, "What environmental factor can effect wood decay the most?" The environmental factors tested were rain water, salt water, acid water, wet soil, and nothing. The hypothesis was that the wet soil would have the greatest effect on the wood. This project was performed by setting 3 1-foot long and one inch thick planks of wood in each bucket filled with each environmental factor. The planks were set here for two weeks and were checked on every three days to take observations. After two weeks in the environment, the planks were removed and tested to see if they decayed. No wood was decayed enough to the point of breaking, but the planks in the wet soil environment showed the biggest sign of decay. In this experiment the independent variables were the environmental factors. The dependent variable was the strength of the wood. The controlled variables were the size, shape, and type of wood. The results of this experiment showed that two weeks is not enough time for wood to decay to the point of breaking, but wood exposed to wet soil has a greater chance of breaking and wearing down than wood exposed to other environmental factors.

Special Categories Selected by Student:

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Today in America there is a demand of antibacterial agents, such as Lysol and Alcohol. Our household surroundings are being eliminated of harmful bacteria, and only a select antiseptic or chemical cleaner can be considered the best. Our project was to test which commonly used bacterial eliminating substance was the best. In six petri dishes were bacterial colonies growing with three different types of substances, Lysol, grain alcohol, and 70% isopropyl alcohol. There were two control dishes per experimental agent, so we could compare the dishes with substances and without. In the original experiment, we found out that the grain alcohol helped bacteria grow because the grain base contained sugar. Drinking alcohol was used because we thought that it was potent enough to kill bacteria, but then we noticed the flaw. We hypothesized that Lysol would be the most effective. Proving itself, Lysol had created a zone of inhibition in the Petri dish and was effective when eliminating various bacterial colonies. In the second experiment, we re-conducted the original experiment but replaced the grain alcohol Petri dishes with isopropyl alcohol Petri dishes. Again, we thought Lysol would win. The isopropyl alcohol was not effective at all. The Lysol prevented the bacteria from growing with a zone of inhibition. So in conclusion we were right, Lysol was the most effective bacterial eliminating agent. If you want to prevent or eliminate bacteria, then Lysol is the right product.

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Student Name(s):

Fair Category

Word Count

Abstract:

To speed up the germination process, many gardeners presoak their seeds. This practice penetrates the hard seed coat and allows liquid to enter, bringing the embryo of the seed out of dormancy. The purpose of our experiment was to determine if presoaking seeds in household liquids with different pH levels would affect their germination rate. We hypothesized that if we soak seeds in liquids with different pH levels for an hour and grow them on a damp paper towel, then the seeds that were soaked in an acidic liquid will germinate the fastest. The first step of our procedure was to soak ten mung bean seeds for an hour in each of the following liquids: lemon juice (pH2), tomato juice (pH4), water (pH7), soap (pH10), and bleach (pH12). Then, we planted the seeds on a damp paper towel and placed them inside a clear plastic bag. After letting the seeds grow for three days, providing them with adequate sunlight and oxygen, we calculated the percentage of seeds that germinated for each liquid and compared the data. The data collected in our experiment proved our hypothesis correct. We found that tomato juice, which was an acid, had a germination rate of 88%, the highest in our experiment. We concluded that soaking seeds in a mildly acidic liquid, such as tomato juice, will help speed up the germination process. Therefore, if gardeners soak their seeds in this type of liquid, they will be able to grow and harvest their plants quicker.

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CSEF Official Abstract and Certification

Fair Category

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Student Name(s):

Fair Category

Word Count

Abstract:

We investigated this topic after scrutinizing the calorie labels on food. We thought it would be interesting to test the calories on food and non-food items. We then came to our statement of problem: Which item will produce the most energy? (Peanuts, Wood, Marshmallow, Almond, or Walnut). For the procedure, we first filled a flask with 100 mL of water. Then we recorded the temperature of the water and measured the mass of the object and the mass of the water on a scale. We then burnt the item until the flame ended and recorded the temperature of the water afterwards. After that, we measured the mass remaining of the object. To calculate the energy released by the object we used: $\text{Mass} \times \text{Temperature Change in water} \times 1.00 \text{ cal/g } ^\circ\text{C}$. Then we divided the answer by the mass burnt to find calories per gram. The results we obtained were that in order of most to least calories: peanuts (2846 cal), walnut (1385 cal), almond (907 cal), wood (423 cal), and marshmallow (265 cal). These results were averaged on 3 trials and showed that peanuts contain the most calories. Our experiment contributes to the area that we worked in by showing what materials can provide the most energy. We concluded that peanuts are superior than other foods in calories and that marshmallows are the least superior in calories. Our process seemed valid because we did three trials. An extension could be possible to add biomass and other foods.

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CSEF Official Abstract and Certification

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Proj.
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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Since most of our teammates on our basketball team use Dove, we wanted to test if Dove deodorant is the most effective in preventing body odor. Our goal was to see if Dove was better at controlling bacteria compared to other popular deodorant brands on the market. We asked our team to smell the different deodorants that we were testing to see which one they liked best. We then assigned each of five girls a deodorant to test. We had them shower and apply deodorant only to one arm. We played basketball for about an hour and then swabbed both armpits with sterile cotton swabs. We took our petri dishes with a nutrient agar and applied what we collected onto each and labeled them accordingly. Our control was the armpit without deodorant. We observed our petri dishes each day. We observed that the armpit without deodorant grew bacteria for each girl before the armpit with deodorant. We waited until all petri dishes grew bacteria and recorded our results from when the control petri dish grew bacteria until the deodorant petri dish grew bacteria. Our results indicated that the Suave swab took the longest to grow bacteria. We were surprised to find that Dove did not work the best since all of us were using it.

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CSEF Official Abstract and Certification

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Student Name(s):

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Word Count

Abstract:

Will the production of plants change if they are grown at five times the force of gravity on earth and with an added amount of carbon dioxide (5,000 ppm or 0.50%) compared to the regular force of gravity and CO2 level on Earth? If so, what will they look like and what will their growth patterns turnout like? There are two different parts to our project, the first part was to experiment with gravity and how it affects plants. We spun plants at 5.5 meters per second creating a force of gravity five times the force on Earth. The second part tests how atmosphere (specifically CO2 affects plants). The independent variable is the plants and the dependent variable is the gravity for part one and the CO2 for part two. Our results concluded that plants spinning did not grow as well as our control group, and plants in normal atmosphere grow better than plants with extra CO2. This experiment can be applied to the real world because as global warming continues, people on Earth may have to move to other planets where the gravity and atmosphere will be different. Our experiments' show that humans will be able to survive on a planet with five times the force of gravity on Earth or less, also plants will continue to grow with the rising amount of CO2 in the atmosphere.

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Student Name(s):

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Word Count

Abstract:

The study of the effects on gamma radiation on plants is a broad field. Gamma irradiation has been useful in agriculture. In this study, I investigated the effects of different doses of gamma radiation on seed germination and growth of radish seeds. Radish seeds previously exposed to gamma radiation of varying doses (i.e. 0, 50, 150, 500, 4,000mrads) were planted in clear CD cases and the germination and primary root growth of each set was studied over a 7 day period. I performed 3 separate trails. I observed the germination of each set of seeds and recorded the number of germinated seeds daily. After 7 days duration, I measured and recorded the longest primary root length in millimeters in each set of seedlings. The results of all 3 trials show that the control group (non-irradiated seeds), 50mrad, and 150mrad seed groups all germinated at 100% rate. The 150mrad seed group germinated at 66% rate. The 4,000mrad seed group did not germinate (0%). However, the 50mrad and 150mrad group seeds germinated faster than the control group. Also, the primary root length of the seedlings decreased in growth with increasing irradiation doses. The results generally show that some gamma radiation will cause radish seeds to germinate and grow faster while a high dose of gamma radiation will cause no growth at all. Mid-range gamma radiation may cause a faster germination , but growth of the primary root is decreased as compared to the seeds that germinated in the control group.

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Student Name(s):

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Word Count

Abstract:

The purpose of this experiment was to see if magnetism effects how tall a Coleus Plant grows. It was predicted that the plants that had a magnet underneath its roots wouldn't grow as tall as a plant without magnets because the iron in the plant would be attracted to the magnet, and the plant would be restrained. To test this theory, three Coleus plants were planted in pots that contained magnets underneath their roots, and three other Coleus plants were planted containing nothing but soil underneath their roots. Over the course of two and a half weeks, each plant was given fifty droplets of water every other day, and they were observed. After the two and a half weeks were over, each plant was measured. The data showed that the plants with the magnetism applied to their roots grew taller than the plants without magnetism. The average height of the Coleus plants that were potentially effected by the magnets was 10 cm, and the average height of the Coleus plants that were left alone was 9.5 cm. Some observations were that the plants with the magnet underneath them were drying out, while the plants without the magnets were healthy, and that the plants with the magnet were dying. Because the hypothesis stated that it was predicted that the plants with the magnets underneath their roots would grow shorter, the hypothesis was incorrect.

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Student Name(s):

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Word Count

Abstract:

My question was whether a green smoothie comprised of kale, ginger, banana, and water offers far greater nutrition than the typical lunch of a cheeseburger, fries, and Coke. Additionally, I wondered whether the smoothie could be made at less cost than the typical fast-food meal. I also considered the environmental impact of the smoothie versus the fast food meal, which leaves behind lots of trash. Comparing the fast food lunch to my smoothie, I found that the smoothie excelled in many, but not all areas. My smoothie excelled in price. With a few additional ingredients such as nuts, coconut water, and spinach, my smoothie could have surpassed the fast-food meal in every way. I searched Google for data on raw ingredients and made charts with the statistics I discovered. I then compiled the data and saw how many nutrients were in each ingredient. Although the fast-food meal looked like the healthier option in some categories, my smoothie was still the healthier option. The calories in the smoothie are comprised of healthy vitamins and minerals. The calories in the fast food-lunch are comprised of mostly fat and sugar. Choosing the smoothie over the fast-food lunch is also the economic and ecological choice. The fast-food lunch leaves behind trash from paper and plastic. Also, it is much more expensive than my smoothie. However, no matter what one adds to the smoothie, it is hard to beat the taste, smell and textures in a fast-food lunch.

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Student Name(s):

Fair Category

Word Count

Abstract:

PERIPHERAL VISION is a part of vision that occurs outside the very center of gaze, what is seen on the side by the eye when looking straight ahead. The purpose of project is to test which color your peripheral vision responds best. My hypothesis is, will red be the color that it to the best? To test peripheral vision hold the vision protractor on bridge of nose using cup on the bottom. Focus solely on the tack. I will start to move a colored object (red, yellow, or blue) on the right or left side of the vision protractor from before the 0° mark. Say stop when you first see the blurry object but still focus on the tack. Then when able to make out the color of the object say stop again and specify the color. I will then write down both degrees that you stopped at on my chart. I'll repeat until I've tested each colored object on both the left and right sides of the vision protractor. In conclusion, my hypothesis was incorrect. It was incorrect because the objects that people saw first in their peripheral vision, according to my research, did not have a specific relationship to the subjects' gender, age, the color of the shape, or the shape itself. For some subjects red was one of the hardest colors to spot in their peripheral vision and the other colors (blue or yellow) were the easiest to. But also for others it was the opposite.

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Student Name(s):

Fair Category

Word Count

Abstract:

The goal of this experiment was to observe and document any differences in the digestibility of processed and non-processed foods. To complete the stomach simulation, 2.5 g of each food was placed into 4 glass test tubes along with 20 ml of gastric solution and placed in the hot water bath. One test tube had no food inside and was filled with 20 ml of the gastric solution and one level scoop of Albumin powder. For the small intestine simulation, two 2.5 g portions of each food were placed into test tubes and two test tubes were left empty. Two rows were arranged; each row had one empty tube and one test tube containing each type of food. Both rows were filled with 20 ml of litmus milk. One row was then filled with one level scoop of water, the other with one level scoop of pancreatin powder. It was hypothesized that the processed foods would take substantially longer to digest in the “stomach” and “small intestine” because of the unnatural chemicals and preservatives within the Chicken McNuggets and Velveeta cheese versus the non-processed foods (chicken breast and cheddar cheese). Two trials of each simulation were performed, and when the mean digestion rates were calculated, it was discovered that there was little difference between the processed and non-processed foods within the digestive tract. In conclusion, though the processed and non-processed foods are almost identical during digestion, there still can be substantial health-related issues with unnecessary consumption of processed foods.

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Abstract:

When a plant is damaged by an animal that's eating it, it releases a chemical that prevents the plants around it from getting eaten or damaged from other organisms. I wanted to do this project because it was interesting to see how plants protect each other. Materials use; 13 tobacco hornworm, 8 green pepper plants, 20 water vials, tape, printer, 5 containers, and a data chart. My hypothesis is, plants near damaged plant are less likely to be eaten than plants that are far because, just as plants absorb food from light, plant release chemicals when being eaten. Plants around it become resistant by releasing protective odors that make them less desirable to insects. For the procedure, I separated the plants into 2 group of four and place 10 caterpillars on one of the plants. Next, I cover both containers. After a week, I took 3 control leaves and three damaged leaves to print. I put the leaves into water vials, tape them to the 3 small containers in a V shape, and put a hornworm in the middle of each of the containers. I scan them to see how much each leaves was eaten.

hornworm	controlled
controlled	controlled
damaged	

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Abstract:

What kind of treats can a horse with risk factors for Equine Metabolic Syndrome (EMS) have? Owners give treats as rewards for training, tricks, or socializing. Last year, a horse at my barn foundered and was diagnosed with EMS. It was a costly and life-changing problem for the owners. My hypothesis: If treats are tested for sugar content and soaked, the simple sugar content should decrease. Using water as a solvent, I knew that hay could be soaked to remove simple sugars. I wanted to see if that process would work with other treats. I tested 15 samples individually by putting each into a 15 ml beaker with distilled water and 10 drops of Benedict's solution. The beakers were placed in a 170° F bath for 5 minutes. This step was repeated with new samples that had been soaked for 15 minutes and again for 30 minutes. First, I recorded the initial color and then recorded the color after heating the beaker. By changing colors, Benedict's solution would show if an item had simple sugar. My hypothesis was correct for 5 out of 15 experiments-including the control. Finally, I tested the water that each item had been soaked in to see if sugar had dissolved: 12 out of 15 tested positive for sugar content, showing some sugar was removed. If I were to continue this experiment, I would test for non-reducing sugars using hydrochloride acid, sodium carbonate solution, Benedict's solution, and then quantify the amount with a colorimeter.

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Fair Category

Abstract:

The mummification of apple pieces with natron, a naturally occurring mixture of sodium carbonate, sodium bicarbonate, and sodium chloride that was used by ancient Egyptians for mummification, was examined. Sodium carbonate is the major component of natron and it was hypothesized that mixtures of the natron components with more sodium carbonate would desiccate the apple pieces quicker. However all of the mixtures that were examined were equally effective. When the experiments were repeated with the individual components, sodium carbonate was found to be the best desiccant.

Word Count

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Student Name(s):

Fair Category

Abstract:

You are born with white teeth. They stain and discolor over time. Drinking certain beverages can also stain and discolor your teeth. My hypothesis is that black tea will stain and discolor your teeth more than black coffee or Coca Cola with lime. My procedure was hollowing out three white eggshells that represented teeth. Then, I put the three eggshells into separate cups with different liquids. After the first five minutes, I removed the eggshells and took pictures. I did the same for two more five minute periods. At the end, the eggshell in the black tea was stained more than the eggshells in the black coffee and Coca Cola with lime.

Word Count

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Word Count

Abstract:

The topic that I chose to investigate was plant growth using different feeding materials. I chose this topic because I was curious to know how the different liquids would affect African Violet plants and their lifespan. The liquids used were water (the control), distilled water, Sprite and Gatorade. Each plant received an assigned liquid. My hypothesis for this experiment, could I substitute water with another liquid and still maintain a healthy growing plant? I did this by watering the plants every other day, on a strict and routined schedule. Each plant received the same amount of liquid. I fed the plants their assigned liquid and I wrote down any observations/changes in the plants. Results were always recorded on the feeding days. A key result that I recorded was that mold developed in four out of my seven plants. Occurrences like gnats and odor also became an issue. Since I was conducting this experiment indoors, I provided access to light by keeping the plants under desk lamps. The addition of the light increased the odor of the plants. I recorded any changes to the soil, leaf count and health and well being of the plant. The research shows a range of results in all of these categories I observed. These findings suggest that using different liquid materials, the growth cycle of the plant is affected. A substance like distilled water provides no nutritional value while a substance like Gatorade, an electrolytic solution, also proved to disrupt growth cycle of the plant.

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Title: How does restriction of breathing while singing affect the sound pitch and voice quality?

Student Name(s): T. Casey

Fair Category

Abstract:

How does different breathing affect singing by testing the restriction of certain abdominal areas? First, you have to prove that abdominal breathing when singing is the best practice. Subject A sang the same song during three test runs. During trial #1, subject A sang using chest breathing. This sounded hard and strained; the singer did not have enough breath to last through some of the phrases. During trial #2, subject A sang while breathing by raising their shoulders up and down, it sounded very breathy and strained. During trial #3, subject A sang using only abdominal breathing. It sounded easy, and singer used correct register. The double blind test with my mentor, had the same results. We proved that abdominal breathing when singing is best. Once proven that abdominal breathing while singing is best, I continued the experiment. Next I needed to find out how restricting different abdominal breathing areas affects singing. Using subjects, A, B and C, I restricted the hypogastrum, trans colon, epigastrium and umbilical from breathing on different trials. Trials involved the test subject singing the "Cup Song" while the belt was placed on different abdominal areas. The "voice memos" Ipod app was used to record each singer. After completing the trials, I captured the notes on the oscilloscope application, and found that they were different. Data analysis showed that Epidestrium restriction was hardest for the singers, and hypogastrum and trans colon restriction was easiest. All four restrictions affected the singers' voice. (Song by Anna Kendrick)

Word Count

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Word Count

Abstract:

The purpose of this experiment was to find the effect of nitrogen fertilizer on grass. The hypothesis was that the plants with more nitrogen fertilizer would grow better, but that was not the case. Instead, most of the plants with fertilizer died, but the ones without didn't. The grass without the fertilizer grew an average of 10.73 cm, and the ones with 2 grams fertilizer grew 0 cm along with 2.5 grams. The grass grown with 1.5 grams of fertilizer only grew an average of 0.5 cm. This shows that nitrogen fertilizer can also hurt the environment more than most people thought. This is one of the many reasons to stop nitrogen runoff. In during the experiment I watered each plant with the same amount of water for 3 weeks. When the first week was done, I measured out different amounts of fertilizer and put them into each of the cups. One section had no fertilizer, another had 1.5 grams, another 2 grams, and another 2.5 grams. They had constant light on them all the time. Even though my hypothesis was not correct I have learned from my experiment.

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Fair Category

Abstract:

Can you tell how far away an object is? Is your grandmother better at judging, or is your baby sister better? A depth perception test was conducted on twenty-four randomly selected volunteers ranging in age from four to seventy-five. To set up the test, a piece of blue tape was taped to the end of one pencil and a same size piece of red tape was taped to the end of another pencil. The tester was seated at a table holding the pencils behind a white board so only the tops were visible. The volunteer was seated 2.4 meters away. The tester held the pencils 5.1 centimeters apart from each other, but at different distances to the volunteer. The pencils were either the same distance from the volunteer, or one of the pencils was 2.5 centimeters closer to the volunteer than the other one. The volunteer was asked to state if the blue was closer or the red, or if they were at the same distance. This was repeated ten times with ten different pencil positions. The same process was repeated with each volunteer but with one eye closed. The results showed that as age increased past 40, there was a steady decrease in the number of correct answers. The oldest volunteers had the lowest percentage of correct answers using two eyes and one eye, which means they had weaker depth perception.

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

The purpose of this experiment was to determine which brand of hand sanitizer eliminated the most Escherichia Coli (e.coli) in a regulated environment. First, the petri dishes were set up with the E.coli in them. They were labeled, Control (1 and 2), Purell (1 and 2), Germ-X (1 and 2) and Gojo (1 and 2). The petri dishes for two sessions were observed, and data recorded, based on the amount of squares the bacteria colonies took up on each plate. The bacterial growth was also documented with pictures. On the third session, the petri dishes were swabbed with the corresponding formula. Three level spoons of the formula were applied to each corresponding dish. After waiting two sessions, the dishes were swabbed with the formulas again. Data was recorded in the laboratory notebook and pictures taken throughout the process. Two sessions after the dishes were swabbed for a second time, the plates dried up and were disposed of in the proper manner. Throughout this testing process, proper protective equipment was worn to prevent contamination. In conclusion, people must be aware of the risk of bacterial resistance and overuse of these popular gels.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

With the number of people becoming infected with drug-resistant Tuberculosis constantly rising, the World Health Organization (WHO) has declared it to be a global health crisis. Current treatment options are expensive and lengthy, and diagnosis of drug-resistant Tuberculosis is difficult. This project investigates why drug resistant Tuberculosis does not respond to the drug Isoniazid, which is the current drug of choice for Tuberculosis. The hypothesis on which this investigation is based is that there is a physical change in the catalase peroxidase protein of the Tuberculosis bacteria that renders Isoniazid incapable of binding to it. To test this theory, molecular modeling studies were conducted on the catalase peroxidase proteins from both regular and drug resistant Tuberculosis, and their respective Isoniazid receptors were compared. Results showed that while the receptor from the normal Mycobacterium Tuberculosis allowed the Isoniazid molecule to fit in perfectly, the receptor from the drug-resistant Mycobacterium Tuberculosis was altered in such a way that it was impossible for Isoniazid to bind to it. This knowledge could lead to avenues for designing cheaper and more effective therapies for drug-resistant Tuberculosis. Secondly, this knowledge of a change in the receptor site, could also lead to better tests for diagnosing drug-resistant Tuberculosis. Efficient diagnosis and successful therapies for drug-resistant Tuberculosis would be a major step forward in addressing this global health crisis.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

I was interested in this experiment because I wanted to know if I could make a seismograph-like marching hat would detect human movements the way seismographs detect Earth's movement. I decided to make a seismograph-like machine that could detect vibration from five different human movements. My hypothesis was that jumping would make the widest lines. I made a seismograph machine following step-by-step instructions. Then I had my subject perform five movements and recorded the results for each. My hypothesis was correct; jumping did produce the widest lines.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Abstract:

The purpose of this experiment was to determine the effectiveness of all-natural sunscreen and commercial sunscreens on UV detecting beads. Each tube contained two beads in which each sunscreen was applied. The tubes were left out in the sun or clouds for 8 minutes, and then brought in to record the data. In the beginning of this experiment, it was hypothesized that the all-natural sunscreen would make the UV detecting beads have a lower UVA/UVB rating than the commercial sunscreens would have on the beads. In the end, the homemade sunscreen had a negative result for each test, and the Neutrogena was more protective than the Banana Boat. Assuming that the negative result offered more UVA/UVB protection, the homemade sunscreen did the best out of the other sunscreens, and the hypothesis was supported.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Num

Student Name(s):

Fair Category

Abstract:

I conducted this experiment because I was interested in how a person's sense of smell and sense of taste are related. I have read some articles about this topic and was happy to test it. Prior to testing each subject, the subject was asked if they were allergic to any of the items used in the experiment. Also, we confirmed with the school nurse that no students had allergies to the food items used in this experiment. I conducted my experiment by first blindfolding people and having them taste a small piece of fruit (apple, pear, strawberry and a grape) and identify it. This was the control. Then each person would smell one of the "interfering smells" (mint, lemon, cinnamon and onion) while eating one of the fruits. Every combination of fruit and interfering smell was tested. The subjects' objective was to identify what they tasted even with an interfering scent to try and trick them. Based on my data, scent can interfere with your taste. However, my investigation's data showed that this can vary depending on the person being tested. Some of my test subjects had almost perfect results, and others did not. In this experiment, smell did interfere with taste to a certain extent. My subjects' scores varied, which concludes that smell and taste depend on the person.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

I wanted to do an experiment about birds because the bird feeders at my house are very busy which made me wonder if location had anything to do with it. Would a feeder located closer to the house have more activity than one located out in the open? Does the location of the feeder have anything to do with how often the birds feed and would one location work better because the birds feel sheltered being closer to a building? My hypothesis was that a feeder placed closer to the house would attract more birds because it was blocked on one side by a building and potentially safer from predators. I set up two identical bird feeders. One feeder was 25 feet away from the house in the open yard and the other was within 5 feet of the house. I measured seed consumption over a seven week period. My hypothesis did not prove out. The unprotected feeder had 33% more seed consumed compared to the feeder near the house. The results may have been affected by a few things: there was activity inside the house, a sliding door that would be opened from time to time and there was a squirrel involved. My experiment is a starting point in determining the best place to set up a bird feeder for maximum seed consumption. Further experiments should be made including duplicating the set up on the other side of the house - eliminating the sliding door and possibly the squirrel.

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment is to test the absorbency of different types of wood. It is predicted that pine piece of wood would absorb the most water compared to the mahogany and oak pieces of wood. Pine was chosen because of being a softwood and oak and mahogany were chosen because of being a hardwood. The pieces of wood were soaked in one liter of water for twelve hours and then was measured on a digital scale to find the mass of the wood after it has been placed in water. The pieces of wood in each trial were measured immediately after the 12 hours they soaked for was over. Then a measurement converter to convert the results in ounces to grams. This was repeated for three trials. The oak and mahogany both averaged a mass of 8.5 grams, while the pine averaged 7.3 grams. The hypothesis was proven wrong, as the pine pieces of wood absorbed the least amount water, and the oak and mahogany pieces of wood averaged the same and most amount of absorbed water in the decided time which was 12 hours. Improvements that could be made to make this experiment better would be to conduct more trials, have more accurate measurements. This experiment could also be made better and more accurate by having the wood soak for longer. This experiment could also be made better by soaking the pieces of wood separately instead of soaking the pieces of wood all together for each trial.

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CSEF Official Abstract and Certification

Fair Category

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Energy in the U.S comes mostly from Fossil fuels, but a growing portion comes from biofuel. Biofuel is quickly becoming one of our best alternative sources of energy. Biofuel is usually manufactured from corn. Corn is easy to grow in the U.S, but it is hard to grow in a lot of developing nations, especially ones that are constantly faced with drought. Switch grass is another plant that can be used to manufacture biofuel as an alternative to corn. I wanted to test if any other plants, such as oat, rye, wheat or switch grass could be used as an alternative to corn to manufacture biofuel. My hypothesis is that of all these plants switch grass will have the most biomass, and therefore be the best alternative to corn for ethanol production. I grew oat, rye, corn, wheat, and switch grass and calculated the wet and dry biomass of each. I used the percentage change from wet to dry weight as a measure of biomass. I found that switch grass lost the least weight when dried and therefore had the highest biomass index; these results support my hypothesis. Switch grass can be another alternative to corn for ethanol production because it grows in places corn can not since it does not need a lot of water to grow. This may be especially important for meeting the energy needs of developing nations.

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Proj. Title:

Student Name(s):

Fair Category

Abstract:

I am conducting this experiment to determine if the Quantum Growth Series will affect plant growth in the way the manufacture claims. My hypothesis is that Quantum will make the plants have better development and growth. I planted 2 trays; I applied Quantum to one 38 cell tray of plant seeds (Rye, Clover, and Cone flower) and planted a control tray that did not have Quantum. I conducted a second trial a month later, repeating the methods of the first trial. I determined plant development by measuring height of tallest plant, number of leaves, and number of plants for each cell. I measured the first trial after 49 days; I measured the second trial after 18 days and I measured it a second time after 38 days. Rye's plant development was not consistent between the control and Quantum in both trails. For cone flower, control had slightly greater number of plants, but plant height and number of leaves had very little difference between control and Quantum. Control and Quantum measures differed very little for Clover for both trails. In general, the average measures of plant development was either not consistently different between trials or differed very little between Quantum and Control. My hypothesis was wrong and Quantum did not affect plant growth consistently.

Word Count

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CSEF Official Abstract and Certification

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Most people think that brushing your teeth always removes the bacteria. Sometimes, using your toothbrush can actually put bacteria back into your mouth! Most people just rinse their toothbrush under tap water to clean it. That may clean the toothpaste off, but it is not cleaning the bacteria off your toothbrush. In my experiment, I tested the best safe way to clean the bacteria off your toothbrush, hydrogen peroxide, alcohol, or salt water. My hypothesis was that if I clean one toothbrush with alcohol, one with hydrogen peroxide, and one with salt water, the alcohol will clean the toothbrush the best because alcohol is used in soap and hand sanitizers. To test this hypothesis, I brushed my teeth with 4 different toothbrushes and soaked one in each of the cleaners and left one for a control that was just rinsed with tap water. After soaking, I used a sterile swab to put a sample of the bacteria on a petri dish prepared with agar. The dishes were placed in a bacterial incubator for 24 hours. I then removed the petri dishes and counted the bacterial colonies on the dishes. My results indicated that although the hydrogen peroxide had the least amount of bacterial colonies, all of the cleaners were significantly better than the control. Word count: 214

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CSEF Official Abstract and Certification

Fair Category

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Bittersweet By: Elizabeth Silva The question for my experiment is: How does the sugar content change during the ripening of a fruit? The purpose of my experiment is to compare the amount of sugar in bananas over a time period of eight days. My hypothesis was that the banana would have more sugar once ripe. I believe that because, a fruit has more ethylene once ripe. Ethylene is a plant hormone and a hydrocarbon. It also has more Monosaccharide (glucose and fructose) and Disaccharide (sucrose) molecules. For my experiment, I measured the sweetness in a banana using a refractometer. I measured it on days 1, 2, 4, 6, and 8. The average for Trial 1 was 34.36 (Brix); the average for Trial 2 was 33.96 (Bx); and the average for Trial 3 was 34.4 (Bx). There was a difference of 6.36 (Bx) between the ripe and unripe bananas in Trial 1. The difference of the unripe and ripe bananas for Trials 2 was 2.96 (Bx). The change from unripe to ripe in Trial 3 was 8.1 (Bx). Then, I graphed and analyzed my data. I repeated the process three times. In the end, my hypothesis was proven correct. I learned that ethylene plays a main role in the process of fruit ripening. That is a brief introductory to my experiment.

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

My project tested whether plants would grow better in an aquaponics system that uses a grow medium or if plants would grow better without the use of a grow medium. First I built two aquaponic tanks out of basic fish tank kits. Then I built covers for the tops of the tanks that hold the net cups and allow the air pump to go through. I put plant seeds in a can filled with starter soil so the seeds could start to sprout. Then I put terracotta in the net cups of one of the tanks and just left the other with water in it. The bottoms of the net cups are just touching the water. Then I added the plants to the cups and hung a grow light over the tanks. Over a range of seventeen days I collected data on the height of the plants, amount of leaves and the appearance of the tanks. In the tank with the terracotta the plants were growing taller, the water was cleaner, and the fish were healthier. In the tank with the water it was the complete opposite, the plants were dying, the water was mirky, and the fish were full of ick. Other people have researched aquaponic systems in general, but my experiment is using the aquaponics system to test the importance of having a grow medium. I conclude that it is necessary to have a grow medium when growing plants using an Aquaponics system.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Survival of Single-Celled water organism in Different Potable Waters

Student Name(s): D. Villalona

Fair Category

Abstract:

Experiment Abstract By Daniel Villalona 7th grade Science Project 1/11/14
Survival of Single-Celled water organism in Different Potable Waters This science research was set up to find out which potable water was the cleanest based on survival of single-celled organism found in lake water mixed with drinking water. The question for this project is: In which of the potable waters (Tap, Bottled, and Well) does single-celled organism found in lake water survive the least? The hypothesis is that the cleanest potable water will not allow organisms to survive for a long period of time, because the cleanest water may contain chemicals that might be harmful to single-celled organisms found in Lake Water. The experiment was done by mixing each of the potable water with lake water containing the single-celled organism at different concentrations and checking for the presence of live organism with a microscope every day in each of the water mixtures. The results of four trials showed that single-celled organism found in lake water did not survive for a long time in Tap water. Based on the results the Tap water was the cleanest because it killed the organisms quicker than the other potable waters.

Word Count

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Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

There are a lot of methods of persevering fresh fruits or vegetables. The problem is knowing the best commercially available procedure to prolong freshness of produce. It is important because identifying the best method to preserve food longer, people can save money by having fruits and vegetables edible longer. Supplies were purchased at the store. At home, produce was separated into groups. One group went in the garage, one on the counter, and one in the refrigerator. I put the produce in brown bags, Debbie Meyer green bags or in open air bowl. I took notes on my observations of subjective measurements of freshness every couple days until endpoint, and photographed the produce to document physical changes. My project was to find the best way to preserve the freshness of the produce. Some factors that will spoil fruit quicker are air temperature, oxygen level, microorganisms and enzymes present in the produce. I learned about ethylene gas which is produced when produce respire, it is one of the factors that causes fruit and vegetables spoil. Debbie Meyer green bags preserved the fruit the longest because the bags absorbed ethylene gas. The brown bags were similar to the Debbie Meyer green bags. Leaving fruits and vegetables in open air is not ideal because the ethylene gas can float anywhere, spoiling surrounding fruits and vegetables. In conclusion, the Debbie Meyer green bags are best at persevering produce because it absorbs the ethylene gas, eliminating one of the factors contributing to ripening.

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Fair Category

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This experiment investigated whether a combination of bacteria, yeast and mold can use bioremediation to consume oil spills in fresh water. Better methods of cleaning up oil spills are needed because petroleum products are often accidentally spilled into waterways. Four vials were labeled and had the following contents measured and poured into them: 1. Water control, no microorganisms 2. Oil and water control, no microorganisms 3. Water and microorganisms control 4. Oil, water and microorganisms The vials were capped, sealed with Parafilm and stored at room temperature near a window. The vials were inverted five times each to mix the contents and mimic water movement in the environment. When I started the experiment, the oil floated at the top of the water, but as days went by a thick line of oil stuck to the sides of the two vials containing oil. The microorganisms started to eat at the line of oil. Vial two had a 6 millimeter ring of oil at the surface of the water. Vial four had a thinner ring of oil at the surface. It was about one millimeter thick. I see that when oil is in water for a month it sticks to objects and spreads onto surfaces. When oil is in water for a month with oil-eating microorganisms, it changes and looks as if it has dissolved or been eaten. It no longer sticks to surfaces. If I repeat this experiment I will give the microorganisms more time to eat the oil.

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Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

This project experiments with the three most common “disposable” materials: paper, plastic and Styrofoam. The purpose of this project is to figure out which one of them has the least impact on the environment and which one takes less time to biodegrade. All manufacturing processes have environmental consequences. But Paper materials still the best option in comparison with the other two materials. The three materials were buried in soil over a 31 day period, all under the same, controlled conditions. Afterwards, they were dug up and compared. I believe that spreading awareness of how these disposable materials will impact the environment can potentially increase the number of people that participate in recycling. It can also teach a lot of people how to make better choices when it comes to buying more environmentally-friendly “disposable” materials. By figuring out which of these three materials has the least negative impact on the environment, people might be more open to changing their habits and opinions about those products. A survey was given to 20 people of all ages and backgrounds to see what experience they have had on the subject and what kind of impact it has had on their decisions until now. More importantly, the survey investigates if the personal approach about this issue would change their future choices. I found that through the results of this experiment and survey, people are more open to changing their shopping habits after a personal approach about the subject.

Word Count

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Student Name(s):

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Word Count

Abstract:

The purpose of this experiment was to figure out which drinks cause erosion of tooth enamel. Enamel is the protective outer layer of the crown of teeth. The drinks tested were water, Sprite®, Coca-Cola®, Snapple®, Gatorade®, and seltzer water. Low pH beverages such as soft drinks, sports drinks, and fruit juices dissolve enamel (<http://drinksdestroyteeth.org/>). Drinks with low pH are more likely to cause a cavity than a high pH drink. Two human teeth were put in four ounces of each drink for three weeks at room temperature. The enamel of the crowns of the teeth was measured for erosion after weeks 2 and 3. Erosion was tested by using cotton pliers to scrape the enamel of the crown of the tooth. Level 1 erosion was no erosion of the enamel, level 2 was little erosion of the enamel, level 3 was moderate erosion of the enamel, and level 4 was erosion through the enamel layer. The results show that Gatorade® caused the most erosion of tooth enamel compared to all of the other drinks. The results also show that the colored drinks caused more erosion of the enamel than the non-colored drinks. After 3 weeks, the enamel of the teeth in all of the liquids except water and seltzer water had higher levels of erosion. The pH of Gatorade® is 2.95, but the pH of Coca-Cola® is 2.63. If low pH is the cause of erosion, it is not clear why Gatorade® caused more erosion than Coca-Cola®.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Growing Green; Searching for Alternative Green Ways to Grow Crops

Student Name(s): B. LoCicero

Fair Category

Abstract:

Over the past 150 years HALF of the earth's top soil has been lost. Today's soil is being degraded because of erosion, loss of nutrients, overuse, and chemical fertilizers. Are there reusable resources in our homes that can provide alternatives for producing crops? We are faced with the challenge of growing crops in smaller areas, such as city roof tops, to provide fresh vegetable to local residents. In my experiment I selected four readily available green materials and tested them against a control specimen of top soil. I tested used coffee grinds, shredded paper, vacuum bag contents and organic table scraps. The control of top soil provided the best results with thick, healthy growth but this is a resource that has been disappearing from our planet. The second best performer was shredded paper. It provided thick grass but it took longer to sprout. The coffee grinds provided initial growth but the grass was not very strong or thick. The vacuum cleaner bag provided growth but the dust and dirt did not foster stong grass since it did not absorb the water. Finally, the table scraps did not allow water flow and mold quickly grew. Overall, I believe a mixture of all of the substances would form a great composting base which would allow us to grow crops in a "greener" way. Each component had a strong element for growth and combined together they can make a solid alternative for growing crops.

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of my science fair project is to try to restore the Scalzi Park Riverwalk in Stamford, Connecticut, by removing the invasive plants and replacing them with plants native to the area. My procedure has two parts. The procedure for propagating plants is the following: to collect seeds, mix tiny seeds with sand, use a local leaf mold compost with no pesticides, label, dampen, and then refrigerate the seeds to allow them to grow as if they were outside. The procedure for removing invasive plants is as followed: do not cut any plant you can't identify, and don't recognize and do not pull vines off plants. Use the paths and limit foot traffic because disturbing the ground encourages weeds to germinate. The data that I have collected are the types of plants that I will be propagating, what types of plants are invasive, and where the invasive plants are so that I can replace with plants native to that area. My results are that the plants that I success in propagating the following species: native Joe Pye, the Wild Sunflower, and the New York Ironweed. My conclusion is that the project, which began in August 2009, will take around 15 years to complete, which means by 2024 the invasive plants will be under control. This is a forever project.

Special Categories Selected by Student:

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Radish's happen to go very fast. Just in 5 days the radish's are halfway through their full growth. The purpose of this project is to see if the group of seeds that were placed in the oven would be extinguished or if the seeds would be able to survive the radiation. The problem that was solved was that if you decide to put radish seeds in the oven for 10, 20, 30 and 40 minutes then they are going to get ruined but if you put them into the microwave for 5, 10, 15, and 20 seconds they it kind of speeds up the process of germination. I wanted to investigate this project a little more because I've never really worked plants and it would have been extremely interesting. My results were very similar to my hypothesis, which was: If I put the groups of radishes in the oven for 10, 20, 30, and 40 minutes then they will be extinguished. All of the microwaved seeds sprouted but exactly none of the baked seeds germinated. In conclusion, My project turned out great for what I expected, I definitely met my expectations.

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Abstract:

In this project, I wanted to find out what plant material would help a seed sprout the best. I grew my seeds in potting soil, my backyard dirt, sand, pebbles, and peat moss. Due to the cold climate I grew my plants indoors. I used a growing light to simulate the sun. Every day I watered the plant with $\frac{1}{4}$ of an ounce of water, and I also provided the plants with twelve hours of sunlight under my plant light. To measure the sprouting, I carefully took the seeds out of their cups and measured the sprouting precisely using a ruler with centimeters. I recorded my data using a data table, a pi chart, and a bar graph. My hypothesis did not support my conclusion. I found out that the sand did not help the seed sprout the best because sand does not hold water well and it does not contain the nutrients that a seed needs to sprout. I found that the seed in my backyard dirt sprouted the best because it has been fertilized yearly with nutrients. I was surprised that the hydroponic cup did not grow, however, I discovered that a green bean seed needs to be in a solution with a pH of 6-6.5, and after measuring the pH level of my tap water with a pH meter, I found that the tap water's pH was higher than 6.5 because tap water generally has a pH of 7.0.

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CSEF Official Abstract and Certification

Fair Category

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Proj. Title:

Student Name(s):

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Word Count

Abstract:

The purpose of my experiment was to determine which type of flower – rose, daisy, or carnation- would absorb the most purple-colored water in either warm air (30°C), room temperature air (18°C), or cold air (3°C). To conduct my experiment I placed three white roses, three white daisies, and three white carnations in each of the nine cups filled with 200 milliliters of purple-colored water. One of each flower was placed in a fish tank under heat lamps, on the dining room table, and in the refrigerator. The flowers were kept in their designated spots for 96 hours (4 days), then the amount of water left in the cups was measured to determine how much water the flower absorbed. I conducted three trials. I hypothesized that roses would absorb the most purple-colored water in the warm air and this was supported by my data. The flowers in the warm air at 30°C on average absorbed the most water. The roses had an average of 64 mL of water left in the cups; whereas, the daisies had an average of 121.7 mL and the carnations had 95 mL of water remaining. This means that the roses absorbed an average of 136 mL of water compared to the daisies and carnations which absorbed 78.3 mL and 105 mL of water, respectively.

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Student Name(s):

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Word Count

Abstract:

My project was about how food can affect the ability of an Orb weaver spider's web spinning. Specifically, I was trying to find how food affects the length and height of the web. I conducted this experiment because I wanted to know if spiders need the necessities in life to trigger their web building instincts or is it just a natural trait. I also wanted to figure out if spiders are consistent web spinners. In the experiment I used orb weaver spiders and two of them so I had data to compare. My procedure was to first build a habitat for the arachnids with sticks and tank bedding. Then to conduct the main experiment I fed the spider it's variable-amount of food (no food, half of a serving and a full serving)-for three days and recorded both of the spiders' data for length and height of their webs. I repeated this for all three variables with a day of just regularly feeding the spider to rejuvenate it in between. I found that Spider Two significantly had better results than Spider One by a web average of 8.15 cm. higher and 1.51 cm. longer. However, in the end my data did prove to show that food significantly affected the web spinning ability of an Orb weaver spider's web spinning (efficiency and energy put into the web making process).

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Student Name(s):

Fair Category

Word Count

Abstract:

My research was conducted to help others better understand the risks taken as they vape electronic cigarettes, and devise a way of eliminating these risks. By evaluating Green Smoke Electronic Cigarette, I gained a clear understanding of how e-cigarettes work and function. I researched the ingredients and found three major threats: Diethylene Glycol, Linalool, and Nickel. I also found one minor threat- Dimethylpyrazine. For dimethylpyrazine to be a threat, one would have to quickly smoke repetitively. This way the body wouldn't have time to eliminate the 2% inhaled, and it would build up to its toxicity level of 10%. I found that linalool creates a by-product when it mixes with oxygen, and linalool is present in the flavors. To safely remove this threat but keep the same flavors, I discovered a chemical known as limonene. Limonene has the same fruity flavors but is safe. I found that nickel is part of the atomizer, and breaks down over time and becomes part of the inhaled vapor. Nickel is carcinogenic and the consumer is inhaling microscopic pieces of it. To keep the same structure of the e-cigarette but eliminate the threat of carcinogens entering your body, my proposed alternative would have an atomizer made of inorganic fibers and ceramics. The user is also inhaling diethylene Glycol, a contaminant of propylene glycol, which is present only in some e-cigarettes at random. Diethylene glycol is deadly and I would replace it with vegetable glycol.

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Student Name(s):

Fair Category

Word Count

Abstract:

The Bouba-Kiki Effect (B-KE) is a mostly unknown topic and I want to make more people aware of it. Also, I take three languages at school and I wonder, since many words are similar among these languages, if the B-KE could be an underlying explanation of global language similarities. My hypothesis is if the B-KE applies to abstract shapes, then it will apply to real-life objects too and most people will sort real-life objects that are roundish (bouba) or sharp-cornered (kiki) the same way. In this experiment, pictures being used for bouba and kiki were laid out face down above the labels "Bouba" and "Kiki". The titles were well separated. When subjects were tested, they were given clear sorting instructions (see procedure) and a set time in which to turn over and sort the pictures of real life objects under the categories Bouba and Kiki. When subjects placed their last picture under the categories Bouba and Kiki, the timer was stopped. The sorted pictures were removed and the subject was asked to sort the two abstract bouba and kiki shapes typically associated with the B-KE as either a bouba or a kiki. This was the control. According to the data, only one subject got the control wrong. Interestingly, this person also got the lowest matching score of the whole experiment and is known to have a hearing impediment. Based on this experiment, my hypothesis that the way most people sort real-life objects complies with the B-KE was confirmed.

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Student Name(s):

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Word Count

Abstract:

The experimental question that was investigated was "how does exposure to nutrient levels higher than those found in nature affect the growth rates of phytoplankton?" This is a relevant topic to explore because it is a prevalent problem in the world. When it rains, the runoff carries fertilizer from lawns and gardens into the ocean (sometimes through rivers and streams). Much like plants, phytoplankton growth is enhanced by exposure to nutrients similar to those found in fertilizer, so when the runoff carries fertilizer to the ocean, it also carries nutrients, enhancing phytoplankton growth for the worse. Some effects that could come from a phytoplankton "bloom" (or explosive growth) are hypoxia, dead zones, and red tides, which are all bad for the environment. As these exposures become frequent and heralding many issues for the environment and humans, this problem should be addressed now or in the immediate future. In the experiment, 0.5 mL of *Isochrysis galbana* was tested in three different concentrations of sodium nitrate (a common nutrient in fertilizer): 882, 441, and 0 micromolars to observe the change in growth rates between the three different concentration groups. The growth was followed using both visual observations and an optical density instrument that measured the percentage of light that could be shone through the cultures (so if a culture had a lower percentage, that meant that there were more phytoplankton cells blocking light). Overall, the exposure of excessive nutrients increased the growth rate of phytoplankton significantly based on the experiment's results.

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Proj. Title:

Student Name(s):

Fair Category

Abstract:

I did my project on greenhouse gases so I can make people aware of pollution in our environment. My project was mostly focused on finding out how fast it travels to our atmosphere. Most people don't know this but greenhouse gases are one of the causes of global warming. Have you ever had those days where day it's cold then the other it's really warm? Well now you know the answer. For my experiment I took two boxes, filled each with soil, then covered one box with clear plastic wrap. I left both boxes in a heated area for an hour with thermometers in each. Finally, I checked the boxes every fifteen minutes for an hour the I collected my data and drew my conclusion. I wasn't very surprised by my results, because it turned out that the temperature of the uncovered box was higher than the one with the plastic wrap. One thing that did catch my eye was that the temperature for the covered box spiked up during the end of the experiment. This proves my theory or hypothesis of how fast greenhouse gases can travel to our atmosphere and affect our ozone layer by rapidly changing the temperature. In conclusion, I hope my project will show people how important it is to not pollute and to make sure they take care of not only material things, but also the environment around us. I say this because they're not affecting anyone but themselves.

Word Count

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Proj. Num Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this project was to discover which 3D molecular models of Amyloid Precursor Protein, or APP, and mutated APP would print the best using a 3D printer to give scientists a different view of the mutation that leads to Alzheimer's disease. My hypothesis is that Ball and Stick and Ribbon models of APP, and mutated APP will print the best using a 3D printer as compared to Wire, Tube, and Space Filling molecular models. My procedure was to first conduct research on Alzheimer's disease, and protein mutations causing Alzheimer's. I researched programs that depict 3D models of proteins and downloaded the Molecular Modeling program Cn3D on my computer. I searched for models of regular and mutated APP on Cn3D. Using "rendering shortcuts, I found comparative 3D models of APP and mutated APP as Ribbon, Ball and Stick, Tube, Wire, and Space Filling models. I downloaded Meshlab and Makerware onto my computer and tried to import each model into Meshlab and recorded its progress. Once in Meshlab, I imported the files that downloaded onto Meshlab into Makerware and 3D printed them. The results were the Space Filling models of APP and mutated APP were the best and only models that would print on the 3D printer disproving my hypothesis. Ribbon, Ball and Stick, Tube, Wire, and Space Filling 3D models of APP and mutated APP were all found on Cn3D however, when imported into Meshlab they converted automatically into Space Filling models making them unprintable on the 3D printer.

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Everyone is familiar with fruit fly infestations in the home. For years homemade fruit fly traps have used apple cider vinegar for bait, but is it the best? This experiment's hypothesis is: if a variety of substances are used as bait then apple cider vinegar should be the best at attracting fruit flies to traps. Twelve different substances were placed inside glass jars. A plastic funnel was taped narrow end down inside the jars. The traps were placed outdoors on a compost pile, where previously fruit flies were seen. After eight days the traps were placed in a freezer and flies were counted later. A total of 3,301 fruit flies were trapped. Results showed that raspberries were the most attractive to fruit flies with a total of 723 flies or 22%. Banana and pineapple came in a close second and third. The least attractive bait for fruit flies was pumpkin, this trap caught only four flies. Apple cider vinegar surprisingly came in fourth place with 290 fruit flies caught. Apple cider vinegar was not the best at attracting fruit flies to homemade traps. Raspberries, banana, and pineapple chunks were all surprisingly better baits. The data from this experiment suggests that homes using traps with raspberries would collect twice as many fruit flies as they would with apple cider vinegar. An extension of this experiment would be testing mixtures, would raspberries and bananas be better than one alone?

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Student Name(s):

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Word Count

Abstract:

The purpose of my experiment was to see what kinds of germs, if any, are at a health club. My hypothesis was that there would be harmful germs at the health club. The first step I did was collect one swab from each of the following amenities at the tested health club: shower floor, mat, fitness bike handlebars, and padded strength training bench. Then, I gave them to a microbiologist from the Western Connecticut Health Network. The microbiologist used the process of streaking to put each sample collected on three different types of agar plates. Next, the swabs were incubated in an ambient incubator for 48 hours. Lastly, the microbiologist identified the bacteria grown. In my results, I found the amenity at the health club that had the most germs lurking on it was the shower floor. The shower floor sample contained non-pathogenic bacteria called skin flora. It also grew bacillus, an environmental bug, and fecal flora. The other amenities tested did not show growth of harmful bacteria. The only growth was skin flora. In conclusion, working out in a health club will not necessarily make you sick. The equipment that was tested was sanitary. On the other hand, freshening up at your health club may not be as good of an idea because harmful bacteria, fecal flora, was found on the shower floor. If I had the time and resources, I would have liked to test more equipment, at different clubs, and at different times.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title: Growing our Future—Using LED Hydroponics to Cultivate Fresh Produce: A Solution for Urban Food Deserts

Student Name(s): K. Robertson

Fair Category

Word Count

Abstract:

Eighty-two percent of Americans live in urban areas with limited access to affordable fresh produce. With little open space for farming, American cities have become fresh food deserts—areas without access to fresh fruits and vegetables. People living in food deserts rely on corner markets filled mostly with processed empty-calorie foods. LED hydroponic technology is emerging as a solution to the urban food desert problem. Abandoned factories are being repurposed and fitted with stacked hydroponic growing tubs under LED lights. These food factories produce abundant fresh produce in previously unusable space, close to the people who need affordable fresh whole foods. I planted a deep water hydroponic garden which received only red and blue LED light, and a traditional sun/soil garden in order to determine if LED hydroponic technology can produce as much mesclun lettuce using less space, and lower electrical costs. I monitored both gardens for seventy-four days noting leaf mass, root mass, and energy cost. At the end of the experiment I weighed the leaves and roots from an average plant from each garden. The LED hydroponic garden produced a plant with 28.9 times the leaf mass and 53.6 times the root mass of a sun/soil plant. Over the experiment's seventy-four days, the energy cost of the LED garden was seven cents less than the sun/soil garden. My experiment proved that LED hydroponic technology is a viable solution for urban food deserts. This technology can be adapted to provide fresh produce for astronauts on long space missions.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Are you gluten-intolerant or gluten-sensitive? Do you know someone who has celiac disease? If so, then you probably know the challenges of finding food that won't make you ill. The purpose of my experiment was "What flour has the most gluten in it?" My hypothesis was "If Pasta Flour, All Purpose Flour, and Whole Wheat Flour were tested to find the amount of Gluten in each, I think the Whole Wheat Flour will have the most gluten because people with celiac disease are affected by wheat, barley, rye, and oat." I tested my hypothesis by weighing out 8 ounces of each type of flour on a food scale. During each trial, I added 6 ounces of water to the flour, stirred it and kneaded the dough for 5 minutes to form a dough ball. After allowing the dough to rest for 10 minutes, I ran the ball of kneaded dough under cold water until all the water-soluble parts (carbohydrates) washed away. A ball of gluten remained. I learned that the Whole Wheat Flour had 31.84% gluten, the Pasta Flour had 34.47% gluten, and the All-Purpose Flour had 25.29% gluten in it. The results did not support my hypothesis. The Pasta Flour had the most gluten rather than the Whole Wheat Flour. I wondered if I tested gluten-free flour, would the same results occur. Through testing potato flour (GF), I discovered that it truly was gluten-free because nothing washed away from the dough ball and the measurements proved it.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Fertilizers used in agriculture sometimes enter watersheds in run-off, resulting in algae blooms and even dead zones along coastlines. They help the plants grow of course, but did you know that sometimes the fertilizers enter bodies of water in ways such as run-off? These fertilizers may be good for the plants and crops for farmers, but very bad for watersheds. One thing that is affected by the fertilizers entering the watershed is algae. Fertilizers can result in higher algae levels than the watersheds can handle, resulting in problems. One of those problems are dead zones, or places that cannot sustain life due to low oxygen levels because of decomposing algae blooms. For my experiment I exposed cultured algae to three different hydroponic fertilizers. I thought that the fertilizer that contained the most nitrogen would cause the biggest algae bloom because nitrates are often used as the main ingrediants in fertilizers to encourage growth. I measured the transmittance of green wavelengths of light through sample to determine the concentration of algae in each trial on day one of project and day ten. I found out that the FloraGro hydroponic fertilizer grew the most algae out of all samples. This was not what I hypothesized. The Flora Gro fertilizer had all three N-P-K components, so I think that the biggest alage bloom could be caused by the presence of all three elements, and not just one.

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The problem is “does juice lose vitamin C content when processed?” It is hypothesized that if fruit juice is processed so that it undergoes oxidation, then it will lose Vitamin C content as measured by iodometric titration. The vitamin C content in both boiled and unboiled juices was measured by making a solution of starch, boiled water and tincture of iodine. This solution is a dark blue color. The chosen juice was then added using a medicine dropper one mL at a time until the solution was no longer blue. The juices were boiled and this same procedure was performed on them. To further the study, juices were left out for three days and each day this test was done to see if the oxygen in the air would lower the content. In conclusion, it was found that boiled or processed juices did lose Vitamin C. Unboiled orange juice had an average of 1.35 mg of Vitamin C, unboiled cranberry juice had 1.1 mg, and unboiled apple juice had 1.35 mg. The boiled orange had an average of 1.175 mg, the boiled cranberry had 1.06 mg, and the boiled apple had 0.85 mg. In the second part of the test when left out on the counter, orange juice had 1.5 mg day one, 1.5 mg day two and 1.5 mg day three. Cranberry had 1.2 mg day one, 1.25 mg day two and 1.111 mg day three. Apple had 1.3 mg day one, 1.2 day two, and 1.2 day three.

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CSEF Official Abstract and Certification

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Proj.
Num

Proj.
Num

Title: N.D. Naturopathic doctors and Alternative Healthcare vs. M.D
Medical doctors and Conventional Healthcare

Student Name(s): S. Shandrowski

Fair Category

Abstract:

Conventional Healthcare is a traditionally accepted medical treatment approach. However, Conventional Healthcare can produce side effects and may not adequately meet the patient needs. Non-conventional or Naturopathic treatment methods can provide patients with viable options that are often overlooked. Healthcare treatment is a bare necessity of the whole population; this project was undertaken to compare the two treatment methods and help people better understand their healthcare options. In the holistic or alternative method of treatment, health is seen as a balance of the body's emotional, mental and spiritual states; practitioners see the three aspects as interrelated. A disruption or disharmony in any of these states is believed to cause illness. Naturopathic doctors use chiropractic, herbal medicine, spiritual counseling and behavioral modification treatment methods. Conventional healthcare practitioners typically use drugs, surgery and radiation treatment methods. My study was conducted through a combination of survey questionnaires and online research. Eight of my survey participants identified using both alternative and conventional treatment methods for the same issue. Seven of the eight showed better results with the alternative treatment methods. Eighty percent of the people within the online research study indicated that they have tried alternative healthcare methods with positive results. I have concluded that the alternative healthcare treatments are a viable option and being used by more of the population, either in combination with conventional treatments or as the primary treatment method.

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment was to see if different locations of gathered soil will affect its components (Nitrogen, Phosphorus and Potassium). The level of each component tested for is very critical in plant growth. Nitrogen promotes growth of plants. What Nitrogen does for leaves and stems, Phosphorus does for the roots. Phosphorus is involved in metabolic processes and responsible for transferring energy from one point to another in the plant. Lastly, Potassium helps to regulate plant metabolism and affects water pressure regulation inside and outside of plant cells. My hypothesis is that if the soil samples are taken from different locations then its components will not be affected. Procedure: The experiment was started by collecting soil samples from different locations: home, woods, busy road, and school. Then the soil samples were used to make an Extraction for each type of soil. Afterward, the samples were tested for three different types of components – Nitrogen, Phosphorus, and Potassium. In the end, the results were recorded for each soil sample and compared to each other. Conclusion: All of the soil samples had the same levels of Nitrogen and Phosphorus - Low, and Potassium - High. Different locations of gathered soil did not affect its components. During the experiment I learned that overall the soil samples were pretty much stable and plant growth can be easily started in any of the locations tested for.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title: "Let Food be thy Medicine and Medicine be thy Food" -
Hippocrates

Student Name(s): E. Connolly

Fair Category

Abstract:

“Do digestive enzyme supplements help the body to better digest foods?” I decided to test this question by imitating the digestion process, using six different foods and a Broad Spectrum enzyme supplement. Millions of people suffer from digestive issues including food allergies, food intolerances and immune diseases. As a way to ensure that the nutrients from the foods they eat are being effectively absorbed by the body, digestive enzymes are often prescribed. In order to determine if these supplements do indeed supply digestive relief, I decided to test their effectiveness. My hypothesis was to prove that enzyme supplements do assist in the digestion process and do help the body to more effectively and efficiently absorb nutrients. My independent variables were the types of foods being tested. My dependent variables were the color, texture, and composition changes to the foods when they were mixed with an enzyme. My control variable was the Broad Spectrum enzyme capsule. I mixed each food with the enzyme supplement for five minutes, documenting the changes in color, texture, and composition at one minute intervals. By the end of the five minute period, all of the foods tested changed in color, texture and composition resulting in a somewhat digested state. In the end, the results of my experiment proved that these supplements do aid in digestion and nutrient absorption. My hypothesis was accepted.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Analysis of Phosphorus (fertilizer) Recovery from Varied "Run-Off" Sources (Local Rivers and L.I.S.)

Student Name(s): B. Forti

Fair Category

Abstract:

Abstract My goal was to discover a way to recover phosphates from the sediments of local rivers and the Long Island Sound. Due to heavy fertilizer use (residential, golf course, farming, and industrial waste), phosphorous has become costly and less available. I wanted to see if different plants can remove the phosphates from the sediment. Through research I found three possible plants to recover the phosphates: cress, tomato, and bean. After collecting sediment from several sources, and then growing my plants in the sediments, I found that:

- Most of the rivers and the Long Island contained high levels of phosphorus
- Cress extracted the highest levels of phosphorus
- Tomato extracted some high levels of phosphorus, but not consistently
- Bean Steadily extracted medium levels of phosphorus and sometimes high levels

I discovered that cress is a great "Phosphate Bait."

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
2508

Student Name(s):

Fair Category

Abstract:

Purpose of experiment: The student did an experiment to find out how global warming affects the root-to-shoot ratio of plant growth. Procedure & Data: I planted pea, bean, clover and millet seeds. The plants were put into cups with soil. One seed of each type of plant was watered daily, one every other day, and one weekly. There were two groups of these plants, one sitting on a heating pad and the other not heated. The student watered the plants accordingly and, after a month, measured the root and shoot growth of each plant and calculated the root-to-shoot ratio. Conclusions: The student's hypothesis was partially correct. Heat and water intake affected the peas and beans more than they did clover and millet. The student thinks that because peas and beans grow longer in both root and shoot, they are more affected by climate change than the millet and clover were. This tells the student that climate change can not only cause plants to not get enough water, but that the plants can also receive too much water and not grow as much. In general, the plants growing on the heating pad grew better and had a root-to-shoot ratio equal to or greater than one, which means that the root grew at least as much as the shoot did. The findings are especially important because beans and peas make up a large part of the human diet and are most affected by climate change.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Num

Student Name(s):

Fair Category

Word Count

Abstract:

This experiment is designed to test the effects of rock and classical music on the germination and growth of the vegetable plants spinach, arugula, and radishes. Research by scientists has found that listening to classical music can improve mental performance. This is known as the Mozart Effect. Rock music has been show to confuse or distract animals. In plants, experiments with sound frequencies have shown increases in growth, although loud music caused stunted growth and death. The experiment consisted of planting seeds of each of the vegetable plants being tested. The containers were labeled with the type of music, both classical and rock, each type of plant “listened” over a period of four weeks. The control set of plants “listened” to no music. Variables such as; soil, pot size and type, sun exposure, temperature, and water were constant for all of the plants. Each week, observations and measurements were be made and recorded to determine the progress of each of the plants. Analyzing the data showed that rock music had the greatest affect on the majority of the plants compared to classical music and the control plants. The vegetable plants that “listened” to rock music germinated at a faster rate than the others although after germinating, these plants declined more quickly. Although the plants that “listened” to classical music took longer to germinate, they continued to grow longer than those that “listened “to rock music. This information could valuable in sustainable farming techniques and methods.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Abstract: The Stroop effect occurs when a test subject attempts to read and name the color of a printed word or group of words. When trying to name the color in which color words are printed, it should take longer when the color word differs from the ink color than when the color word is the same as the ink color. In this project, I decided to see what happens if you 'warp' the words into a curved shape. Is it harder to recognize as a word or color? Will the Stroop effect still happen? If so, what variables might come into play?

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: It's raining, It's pouring, and pH levels across Hamden need exploring

Student Name(s): B. Kaffman

Fair Category

Word Count

Abstract:

Purpose: It is known that acid rain is due to pollution in the air and that it affects plant growth. However, it is unclear whether a local source of air pollution affects the acidity of the rain and plant growth within its vicinity. In this project, I hypothesized that rainwater collected in the vicinity of a polluting source will be more acidic and have more deleterious effects on grass growth compared to rainwater collected in my backyard. Procedure: Rainwater was collected from my backyard and another site located 3 miles away from my home and was cited recently for air pollution. I then tested the pH of the rainwater collected in these 2 sites and compared them to the pH of tap water. I then used these samples on grass seedlings to test how they affect their growth. Results: Rainwater collected in Hamden was significantly more acidic compared to the tap water. The rainwater collected in the polluted site was slightly more acidic than the rainwater collected in my backyard. Moreover, the rate of seed germination was greater in samples irrigated by tap water followed by seeds irrigated by rainwater from my backyard with the slowest growth seen in seeds irrigated from rainwater collected from the polluted site. Conclusion: This project suggests that local sources of air pollution in Hamden CT may increase the acidity of rainfall in the vicinity of the polluting source causing negative impact on local vegetation growth (AKA the Boaz Kaffman effect).

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Water becomes dirty by industries, individuals and farming/livestocks. So, people get diseases such as cholera and typhoid. I wanted to find the best water purifier to clean water. I predicted that the purifier that has cotton, charcoal, sand, small gravel and large gravel would purify the cleanest water. I made three water purifiers with rocks and cotton. I put cotton, small gravel and large gravel in all the bottles. Then, I added sand in the second purifier, and added sand and charcoal in the third purifier. Next, I poured in the polluted water, which is mixed with soil and water. The results were that the third purifier cleaned best. The water had no dregs, and it was almost clear. However, the others had lots of dregs, and the color of the water was yellow. In conclusion, the third purifier purified the water best because it has smaller materials than the others. Possible future experiment could be to include smaller materials in the rock filter than the ones used in this experiment and using cleaner rocks. I learned that smaller materials, such as sand and charcoal makes cleaner water.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

I am investigating whether pine would burn faster than oak because of their densities. I bought 1 oak and 1 pine 1/2*2*24 pieces of wood and cut them into four equal strips of 6 inches long. I used 3/4 of each for testing and one to use for my display. I made a mini tinfoil grill in a fire pit to 1. Contain the fire, 2. To make sure nothing like my house burning down happen, and 3. To have a safe controlled testing environment. Then I built a paper bag filled with burnable object and lit it with a match. Then I began timing and waited till the flame was completely out to stop it. And before I burned it and after I burned it I weight the block of wood. I did this three times. I learned it took a lot of effort to burn the oak and pine for just a small little piece and that pine burns faster than oak proving my hypothesis.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Microwaves are the easiest way to quickly, and effectively warm or cook food. But are they safe to use? Do microwaves have any impact on the health of plants when water is boiled, cooled, and poured onto the plant? Do conventional stoves have a similar impact on plants? If so, what are these appliances doing to our bodies? The FDA is responsible for the oversight of radiation-emitting products including microwaves since 1971. The FDA has never tested the long term impact of microwaves and human food consumption. The FDA warns that radiation exposure can produce burns and cataracts to the users but tests have not been done on the food we eat after being heated in a microwave. A 1992 study at Stanford University stated that using microwaves to heat breast milk can increase bacteria levels in the milk. My procedure was to heat water until it boils in both the microwave and on the stove. I let the water cool to room temperature after it had been boiled. I watered one plant with the microwaved water and another with the boiled water. I repeated this process every two –to- three days, as needed. After four weeks of watering the plants with water boiled from a microwave and a stove, the plant with the microwaved water declined in health, while the plant with boiled water remained healthy. The leaves became brown and brittle. Further testing is needed but there may be an impact on our health.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose for my science fair project was to determine the effect that high temperatures have on proteins found in the body. I discovered that proteins denature at different temperatures, with albumin denaturing at the lowest temperature of the proteins that I tested. This is relevant because albumin is found in the blood and is used for growth and tissue repair, and it started to denature at temperatures that are comparable to that of a high fever. I investigated which of the proteins keratin, casein, and albumin would denature at the lowest temperature. All three proteins are found in the human body. I cooked egg whites, which are mainly albumin, powdered milk, which is mainly casein, and hair, which is mainly keratin to see at what temperatures they denature. I conducted three trials of the experiment to obtain as accurate measurements as possible. My results indicated that albumin is the protein that denatures at the lowest temperature. The results of the project contribute to the humankind because it shows what would happen to people if their body temperature gets too high.

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Student Name(s):

Fair Category

Abstract:

My project was Planting with Compost. I tested to see which level of compost made sunflowers grow the tallest. Most garbage heaps in North America are full, so using compost to grow plants can help save the Earth. My hypothesis was if I grow a sunflower seed using the middle of the compost pile, then that flower will grow the tallest. I investigated this by putting a sunflower seed in each bin that had the different levels of compost and observed them for two weeks. I found that the bottom of the compost pile made sunflowers grow the tallest. People can use my results in their daily planting. Instead of using regular soil, they can start a compost pile and then use the bottom of that pile to grow tall plants. They can help save the Earth and benefit in gardening at the same time.

Word Count

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of my experiment was to discover how three different milks would react if dish soap were put into them. I hypothesized that the whole milk and the 2% milk, which has more fat than the skim milk, would react. I also reasoned that the skim milk wouldn't work at all due to its lack of fat. I predicted this because I think the dish soap is made to break down fat and grease. I tested my hypothesis by putting the three milks into different plates. I put four drops of food coloring into the milks to show the reaction with the soap. Once all of the milks were settled, I put one drop of dish soap into each of the milks and started a timer for each of them. Immediately the colors in all of the plates spread out to the edges. Colors were spreading out from the center in waves and swirls. I discovered that the skim milk did react, but for the least amount of time. The whole milk reacted for the longest amount of time. I conclude that my result partially supported my hypothesis. They supported it because the 2% milk and the whole milk did react. My hypothesis was incorrect because I hypothesized that the skim milk wouldn't work at all, and in my experiment it did work for a short amount of time.

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Title:

Student Name(s):

Fair Category

Abstract:

This science experiment was to test which disinfectant wipe eliminated the most germs. The hypothesis was that Clorox wipes would eliminate the most germs compared to Lysol and Oxivir. The independent variables were the disinfectant wipes and the dependant variables were the impact the wipe had on bacteria. The controlled variables were the counter top surface and amount of time between testing. Three types of wipes Clorox, Lysol, and Oxivir were used to determine which would kill the most bacteria. As the experiment went on and observations were made, bacteria started to grow in the petri dishes. The bacteria in the Clorox dishes started to grow the most as Oxivir had minimal growth. Oxivir ended with the least amount of bacteria and Clorox with the most.

Word Count

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Num

Proj. Num: Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The debate over antioxidant use has been a recurring theme for many years. Though advertised and thought to be great for the immune system and the body's cells, antioxidants have also been proven to be potentially dangerous. Previous research has stated that the free radicals that invade and infect human cells, and influence antioxidants instead of being destroyed by them, damage the body to a potentially large extent. These antioxidants are called rogue antioxidants. Although antioxidants have dangers, do its healing and supporting benefits of the immune system and cell strength outweigh its possibility of harming the body? This project tested whether or not antioxidants really do help cells regenerate and heal when damaged, or if they slow the healing process in general. The use of the Lumbriculus variegatus or black worm represented a cell, as their bodies can regenerate segments, and they are very sustainable and influenced by their environment. If cut into four even pieces and placed in a centrifuge tube with antioxidant filled water, the worms regenerating will be affected by the antioxidant variable. Based on the data collected, this project showed that the worm segments in the control grew back segments significantly faster and to a larger extent. Two of the worms inhabiting the Bilberry solution died, and the other two grew extremely slowly. Out of all of the antioxidants, Vitamin C grew the fastest and the most efficiently; however, none of the worms grew as fast as the worm segments on the control.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Can action related video games trigger an adrenaline response as measured by changes in heart rate or blood pressure?

Student Name(s): G. Sechen III

Fair Category

Abstract:

Purpose: The purpose of this experiment is to see whether video games with action in them can toy with your brain and your body, making you feel as if you were in the video game. Procedure: 1. Find 5 subjects. Note the subjects' ages, sexes, and experience level with video games to identify any trends. 2. Take first subject's pulse/blood pressure. 3. Have subject play game for ten minutes. 4. Stop play, take pulse/blood pressure. 5. Resume game for five minutes. 6. Pause game. Take subject's pulse/blood pressure. 7. Resume game for five minutes. Test heart rate/blood pressure. 8. Repeat test on 4 more people. Have each person perform the test 4 times. Results: The results of the experiment are that video games do have an effect on your body and trigger an adrenaline response. As I tested the people a trend showed up. There was only an adrenaline response for the first three times but on the fourth time playing in 1 round the adrenaline subsided, showing that without you actually experiencing the situation then the response would only be minor. Conclusion: I conclude that as you play an action related video game your body will produce some amount of an adrenaline response. As you play the video games multiple times over your body becomes more used to the feeling and experience. Slowly your body will produce less adrenaline.

Word Count

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

I wanted to find out plants like fruit juice. I chose bean seeds to grow because they grow rather quickly. I planted them in small containers and put them in a larger container next to sun light. All three beans were in the same conditions to receive the best results. Through my background research I learned that fruit juices have too much sugar and also has artificial flavor and color, so I decided that I would make my own fruit juice. But homemade fruit juice still has a lot of sugar so I made a diluted version which is half water and half juice so it is not as strong. The first bean seed has fruit juice, the second has half water and half juices and the last has water. I gave them all 1/8 cup once a day.

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Student Name(s):

Fair Category

Word Count

Abstract:

According to my last year's experiment, a magnetic field can affect plant's growth. Soybeans with magnets grew longer and weighed more than soybeans with no magnets. This year's experiment investigates soybean growth on a cellular level. Does a magnetic field affect cell size? I hypothesize that the increase in plant length and weight is due to cell elongation and increased water intake. In each trial, I divided 12 soybeans into 4 groups: magnet in dark (MD), without magnet in dark (D), magnet in light (ML), and without magnet in light (L). After 14 days, I weighed and measured the beans (gm) (cm). Then I made epidermal impressions. Next I dried the plants for 1.5 hours (135 F) and weighed them. Finally, I took 5 cell measurements (length & width) using microscope. In all three trials, MD soybeans had more fresh and dry weight, and a longer length than the D soybeans. Also, the soybeans with MD and ML had a longer cell length and width than L and D. In trial 1 and 2, the water content per tissue was greater in D and L than ML and MD. In conclusion, increased growth in the soybeans in response to magnets was much greater in the dark than in the light, and involved increases in total size, but not the proportion of water per gram of final tissue. Although L had a larger mean water/gm, MD had a larger plant length, water intake, dry weight, cell length, and cell width.

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Word Count

Abstract:

My experiment was to investigate if plants are affected by the recent increase of EMF's (Electromagnetic fields) in our world. I was curious because of the concerns and controversy with cell phones and the health risks associated with them and thought plant cells might also be affected. My hypothesis was that the seeds subjected to the EMF's would not grow as well or as fast as the seeds that were not exposed. I did three tests in total. The first two tests I planted four kidney beans into each pot. Three of the pots, I wrapped a lamp cord with a black light attached, to the top rim of the pots three times around. The first experiment was inconclusive because the planters were not in a warm enough environment for the plants to grow. I measured the EMF rate each day with meter I bought online. The average rate of the plants with EMF's attached were .6 Gauss. The rating of EMF's without the electrical cords attached were at a 0 reading. I watered every other day and took pictures. The plants grew good in test two and my conclusion was the plants surrounded by the EMF's grew at a faster rate than the others that were restricted from EMF's. In my opinion the plants growing in close range to the EMF's grew faster because of the heat from the bulb. Due to this unexpected variable, I am continuing my research and a final conclusion is not yet available.

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Have you ever tried to attract certain birds to your backyard and had no luck? Have you ever taken color as a main factor of general appeal with birds? If you haven't, you might be surprised what a small detail can do to your overall success. The problem this experiment solved was finding the extent in which color influences a bird's decision. This experiment can be conducted using five bowls that are different colors, any type of mixed birdseed (must be the same type of seed(s) in the bowl(s), a weight to measure your results, and a log in which you can record your data. To achieve maximum accuracy in your results you must record weight of the bowls with the seeds inside. Next, distribute the bowls around the yard but keep them in an area in which you can see them all at once. After that, watch the bowls carefully so squirrels and other pests can't interfere with the experiment. Later, recollect the bowls and weigh them again. Finally, subtract the new weight from the old to measure the seed consumption. Do this every day for five days. The results of this experiment showed that yellow is first, green is second, blue is third, red is fourth, and white is last. The conclusion is that in the area birds seem to have a generally higher appeal to yellow than most other colors. The trends in the graph show little fluctuation in daily seeds consumption between the colors.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Bacterial resistance to conventional antibiotics is a growing problem in today's society. Penicillin, Azythromycin, and Methicillin among other antibiotics are becoming less effective in treating human bacterial infections. The usage of plants as antibiotics is innovative and desirable because they are a widely available, potentially inexpensive treatment. Plants could potentially exhibit less side effects than antibiotics as well. The purpose of this experiment was to discover a solution by investigating the antibacterial properties of various plant extracts as a novel replacement for conventional antibiotics. This study focused on Cinnamomum cossia (cinnamon), Curcuma longa (turmeric), Camellia sinensis (green tea), Allium satvium (garlic), Zingiber officinale (ginger), and Cuminum cyminum (cumin). The Kirby-Bauer disk diffusion method was used to test several ethanolic plant extracts on Escherichia coli (E. coli). The minimum inhibitory concentration (MIC) was found by diluting each extract with deionized water to achieve 100%, 75%, 50%, and 25% concentrations. The zones of inhibition were measured after 24 hours of incubation, and all six plant extracts demonstrated antibacterial properties. Cinnamon, measuring at 19.5 millimeters, and cumin, at 16.5 millimeters, had zones of inhibition that were significantly larger than the other plants, making them of key interest. It is evident that a notable amount of bacteria was eradicated by cinnamon and cumin, even in comparison to the control, 100% pure ethanol, which had a zone of inhibition of 9.5 millimeters. Plants such as cinnamon and cumin have the potential to be a solution to the current problem of antibiotic resistance.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

All of hockey is trying to find ways to ensure concussion prevention. They've began their efforts by making the new Bauer RE-AKT helmet. This was with full intentions to prevent concussions. It contains a Suspend Tech Liner that has proven to work the best through several science experiments. I tested my helmet (Bauer 7500) and the Bauer RE-AKT helmet in a drop test experiment. I dropped each helmet five times each time with a different hard boiled egg in it. The egg represented the human brain. I used the crack pieces of the egg shell to represent the damage on the brain. The Bauer 7500 helmet had an average of 84.4 cracked pieces and the RE-AKT helmet had an average of 9.05 broken pieces. This experiment proved my hypothesis to be correct and eliminated any suspicion that the RE-AKT helmet was just a high commercialized over priced scam rather it proved to be a working development in hockey's efforts towards concussion prevention

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5. My display board includes photographs/visual depictions of humans (other than myself or my family):

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
2528

Student Name(s):

Fair Category

Word Count

Abstract:

Last year I researched whether the content of an article affected the reader's heart rate. I found that reading, in general, effected heart rate but reading two different genres did not affect heart rate differently. The purpose of this year's experiment, as a follow-up test, is to look at reading versus listening to scary versus neutral passages. My hypothesis is that listening would produce higher heart rates in subjects. I measured five conditions: listening to a scary article; reading a scary article; listening to a neutral article; reading a neutral article; and baseline heart rate, with an oximeter. When subjects' data were examined individually, heart rate remained consistent in conditions, but subjects differed from each other. By a fraction of a beat, reading the phone book passage produced the highest heart rate. In looking at the data, I decided to see if the order the subjects read the articles in affected their heart rate. I found that the second article that subjects read produced a 1-2 beats per minute higher heart rate suggesting there might be a fatigue factor causing a small amount of stress in the experiment. There also is not a substantial difference in heart rate between reading and listening to articles for either neutral or scary passages. The results were consistent with my previous project. Reading even a scary story didn't affect the subjects' heart rate, but it showed that reading a neutral article produced a higher heart rate, maybe because the subjects were stressed or bored.

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3. This project was conducted at a Registered Research Institution. Yes No

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The question that this project is based on is which type of light source will be the most successful in growing plants at different levels of light exposure? After doing extensive research on this topic a hypothesis was put together. The hypothesis stated that if plants are grown using incandescent and fluorescent lighting in different light cycles, then there will be a significant difference in the growth rates of the plants between the two different light sources and cycles. Then, the variables were recorded; the independent variable was the type of light source and the amount of light exposure for the different trials. The dependent variable was the growth rate/height of the plants. The controlled variable was the time that water was given to each plant (water will be given to both plants always at the same time), and the amount of space each has to grow. After this, the plants were put under the lights to grow. While they were growing, the heights of each individual plant were recorded in separate data tables. Once one session was over the timer was modified and the experiment was repeated. When all the sessions were over, the averages were all put into graphs. It was found that the incandescent lights worked the best. More specifically, the 6 hour incandescent time cycle produced the tallest plants. This proves that the hypothesis was accepted, and that this session was truly the most effective way to grow indoor plants.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Num Title:

Student Name(s):

Fair Category

Abstract:

The reason for my project is to test quantum (a microbial soil conditioner) to see if it really grows plants better and to also see if you're getting your money's worth. The creators of Quantum say that their product grows plants better in a healthy way. Quantum has humic nutrients, photosynthetic strains, and microorganisms in it which are supposed to make plants grow better. If I give one tray of plants Quantum then my plants will grow better than the tray of plants with regular water because of all the nutrients in the product that are supposed to help plants grow to be healthier. In my experiment I had two plug trays filled with soil and seeds. I watered one with quantum mixed in water and the other with plain water. Over the course of weeks I watered them both with water and recorded the data when both were fully grown. My results showed that Quantum grows plants the same way water does. I concluded that Quantum really isn't what it's said to be. My plants grew the same way with and without Quantum.

Word Count

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CSEF Official Abstract and Certification

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Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

My problem was if different temperatures and vitamins A, B, B9, B12, and C affected the regeneration of planarians. Regeneration is something that I find magnificent and amazing. Planarians can be cut up and regenerate another whole entire planarian. But the regeneration time of the planarians is quite long of about 2 weeks time. I chose my experiment to try to speed up the regeneration time using vitamins and different temperatures. What I did was I took the vitamin pills and crushed or cut them all into dust or oil. I then mixed the vitamin with water. Mixing the water was to make sure the concentration of the vitamin wasn't too high. I took the mixed solution and put it into the wells of the micro plates and then labeled what I put in the wells. After that I cut the planarians into 2 equal parts after measuring it. Finally you place the planarian head part on top and tail part on the bottom in the solution of vitamin and water. You then place the micro plates into different temperatures of 67, 87, and 77°F. You have to observe the planarians everyday under a microscope. I noticed that vitamins A, B, C, B9, and B12 increased the regeneration time by a couple of hours. The temperatures also had an effect on the regeneration time. The higher the temperature was which in this case was 87°F the more it speed up in the regeneration of planarian.

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CSEF Official Abstract and Certification

Fair Category

Proj.
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Num

Title:

Student Name(s):

Fair Category

Abstract:

In the current study female rats were housed 2 per cage (n=10). Rats 1-5 were controls and rats 6-10 were experimental. Experimental rats got an injection of BPA in the nape of the neck. It was hypothesized that rats injected with BPA would have higher anxiety levels, impaired short-term memory, and a preference for sucrose. All rats were then individually tested for anxiety using the elevated plus maze. If a rat makes more visits to the closed arms it means it is more anxious. . The rats were then individually placed in the Object Recognition test. This tests short-term memory. The rats were placed in an enclosed box with two identical objects. The time spent with either objects was recorded. Then the rat was put back in cage for a delay time of 15 minutes. When the rat was put back in the testing box one of the objects had been replaced with a new object. Since rats like new things the rat should remember the old object and spend more time with the new object. Next, rats were tested for sucrose preference. Each rat was placed in a cage which was equipped with no food and two water bottles. One water had tap water and the other had sucrose water. Rats were housed in this environment for 24 hours. It is concluded that rats injected with BPA had higher anxiety levels, impaired short-term memory, and a lower preference for sucrose.

Word Count

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CSEF Official Abstract and Certification

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Proj.
Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Abstract:

Andrew Ouellette The potential presence of genetically modified elements in foodstuffs has become a significant concern. There are indications that such elements (Typically plasmid DNAs) may be transmitted from a GMO organism. Thus there is a need for a way to analyze the DNA to check for these elements. It is possible that such elements may not be present in all cells of a plant so there is a need for a method that can evaluate seeds. In this approach I have used gel electrophoresis to evaluate the presence of plasmid DNA in organic corn seeds. I started this project after spending time looking at the controversy about GMOs being sold without labels. (1) Also, there was a debate about whether 'organic' food can have GMOs in them. After reading this, I decided to start this Science Fair project. 'GMO' is an abbreviation for Genetically Modified Organism. GMOs are the result of taking a plant or animal, then modifying its DNA so that its function changes. (2) For example, scientists insert a foreign gene into corn plants that made it resistant to the pesticide Roundup, or Glyphosate, so that farmers can abundantly spray the pesticide onto it. However, the plants absorb the Roundup, and in turn humans eat it. GMOs have many benefits, yet also possible problems. GMO crops have caused a large amount of controversy in recent times, with many researchers claiming that the crops are dangerous to human health. (3)

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Word Count

Abstract:

Planaria are simple flatworms whose bodies are composed of proteins. Their ability to regenerate over a short period of time has made them useful in scientific studies of regeneration. A planarian has simple organ systems including a digestive system. Planaria eat small animals and other sources of protein. Whey protein which is extracted from milk has been shown to be more easily digested than other sources of protein. Whey protein contains nine essential amino acids necessary for production of proteins in humans. Used by athletes and others as a dietary supplement to increase muscle mass, it is also being studied as a way of reducing health problems such as heart disease and some cancers. This experiment tested the effects of whey protein on the regeneration rate of planaria. Planaria were cut into pieces and placed in containers containing spring water. The containers were labeled with the type of protein they were fed, whey protein and egg whites, over the course of the experiment. Solutions of whey protein and egg whites were made. All of the planaria were fed the same amount of each solution. Observations were made on a daily basis of the evidence of regeneration. The results showed that the planaria heads that were fed the whey protein regenerated more quickly than those fed egg whites. These results may be useful to scientists who study regeneration and for those looking for an easily digested protein which produces lean muscle mass including the elderly

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Fossil fuels are a large pollutant to Earth's environment. In addition, they are a limited source of energy. However, this problem could be solved by using alternative energy sources. A new and upcoming source of green energy is bio-gas. Bio-gas is any organic matter that can be turned into fuel for energy. Additionally, it is renewable and less dangerous. In this experiment, corn and wheat were tested to see which plant will produce the most bio-gas, therefore producing the most energy. This was done by allowing corn and wheat to decompose in Erlenmeyer flasks connected to airline tubing. This tubing was inserted into a gas trap that was inverted into a beaker full of water. The water being displaced showed the volume of gas produced. During the experiment, wheat showed more bio-gas production when measuring the gas trap. It displaced all of the water while corn only displaced a few centimeters every few days. Determining the plant that abundantly produces bio-gas is important because it can lead the United States to be more knowledgeable about which plant will have a better outcome when looking for alternative energy sources.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
2536

Student Name(s):

Fair Category

Word Count

Abstract:

I decided to try and grow radish plants and cross pollinate them by hand. My question is: Can I pollinate and make two generation of radish plants grow from seeds? My first hypothesis was: If I plant 48 seeds, at least 16 would grow; if more than 16 grow I will pick the 16 strongest. The second hypothesis was: If I use bees to cross pollinate the radish flowers, they will all make seeds. My independent variable is the seeds I will be planting: the first generation of seeds will be store brought, the second generation will be the seeds created through pollination. My dependent variable is the comparison of my first generation of plants to my second generation of plants. To test my hypotheses first I planted 48 seeds and hung a UV light 10 inches above. On day 3 the seedlings started to break through the soil. They continued to grow at a constant rate until day 11. The next 8 days the plants stopped growing. So in my experiment the first and second hypotheses were accepted. However, I ran into difficulty when my first generation of my seeds went into shock from being at a temperature below 65 to 80 degrees. My final conclusion is: I cannot complete this experiment in 75 days if I allow my plants to go into shock. I need to be careful monitoring the light and temperature to complete this experiment in the future.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Many people suffer from dry hands in the winter such as me. With the results from my experiment, people will know to buy oil-based moisturizers versus water-based. The oil-based lotions keep moisture locked in for longer and relieve dry and rough skin faster. To start my experiment I put 15 ml of Jell-o into 9 Petri dishes and 15 ml of Petroleum Jelly in 3, Eucerin in 3, and L'occitane in 3. Over a span of 2 days I took the mass of the Petri dishes. I started with 1 hour, then 2, 4, 8, 16, 24, and 48. Over two days the Petroleum Jelly stayed the exact same weight and the texture didn't change at all. The Eucerin lost an average of .9grams for trial 1, 1gram for trial, and .8grams for trial 3. The L'occitane lost an average of 1gram for trial 1, .9grams for trial 2, and .8 for trial 3. I found Petroleum Jelly is the best moisturizer to use on your hands. It locks in moisture as apposed to having all the moisture evaporate leaving your hands dry. The Eucerin and L'occitane lotions about .9grams of water, which would keep your hands smooth and moist for a little, but then the moisture would evaporate. By using an oil-based moisturizer such as Petroleum Jelly the moisture would be locked in keeping your hands smooth and moist for a lot longer.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

I chose to do this experiment because I like flowers and my garden and was interested in how plants grow. I studied how plant orientation affects growth. I placed four Lima beans facing right, four facing left, four facing up, and four facing down, and put each Lima bean in a separate Ziplock bag with a paper towel. Then, I hung each bag up on the clothesline (held up by duct tape) with clothes pins in a window and observed the beans roughly once per week. In my results, I found that the beans facing right grew the most. I think this happened because the beans facing right were in the most direct sunlight, so they had the best chance of growing. In conclusion, I learned that the orientation of seeds affects their growth.

Word Count

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Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

My experiment is titled 'Mussels: Unfiltered!' I was testing to see how water temperatures affected the filtration rate of blue mussels. This project will see how global warming could affect the filtration rate of the mussels. Algae blooms have been increasing with the increased use of fertilizers in agriculture and other forms of landscaping. When algae blooms die, they soak up the dissolved oxygen in the water, killing the organisms that need it. I added algae to 5 different temperatures of water and added liquid algae food. I tested the water every ten minutes for an hour and a half using a colorimeter. The data I collected showed that mussels in colder temperatures of water filtered out the algae the fastest. The mussels in the warmer temperatures filtered the algae the slowest. This information can tell us that, with rising temperatures, mussels will not filter as fast. The average difference between how much the highest and the lowest temperatures filtered was 6.1%. There could be algae blooms that die and they could kill all of the fish and bottom-dwelling creatures by soaking up all of the dissolved oxygen.

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Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of my project was to see which type of liquid would make my plants grow taller. For this project my materials were: 3 round pickle jars, Alyssum snow flower seed packets, 1.2 liters of soil, 10 millimeters of salt, sugar, and water, 3 9.85 milliliter cups, a wooden ruler. The independent variable is the different liquids. The dependent variable is the plants' height.

1. Take the pickle jars and clean them
2. Take labels off.
3. Take the 1.2 liters of soil and put 0.4 into each jar.
4. Use your finger to poke 3 holes into the soil.
5. Insert 2 seeds into each hole.
6. Cover holes by moving your hand over the soil and patting it down.
7. Label the first jar A: water
8. Label the second jar B: sugar water.
9. Label the third jar C: salt water.
10. Fill 3 cups with water and mix the salt in one and sugar in the other.
11. Take the small cups and put them on top of the surface.
12. Put the lid on the pickle jars and let them sit on a flat surface for a week.
13. At the end of every week replace the water in the cup.
14. Take your ruler and measure the plant from the top in cm after you have replaced the water each week.

The result for the project were the sugar water's plant growing the fastest.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
2543

Student Name(s):

Fair Category

Abstract:

My science fair project is a study that uses a computer model to determine what the most effective flu vaccination policy should be. Current government policies say that the elderly who are more at risk to the flu should receive the vaccination first, but children are at great risk due to the fact they spend lots of time mixed in with other children during school and other activities. Younger people have more robust immune systems which causes the flu vaccine to have a higher efficacy. Although they have more robust immune systems, they have less developed immune systems meaning they get the flu easier. On the other side older people have less robust immune systems, not allowing the vaccine to work as well, but their immune systems are more developed because have been exposed to more viruses, causing them to tend to get the flu less. Additionally older people have a higher rate of fatal outcomes. What is the most cost effective flu vaccination policy? Resulting in the least amount of infected people. Using a flu computer simulation using Monte Carlo type analysis, it tested multiple flu vaccination scenarios in a virtual population. Based on the results, the most cost effective flu policy should favor vaccinating the younger and older patients more so than the middle aged.

Word Count

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CSEF Official Abstract and Certification

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Proj.
Num

Proj. Title:
Num

Student Name(s):

Fair Category

Abstract:

In preparation of the science fair project, the regulations required to do an abstract addressing what my project is about. This project is about the affects that the sun can have on different color houses. The Affect of this results to the cost of the energy bill. The results of the research offer information that may prove to be very valuable, efficient and money saving. Also, it was delightful to learn how just the simple colors found on houses may cause an astronomical effect on the cost of an energy bill. As such, the findings may also lend ideas for better energy- saving, modern day living. Furthermore, the outcome may suggest ways to help improve the environment's quality.

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Word Count

Abstract:

The Thermohaline Circulation system (THC) is a big part of our climate. Often referred to as the great ocean conveyor belt, the THC circulates warm and cold water currents through the Earth's oceans. However, due to changes in the current climate, the THC is considered in danger of shutting down due to factors such as extreme fresh water input and reduced sea ice formation. Many studies have been conducted all over the world to figure out if the shutdown would be disastrous to the Earth and if the shutdown would be reversible. The conclusions of these experiments have varied greatly, with a large amount of different outcomes. My hypothesis stated that a shutdown of the THC would be disastrous to our current climate, with adverse effects depending on whether the damage was reversible or not. After examining many different conclusions from previously mentioned studies, my hypothesis was supported with evidence that a shutdown of the THC would indeed be disastrous, with consequences such as the lowering of temperatures in Europe, the extinction of hundreds of species, and a global climate change. However, these studies also show that such damage wouldn't be permanent, and that regular condition would be restored along with the replacement of the THC.

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This experiment was conducted to determine if certain scents are more effective in improving one's test performance. Because aromatherapy has been known to cause mood change, it is possible that other benefits, such as improved test scores, could arise from smelling a certain fragrance. I carried out the experiment by choosing lemon and lavender as my two scents. Background research shows that lemon improves focus, while lavender induces relaxation, allowing me to compare the results and look for noticeable differences. This information made me hypothesize that lemon would have a significant effect on aptitude, while lavender would have no effect. I tested thirteen subjects by having them take a five question aptitude test after smelling each scent. I recorded the number of questions each subject answered correctly while smelling each scent. After using a one-sided test to analyze my data, I came to the conclusion that my results are statistically insignificant. This outcome is explainable because one's sense of smell is linked to their memory, and although a scent can have an impact on the brain, the effect is different for everyone, because everyone has different memories. In summary, my experiment proved that the scent of lemon and lavender do not have a significant effect on test performance.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Sequences Supported by Microhomology Mediated Unique DNA Structures Formed Between DNA Minisatellites are Precursors for

Student Name(s): S. Roychoudhury

Fair Category

Word Count

Abstract:

Despite a 97% DNA sequence similarity between humans and chimpanzees, humans have significantly more genomic disorders. One example is Autism wherein 1 in 88 children are diagnosed with it, a 78% rise in the last 6 years. My hypothesis is that clues to Autism can be found in the regions of the genomes that are diverged between the two species. Previous research on other genomic disorders such as Fragile X syndrome and Huntington's disease have shown the presence of trinucleotide DNA repeats, e.g, (CAG)_n near altered regions (loss/gain) of the genome. These trinucleotide DNA repeats are capable of forming atypical DNA structures, structures that are different from the well-known α -helix discovered by Watson/Crick. I identified, via Bioinformatics, a set of UNIQUE DNA REPEAT SEQUENCES (UDRS) that facilitate the formation of atypical DNA structures. These sequences have specific architectural properties, like, clustering of direct, inverted, or palindromic repeats and are hypothesized by me to be the "abnormality/disease precursors". Remarkably, chromosomal locations examined for the presence of the above-mentioned UDRS not only showed significant divergence between the human and chimpanzee genome, but also had a significant correlation with altered regions (breakpoints) of several cataloged genomic disorders mentioned in DECIPHER database. All of the 23 genes identified as "Syndromic" for Autism by the Simon Foundation Autism Research Initiative, show the presence of UDRS near their breakpoints. This validates the involvement of UDRS in genomic disorders, enabling this landmark function to be used as a biomarker for identifying disorder prone regions of the genome.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

The purpose of this project was to induce nodulation in Brassica rapa to promote symbiosis with Rhizobia in order to reduce the dependence of Brassica rapa on organic nitrogen from fertilizers. It was hypothesized that successful nodulation will provide an alternative source of organic nitrogen for Brassica rapa, and thus allow for a decreased dependence on nitrogen fertilizers. Experimentation began by planting Alfalfa seeds inoculated with Rhizobium and uninoculated Brassica rapa seeds in transparent pots. Soil samples from both pots and from a control sample were tested for ammonium and nitrate and nitrite levels by measuring 0.1 grams of soil and placing it in a tube of peptone broth and nitrate-formation broth, respectively. The peptone broth was exposed to Nessler's reagent while the nitrate-formation broth was exposed to Trommsdorf's solution and the resulting color change corresponded to the levels of ammonia or nitrates and nitrites present in the soil. Once nodulation was observed in Alfalfa's root system, the nodules were isolated, grinded, and inoculated in a slant plate. After three days, the Rhizobium mixture was removed, a small incision in the root system of the Brassica rapa planted earlier was made, and the Rhizobia mixture was spread across the incision. While no visible nodulation was observed, testing for ammonium and nitrate and nitrite levels showed that the Rhizobium successfully converted inorganic nitrogen into forms usable by Rapa. Further research should focus on Rapa's immune response to Rhizobia as well as the induction process to understand the requirements of successful nodulation.

Word Count

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CSEF Official Abstract and Certification

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Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This experiment tests different study techniques such as mental repetition, muscle memory, and the chaining strategy, by asking high school students to use each technique in memorizing, and then recalling, three separate sets of 15 words in succession. Upon experimentation, I hypothesized that the chaining technique would be the most effective in memorizing the greatest amount of words recalled in order because memory works by creating links between information and constructing facts into the fundamental framework of the mind. Essentially, three trials were conducted, per participant, using one of each method, and its corresponding set of 15 words. The student is first asked to perform the experiment by repeating the word multiple times until the next card is shown. After the entire set of 15 words is shown, the experimenter and student will run through the cards once again, to commit them to memory. Once this is finished, it is the student's responsibility to recall as many words as possible, in order, within the allotted two minutes. This procedure is then repeated with the other two techniques: writing the word out on a white board, and making a story joining all of the words together. It was discovered that a majority of the students tested more successfully when the third technique, the chaining strategy, was implemented. Therefore, out of the methods used, chaining works the best since it works similarly to brain functions. Further real-life applications of this experiment would extend to anyone looking to improve their memory capacity.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

This study hopes to determine the significance of asymmetric division during the early stages of the immune response. When mice are immunized, B lymphocytes in the lymphoid tissue begin to proliferate and differentiate to become quiescent memory B lymphocytes, plasma cells, and germinal center B lymphocytes. The method in which they differentiate is poorly understood. Past research shows evidence that some T lymphocytes and stem cells differentiate through asymmetric division. Thus, in this study, it is hypothesized that asymmetric division is a mode of differentiation in B lymphocytes. This study monitored asymmetric division during the earliest cell divisions in the immune response. Phosphorylated retinoblastoma protein (pRB) is a protein that enables a cell to go through the next round of division. If one daughter cell gets a significantly greater amount of pRB than the other daughter cell, the division was considered asymmetric. Spleen tissue was analyzed at 0, 0.5, 1, and 1.5 days after immunization. The tissue was stained with fluorescent antibody indicators that identified activated B lymphocytes in the final stages of division, when asymmetric division is most evident. The sections were imaged under a microscope and the images analyzed to determine the intensity of pRB as normalized to the amount of DNA present in each daughter cell. The study supports the existence of a pattern of symmetric and asymmetric divisions that lead to differentiation. Future studies could determine whether the quiescent daughter cell becomes a persistent memory B lymphocyte or if it fails to persist and dies.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Once referred to as miracle drugs, antibiotics might as well be referred to as cataclysm drugs in our current day, causing infectious bacteria to become resistant to the antibiotics. In my experiment, a further study of bacterial resistance, I grew the bacteria Escherichia coli and Micrococcus luteus while being exposed to the antibiotics Ampicillin and Vancomycin in order to determine the acquired resistance over four generations. More commonly known as the Kirby Bauer or disk diffusion method, my method of experimentation included collecting the bacteria which grew nearest to the antibiotic disks on the edge of the inhibition zone. Generally understood that these closely growing bacteria would hold genes for resistance to the antibiotic rather than the others, once collected, I re-grew the bacteria and tested them yet again to discover and record the change of the inhibition zones. The purpose of my experiment was to test the acquired resistance of each the E. coli, a gram-negative bacterial species, and Micrococcus luteus bacteria, a gram-positive species towards Ampicillin, specific towards gram-positive bacteria, and Vancomycin, specific towards gram-negative bacteria, over a period of about one week of growth. After examining the results and data, I concluded that the E. coli did not develop any recognizable resistance to either Ampicillin or Vancomycin; the radius of the inhibition zones remaining consistently the same. The Micrococcus luteus bacteria, most interestingly, developed dramatic resistance to the Antibiotics after two generations, then in the third generation it died completely, developing no growth at all.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title: Synergistic antimicrobial activity of Manuka honey and silver
nitrate

Student Name(s): E. Goodman

Fair Category

Abstract:

Antibiotic resistance is a significant problem in contemporary medicine. Drug-resistant microbial strains limit the number of treatments available, which has led to a push for new antibiotic therapies. Traditional topical antibacterial agents such as honey and silver are once again gaining favor due to their low propensity to induce microbial resistance and effectiveness in treating infected wounds. This research investigates synergistic combinations of manuka honey (MH) and aqueous silver cations (Ag⁺) that could act as a new antimicrobial treatment with increased effectiveness and a broad spectrum of activity against many different types of bacteria. *E. coli* K-12 W1485, which closely mimics the behavior of pathogenic O157-H7, was cultured in broth and subjected to broth dilution susceptibility testing to determine minimum inhibitory concentrations (MIC) of MH and Ag⁺. To investigate synergistic interaction between MH and Ag⁺ against *E. coli*, a 96-wellplate checkerboard was created; doubling dilutions of AgNO₃ (2.5-160 μM) were dispensed into successive rows and stepwise dilutions of 0-20% (w/v) MH were dispensed into successive columns. The MICs were observed as the lowest concentrations that lacked visible growth, which was confirmed via OD₆₅₀. Samples from the wells that inhibited bacterial growth were then plated and checked for visible growth after 24 hours to look for synergistic bactericidal activity. The combination index (CI) was calculated, where: 1, antagonism, based on the Loewe-Additivity model. The CI was found to be 0.75, indicating synergistic growth inhibition. Plates demonstrated that the two antibacterial agents had synergistic bactericidal activity.

Word Count

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2. Student independently performed all procedures as outlined in this abstract. Yes No

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4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3009

Student Name(s):

Fair Category

Word Count

Abstract:

Biomedical implants are used for a wide variety of medical reasons. One problem however, is the foreign body response (FBR), which is characterized by macrophage fusion (resulting in foreign body giant cells [FBGCs]) that can cause surface degradation, and impact fibrous encapsulation, both of which can lead to implant failure. These problems have led to a growing interest in discovering new biomaterials or implant coatings that will elicit a minimal FBR. Electrospun scaffolds are sheets of polymer made of interweaving micron-wide fibers. They are being investigated because they are very adaptable as the fiber diameter, porosity or scaffold material can be easily altered. In this study, Raw 264.7 macrophages were seeded on poly(lactic-co-glycolic acid) (PLGA) electrospun scaffolds in order to determine whether the scaffolds have any effect on macrophage fusion. Results show that minimal fusion was seen on day 9 on the scaffold while control samples without scaffold had significant fusion by day 3. It was postulated that the lack of fusion on the scaffolds is caused by the enhanced cell attachment abilities of the fibers, which may be impeding chemotaxis of macrophages toward each other. Therefore, it may be concluded that PLGA electrospun scaffolds both slow down and reduce macrophage fusion. This could indicate a reduced FBR for PLGA electrospun scaffold implants or coatings. Future work should focus on repeating this research for longer time points in addition to testing different types of scaffolds.

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4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Food spoilage is a common issue in many homes. There have been so many studies to find common causes of food spoilage. One research has been done on the vibrations from sounds, like talking, screaming, and playing music and how it may affect the growth of bacteria on food. This experiment will be to test this theory. The procedure will consist of placing bacteria near three types of music for one weeks. The bacteria will then be measured to determine the rate of growth and the location of the growth. Through this experiment, one can infer whether or not music plays a direct role in the growth of bacteria, thereby the accelerated decay of food.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Num

Student Name(s):

Fair Category

Word Count

Abstract:

The human brain is the most important organ in the body. It is split into two hemispheres; the right and left hemispheres. Each hemisphere is known for its own special function. The left-brain is known as the more logical side of the brain, while the right-brain is known as the more creative side of the brain. Sometimes people might favor one side of their brain over the other when performing a task. Since each hemisphere has its own function, a test was developed to determine which side people use the most. To help answer that question, 10 volunteers were gathered to perform a series of tests that tested their sidedness. The average of right dominance percentage to left dominance percentage was determined by adding all of the percent lefts then dividing them by four (the four tasks) and doing the same for the percent right side. The scores were then compared to determine which side of the brain people use the most.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3013

Student Name(s):

Fair Category

Abstract:

Organisms maintain limited amounts of hydrogen peroxide, a by-product of cellular respiration, which is also used by white blood cells to kill targeted cells and maintain other life processes, while avoiding harmful side effects. Catalase maintains this delicate hydrogen peroxide concentration by increasing the rate at which H₂O₂ is broken down. The rate at which catalase breaks down hydrogen peroxide depends greatly on the concentrations of the enzyme and the substrate. The present study characterizes the relationship between the rate of reaction and the concentration by testing a range of substrate concentrations and observing the effects of different concentrations of H₂O₂ on onion cells. My findings revealed that increased substrate concentrations (hydrogen peroxide, or H₂O₂) as well as increased enzyme concentrations (catalase) yielded an increased rate of reaction, respectively; however, the reaction time as a function of the H₂O₂ concentration decreases asymptotically. My observations of onion cells exposed to progressively higher concentrations of H₂O₂ exhibit increased damage to integrity of the cell wall and plasma membrane. Furthermore, high concentrations of hydrogen peroxide cannot be combated by simply increasing the concentration of the catalase. Future studies should elucidate the relationship between H₂O₂ concentrations that can support necessary tasks, but also limit its harsh side effects.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title: ACVR1/ALK2 Inhibitors as a Cure for Fibrodysplasia Ossificans
Progressivia (FOP)

Student Name(s): A. Agarwal

Fair Category

Abstract:

A mutant ACVR1 (Activin A type I receptor; also known as ALK2, activin-like kinase 2) promotes leaky signaling in absence of the endogenous ligand and results in a rare but debilitating disease, Fibrodysplasia Ossificans Progressivia (FOP). FOP is associated with ectopic skeletogenesis which renders a patient immobile and causes severe weight loss, ankylosis, pneumonia, right-sided heart failure and mortality. Currently there is no treatment. Known inhibitors of ALK2 lack target specificity, especially over most closely related ALK1 (PLoS one 2013, 8, e62721). Two distinct structure based drug design approaches were applied to discover ALK2 specific inhibitors: in silico screening was conducted to select available compounds which would interact with Lys 340 which is unique to the ATP binding site of ALK2 and/or will be more potent than known ALK2 inhibitors. In addition, novel pyrazolo-pyrimidine analogs were designed to maximize their interactions in the ATP binding site of ALK2. Calculated binding energies of the ten most potent ALK2 inhibitors identified by in silico screening ranged from -103.11 to -94.22 kcal/mol and two of them, ZINC49550405 and ZINC00977602, are observed to interact with Lys 340 in the 3D models. Pyrazolo-pyrimidines designed, AA2 and AA3, and previously optimized, LDN-193189 interacted with ALK2 with calculated binding energies of -95.30, -90.52 and -88.17 kcal/mol, respectively. These results indicated that my project was successful in discovering small molecule drugs that will potently and specifically inhibit ALK2 and stop the progression of FOP. Procurement and biological testing of these inhibitors will improve the accuracy of these results.

Word Count

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Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

College campuses are infamous for the prevalence of contagious diseases due to high volume of people living in shared spaces in dorms. This research experiment looked at whether there is a relationship between students getting sick during an outbreak on campus and the average number of students that are sharing a bathroom. The researcher predicted that schools with a higher number of students that got sick would have a higher number of students per bathroom. The information used in this experiment was taken from internet sources. The number of students that got sick during an outbreak came from local news stories. The stories were from newspapers and news stations near the colleges and universities. The information used to come up with number of students sharing a bathroom came from each college's website. The colleges provide information about each of their residence halls and describe whether there are community, shared, or private bathrooms. To analyze the data, the colleges were split into two groups: ones that experienced less than 5 students getting sick during an outbreak, and ones that had more than 5 students that became sick. The average number of students per bathroom for the colleges with less than 5 students was 16.73 while it was 14.66 for schools with more than 5. This would disprove the hypothesis, however the analysis showed the results were not statistically significant, and there is no relationship between the number of students getting sick and the number of student per bathroom.

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment was to create and test the strength properties of starch, algae, and banana based bioplastics. The objective of this comparative analysis was to determine which type of bioplastic holds the best strength properties, including tensile strength and impact resistance. Three sets of corn starch, agar, and banana-starch-based plastic were made using similar plasticizers and additives with each group combined glycerol, sodium hydroxide, hydrochloric acid, and the polymer. The mixture of these four ingredients was then placed on a hot plate for 15 minutes. The resulting composition was dried inside the fume hood. After the plastic was dried, tensile strength was tested by gradually adding weight to a hanging piece of plastic. The number of grams that the plastic withstood before deforming was noted. Impact resistance of the plastics was tested by dropping a fixed-mass ball bearing from increasing heights onto a stretched sample of the plastic. The height at which the plastic deformed was noted and the hardness calculated using the BHI formula. Analysis of the results indicated that the starch-based bioplastic had the most tensile strength and was able to withstand the greatest impact, but the results were not statistically significant as compared to the algae and banana-based bioplastics. Further research should focus on practical applications of the starch-based bioplastics as well as methodologies to delay degradation without dramatically impeding biodegradation when use of the bioplastic is complete.

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Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of the experiment was to test non-pathogenic Escherichia Coli's ability to become resistant to 409 Antibacterial cleaner using the zone of inhibition process, where bacteria is spread over a nutrient agar plate and concentrated filament paper disks are soaked in a cleaning solution are placed in the petri dish and incubated for at least 24 hours. If the solution is effective, a ring appears around the filament paper where the bacteria do not grow. This ring is called the zone of inhibition. The data obtained suggested that non-pathogenic E. coli become resistant to 409 Antibacterial cleaner using the zone of inhibition process, with resistant bacteria colonies growing onto the 409 Antibacterial cleaner soaked filament disks. On average, the 10% bleach solution had the largest zone of inhibition, averaging 6.1 millimeters. The 409 Antibacterial cleaner allowed colonies of bacteria to grow into the zone of inhibition and had an average zone size of 4.0 millimeters. The control group for each test had no zone of inhibition. The data recorded allows comparisons to be made between common household cleaners (409 Antibacterial cleaner) and more resilient cleaners used at hospitals (10% bleach solution) and their effectiveness in killing non-pathogenic E. coli. The experiment also produced data which supported the cross resistance theory closely implicated with bacteria becoming resistant to antibiotics, an issue of importance in many hospitals.

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment was to discover a method that allows radish seeds to germinate quicker and taller than the traditional method where seeds are left to presoak in water before planting. A series of tests took place in which, radish seeds were left to presoak in each of the solutions of tap water, hydrogen peroxide, vinegar, and isopropyl alcohol for two full hours before planting. The hypothesis was that if radish seeds were presoaked in hydrogen peroxide before planting, then they would grow taller than if they were presoaked in just tap water, vinegar, or isopropyl alcohol. After 31 days, radish seeds presoaked in tap water were at a height of 10.91 cm; seeds presoaked in hydrogen peroxide were at a height of 6.68 cm; seeds presoaked in vinegar did not grow at all and were at 0 cm; and seeds presoaked in isopropyl alcohol were at a final height of 11.25 cm. The hypothesis was not refuted because the radish seeds presoaked in hydrogen peroxide were only at a final average height of 6.68 cm where as the seeds that were presoaked in isopropyl alcohol were at a final average height of 11.25 cm. If all calculations were precise, the radish seeds presoaked in isopropyl alcohol grew 3.12% faster than the traditional method of tap water.

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
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Num

Title: Calendula officinalis Naturopathic Treatments for Acne vulgaris
Reduction affecting the Glandula sebacea and inhibit the excessive

Student Name(s): D. Grey

Fair Category

Abstract:

Acne vulgaris and other types of acne represent a significant challenge to dermatologists because of its prevalence, complexity, and range of clinical expression. The sebaceous gland and oil gland is the key factor in the production of acne vulgaris. Acne vulgaris is the single most common disease affecting over 85% of teenage boys and over 80% of teenage girls. Because treatment of acne with topical and over the counter medicines result it side effect which can range from either mild or very severe. The herbal naturopathic treatment of acne with Calendula officinalis is one of the many different herbal treatments that are a major source of alternate treatment. Calendula officinalis has been used in traditional healing treatments all around the world. Studies performed on the plant have found that it has various classes of compounds within its structure. Primarily carotenoids, flavonoids, terpenoids, saponins, carbohydrates, lipids, amino acids, and a bunch of other minor compounds. These different constituents from the Calendula flower heads possess multiple healing properties, including anti-inflammatory, antiedematous, antioxidant, immunostimulant, anti cancer, lymphocyte, wound healing, hepatoprotective, antibacterial, and antifungal. Not to mention a lot of other helpful medical properties. In this study I explore three different common treatments available for everyday make and use, to help reduce the overproduction of sebum and stop the production of Acne vulgaris.

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

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CSEF Official Abstract and Certification

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The efficacy of flavonoids, specifically Quercetin, Luteolin, and Genistein, at reducing cancer proliferation and inducing apoptosis among mouse mammary carcinoma is of interest in this experiment. Flavonoids, which are ubiquitous polyphenols found in common fruits and vegetables, demonstrate great potential as anticancer agents because of their ability to induce apoptosis, anti-proliferation, cell cycle arrest, inhibit angiogenesis, inhibit metastasis, and reverse drug resistance. Luteolin has shown potential for use in cancer prevention and therapy, but in some cancers it can induce apoptosis. Genistein, which is structurally similar to estrogen, is known to inhibit cancer cell growth but also promote it. Quercetin has shown great anti-cancer potential in the lab, but according to the American Cancer Society, "...there is no reliable clinical evidence that Quercetin can prevent or treat cancer in humans." The purpose of this lab, therefore, is to investigate whether or not these flavonoids can reduce cancer populations. Each mouse breast cancer population was treated with 100 μ M of either Quercetin, Luteolin, or Genistein; the latter two were derived from popular vitamin supplements Lutimax and Vital Nutrients. Then, the cancer populations of each flavonoid and a non-treated population were assessed using a hemocytometer and assessed visually with a microscope. Results show that cancer populations decreased.

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Functional response is intake rate of a consumer as density of food changes. Compensatory growth is when an organism grows more than usual to make up for a lack of nutrients or other factors. Collembola (a.k.a springtails), are decomposing hexapods. Collembola feed on fungus. The purpose of this project was to measure functional response of collembola. The results could demonstrate the impact of the organisms' feeding patterns on its ecosystem. If the organisms consume more when more is made available, there could be detrimental effects on the ecosystem. It is hypothesized that as more fungus grows, and therefore more food is introduced, the collembola will consume more fungus. The independent variable is the amount of fungus in the collembola's environment. The dependent variable is the amount of fungus the collembola consume. To carry out the project, forty soil trays were made for the fungi and collembola. Blocks of birch wood inoculated with fungus were placed in four trays for the control. Five more groups of four trays each were also inoculated with fungus. Each experimental group was meant to be used once its fungus reached a radius of two, four, six, eight, or ten centimeters, respectively. Pictures were taken of trays before the collembola were added and after they were removed. Image J, a computer program, was used to measure the amount of fungus in the pictures. The results were inconclusive regarding the functional response of springtails, but it did show that fungus exhibits compensatory growth when being grazed.

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CSEF Official Abstract and Certification

Fair Category

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Num

Title: An investigation of the effects of fructose on growth, phenotype, and protein production in *Caenorhabditis elegans*

Student Name(s): C. Peisch

Fair Category

Abstract:

The purpose of this experiment was to investigate the effects of fructose on growth, phenotype, and protein production in *Caenorhabditis elegans*. It was hypothesized that growth would be inhibited, phenotype altered, and protein production increased when *C. elegans* was grown in the presence of fructose. To begin, pure fructose powder was added to four 135ml bottles of melted, nutrient agar: 0g, 4g, 8g, 12g. After the fructose dissolved, each bottle was poured into 4 sterilized plates to create 4 trial groups, each with a control of 0g of fructose. Once solidified, the plates were inoculated with *Escherichia coli* broth, the primary food source of *C. elegans*. After 24 hours in a 37°C incubator, a 1cm³ chunk of growth medium containing *C. elegans* was placed in the center of each plate. The plates were qualitatively observed for phenotypic norm and overall health and size for 7 days. Next, a 1cm³ section containing *C. elegans* was cut from each dish, ground, and tested for pH, urobilinogen, protein, ketones, and nitrites. Although results indicate that higher amounts of fructose initially caused a growth spike (first in *E. coli* and then *C. elegans*), overall health of *C. elegans* in each plate deteriorated rapidly as indicated by apparent nematode death. Results regarding the effects of fructose on phenotype and protein production were inconclusive.

Word Count

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

As of this writing, the cost of energy has gone up substantially and it has become extremely important to generate more environmentally clean energy economically. The purpose of this experiment was to find out if Solar panels under water at different depths produces more energy output compared to keeping it outside and if so, under what depth. My goal is to help in creating a greener planet. In my hypothesis, I stated that by putting solar panels under water, we can get more output. I used 5 solar panels each having a maximum of 0.5V output, keeping one outside the water, and the rest under four different levels of water; 2cm, 4cm, 6cm and 8cm. The water temperature for the containers was same. The experiment was performed on a sunny day at 52°F. I took 4 identical plastic containers. Then I poured water in each. I measured the depth of water at the desired levels. I made all 5 solar panels waterproof by putting them in Ziploc bags and sealing them, keeping the wire outside to measure energy output. I measured the output from each panel at different times in interval of 2hrs, at 10am, 12am, 2pm and 4pm. The panel under 4 cm produced the greatest power output. The panel under 4 cm of water, produced 20.34% more energy output compared to the traditional way of keeping it outside. The application of this experiment is to improve the output of solar panels to help make the planet greener.

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Num

Title: Efficiency of Chlorophyll A and B found in Spinacia Oleracea for Electrical Generation in a Photosynthetic Solar Cell

Student Name(s): A. McGowan

Fair Category

Abstract:

The need for energy across the United States and other countries is burgeoning. Because it is seen as a tremendous problem of our future, President Obama is giving millions to renewable energy companies, including a recent 400 million loan to "Abound Solar," a company that makes solar panels. The problem being that America is stuck in growing debt, meaning that we need to seek less costly alternatives to renewable energy. Not only are solar panels expensive, but also they are harmful to our environment because of the dangerous chemicals found in them, such as gallium-arsenide and cadmium-telluride. The photovoltaic solar cell made with Chlorophyll A and B found in Spinacia Oleracea is inexpensive and non-toxic, deeming it safe for the environment. In order to make a Photovoltaic solar cell from Chlorophyll, Chlorophyll is isolated from Spinacia Oleracea by making a solution of hexane, ethanol and leaf trimmings. After this, the chlorophyll is extracted with the use of a centrifuge and volts conducted will be measured with a multimeter to determine the efficiency of a photosynthetic solar cell made with Chlorophyll A and B, graphene and copper plating. Based on the results, a small voltage was measured varying between .1-1.3 mV based on the layering method carried out. Copper plating alone, the control had a voltage of 0.0, suggesting that it is possible to make a solar cell this way, but several changes in the future are necessary in order to make it more efficient.

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CSEF Official Abstract and Certification

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Proj.
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Num

Title: How does Gorgonian coral affect the ammonia, and pH levels of water?

Student Name(s): A. Deming

Fair Category

Abstract:

Recent studies have displayed that stony corals have been in decline due to coral bleaching, increase of acidity and drastic escalation of temperature. However, there are discoveries showing that gorgonian coral is capable of sustaining life despite these detrimental factors. Within this experiment, there were trials conducted to see how gorgonian coral affected the ammonia and pH levels. Through observing these factors, determining whether gorgonian coral is a viable stabilizer for aquatic environments was detected. There were two independent variables that were observed in this lab: amount of coral and time. Two environments for the coral were created to live in and testing traces of ammonia and pH were conducted in periods of 24 hours. Every 24 hours, a section of coral was placed in one of the environments to see if amount had any impact of the regulation of bacteria and acidity. The results from this experiment were that the environment with the added coral would have greater ability of reducing bacteria. Both environments were capable of stabilizing pH. Therefore, gorgonian coral is a viable manager of aquatic habitats. Further studies on this subject could aid deep sea life, providing shelter as well as a healthy environment. Various trials consisting of more realistic environments to test what other factors are hindering the lives of coral. The health of the environment is a crucial factor to take care of because it provides resources that are essential to life on earth.

Word Count

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In this experiment sugar substitutes were used to learn if *Saccharomyces cerevisiae*, or more commonly known as yeast, contains the enzymes required to break down sugar substitutes and use the energy stored in the molecules to go through cellular respiration. Since yeast normally consumes sucrose and uses it for cellular respiration it goes through aerobic respiration and releases carbon dioxide (CO₂). Using this fact balloons were used to measure the amount of CO₂ produced and see if the yeast cells could go through cellular respiration using the brand name sugar substitutes Equal, Sweet n' Low, and Splenda because they are found commonly in many kitchens and could possibly be used in replace of sugar while baking bread which relies heavily on the use of yeast. If, while baking bread, sugar substitutes can be used then it would lower the calorie count on bread and other recipes that involve baking with yeast.

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Student Name(s):

Fair Category

Word Count

Abstract:

Coral reef ecosystems are negatively affected by numerous external factors, including the marine aquarium trade. Millions of corals are retrieved from reefs each year, harming the delicate balance in the ecosystem. Aquaculture represents one possible solution to the problem. This experiment tests the effect light levels have on the growth of a variety of coral species common to the marine aquarium trade. Corals are known to harbor symbiotic algae known as zooxanthellae, which provide the coral with carbohydrates via photosynthesis, making light a vital component of keeping these organisms in captivity. The hypothesis for this experiment is that despite the fact that light is necessary for the health and growth of corals, lower light levels will result in accelerated growth rates. Three species of coral were used; *Leptoseris*, *Clavularia*, and *Zoanthus*. These “fragments,” representing a number of coral genera, were separated into three experimental groups and placed them in tanks with varying light levels. The light levels were quantified using a PAR meter and adjusted to represent full, 2/3 and 1/3 light intensities. Growth of the coral species were analyzed using computer based surface area estimation software on a weekly basis. The resulting growth of the coral depended on the species; each type needed a specific light level to grow, different than the others two.

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In China, many women do not receive the nutrition they need during their pregnancy. One of them is folate, which could affect various aspects of fetal growth. Issues from this could affect the development of the fetus not only in the womb but also later in life. The objective of this study was to examine if folate supplementation during pregnancy could reduce the risk of newborn low birth weight, which was separated into either low birth weight (LBW) or small for gestational age (SGA). It was hypothesized that there is a correlation between a deficiency of folate, from dietary and/or supplemental, and the LBW and SGA of newborns. Data was collected from a large birth cohort study conducted in 2010-2012 at the Gansu Provincial Maternity & Child Care Hospital, in Lanzhou, China. Data was then analyzed through series of univariate analyses produced by the SAS statistical software. P-values were obtained from Chi-Square tests for categorical variables and t-tests for continuous variables. Unconditional logistic regression models were used to estimate odds ratios (OR) and 95% confidence intervals (95% CI) for the association between folate deficiency and birth weight. The results show that dietary folate is insignificant to the LBW and SGA ($p > 0.05$). Folate supplementation significantly reduced the risk of LBW ($p < 0.0001$) by 30.9% (OR 0.691, CI 95%: 0.551, 0.866) and SGA by 24.5% (OR 0.755, CI 95%: 0.654, 0.871), both with confounding variables. Conclusively, this study supports folic acid supplemental/multivitamin intake as an important factor of healthy fetal growth.

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

For years, scientists have conducted research regarding how a person's eye color affects his or her vision, however no specific evidence backs this idea. The purpose of this project is to discover a relationship between a person's eye color, and his or her ability to compare shades of colors that are extremely similar to one another. The researcher hypothesized that if someone has brighter colored eyes, then he or she will be able to more accurately compare and align similar hues of color. The researcher arranged 45 high school students into three groups of 15 based on the eye colors blue, green, and brown, and had subjects take a short online color perception test revealing their ability to line up squares by hues of only slightly varying colors. In analyzing the data, the researcher has come to the conclusion that there is an extremely minor relationship between a person's eye color and his or her ability to perceive and compare similar hues. The researcher had predicted that subjects with blue or lighter colored eyes would be able to more accurately arrange the colors, and those with darker eye colors/brown would not as effectively be able to recognize the small differences in shades. The results in fact show that people with lighter eye colors score better on this color perception test, whereas those with darker eyes do not score as well. However, the results were very minorly significant, and do not provide sufficient proof that the hypothesis was correct.

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Title:

Student Name(s):

Fair Category

Abstract:

Sleep, and getting enough sleep, is a fundamental human need. Many adolescents do not get enough sleep, which can cause increased stress and mental disorders such as depression and anxiety. These factors can influence students' academic performance, however it is not widely known if the amount of sleep a student gets on average each night directly correlates with their academic performance in specific subjects. This research study aimed to determine if there is a correlation between the two factors. A survey was created and sent out to students through email and various social networking sites. After the survey was closed and the results consolidated and evaluated, 300 total students responded to the survey. The end results showed that there is no significant correlation between the hours of sleep per night and academic success in a particular subject. This information can benefit students by helping them to realize that academic grades are not directly dependent on how much sleep they get each night, meaning that they can focus on other factors, such as studying, to help them to do better academically.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3032

Student Name(s):

Fair Category

Abstract:

The purpose of this study was to investigate the effects of certain enteric symbionts on the interaction between gliadin, a component protein of gluten, and anti-gliadin antibodies. It was hypothesized that the presence of these gut bacteria would serve to break down the gliadin and thus lessen the degree of interaction between the gliadin antigens and anti-gliadin antibodies. In order to ascertain the validity of the hypothesis, enzyme-linked immunosorbent assays (ELISA) were run on gliadin in the presence of gut bacteria and the resulting solutions were analyzed spectrophotometrically. Gliadin samples were added to cuvettes, and the bacteria were also added into these cuvettes (aside from the cuvette designated for the control). Next, anti-gliadin antibody samples were added to the cuvettes. These antibodies bound to any in-tact gliadin protein to form antigen-antibody complexes. Then anti-gliadin peroxidase conjugate was added to the cuvettes, which bound to the antigen-antibody complexes. A chromogenic substrate was added to the wells, which produced a color change indicating binding. Transmittance data was collected for the resulting solutions in the cuvettes. The transmittance patterns of the bacteria-treated samples were analyzed in comparison to the patterns of the control in order to ascertain whether or not the presence of the bacteria affected the system. The results of the testing showed that the gut bacteria were in fact able to affect the interaction between gliadin and anti-gliadin antibodies. Further investigation should include repeatability of the results and the testing of additional enteric symbionts.

Word Count

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- Yes No

CSEF Official Abstract and Certification

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Fish populations in general have been dropping dramatically and a major blame for this is a rise in ocean temperatures. This is because plankton cannot grow in warmer temperatures and since they are at the base of the food chain, their population affects every other animal population in the ocean. A two tailed t-test was performed for four different locations. These locations are: 37° N, 67° W, 23° N, 67° W, 25° N, 83° W, and 23° N, 95° W. Each of the tests for these locations had a “p” value below 0.0001. Meaning that there is a correlation between sea surface temperatures and chlorophyll concentrations. The reasoning behind looking at chlorophyll concentrations was that where there is chlorophyll, there are plankton. So, basically, if there is more chlorophyll in an area, there will be more plankton

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Title: Bioengineering of Popular Peppers to Create a Disease-Resistant Hybrid with Prolonged Shelf Life, Increased Biomass, and

Student Name(s): A. Lim

Fair Category

Word Count

Abstract:

Capsaicin is the primary ingredient in chili peppers, being primarily responsible for its hot taste. Capsaicin is also used in medications for diseases such as herpes and psoriasis. Current methods for obtaining capsaicin include laboratory synthesis (expensive), or isolation of the compound from peppers. Additionally, peppers are an excellent source of vitamins and carotenoids. As a valuable food stock, increase in pepper size, their capsaicin content, their pathogenic resistance, and overall plant viability is highly desirable. Grafting common pepper species may represent an opportunity to promote these properties. In this research, Jalapeño and Cayenne peppers were each grafted with Bell peppers, to produce two hybrid pepper species. The capsaicin content of each hybrid, relative to the original peppers, was determined via HPLC/UV, while size was determined via final biomass prior to harvest. Results demonstrate that the Cayenne/Bell (CB) hybrid had twice the biomass, yet contained only 33% of capsaicin, relative to the normal Cayenne. Jalapeño/Bell (JB) pepper hybrids resulted in a pepper with similar biomass, however the capsaicin content per gram was more than 3.5X that of the normal Jalapeño pepper. To measure pathogen resistance, hybrid and original species were subjected to root soaking and direct-stem injection with 10% *Fusarium oxysporum*. For direct injection, both Jalapeno and Cayenne pepper plants showed signs of wilt, while their hybrids did not. Ethylene plant production was used as a marker for overall plant health. CB and JB hybrid plants produced 33% and 71% less C₂H₄ than the normal counterparts, suggesting improved plant health.

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Title:

Student Name(s):

Fair Category

Abstract:

Toxoplasma gondii is an obligate intracellular parasitic protozoan that is capable of infecting virtually any nucleated cell. Oftentimes, Toxoplasma gondii is able to infect its host without providing more than flu-like symptoms. About 15-30% of the human population has toxoplasmosis, yet many do not know they have been infected. Much research has gone into the parasite's secretion of organelles into its host during invasion, yet there is a very finite amount of research that has been conducted regarding the interaction between the exterior membrane of the parasite and its host. In this study, we used light microscopy and the application of dyes to observe the interaction between Toxoplasma and human foreskin fibroblast cells. We used both the type I RH strain and the type II PRU strain of Toxoplasma to view the exchange of each type's membrane proteins with the host. This exchange of cellular membrane, known as trogocytosis, has primarily been observed in regard to lymphocytes rather than microbes. The results of the recorded interactions show the possibility of Toxoplasma gondii being able to carry out trogocytosis. Our findings show that not only does Toxoplasma gondii secrete proteins into the host during invasion, but the parasite also shows evidence of exchanging membrane proteins with the host cell. These results may lead to a new perspective on the role of Toxoplasma's cell membrane during invasion as well as shed light on the possibility of other microbes having the ability to carry out trogocytosis.

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CSEF Official Abstract and Certification

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Proj.
Num

Proj. Title:
3036

Student Name(s):

Fair Category

Word Count

Abstract:

CyberKnife stereotactic radiosurgery (SRS) is a minimally invasive treatment option for patients with trigeminal neuralgia. The purpose of this project is to determine the effects of dose and other clinical parameters on the rate of pain relief, duration of response, and rate of adverse effects in the treatment of trigeminal neuralgia using CyberKnife SRS. A total of 56 patients were treated CyberKnife SRS for classical trigeminal neuralgia. Pain level was documented at consultation and at follow-up, and adverse effects were recorded at follow-up conducted between 2013-2014. Patients were administered the BNI pain scale (given to by Dr. Francis Cardinale). I performed a retrospective review of the de-identified records and extracted pertinent data for the study. Logistic regression was used to test for correlations of clinical parameters including dose, gender, age, pretreatment pain level, treatment order, and TN type, with the rates of pain relief and adverse effects. Median follow-up for the study was fifteen months. Fifty-seven treatments (86%) resulted in pain relief. Thirty patients (54%) experienced mild (16%), moderate (18%), or severe (20%) facial numbness. There was a trend toward lower rates of numbness in patients treated with 60 Gy compared to 70 Gy ($p=0.07$). In the analysis it was determined that Cyberknife SRS is safe and effective for the treatment of trigeminal neuralgia. Prescription doses of 60 Gy provide pain relief similar to higher doses. Prospective studies with larger cohorts and longer follow-up should be considered for further consideration of this treatment modality for trigeminal neuralgia.

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CSEF Official Abstract and Certification

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Proj.
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Num

Title:

Student Name(s):

Fair Category

Abstract:

Systemus lupus erythematosus (SLE) is an autoimmune disease characterized by anti-dsDNA antibodies (antibodies that attack double stranded DNA), extensive tissue damage, and inflammation. Recently, newfound mechanisms have allowed for the synthesis of a multitude of treatments that have shown more potency than traditional nonspecific (affecting multiple targets, not necessarily specific to the disease) drugs including glucocorticoids and antimalarials. Belimumab became the most recent FDA-approved SLE treatment in 2011; it targets the B-cell activating agent (BAFF). Others, such as sifalimumab, which targets interferon-alpha (IFN-a), have undergone or passed Phase I trials. However, the vast majority of these drugs are only temporary immunosuppressant agents. This Review (research paper) discusses the efficacy of current pharmacological treatments and the risks of certain therapeutic targets based on the current understanding of autoimmune pathways.

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Water is essential to life, but do we know what is in it that we actually consume? The focus of this experiment conducted was to find the affect three different sources of water (rain, bottled, and tap) have on plant growth and development. My hypothesis stated that tap water would be the preeminent choice because their treatment process differs from bottled. Research has shown that the contents of rain, bottled and tap contain harsh chemicals, pollutants, & the byproducts left from the water treatment of filtrating. In bottled water, fluoride, phthalates, trihalomethanes and arsenic, are present from the bottling process or from the bottles themselves. What flows from the tap at home is often polluted with some form of pesticide, industrial chemical, pharmaceutical drug, or other toxin, even after it's passed through a treatment facility. With rain water, acidic levels were already high from air pollution. After collecting the 3 types of water, corn seeds planted into soil were watered everyday (when soil was dry) into 6 different pots (2 of the same water type) for 30 days until it deteriorated. Results showed that tap water was the best for germination and development, rather than bottled water that was good for growing only. In this experiment, my hypothesis was supported. Different towns, and states may have different ways of water treatment filtering, consequently altering the effects on plant growth. Future studies may include analysis of actual contamination from different areas.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Investigation of the Inhibition of E. coli Biofilm Formation on Food-Contact Surfaces via a Brominated Furanone

Student Name(s): S. Bardos

Fair Category

Word Count

Abstract:

Recent outbreaks of pathogenic E. coli due to food-borne pathogens have produced severe consequences in the food industry, leading to consumer illness. A main cause of these outbreaks are bacterial biofilms, which are highly adhesive films of bacteria that form on various biotic and abiotic surfaces using bacterial communication, or quorum sensing. Their inherent antibiotic resistance enable these pathogenic biofilms to form on both antibacterial-treated and untreated food-production equipment, allowing planktonic bacterial cells contained within the biofilm to spread to food products. Current measures to prevent biofilm growth are inadequate, and not applicable to the food industry. Recent studies have suggested that the use of brominated-2(5H)-furanone can inhibit E. coli biofilm formation by inhibiting the bacteria's quorum sensing mechanism. This research investigates the efficacy of (Z)-4-Bromo-5-(bromomethylene)-2(5H)-furanone (BF) at inhibiting biofilm growth of a nonpathogenic E. coli H157-07 surrogate (K12-W1485), for the eventual use on food-contact surfaces. Biofilm assays (10 & 24hrs) were conducted, in which E. coli was incubated with various concentrations of BF, and later quantified using OD510/OD610. Results demonstrate that biofilm thickness was reduced by 75.4% with as little as 20 μM BF, and 88.2% with $>25 \mu\text{M}$ BF. BF's ability to inhibit biofilm growth on production machinery materials was next evaluated. On stainless steel, biofilm thickness was reduced by 59.9% with only 5 μM BF, and by 79.9% with 10 μM concentration. BF's ability to reduce biofilm thickness should enhance antibiotic's ability to kill the remaining planktonic cells, which will help eliminate bacterial transfer onto food products.

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CSEF Official Abstract and Certification

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Title:

Student Name(s):

Fair Category

Abstract:

The aim of this experiment was to determine if chemicals that combine to produce exothermic reactions will work effectively as deicers and also to test if these chemicals are less toxic to the environment than commonly used rock salt. The hypothesis is that exothermic deicers will melt ice faster than rock salt because of the heat produced, and they will also lower the melting point of ice. The additional hypothesis is that they will not adversely affect rubber (i.e. tires), asphalt, or grass. The controls were rock salt and sand. The deicers tested were “elephant toothpaste” (yeast plus hydrogen peroxide), a hand warmer (mainly iron), and sodium acetate solution. The hand warmer was slower at melting ice than rock salt (yet faster than sand) and did not depress the freezing point. It did not adversely affect grass growth. The sodium acetate solution was slower at melting ice than sand but it depressed the freezing point. It had an adverse effect on grass, albeit less of an adverse effect than rock salt. The elephant toothpaste was the fastest at melting ice (30% faster than rock salt) but did not depress the freezing point. It had a beneficial effect on grass growth because yeast can be used as a fertilizer. No deicer adversely affected asphalt or rubber. The exothermic “elephant toothpaste” has the potential to be used as a rapid and environmentally safe deicer, but it would probably work better when combined with something that will lower the freezing point of water.

Word Count

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CSEF Official Abstract and Certification

Fair Category

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Scientific research evidence has shown that the vegetable known as the bitter gourd can help lower blood sugar levels. This experiment was put to test to show if the bitter gourd can give fast results on lowering high blood sugar. It was hypothesized that if bitter gourd juice was consumed by an individual, then the individual's blood sugar will lower significantly because the bitter gourd tends to have the chemicals Charatin and Lectin that act as insulin to lower blood sugar levels. Three subjects were put to the test. The first subject is a Type 1 diabetic patient that takes insulin and one 15 mg tablet daily. The tablet is called Actos. The second subject is a Type 2 diabetic patient that takes a 15 mg tablet called Metformin. The third subject acts as a control. The individual has a healthy blood sugar level. The change in sugar levels was tested on each subject based on a glucose urine analysis and a blood sugar meter. Each subject was tested for two trials, six days each. For the first three days, the data on each individual's blood sugar level was taken without consuming the bitter gourd juice. The next three days, the same procedure had taken place, but the bitter gourd juice was given to each subject to consume two hours in advance. The hypothesis was correct. The bitter gourd helped lower the blood sugar of all three subjects. The bitter gourd is an excellent source to help lower blood sugar levels.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title: Studying the role of neutrophils in preventing the dissemination of oral *Listeria monocytogenes* infection in the intestinal mucosa

Student Name(s): I. Walawalkar

Fair Category

Abstract:

Listeria monocytogenes (Lm) is a bacterium that causes listeriosis, a foodborne infection with a high mortality rate. In contrast to previous murine models of infection in which Lm has been administered systemically (i.e. intravenously or intraperitoneally), our more relevant model of oral Lm infection has shown that the intestinal mucosa is actively involved in bacterial containment. In our study, we tested the hypothesis that neutrophils, a population of white blood cells, play a significant role in preventing the dissemination of Lm into the intestinal lamina propria and consequently, into the bloodstream. Here we showed that bacterial counts within the small intestinal mucosa are higher when neutrophils are depleted. In addition, using confocal microscopy, we observed cellular aggregates at the bases of the small intestinal villi containing gamma-delta ($\gamma\delta$) T cells that have been shown to participate in the recruitment of neutrophils to the site of an immune response. In conclusion, the current results of this study suggest that neutrophils play a key role in preventing the propagation of oral Lm infection within the intestinal mucosa.

Word Count

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3044

Student Name(s):

Fair Category

Word Count

Abstract:

Psoriasis is a chronic autoimmune inflammatory disease involving the skin and characterized by scaly plaques. Often having a genetic component, psoriasis is associated with other serious health problems including arthritis, cardiovascular disease, obesity and depression. There is currently no cure, but various treatments can reduce major symptoms. Since disease itself, treatments and co-morbidities can have a serious impact on quality of life, it is important to better understand the genetic basis for psoriasis in order to design more targeted and effective treatments for patients. The primary aim of this experiment was to determine which (if any) genes were differentially expressed in the adipose layer of skin, an area largely unstudied in psoriasis, but likely implicated in the inflammatory process given its proximity to the cutaneous layer and the association between psoriasis and obesity. Using the statistical computing program R, data from Affymetrix microarrays was sequenced and the differentially expressed genes (DEGs) were determined. Of 474 DEGs identified in the adipose (fat) layer, 151 are up regulated and 323 are down regulated. Most of the up-regulated genes are found to be pro-inflammatory, while most of the down-regulated genes are anti-inflammatory. In conclusion, psoriasis does involve differential gene expression in the subcutaneous fat, and is not only a topical disease as previously believed. This study suggests that psoriasis' effects on cardiovascular health and obesity may be linked on a molecular basis, and future treatments that modulate the expression of DEGs in the adipose layer may benefit affected patients.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this research is to identify factors that contribute to the stress-level of high school students. The project was conducted in order to further the study of student stress levels and provide more information on how to assist in lowering the levels of student stress. The project was conducted by issuing a survey to every eleventh grader in Oxford High School. Once the surveys were returned, the data was then analyzed by compiling the data into Microsoft Excel. The data was organized into tables and then graphs were made using the data. The graphs were used to compare and contrast the factor of stress most prevalent between male and female eleventh grade students, but also to evaluate the grade all together. The data showed that the factor of stress most prevalent in male eleventh grade was the amount of activities they participate in as well as for females. This can be used to conclude that the more activities a student does, the more stressed they feel. The results suggest if students want to reduce stress, they should limit the amount of activities they participate in.

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CSEF Official Abstract and Certification

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of these experiments was to test if cyclohexane methyl alcohol (CHMA) could potentially affect the environment by exposing *Raphanus sativus* (Radish) seeds to increasing concentrations of the chemical. CHMA is very similar to the chemical spilled in the West Virginia Elk River on January 9, 2014, when 28,390 liters of 4-methyl cyclohexane methanol was accidentally released. Unfortunately, 4-methyl cyclohexane methanol is not commercially available, so CHMA, a chemical with similar properties, and authentic tap water samples from West Virginia, obtained February 21, were used. The seeds were exposed to different concentrations of CHMA as well as hot and cold West Virginia tap water. The effects were observed over a 7 day period. The hypothesis is: If the *Raphanus sativus* seeds are placed in solutions with a 0.0001%, .01%, 1% concentrations of CHMA, and also the samples from West Virginia, then the germination rate will be impacted. Water was used as a negative control, while 4% bleach served as the positive control. Each trial had three replicates. The temperature was kept constant (ranging from 18°C-20°C). Data was taken in 12hr intervals. The germination of the seeds ranges from a low of 0% to 100%*. None of the seeds germinated for the 1% CHMA solution while more than 90% of the seeds germinated for the 0.01% solution, the 0.0001% solution, and the hot and cold tap water. However, the seed germination for the 0.01% solution was delayed by about 36 hours but eventually reached 97%.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

A possible new liquid bandage is important because the current technology is an area that needs to be improved on due to the fact that preventative care is an important part of home care. If the area was improved then it could enhance how we treat wounds and decrease the possibility for infection. The problem I experimented on was a new combination of differently sourced mediums for an antimicrobial adhesive. Due to the fact of its abundance in this area I chose to research using the bioadhesive of pine sap. When I exposed 15 slides of cultured bacteria to both glues the results overwhelmingly pointed to the new glues as a more sustained and limiting growth agent. My data was limited in the fact that I could not test to evaluate bacterial growth to see the effectiveness of either product due to the fact that it was outside the scope of my initial experiment. This experiment would need a follow up experiment to test growth under the exposure to see if the area that appeared to harbor bacterial growth was bacteria or just looked strange. These findings are indicative to ones that would support this new glue as a more effective medical adhesive. Without a follow up experiment it would be irresponsible to claim that the new glue is more effective but my results overwhelmingly pointed that that was the case. My results narrow down the initial question for better glue but are not proven to be conclusive.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Studying the Effect of the Color of Light on the Rate of
Photosynthesis in Aquatic Plants

Student Name(s): S. Shaikh

Fair Category

Abstract:

The experiment examined the effect the color of light had on the rate of photosynthesis on aquatic plants. The color of the light a plant is provided will affect how fast it photosynthesizes, so this data will be useful to aquarium owners who want to yield the maximum benefits of aquatic plants in their environment. Faster photosynthesis results in more oxygen production, which is beneficial. The hypothesis stated that if the plant was provided blue light, the rate of photosynthesis would be the fastest. To conduct the experiment, plants were placed in an aquatic environment in a jar. The jars were wrapped in different colors of cellophane (red, blue, and green). The dissolved oxygen in the water in the jar was measured every morning for 12 days. The data show that providing blue light resulted in the most oxygen production, which indicated a faster rate of photosynthesis. The plants with blue light photosynthesized the fastest. In conclusion, blue light results in faster photosynthesis.

Word Count

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CSEF Official Abstract and Certification

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Proj.
Num

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Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In 2009, zebra mussels (*Dreissena polymorpha*) were found in the Housatonic river watershed. In 2010, these highly invasive clams were found in Lake Lillinonah and Lake Zoar. To study the distribution of adult zebra mussels in these two lakes, in 2013 twelve artificial substrates were suspended from docks in Lillinonah and two in Zoar. The substrates consisted of four squares of masonite connected by a bolt. These provided an ideal site for colonization by adult zebra mussels. The substrates were located from the upstream end of Lake Lillinonah to the downstream end of Lake Zoar. The substrates remained in the lakes from early July to late October. After the substrates were retrieved from the lakes, the mussels were removed and the length of the shells were measured. The size distribution of mussels on each substrate was depicted using a histogram. The substrates in the most upstream sites had few mussels. Since larvae cannot swim against the current, this indicates that there are at least some larvae entering Lillinonah from the Housatonic River upstream. The largest number and largest sizes of adult mussels in Lake Lillinonah were found on the substrates in the middle area of the lake. This indicates that zebra mussels are reproducing in Lillinonah. Both substrates from Lake Zoar contained more zebra mussels than any substrate in Lillinonah. This suggests that Lake Zoar has a larger population of zebra mussels than Lake Lillinonah.

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Proj.
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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

One of the most pressing public health threats of our time is antibiotic resistance. This project explores the mechanisms of antibiotics, bacterial resistance to antibiotics, and suggests an optimized solution to this problem. Antibiotic resistance occurs when bacteria pass on their resistance. The transfer of genes leads to antibiotic resistance of three categories --intrinsic, mutational, and acquired. HAMLET (Human alpha-lactalbumin made lethal to tumor cells) has been shown to increase sensitivity to antibiotics and enable their use on the most resistant strains. HAMLET, a protein derived from human milk, consists of alpha-lactalbumin and oleic acid. HAMLET has been shown to increase sensitivity to antibiotics, and enable their use on resistant strains, including MRSA. This project experiments with optimizing HAMLET effectiveness through the optimal pH and dosage. At a pH of 2.0, HAMLET will formation will be optimized, as this is near the average pH of an infant's gut, which encourages HAMLET formation. When alpha-lactalbumin is exposed to a pH of 2.0, it starts to denature, forming HAMLET. However, after HAMLET formation the optimal pH_i (intracellular pH) becomes close to 7.0. MIC (minimum inhibitor concentration) was shown to be improved when HAMLET, tested against resistant bacteria was combined with the antibiotic that bacteria had developed resistance to. This improvement was estimated to be 4 fold, based on a compilation of previous testing results. This project shows that HAMLET is a highly effective in eliminating antibiotic resistance and can be optimized by varying the pH, and the antibiotic concentration.

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CSEF Official Abstract and Certification

Fair Category

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

High blood pressure, often categorized with high stress levels, is a common complication among individuals today. What if there is another solution besides medication? This experiment was conducted in order to discover the psychological capabilities of iPhone Apps and their impact on individual's stress levels. The idea is that essentially, if a patient were to be diagnosed with high blood pressure or was undergoing high levels of stress, they could be prescribed to play say, Pocket Frogs. However, not all Apps are the same and different Apps produce different effects on those who use them. For example, games like Candy Crush tend to raise stress levels while games like Pocket Frogs are more likely to relax patients. Thus, additional research would be necessary past this experiment to solve which games optimize this relaxation effect. During this experiment, each subject was asked to have their blood pressure as well as their pulse taken before and after playing ten minutes of a specific game on the iPhone. The Candy Crush player results proved statistically insignificant in increasing blood pressure but statistically significant in increasing one's pulse. The results for Pocket Frogs proved statistically significant in lowering systolic blood pressure, but statistically insignificant in decreasing diastolic blood pressure and pulse. In conclusion, despite the data having mixed statistical significance, this hypothesis should certainly be looked further into as App Therapy could most definitely be useful if used in the right context, with the right game.

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CSEF Official Abstract and Certification

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Proj.
Num

Proj.
Num

Title: The effects of L-carnosine on the lifespan of Caenorhabditis
Elegans

Student Name(s): J. Gilleran

Fair Category

Abstract:

Aging on a cellular level is largely the result of molecular damage within the cell, including DNA and other proteins vital to cellular processes and viability. By reducing the levels of damage a cell received, one would effectively slow the aging of that cell. The drug L-Carnosine is a powerful antioxidant that reduces the concentration of certain molecules known to cause damage to DNA and other key proteins. This property makes it a promising drug for safely slowing the aging process. In my project, I will be using Caenorhabditis Elegans, a 1-mm long nematode that lives in soil, commonly used in aging research and study of the nervous system. By exposing experimental groups of nematodes to l-carnosine, I hope to see an extension of one to two days in their two to three week lifespan. I will be testing concentrations of 0 (control), 20, 35 and 50 millimoles per liter in the agar the nematodes are growing on. Procedures include preparation LB agar and L broth for culture of bacterial food source, petri plates containing nematode growth agar infused with desired concentrations of L-carnosine, inoculation of nematode growth agar with bacteria, and nematode observation and plate transfer. All procedures have been performed by me while practicing sterile technique under the guidance of a qualified biological scientist. Nematodes will be observed daily to see what effects L-carnosine has on C. elegans lifespan. Nematode death will be recorded when there is no observed body movement, pharyngeal pumping or response to touch.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3054

Student Name(s):

Fair Category

Word Count

Abstract:

The location of a newly discovered protein, Nin1, in *Saccharomyces cerevisiae* was investigated. Nin1 is thought to interact with a nuclear pore complex (NPC) protomer. Nin1 was tagged with green fluorescent protein (GFP) and the endoplasmic reticulum (ER) was tagged with HDEL-DsRed. Using images taken on an oil-immersion microscope, the location of Nin1 was confirmed to be the ER. The effects on the ER's structure and organization were studied by taking additional pictures. The lack of Nin1 does not appear to affect ER structure or organization. Additionally, the absence of Nin1 on nuclear migration in budding yeast was studied. A strain of yeast was developed that lacked the Nin1 protein. Nin1 expression was suppressed by growing cells in a YPA-raffinose culture. Cells were examined underneath a microscope for six hours and pictures were taken every five minutes. It was observed that nuclear migration was impossible without Nin1. Thus, it was found that Nin1 resides on the ER, does not affect the structure or organization of the ER when absent, and is necessary for successful nuclear migration. This is important as NPCs are evolutionarily conserved and implications for human cells and health may exist.

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4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

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Title:

Student Name(s):

Fair Category

Abstract:

Phytoplankton are the source of approximately 50 % of the Earth's oxygen. In this experiment, the impact of pH on the oxygen production of the diatom cyclotella meneghiniana was tested. Infusion of carbon dioxide was done to lower the pH and mimic the acidification of the ocean that is occurring due to excess carbon dioxide in the atmosphere. There were six groups; three had cyclotella and three did not, and the pH of each one was varied by infusing carbon dioxide. Results showed that infusing carbon dioxide alone did not have a significant effect on the dissolved oxygen levels, and that the presence of cyclotella resulted in a higher dissolved oxygen content. Results also showed that, at a lower pH, cyclotella will produce less oxygen, which is important because if the ocean continues to acidify, there will likely be less oxygen available for humans.

Word Count

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Research has proven that there are many different types of food and nutrients that improve memory, including fruits, vegetables, and fish. The purpose of this experiment was to determine if protein consumption improves one's short-term memory. Participants were randomly divided into two groups and told to take a short-term memory test, drink a smoothie, one of which was enhanced with Greek yogurt, wait an hour and then retake the memory test. In the experimental group, the group with the yogurt, all of the participants' scores increased after drinking the smoothie. The results of this were statistically significant with a probability that this happened by chance less than .0005 or .05 percent. However, the control group did not show a statistically significant increase in score. Overall, the smoothie with the protein did improve one's short-term memory more than the smoothie with no yogurt, but there is too little data to come to a reliable conclusion.

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Because there is a cure yet to be discovered, this project specifically focuses on a possible factor that may be linked to finding a cure for Breast Cancer. Mammary epithelial cells are found in mammary glands that are found in breasts. In normal breast development, the cells within the breast are both proliferating and differentiating to form the necessary ductal and alveolar systems. These changes are regulated by systemic hormone and growth factor releases. PTHrP is a necessary regulatory molecule expressed in many organs within the body found in almost all normal fetal and adult tissues. It plays a crucial role in the development of the mammary gland and skeleton. Specifically in the mammary gland, it's produced by alveolar tissues and is secreted in milk when a woman is pregnant. I hypothesized that, if PTHrP affects cell proliferation, then the rate of proliferation will be greater in cells treated with PTHrP will proliferate greater than cells not treated with PTHrP. To test my hypothesis, I use cells and tissue samples that were untreated and did not overexpress PTHrP cultured cells and tissues that were transfected with PTHrP. To quantify the results of the transfection and cell growth, I performed assays to quantify proliferation and apoptosis of the cell population by incorporation of dye into newly synthesized DNA. Cells that overexpressed PTHrP grew faster than the cells not treated with PTHrP. Therefore, based on the results in both experiments, the presence of PTHrP not only causes proliferation, but accelerates cell proliferation.

Special Categories Selected by Student:

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 vertebrate animals controlled substances

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Research has been done on the topic of heavy metals in fish to show that fish can be toxic to eat every day. This has been done through a procedure of soaking fish in a water and chlorella mixture. Chlorella is an algae that can be used as a health supplement or as a medicine. Chlorella can be has been shown to protect against and expel heavy metals in the body. The experiment that took place in class used chlorella as a medicine to “cure” the portion of fish meat from mercury. Research has also been done in the past to show that mercury does in fact hurt the human body. Mercury’s toxic effects can cause damage to the brain, kidneys, and lungs, with symptoms including sensory impairment (vision, hearing, speech); lack of coordination; loss of hair, teeth, and nails; memory impairment; and insomnia. The results of this project would look like the mercury levels before and after the fish were soaked in the water and chlorella mixture. The results of this experiment will be taken in the unit parts per million. This will allow for more individuals to consume fish without accepting mercury into their system. The research highlights the importance of mercury and heavy metal toxins and may direct future research on the lessening of pollutants allowed in the food consumed by the public.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3060

Student Name(s):

Fair Category

Abstract:

Megakaryocytes are multi-nuclear hematopoietic cells located in fetal livers and adult bone marrows that are responsible for platelet production. Little is known about the regulatory factors that control the maturation of these platelet precursors. However, the protein Megakaryoblastic Leukemia Factor-1 (MKL1) has shown to be a vital regulator of maturation. MKL1 is kept inactive in the cytoplasm, and when activated, accumulates in the nucleus; its nuclear localization is critical for the cells' maturation. MKL1, with its cofactor Serum Response Factor (SRF), regulates expression of genes necessary for an increase of ploidy and other aspects of cellular maturation. Concentrating on the RhoA/SRF pathway and the Erk pathway, HEL cells (Human Erythroleukemia Cell Line) were treated with 12-0-tetradecanoyl-phorbol-13-acetate (TPA), inducing HEL cells to undergo megakaryopoiesis. Prior research showed cells treated with CCG-1423 inhibited MKL1 nuclear localization. We found cells treated with CCG-1423 do not inhibit actin polymerization via phalloidin staining. This was also true for the transcription of Ott-MKL1, a known transcriptional phenotype of Acute Megakaryoblastic Leukemia (AMKL). To scope whether CCG-1423 enhanced the negative feedback loop of the ROS/Erk pathway, flow cytometry was used, measuring ROS levels in cells treated with CCG-1423. There was no effect on ROS levels under CCG-1423 treatment. Finally, murine AMKL cells immortalized by Harvard University were treated with CCG-1423. These cells when treated with CCG-1423 showed no difference in proliferation or maturation in contrast to HEL cell treatment which showed cytotoxicity. These results lead to a new hypothesis that MKL1 is already inhibited in AMKL.

Word Count

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CSEF Official Abstract and Certification

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Since the 1950's, men and women alike have attempted to lose weight to maintain a healthier body. A recent National Health and Nutrition Examination Survey states that over 40% of women and 24% of men are actively pursuing weight loss, spending over \$30 billion annually on weight reduction products and services. Less than 5% are actually successful in achieving weight loss. Recent research into olfactory perception's effect on dietary habits may prove useful in providing an effective solution to weight loss. In particular, the d-limonene component of Citrus paradisi (grapefruit) oil has been shown to induce weight loss. This research investigates whether the scent of Citrus paradisi concentrated oil reduces dietary intake in mice. 30 Swiss white female Mus musculus specimens were housed in 10 separate Tecniplast laboratory-grade mouse cages over a span of 3 months, while their dietary intake was monitored. Following initial experiments to evaluate normal eating habits, a 25cm² paradisi concentrated oil was suspended in each of the experimental group's cages daily, and used to effuse odor. Dietary intake of mice subjected to the odor were measured, and compared to a concurrent control group, and previous eating habits of the same mice. Results demonstrate that mice subjected to Citrus paradisi consumed 25% less, suggesting an inverse correlation between oil scent and dietary intake. This measurable, dramatic decrease in appetite may shed light on the untapped potential of manipulating the olfactory receptors to affect a desired change in consumption.

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

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Word Count

Abstract:

Research has shown that as people age, their skeletal muscles shrink. Their satellite cell numbers also decrease. It takes longer for them to recover after an injury and they do not heal completely. Satellite cells are muscle stem cells. They play a major role in muscle regeneration. They are usually dormant, but are activated by the Notch Pathway after an injury is sustained. These satellite cells then rapidly multiply and differentiate into other cell types that help regenerate the damaged site. Anti transforming growth factor beta (Anti-TGF-B) is a substance that has been proven to help with muscular regeneration. Endurance training has been proven to increase the number of satellite cells in people's body. With the guidance of my mentor, I decided to combine these two processes and observe their effects on muscular regeneration. First, 4 groups of mice were injured with snake venom. Then, as a recovery method, they were either given just Anti-TGF-Beta, put on an endurance training regiment, received both processes, or received none at all (the control). The mices' gait was recorded before and after the injury. Whichever group's gait kinematics were the most similar from pre-injury to post-injury had the best functional muscular regeneration.

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CSEF Official Abstract and Certification

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Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment is to answer the question: Which buildings within Connecticut communities harbor the most bacterial life: libraries, post offices, town halls, supermarkets, or gas stations? My hypothesis states that more bacteria will grow in a building that facilitates bacterial entry, provides a hospitable environment, and undergoes minimal disruptions. My procedure included identification of 3 towns for data collection, 5 public building types, and 3 testable surfaces per building. Using Mannitol and MacConkey agars, I collected 3 samples per building on both agar types. After incubating the agar plates at 37°C for 48 hours, the bacterial growth was quantified and photographed. The data indicates that libraries harbor the greatest amount of bacteria, as almost half of all the bacteria grown was collected from libraries. This finding is supported by the hypothesis because a library is patronized by people on a daily basis, allowing for bacterial entry. Library books serve as a nidus of entry as they are exposed to bacteria from private residences. A library provides a stable, hospitable environment for bacterial growth as an ambient temperature, without extreme fluctuations, is maintained year round. Finally, books are not cleaned which allows for minimal disruption of the bacterial environment. In conclusion, libraries harbor the most bacterial life within the Connecticut communities studied.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

While previous studies have investigated the incidence of injuries among high school cross country runners, there has yet to be a study conducted to compare barefoot and shod running in this population. My experiment investigates the influence of these two conditions on biomechanical risk factors that have previously been associated with injuries in female high school runners. Eleven recreational runners participated in this study. Ten trials were conducted per condition for each runner. A trial was defined as one run down the fifty foot long track with the runners striking the force plate with their right foot. Step frequency, step length, contact time, knee flexion angle in the stance phase, sole angle at touchdown, the peak impact force, and the length of time the maximum force was sustained for were compared between both conditions. Stride length and contact time were both shorter in the barefoot condition, which led to less prominent rearfoot striking among the majority of runners. The knee flexion angle and sole angle were also smaller when barefoot, which are both impact reducing mechanisms. Impact forces were higher in the barefoot condition, as was expected for runners who typically run with shoes. However, other biomechanical adaptations were clearly made. This includes a shorter period of time during which the maximum force was sustained during barefoot running in comparison to shod running. This information could be used to support a prospective study that follows barefoot and shod high school runners to determine the incidence of injury in each group.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3069

Student Name(s):

Fair Category

Word Count

Abstract:

Nepal is a land locked third world country in the Himalayan region. More than 90% of its population is dependent on subsistence farming, and agriculture is the single largest industry. Land use changes including urbanization and deforestation have led to changes in farming. The impact of urbanization and deforestation on soil composition and fertility has not been well studied. In this project, the composition of soils obtained from control, urbanized, and deforested environments were studied to determine differences in soil fertility using Cation Exchange Capacity, pH, as well as other measures of soil composition. Soil samples were collected at each of three sites (urban, deforested farm, and control). Nine samples were taken per plot in each of three sites per area. Soil was dried, pulverized, and passed through a 2mm sieve before analysis. Results demonstrate that surprisingly, the deforested areas tended to be more fertile than both control and urban areas. Urban soils had lower nutrient levels, thus impacting their ability to sufficiently support most of the subsistence plants grown by local farmers, whereas nutrient enrichment in deforested areas from recycling of trees and vegetation led to more fertile soils. These results suggest that further urbanization will likely lead to soil degradation and, in the long run, will impact overall crop and subsistence farming yields.

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4. Is this project a continuation? Yes No

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Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: An Environmental Study of How Fuel Efficiency is Affected by the Addition of the Bio-Fuel Ethanol.

Student Name(s): J. Siveyer

Fair Category

Abstract:

Since there is focus on the impact of fossil fuels and their effect on climate change, a more environmentally friendly option is using renewable fuels such as ethanol, which is made by fermenting plant matter. Due to the lower energy ethanol produces is it a viable alternative fuel source? This experiment compared ethanol to gasoline. After determining the amount of ethanol in a sample of regular gasoline (8%), blends were made with varying amounts of ethanol (8%, 14%, 19% and 25%). Next, a generator was preheated under a constant load. Then, 100ml of the 8% blend was put in the generator and the elapsed run time was recorded. This was repeated 5 times for each blend. The whole experiment was then repeated using 50ml of each blend. The experimental data shows that as the ethanol to gasoline ratio increases, the efficiency of the fuel decreases. Using an 8% ethanol ratio (found in normal gasoline) as the control, the change was as follows: With 14% ethanol there was a 4.77% reduction in the fuel efficiency compared to the control. 19% ethanol had an 8.25% reduction, and 25% ethanol had a 15.13% reduction. My results showed a decline proving that ethanol is less efficient than gasoline; in fact the decline was higher than expected. While I proved the inefficiencies of ethanol, it's still a potentially low cost, renewable resource that can use waste products. Emerging technologies are predicted to make cellulosic ethanol overcome some issues, making it a good alternative/additive to gasoline.

Word Count

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CSEF Official Abstract and Certification

Fair Category

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

I came up with this project with the intended goal of observing adaptation (and therein some degree of evolution) in a population of microorganisms because of their fast reproductive rates and great adaptability. I decided to use cyanobacteria of the genus *Gloeocapsa* due to their easily affected photosynthetic nature. A culture of these organisms was split into six different vials, each containing an equal volume of 'algae'-containing liquid (7.5 mL per vial). Each population was then estimated by taking a sample of the culture (a single drop) and counting the number of visible organisms under a microscope. This number was then scaled up by volume (12 drops = 0.5 mL of fluid) to estimate the total population of each vial. Then each of the six vials was placed into a separate isolated cubicle to be exposed to a different amounts of light exposure (24 hrs, 12 hrs (control), 9 hrs, 6 hrs, 3 hrs, & 0 hrs). These populations were to be estimated at regular intervals of every other day for 2 months using the aforementioned sampling method, and observations of population depletion and subsequent regeneration was to be the indicator as to whether and how well these organisms were adapting to their new environments. Initial conclusions seem to show that higher levels of light exposure proved detrimental to the *Gloeocapsa* populations, particularly the 24- and 12-hr vials. However, inability to sample the populations as regularly as needed to ensure validity renders these conclusions as weakly supported.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3072

Student Name(s):

Fair Category

Abstract:

Tourette Syndrome (TS), an inherited neuropsychiatric disorder, creates a deregulated immune system with Obsessive-Compulsive Disorder (OCD) comorbidity. In mice, excessive grooming characterizes OCD. Mutations to histidine decarboxylase (HDC), which biosynthesizes histamine, create a rare genetic cause for TS. It is unclear whether microglia have any direct influence on behavior in OCD and TS. It is hypothesized that lack of histamine four (H4) receptor expression will not ameliorate behavioral symptoms of TS. H4 receptors in HDC-KO (knockout), HET, and WT (wild type) mice were targeted, using antagonists and agonists. Cells were examined by immunohistochemistry using antibodies against CD11b, Iba1 and F4/80 markers. Mice were transcardially perfused, fixed, cryoprotected, and then sliced. Slices were immunostained using secondary antibodies coupled to biotin and avidin-biotin complex for diaminobenzidine amplification. Using bright field confocal microscopy, striatal stained cells were quantified. Previous research indicates a relationship between histamine and TS stereotypies in HDC-KO mice. This study found microglia with reduced H4 receptor activation are morphologically different from WT, with significantly different optical densities. Successful striatal Iba1 staining proves the ability of agonists to activate microglia, even in HDC-KO mice, which had a reduced number of HA receptors. The HDC-KO mice exhibited neuroprotective (versus cytotoxic) activation, indicating a new functionality for the microglia, confirming the hypothesis that not all microglia behave in the same way, nor serve the same purpose in the central nervous system (CNS). Future implications include characterizing the microglial abnormalities and clinical trials in developing a medication for humans with such compulsive disorders.

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CSEF Official Abstract and Certification

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Title:

Student Name(s):

Fair Category

Abstract:

While the primary visual cortex is credited for visual processing, the parietal lobe is said to have a preliminary role, though it is not well documented. If functional activity of subjects presented with different rest conditions is compared, then regions of the parietal lobe will exhibit activity increases while others will exhibit decreases when task demand is increased. This is because activity increases in parietal regions are associated with top-down modulation and cognitive tasks, while activity decreases are proportional to task difficulty. The functional magnetic resonance imaging of the brain (fMRIB) dataset analyzed, Brainscape_BS003, was acquired from Biomedical Informatics Research Network (fBIRN), converted from “.dicom” to “.nii” format, and analyzed with fMRIB Software Library (FSL). Retinotopic mapping was used to define regions of the brain within FSL. When task demand is increased, task-positive regions of the parietal lobe experience activity increases while task-negative regions experience decreases. There is behavioral competition between task-focused attention and stimulus-independent thought, which increases activity in task-negative networks and decreases activity in task-positive networks. The identified task-positive regions are proposed to play a supplementary role to visual processing. In this manner, defining the role of the parietal lobe in visual processing allows for a better understanding of attention-based conditions in humans, such as ADHD and autism.

Word Count

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Proj. Title:

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Student Name(s):

Fair Category

Word Count

Abstract:

In the 80s, we started studying how certain proteins can kill cells with tumor-like features. Until very recently, these proteins have not been widely approved by the FDA. They are a viable option as a non-surgical treatment for some types of cancer. This drug, Perjeta, is used in the treatment of HER2+ cancer. This is an uncommon version of the more common HER2- type. This drug uses a monoclonal antibody that prevents dimerization with the HER2 receptor. This slows the tumor so that it does not get the signal to grow and therefore would die off. More drugs like this are going to be discovered, and they will have a huge impact on the market. For example, they remove the hassle of scheduling office visits and paying for a surgeon. This removes the stress of having this disease allowing those who had it, a faster return to their normal lives. This also had large economic effects. These treatments would save both insurance companies and patients thousands of dollars.

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Title:

Student Name(s):

Fair Category

Abstract:

The U.S. is extremely reliant upon fossil fuels, especially greenhouse gases. Because of this, we contribute enormously to the emission of greenhouse gases. Greenhouse gases, such as carbon dioxide, absorb long wavelengths of light rather than allowing them to pass through the medium as shorter wavelengths do, thus causing higher resultant temperatures and increasing the concentration of CO₂ in the atmosphere. If we could use a natural remedy to lower the concentration of greenhouse gases in the atmosphere, we would see less of this effect referred to as “global warming.” Coccolithophorid Algae, like most species of algae, are known to go through the process of photosynthesis in order to produce ATP. However, unlike most other photosynthetic life forms, coccolithophores do not release the CO₂ that they produced back into the atmosphere when they die; they capture it. Based on this knowledge, I decided to experiment with this seemingly useful species. Using 2-litre bottles, soil, sea salt, and coccolithophorid algae, four isolated environments were created. The control had no algae, and the other three had increasing amounts of algae. Once set up, the concentration of carbon dioxide in each bottle was measured, and again after three days. I hypothesized that introducing increasing amounts of coccolithophorid algae to an environment would decrease the level of CO₂ in that environment. When 3 samples of coccolithophores were introduced, the decrease was 74.7% higher than when no algae were introduced. This research shows that coccolithophores can be used as a natural remedy to global warming.

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Abstract:

The purpose of this research and experiment was to determine the effects of sound/noise on palaemonetes (ghost shrimp) behavior to include: orientation, avoidance, attraction to a sound source and ability to collect and consume food. This experiment and research will help improve field research, which can be extremely complex since there are no easy methods to associating absolute responses to specific noise levels. This experiment investigated the effects of changes in noise/frequency, ranging from 0 Hz to 1500 Hz, and observed their influence to marine life behavior and response. The most affected area of the results was the decrease in ability for the ghost shrimp to collect and consume food with the increase of frequency. The results give insight to more complex marine life during a time of increased noise pollution resulting from activities such as oil reserve exploration and boat traffic.

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Abstract:

In today's age antacids are used by many people in order to counteract uncomfortable acid reflux, which can be an indicator of Gastroesophageal Reflux Disease. Antacids and other medications, used over the counter, create a more basic stomach environment. It is therefore hypothesized that the effect of this change in pH had a direct effect on nutrient breakdown; therefore Iron Citrate capsules and Folic Acid capsules were incubated in artificial stomachs (pH 1, 4, and 7) for two days at 37 degrees Celsius. These samples were analyzed light scattering in order to determine the nutrient breakdown of the nutrients using a homemade piece of equipment (created with the aid of the mentors), constructed from a condenser, a photometer, and a magnetic stirrer. The data collected showed consistent decrease in the amount of light reaching the central photometer in the trials containing folic acid capsules and iron citrate capsules. This decrease in the amount of light arriving at the central photometer indicates that there is a greater amount of light being scattered to other locations within the box. This scattered light is due to increase in number and size of particles remaining in the artificial stomach. In conclusion, as the pH of the artificial stomach became more basic the particle size increased, showing lower rate of breakdown. These results, if followed by more extensive research into different types of nutrients and more pH levels, could lead to an awareness of dietary supplementation in patients on antacids.

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Student Name(s):

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Abstract:

This research determined the concentration of yeast bacteria over time when olive oil is added to a yeast solution. The purpose is to see whether olive oil has the potential to receive a place in the world of food preservation. 12 different yeast solutions were created and 5 mL of olive oil was added to each. A spectrophotometer was set at 620 nm to determine the transmittance, but most importantly the absorbance of the mixture. After the absorbance was collected the concentration was able to be calculated. Data showed a gentle decrease in absorbance, therefore due to Beer's Law a decrease in concentration was also present. Two of the four solutions of yeast presented more problematic results where the spectrophotometer would not give off a reading for absorbance. But the little data from those two trials shows a similar trend developing at a slower pace. Based on the data it is clear that the concentration of yeast bacteria while in a mixture with olive oil does decrease. Yet, more research is necessary to finalize whether olive oil has potential in the business of food science. If that statement is proven its effects could potentially change the way we look at preservatives, giving the common consumer confidence that they know how to pronounce, and they know the preservative is just as healthy as the food they are putting into their bodies.

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Fair Category

Abstract:

With the ever increasing amount of overpopulation, there is an average of 12+ suicides per 100,000 people, per year in relation to stress, the number consistently growing. Sensory Deprivation is a process in which a person undergoes a deep meditative state that causes the brain to go into remission by isolating all of their senses. This was achieved using a facility called Ifloat Westport and their isolation chambers, where a person floats on a body of water, unable to see, hear, smell, taste, or feel for the duration of a full hour. Through many layers of research, I hypothesized that if I modified and altered the Pre-Sensory-Deprivation method in order to stimulate activity in the brain's Pre-Frontal Cortex, Pituitary Gland, and the Hypothalamus, then the short-term and the long-term positive effects of Sensory Deprivation, such as reduced stress, will be enhanced and elongated/prolonged. Eight total test subjects were separated in the control or variable group and each person spent an entire hour in a deep meditative state in an isolation chamber. Before the sensory deprivation, each person was tested for their blood pressure, heart rate, and cortisol level as well as their own perception of their mental, physiological, and physical state. Afterward, the test subjects in the Independent Variable group performed a series of procedures to spark activity in the certain parts of the brain. After the test subjects floated for a full hour, another set of data was recorded. The difference between the IV and Control was substantially prominent.

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3080

Student Name(s):

Fair Category

Word Count

Abstract:

Growing up near the ocean, I have always been fascinated by the life within it and concerned of the effects that climate change have on this incredible biome. I decided to study the effect that warming temperatures have on oyster and quahog water filtration efficiency. My hypothesis was that warming temperatures would increase the filtration efficiency of the oyster because they are native to the southern parts of the eastern seaboard and because of metabolism speeding up from the warmth. I hypothesized that the quahog would also filter more efficiently but less because I was told by a oyster specialist that they shut down after 30 degrees. I had the 1 bivalve per fish bowl and did 3 experiments at three various temperatures (18,22 & 25) the bowls also had phytoplankton in them and every 15 minutes I took a sample of each bowl and put it through a spectrophotometer and a fluorometer. Over time, it was clear to see a change in the clearness of the water. At ambient temperature, they stayed together but when the temperature was raised, the oyster clearly filtered much faster while the quahog did not even open for the entire experiment. My hypothesis was nearly correct, I just did not realize that the quahog would go into such shock in the warm water. If I was to extend on my research, I would have done more trials of the temperatures. I fully enjoyed partaking in this research project regardless.

Special Categories Selected by Student:

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 vertebrate animals controlled substances

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3081

Student Name(s):

Fair Category

Abstract:

Filamentous actin (F-actin) serves a crucial role in governing cellular shape and movement. Therefore, the processes by which it behaves and is regulated have been extensively studied. This explosion of information is promising, but it also presents a new challenge; as our understanding of actin grows, our questions about it become more complex. Mathematical modeling enables biologists to study and make predictions about cellular systems. The rule-based approach to modeling can deal with highly-complex systems, such as actin. However, this approach is characterized by a steep learning-curve, which discourages biologists from creating and using models. In this work, I design and implement an environment for rule-based modeling of F-actin that is as equally intuitive and convenient to the curious student as it is to the professional researcher. Specifically, I design a library of rules that includes observed and hypothesized activities involved in the formation of F-actin; develop a web-based tool that enables users to query this library and generate models of interest; and create a framework that allows users to select additional details from which to generate increasingly complex models. The tool surpasses its original goal, as its data structure is compatible with any cellular system. This provides scientists a powerful modeling environment and testbed. Future investigations will focus on allowing for on the fly introduction of user-defined molecules, rules, and model parameters, extending models beyond their original libraries. Ultimately, I plan to distribute the source code to enable other labs to implement their own rules constructors.

Word Count

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3. This project was conducted at a Registered Research Institution. Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Primary Cilia Vesicle Secretion and Resorption Facilitate Cell Communication

Student Name(s): A. Agarwal

Fair Category

Abstract:

Cilia are highly conserved sensory organelles present on the surface of nearly all vertebrate cells and are strictly regulated by external and internal cues such as light, odor, fluid flow, etc. Inborn defects in cilia cause diseases known as ciliopathies such as polycystic kidney disease and Bardet-Biedel Syndrome (BBS). Primary cilia serve as external sensors due to the specific accumulation of signaling molecules such as G-protein coupled receptors (GPCR) at the ciliary membrane. Ligand activation of GPCRs triggers signaling cascades from the primary cilia which can control different cell responses. However, such signaling cascades can also lead to changes in primary cilia morphology and stability. The goal of this study was to understand how accumulation of active GPCRs can affect primary cilia morphology to promote cilia reabsorption. Analyses of primary cilia morphology were done by live cell imaging through spinning disc confocal microscopy in cells expressing a fluorescently labeled hyper-active GPCR at the ciliary membrane. Accumulation of active GPCR at the primary cilia triggered vesicle secretion in 73% of the primary cilia analyzed. In addition, about 63% of the cilia that secreted vesicles were reabsorbed by the cell. This indicates an intrinsic relationship between ciliary vesicle secretion and cilia reabsorption. These observations afforded a novel model for ciliary vesicle secretion and reabsorption as a possible mechanism to regulate signaling cascades from the primary cilia. Future and ongoing studies will be focused on studying the absorption of secreted vesicles by other cells and possible roles of this biochemical communication between cells.

Word Count

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3083

Student Name(s):

Fair Category

Word Count

Abstract:

The lack of a modern database of Asian American / Pacific Islander (AAPI) Youth perceptions of stress and coping mechanisms motivated this study. The concept of “choking,” in which people struggle under the high pressure of expectations (i.e. academic, social, parental, self) was a major focus in the study, to determine how AAPI youth cope under duress. The study was conducted in two parts. First, the study determined specific terms that tend to stress AAPI youth out and causes for AAPI youth to use drugs (a negative coping mechanism). Then, participants were asked to categorize the terms to see how AAPI youth perceive different terms. For the second part, participants were analyzed based upon responses to an in-depth interview. As a sub-study of a larger research, the category of self-esteem was developed into a set of questions, included in the interview guide, which also explored stereotypes, self-identity, parental control, and parental expectations, in addition to previously mentioned topics. A majority of participants had high levels of stress and pressure to meet expectations. Also, the majority had a medium level of self-confidence with high self-respect. It can be concluded stress level affects confidence, and consistent perceptions of academic failure of parental, self, and other expectations led to increased stress and a lower self-confidence, introducing various coping methods, such as setting lower expectations. However, people with high levels of self-confidence are capable of reflecting on past achievements in times of failures and focusing long term instead of coping negatively.

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Plastic products, used by our society daily, require biodegradation, which is becoming a necessity for removal from the environment. The goal of this project was to evaluate if exposure to pseudomonas putida (*P. putida*) induces biodegradation of plastic. Six plastics (polyethylene terephthalate, high-density polyethylene, polyvinyl chloride, low-density polyethylene, polypropylene, and polystyrene) were exposed to *P. putida*. High-Density Polyethylene was expected to demonstrate the largest degradation after *P. putida* exposure because it is known to breakdown more rapidly than any other plastic. Samples from six plastics were weighed using a Mettler Toledo analytical balance. *P. putida* (Carolina Biological) was placed into media for 5 days to expand the population. *P. putida* solution (5 mL) was pipetted into 30 test tubes. 5 mL of media broth was pipetted into 30 additional test tubes as a control. Plastic samples were inserted into the 60 test tubes kept at 25C for seven days. Plastic samples were removed from media, dried for 24 hours, and weighed for final measurement. The primary outcome was the difference in weight before and after the samples were exposed to *P. putida*. For additional information regarding plastic degradation, scanning electron microscope (SEM) was used for photographs of six samples. The data demonstrates weight reduction in all plastics, except polyvinyl chloride, following *P. putida* exposure. However, these differences did not reach statistical significance. The largest weight difference was found in polyethylene terephthalate, mean difference of 0.202275 (control 0.00002). Limitations to this experiment were the duration of exposure and period of drying.

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4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3085

Student Name(s):

Fair Category

Abstract:

Full spectrum white light therapy (10,000 lux) is used to treat Seasonal Affective Disorder (S.A.D.). Anecdotal reports of facial skin cancers in S.A.D. patients inspired this experiment. This study was designed to examine the effects of a light activated endogenous photosensitizer under in vitro conditions. Beta Carotene (BC), a naturally occurring vitamin A derivative, is a strong absorber of blue light. The white light sources used in S.A.D. therapy have a strong blue component. To determine whether these lights could activate B.C., 93 micromolar BC was incubated with a custom synthetic oligonucleotide (ATATGCATAT), and then exposed to intense white light from a S.A.D. phototherapy unit (Go-Light) for up to three hours. It was expected that the target Guanine would form 8 oxoguanine. This modification disrupts the ability to base pair with cytosine; which could possibly lead to a site specific mutation. Mutations like this have been shown to occur in human skin cancers. The synthetic oligonucleotide from the original experiment was analyzed by MALDI-TOF spectrometry (by an associate at Ohio State University). This technique can detect molar mass changes as small as 1 g/mole. The formation of 8 oxoguanine causes a change of 16 g/mole. These analyses showed that there had been some degradation of the oligonucleotide. Therefore in a new experiment the BC concentration was reduced to 12 micromolar but no evidence of photomodification was detected. In future experiments we will use intermediate concentrations of BC.

Word Count

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4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Everyday millions of people across The United States have difficulty sleeping. The National Institutes of Health report that 30 to 40 percent of adults have symptoms of insomnia each year. Many people try listening to music to help them sleep. Are there any positive or negative effects to listening to music while sleeping? Would certain types of music allow us to get into deeper sleep, which would provide us with more rest? These questions have lead to Prime Health Care Sleep Disorder Center and Harry Bender, a registered sleep technician and director of the facility. Sleep is divided into rapid eye movement sleep (REM) in which we dream, and non REM sleep (NREM). The NREM sleep is further divided into light sleep, or deep stage three sleep. By measuring brain waves during sleep, sleep stages can be determined. During this study my brainwaves were recorded during three separate nights of sleep. One night was spent without music, one night listening to Rock music, and the final night with classical music. The sleep stages were scored by Mr. Bender. The study showed that stage three, considered to be the most restful stage of sleep, was found in the highest percentage during the sleep were no music was played. The lowest amount of stage three sleep was during Rock. Classical music was intermediate. This study suggests that listening to music while sleeping may not improve deep restful sleep. Indeed, listening to rock music may decrease the percentage of deep restful sleep.

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4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3087

Student Name(s):

Fair Category

Word Count

Abstract:

Conventional chemical assays of water samples typically target certain chemicals and are difficult to apply to a broad range of water contaminants. An economical and robust bioassay method for determining the toxicity of water contaminants should help improve public health worldwide. This research explored the effect of six common water contaminants - CuSO₄, ZnSO₄, NaNO₃, HgCl₂, Atrazine, and Permethrin, on the bioluminescence of the Panellus Stipticus mushroom. Panellus Stipticus was cultivated using two methods; a nutrient culture method and a plug spawn method. The harvested mushrooms were introduced to contaminants that were diluted according to EPA Maximum Contaminant Level values and at other varying concentrations. Decay in Panellus Stipticus bioluminescence intensity was visually monitored as well as measured using a Sper Lux/FC meter. Decay can be visibly observed with bioluminescent intensity reduction of 10%. The bioluminescent intensity of Panellus Stipticus was measured at 4.7 lux. 30 minutes exposure to metal salts, CuSO₄, HgCl₂, and ZnSO₄, reduced the bioluminescent intensity by 68-72%. 90 minutes exposure to alkali metal salt contaminant, NaNO₃, showed a reduction of bioluminescence intensity by 15%. Panellus Stipticus subjected to Atrazine and Permethrin contaminants showed a reduction of bioluminescence intensity by 12-13% after 150 minutes. Bioluminescence intensity decay of 10% or greater could be detected within 130 minutes under all contaminant concentrations. This makes Panellus Stipticus a viable qualitative and quantitative biosensor to detect toxicity of water sources.

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

The purpose of this experiment was to use *Vibrio fischeri* as a broad-spectrum bioassay to assess the toxicity of local water sources as indicated by the level of pollutants in water and sediment samples. It was hypothesized that *Vibrio fischeri* would bioluminesce more brightly and dim more quickly when exposed to toxins in nutrient-dense water which contained sediment samples. *Vibrio fischeri* was cultured in photobacterium broth vials from an original Carolina Biological *Vibrio* culture. A sterilized inoculating loop and aseptic techniques were used to inoculate the sterilized broth tubes. Tubes were stored in a cool, dark place for 24 hours. Once fluorescence was confirmed and measured, using a Vernier Spectrovis, to establish a baseline, 2 mls of 25 degree celsius water from each of the five sample sites were added to individual tubes. Fluorescence was measured at 3 second intervals for 5 minutes. Three trials were conducted for each of the five water/sediment samples. Data was then graphed and analyzed for statistical relevance. It was concluded that although various samples fluoresced more brightly and dimmed more quickly, indicating higher levels of pollutants, further studies need to be conducted to assess the water quality of each sample (pH, turbidity, nitrogen, dissolved oxygen, etc) in order to draw a correlation between fluorescence and level of pollutants.

Word Count

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4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

There are many known factors that alter ones reaction time. Finding a correlation between a person's height and their reaction time would be significant information because taller people can train themselves to boost their reaction time. This information would be important to taller people if the data supported that there is a difference in reaction time. In life threatening incidents one's reaction time can determine one's survival. The experiment tested to see if there is difference in reaction time in longer neuron length (in a taller person), and shorter neuron length (in a shorter person). When conducting the experiment, subjects were organized into two different groups; one group is 5'8" and shorter and the other is 5'9" and taller. Then the subjects had their reaction time tested on an online program. The results showed that there was no significant difference between the two groups. In conclusion, a persons height does not alter reaction time significantly.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In my project I looked at the effect of inattentive blindness throughout the ages of different students. I went to a local Elementary and Middle school, Sacred Heart School in Groton, to conduct my experiment. I wanted to see if the level of inattentive blindness increased, decreased, or stayed the same in ages ranging from 6-14. I went to Sacred Heart, after collecting all my permission slips, ready with a video and a questionnaire. I went into each grade and showed the students a short video of a man flipping over cards. The catch was that there was writing on the back of about eight of the cards. The idea was to see if the students saw the words or not. This would give me the answers about inattentive blindness. After the students watched the video they had to answer a few questions. These sheets were all kept anonymous. The data that I was looking for was, whether or not they had seen something unusual and if they had noticed what it was. I also asked for their age and gender. In my results I did not see a significant enough change to warrant positive results. If I could do it again I would do it with a bigger sample size and older people.

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3091

Student Name(s):

Fair Category

Word Count

Abstract:

Embryonic stem cells have been of key interest in the biotechnological community because of their pluripotent abilities, allowing them to differentiate into an array of different cell types. In particular interest is the presence of the mesendoderm, which forms during the early stages of gastrulation and is believed to be bipotent for both endoderm and mesoderm cells. The focus of this experimentation was to first differentiate the human embryonic stem (hES) cells to a mesendoderm intermediate through the use of growth factors WNT3A and Activin A. Once at a mesendoderm intermediate, the different timings of introduction and concentrations of the growth factor bone morphogenetic protein-4 (BMP4) necessary to produce cells of the mesoderm lineage in a WNT3A and Activin A deficient environment was explored. Real-time qPCR and electron microscopy were used to determine the expressed genes and the cell morphology, respectively. Through the exposure of BMP4 in culture, the mesendoderm cells formed an assortment of cells that were similar to both endoderm and mesoderm cells in cell morphology and gene expression. In the future, an Activin A inhibitor should be used to limit endoderm differentiation. Also, it was shown that 18-hour introduction of BMP4 yielded the highest amount of mesendoderm cells. These findings indicate a possible new procedure for producing mesoderm cells from an hES cell derived, mesendoderm intermediate.

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4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3093

Student Name(s):

Fair Category

Word Count

Abstract:

Lyme disease is an emerging infectious illness caused by the bacteria *Borrelia burgdorferi*. The disease, endemic throughout the Northeast and upper Midwest, can present therapeutic challenges and cause diverse symptoms in its disseminated stage. Though a vaccine active against *B. burgdorferi* was manufactured for a period in the 1990s and early 2000s, that immunization was discontinued by its developer after poor sales, which were mainly due to concerns over side effects and the need for repeated booster injections. Though the side effects were later proven spurious, the requirement for boosts remains. This study sought to assess whether immunization with a vaccine antigen (OspA and OspC) and adjuvant (MPLA) delivered within the biodegradable, FDA approved nanoparticle PLGA improves immunogenicity in comparison to conventional immunization using antigen emulsified in adjuvant. It was hypothesized that encapsulation of the vaccine antigens within PLGA would elicit higher initial antigen-specific antibody titers and increased protection against challenge infection when compared to conventional immunization using antigen emulsified in adjuvant, as well as higher antibody titers, particularly titers of the subset that provide protective immunity. Data suggest that the use of PLGA generates an increased immune response with less antigen and may enhance the production of the antibody subset that confers protective immunity. These results contribute to a growing body of Lyme disease vaccine models and drive progress towards the ultimate goal of a well-tolerated, highly immunogenic human vaccine.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Over the past few years, reading scores in the US have remained at proficient while other countries have been making rapid improvements, resulting in the US slipping in international rankings. The purpose of this study was to determine if parental reading behavior affects child reading behavior. Based on past research, it was hypothesized that parental reading behavior would have an effect on children's reading behavior. To accomplish this, twenty-one third and fourth graders and their parents completed a survey on reading behavior and extracurricular activities. Their teachers were asked to rate children's reading abilities. Data was coded and analyzed using SPSS and Excel. Results show that based on characteristics of reading behavior analyzed, all have a strong relationship. It is concluded that parental reading behavior appears to have an influence on child reading behavior. Additional analyses on the effect of sports and video games on children's reading levels shows that playing sports does not affect child reading level while playing video games does not affect reading level unless children play for more than half hour at a time on the weekend. Playing for more than half an hour is associated with lower reading level. The results also show that by third and fourth grade, children who read alone have a higher reading level; therefore parents should encourage their child to read alone after third grade. This suggests that parents play an important part as role models in the literacy development of their children.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Diabetes affects approximately 25.8 million people of all ages across the world. Factors such as food, activity, and medication can affect glucose levels, but moderate altitude may be an additional factor. In the experiment that was conducted, a reference point was used at the beginning of a lengthy slope, labeling this beginning point as an altitude of 233 feet. The volunteer's blood glucose was measured. He was then to exercise to raise his heart rate to 60% of his resting heart rate, so that changes at the altitude may be monitored. After the heart-rate returned to "normal", the participant's blood glucose was measured once more. The procedure completed at 233 feet was repeated at the new altitude of 950 feet, which was at the top of Talcott Mountain located in Simsbury, Connecticut. There were clear, easy-to-see changes in the blood glucose due to altitude changes, even when oxygen level changed due to altitude changes are accounted for. The individual's blood glucose was seen to decrease at moderate altitude, whereas it was seen to increase at an altitude of 233 feet. The results of this experiment can be used in all aspects of addressing diabetes, including diagnosis, treatment, and technological advancements. In addition, it can help aid diabetics in whether or not they should be more cautious and careful when it comes to engaging in physical activity such as mountain climbing. Overall, the experiment that was carried out provided answers to a few unknowns surrounding the knowledge of altitude and diabetes.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

With gasoline coming from a nonrenewable source, interest is increasing in developing renewable sources of fuel. Cellulosic ethanol is one of these fuels under research. This experiment focused on the last part of the process of turning the cellulose into glucose. The test was to see whether using an enzyme called beta-glucosidase, or using hydrochloric acid produced more glucose in the final step of hydrolyzing sucrose to glucose and fructose. It was hypothesized that the enzyme beta-glucosidase would hydrolyze more sucrose to glucose than the standard hydrochloric acid method, because hydrolyzing sucrose is the function of this enzyme. The way this was tested was by adding either hydrochloric acid or beta-glucosidase to beakers with a 32% concentration of sucrose. Then using a diabetes tester the amount of glucose produced was measured then compared. What was found was that for a 32% concentration, hydrochloric acid produced around 1 gram of glucose and beta-glucosidase produced around 3 grams of glucose, about 3 times more. The data shows that when hydrolyzing sucrose beta-glucosidase is able to produce more glucose than the hydrochloric acid and will be more effective in the process of turning cellulose into ethanol for fuel.

Special Categories Selected by Student:

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3098

Student Name(s):

Fair Category

Word Count

Abstract:

Eurasian water milfoil (EWM) is an invasive species of aquatic plant that grows in thick mats with stems that can grow up to three meters long. The milfoil grows and spreads rapidly, crowding out native plants, interfering with recreational activity, and causing severe ecological damage. Since its accidental introduction into the United States in the 1940's, milfoil has been found in almost every state. Present methods of control include the use of dangerous chemical herbicides that cause mortality in non-target species such as native plants and aquatic vertebrates and invertebrates. I developed an approach towards controlling EWM using small native aquatic insects that feed on it called milfoil weevils. Adult weevils lay their eggs on the stems of milfoil plants, and once hatched the larvae burrow into the stems destroying them. After four weeks exposure to the milfoil weevils I measured both the stem growth rate and overall biomass of the milfoil. I discovered that the weevils were effectively able to control the growth of EWM dependent upon weevil stocking density. In addition, I compared it to the herbicide Diquat. Although effective, it was toxic to non-target species and aquatic invertebrates. Therefore, I was able to demonstrate that biological control using milfoil weevils is a promising approach towards controlling the growth of this ecologically dangerous and economically threatening invasive species.

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Use of Stem Cell Engineering to Test The Function of a Genetic Variant for PTSD

Student Name(s): A. Kelly

Fair Category

Word Count

Abstract:

Development of post-traumatic stress disorder (PTSD) has been linked to environmental and genetic factors including childhood trauma and genetic differences. The FK506 binding protein (FKBP5) has been to this disorder. The single-nucleotide polymorphism (SNP) that has been most associated with PTSD is rs1360780. SNPs occur when base pairs in DNA differ at the same site in the genome between two individuals. To study the involvement of this SNP in FKBP5 regulation, an in-vitro model of PTSD was constructed using genome editing of human embryonic stem cells (hESCs). To do this we engineered two lines of hESCs that were either homozygous (A/A) for risk or homozygous (G/G) for the protective allele. The two homozygous cell lines created had identical genetic backgrounds except at the single rs1360780 site. The advantage of using hESCs is that they are pluripotent and can differentiate into different types of cells including neurons. The effect of stress on neurons, mimicking the gene-environment interactions observed in the brain, can be induced by the addition of glucocorticoid using the drug dexamethasone (Dex). We compared the effect of Dex on the neurons differentiated from the PTSD risk hESC line to that of the neurons differentiated from the PTSD protective hESC line using RT-PCR. It is expected that there will be more of a change in expression of FKBP5 in the PTSD risk neurons than in the PTSD protective neurons. Understanding and characterizing this gene-environment mechanism is crucial to the development of new therapies and treatments for PTSD.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3101

Student Name(s):

Fair Category

Word Count

Abstract:

Wastewater contamination is a prevailing problem in our society. Among the many different pollutants, two common contaminants are copper and chlorine. With health hazards and environmental impacts caused by these two toxins, a treatment for wastewater is crucial. Over the years two novel materials called Graphene Oxide (GO) and Titanium oxide (TiO₂) has proven to hold successful characteristics for the absorption of these contaminants. This study uses TiO₂/ GO to investigate the absorption efficiencies of Tris(2-chlorethyl) phosphate (TCEP) and copper sulfate (CS) in wastewater. Two studies were conducted in which two variables were tested: Immersion Time of TiO₂/ GO Films and UV Exposure to TiO₂/ GO powder. Both the films and powder were exposed to a mixture of TCEP and CS and an XPS Analysis was used to quantify the absorption. Both studies show that Cu and Cl were successfully absorbed. For the Immersion study, an increase in the Cl 2p peak and Cu 2p peak occurred with the increase of immersion time. This was similar for the UV Exposure where there was an increase for the exposed sample of the contaminants as opposed to the unexposed one. This preliminary study works to further the application of Nano-technology and water purification.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

It is generally agreed that widespread advertisements influence consumers' food choices. Often, unhealthy choices, such as fast food, are promoted. In 2009, the fast food industry spent \$4.2 billion marketing their products. The need to find a new, effective way to promote healthier eating is essential. This project examined whether subliminal messages could affect one's food choices. It is hypothesized that if participants watch a video containing subliminal messages depicting specific food options, then their food choices will be influenced. To test this hypothesis, subliminal messages in the form of fast flashing images were overlapped in a video. Three variations of this video were created displaying healthy, unhealthy, or no food options. Each group of participants watched one variation of the video and later completed a series of surveys. The first two surveys questioned all participants on their views of America's eating habits and their desires for specific food options. A third survey asked participants (who were not in the control group) to recall subliminal messages seen within the video. Survey results, based on a 1-5 likert scale, showed that 55% of the control group craved unhealthy foods; 85% of the group who watched the video containing unhealthy subliminal messages craved unhealthy foods; and 30% of the group who watched the video containing healthy subliminal messages craved unhealthy foods. Overall, the subliminal messages had an effect on the participants' food choices. If subliminal messages can be used in society, then this technique could improve the eating habits of many.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3103

Student Name(s):

Fair Category

Word Count

Abstract:

Fetal Alcohol Syndrome affects thousands of babies across the world, and inspired me to conduct a trial on ethanol's effects on zebrafish. FAS is a condition that causes children to have primary cognitive and functional disabilities, as well as a greater chance of developing drug and alcohol addictions. I am interested in testing the effects of ethanol on zebrafish embryo development to understand more about the way it may impact development of a growing child in utero. The zebrafish in the trial were exposed to the different concentrations of ethanol over a 4 day fertilization period. The concentrations were .25%-1% 95 grade ethanol in .25% increments, along with 5% and 10%. The varying concentrations were based on the concept of dose response, where the zebrafish were observed for characteristics that showed the ethanol's effects. Different assays were used to measure the effects, including gross morphology and behavioral responses. Tests for the gross morphology assay were measuring the size and state of the yolk, and eye formations. Behavioral response tests were counting heartbeats and administering a startle response test. After taking pictures every day, I noticed the ethanol altered the development of the zebrafish, particularly the fish exposed to higher concentrations. The yolk was generally smaller and misshapen, and the development wasn't as pronounced. In conclusion, if given the chance to further research, I would like to explore fluorescent transgenic zebrafish and administer time limits on the ethanol exposure to understand other alcohol-related birth defects (ARBD's) to explore my curiosity.

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Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

In a society where economic efficiency results in water pollution, methods to extract toxins require attention. Heavy metals lead and arsenic, for example, pose direct threats to ecosystem health and stability. Fungus is one attractive biological metal remediation solution that has yet to be investigated thoroughly. This research investigates one fungus, *Aspergillus niger*, and its remediation potential. Unlike many organisms that utilize intrinsic functional groups for remediation, *A. niger* naturally creates superoxides, which oxidize and bind native metal cations in water. To measure *A. niger*'s potential to remediate lead and arsenic, the fungus was cultivated and applied separately to a flow membrane. Remediation efficiency was measured at various time points via atomic absorption analysis of the aqueous filtrate. In initial experiments where 7.5g of *A. niger* was suspended in contaminated water, 45% of lead and 14% of arsenic were remediated in 48hrs from separate 10 and 50ppm solutions, respectively. In 24hrs of exposure, 1g of suspended fungus remediated 9.9% of lead and 5.4% of arsenic from the same initial concentrations. A novel Fungal Flow Filter was constructed to include 50g of *A. niger*. The surface area of the fungus, and thus remediation efficiency was maximized by employing a fungi-coated coil to which contaminated water is exposed. Remediation trials demonstrate that 96% of a 10ppm lead solution and 9.4% of a 50ppm arsenic solution were removed within 24hrs. In a solution where the metal ions were combined, 96% of lead and 14% of arsenic were removed in the same time interval.

Word Count

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3105

Student Name(s):

Fair Category

Word Count

Abstract:

Creating a renewable green fuel source will not only help the environment by closing the carbon cycle, it will also ensure future energy security, lessen our dependence on foreign nations for fossil fuels, and created numerous production and management jobs within the United States. Lignin is an attractive fuel source because its biomass crop is currently being produced but not harvested. Possible biomass sources are the nonfood portions of our crops (stems, leaves, husks) and black liquor, a byproduct of the paper industry. Lignin is difficult to degrade and only a few fungi possess the ability to break lignin into phenylpropanoid units that can be converted into pyruvate (the main reactant used for fermentation). *S. paucimobilis* is a bacterium that breaks down lignin and it is crucial to understand all of the enzymes in its catabolic pathway to comprehensively learn about the degradation of lignin. Protein expression was performed on DesB and DesZ, two dioxygenases in the catabolic pathway of *S. paucimobilis*. The procedure involved subcloning the enzymes into different expression vectors and then transforming the vectors into a number of *E. coli* cell strains. The samples were grown in various temperatures in the hopes of finding a condition under which the enzymes are produced and are able to be purified. The goal of this experiment is to learn enough about both enzymes so they can later be genetically modified to increase the efficiency of lignin degradation so that the fermentation procedure can then be scaled up to industrial standards.

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4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

Biochar is charcoal formed by heating biomass at elevated temperatures without oxygen. It is used as a soil additive to enhance quality. My purpose was to investigate if biochar improves plant growth in various types of soils and/or improves water efficiency. Two separate trials were conducted comparing the impact of adding biochar to soil while measuring plant growth and water usage. In the first study, 2 radish seeds and 25% biochar were added to two 3-inch pots of topsoil, sandy soil, aquatic soil and clay soil and two separate control pots were prepared without biochar. Introduction of biochar not only enabled radish seeds to sprout in clay soil but also increased growth and water retention in sandy and aquatic soil. There was no apparent improvement in topsoil and biochar actually reduced water holding capacity in clay soil. A second scale up trial with larger soil and seed samples was conducted to produce a larger number of observations and reduce peripheral evaporation. In the second experiment, pre-sprouted seeds were planted to eliminate seed germination efficacy as a variable. Twenty radish seedlings of nearly equal height and 25% biochar were added to 12-inch pots of topsoil, sandy soil and clay soil. The aquatic soil was eliminated because it appeared not a realistic soil type. The plants growing in biochar-amended sand showed increased growth versus sand alone, while the other results were consistent with the first, limited experiment. The results suggest that biochar be used to increase crop production in coastal and drought stricken areas.

Word Count

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Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
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Proj.
Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Medically useful recombinant proteins are synthesized by inserting plasmid DNA into the nuclei of single-celled organisms, resulting in the expression of a desired protein. Conventional host cells — usually bacteria or yeast — are complex and difficult to work with because the cell membrane and cell wall must be fully penetrated for the plasmid to be taken up by the cell's nucleus. However, coconut water – a sterile, living, syncytial endosperm – lacks both a cell wall and a cell membrane, and may be useful as a "naked nucleus" in facilitating recombinant protein production. This research investigates the feasibility of using coconut water as a recombinant protein host. Fluorescent plasmid vector pAcGFP-C1 (Clontech Laboratories) was introduced into sterile coconut water from freshly cut green coconuts (20µg/ml). The concentration of fluorescent plasmid, and subsequently fluorescent protein expression, was measured at 540nm (with excitation of 485nm) over four day period. After 26 hours of mixing, plasmid expression began, reaching a maximum rate of production (0.12µg/ml) from 30-35 hours. Plasmid expression continued until 60 hours of mixing, after which the concentration of plasmid remained constant. In 60 hours of mixing and 1.3ml volume, increase in expression of 20µg of pAcGFP-C1 demonstrated total protein synthesis by the coconut water of 179µg. These results demonstrate that coconut water can be used as a novel and simple method for recombinant protein production, having significant potential for applications in tropical third world countries, where synthesizing vital recombinant proteins locally is expensive and challenging.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Lung cancer remains the leading cause of worldwide cancer related deaths. The Kirsten rat sarcoma oncogene, or the KRAS, was discovered over 30 years ago and remains 'undruggable' as termed by the National Cancer Institute. The research problem was to examine the levels of inhibition by the cyclic adenosine monophosphate response element binding (CREB) inhibitor on non-small cell lung cancer proliferation, specifically focusing on the suppression of the KRAS activated CREB transcription factor and of heat shock proteins (Hsp). Heat shock proteins maintain proteostasis in normal body conditions; however, these functions become subverted during oncogenesis resulting in malignant transformations. Hsp70 and Hsp90 are two highly overexpressed proteins found in several cancers. It was hypothesized that the CREB inhibitor would be able to block CREB as well as Hsp70 expression. Many inhibitors have been identified for Hsp90, with little success for Hsp70. Through cell culture, western blot, and quantitative polymerase chain reaction analyses, specific signaling molecules were targeted as an approach to cancer therapy. Results thus far show that the CREB inhibitor was able to block CREB and Hsp70 expression, with only slight levels of inhibition for Hsp90. Future plans include combinational blockage with the CREB inhibitor and an HSP90 inhibitor.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

A common problem that seasonally faces homeowners is the swarming of insects to porch and deck lights. This nuisance would seem unavoidable with the use of outdoor lighting. The purpose of my experiment was to better understand this attraction to light in insects, and for the case of this specific project, moths. My experiments focused on testing certain variables that may be impacting the moths, such as heat, height, and different forms of light sources such as fluorescent, LED, halogen, black light, and incandescent. The insect chosen for this experiment was the tobacco hornworm moth, *Manduca sexta*, because these could be raised in the winter. I hypothesized that the black light would attract the most moths, based on its UV output. A wide container was chosen for these experiments, with a circle of 2.5 inches radius at the center, with the light at its center. The moths were then introduced to the enclosure; a timer was set for ten minutes, after which the number of moths that entered the circle were counted. For the height trial, a tall container was used with the circle on the lid. After analyzing the data, I found that the black light had indeed attracted the most moths, with other light sources showing varying degrees of effectiveness. The factors of height and heat however, had no effect on the moths at all. Given these findings it was concluded that luminescence is the main factor in attracting insects, specifically UV light.

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4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3110

Student Name(s):

Fair Category

Word Count

Abstract:

A prevailing obstacle in the field of induced pluripotent stem cells is the ability to effectively generate pluripotent stem cells whilst maintaining a stable and safe cell-line. Highly efficient models, such as retroviral transduction, have been found to be dangerous and damaging due to the unintended activation of specific host genes in the target cells. Since adenovirus' viral DNA remain epichromosomal and do not integrate into the host chromosome, host genes are not improperly activated or inactivated. Adenoviral transduction has been observed as an acceptable alternative. Adenoviral transduction maintains a higher level of cell stability, thus making it the safer method. The problem, however, with the adenovirus method is that it carries a substantially lower transduction efficiency. High-affinity binding to the Coxsackie-Adenovirus Receptor (CAR), facilitates the attachment of adenoviruses to cells. Cells expressing low or no levels of CAR prove to be a hindrance to the transduction process and a way to deal with this issue is to supplement cells with transduction reagents. These reagents, namely ViraDuctin provide many advantages. These include a higher transduction efficiency in cells with no or low levels of CAR sites and an increase in both the total number of transduced cells and the level of transgene expression per cell. Using ViraDuctin to supplement cells is a method in which I used to net a higher transduction efficiency.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Parkinson's disease (PD) is progressive neurodegenerative movement disorder, most commonly found in an aging population, and characterized by tremors, rigidity, slow movement, and posture instability. Marked by a debilitating loss of dopaminergic (dopamine-generating) neurons in the substantia nigra pars compacta (SNpc), PD patients experience acute cell death to their movement control centers of the brain. Preventing dopaminergic cell death is a key target to diminish the adverse effects of PD. If fenofibrate is tested in vitro in the MPTP induced mouse model of Parkinson's disease then the PPAR-alpha agonist will exhibit a neuroprotective effect because of its inhibition of inflammation, oxidative stress, and apoptosis. Although the pathology of PD is still largely unknown, in vivo models have attempted to capture as many hallmarks of PD as possible and can subsequently be used to test therapeutic strategies. Lipid lowering drugs in the MPTP mouse model of Parkinson's Disease are tested to palliate the loss of dopaminergic cells. In this experiment a synthetic ligand, fenofibrate, was tested as a PPAR-alpha agonist. TH immunohistochemistry was performed after MPTP intoxication, at which point fenofibrate administration took place for MPTP treated mice. Control and MPTP (treated and untreated) mouse models were then analyzed for cell death. Fenofibrate is shown to demonstrate a neuroprotective effect against dopaminergic cell death in both the SNpc and the striatum. These findings are crucial to further our understanding of the pathogenesis of Parkinson's and promoting the continued endeavor of developing treatment methods for those afflicted with the disease.

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4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Use of FRET based intercellular ATP imaging for identifying BCL-xL as a mitochondrial efficiency enhancer after Long Term

Student Name(s): C. Weiss

Fair Category

Word Count

Abstract:

Long Term Potentiation (LTP) is predominantly thought to be the cause of memory formation in neuronal cells. During and after the process of LTP there are many changes that occur in both the presynaptic and postsynaptic cells, among these is an increase in the cell's metabolic rate. B-Cell Lymphoma-2 (BCL-2) family proteins have been thought to play roles in many other cell processes other than apoptosis, more recently it has been found that an anti-apoptotic BCL-2 family protein called B- Cell lymphoma- extra large(BCL-xL) plays an important yet unknown role in the process of LTP. The goal of the experimentation being conducted is to test the hypothesis that BCL-xL is a mitochondrial efficiency enhancer that plays a part in the changes undergone in Post-LTP neurons. Through the use of confocal microscopy, rat hippocampal neurons were examined and ATP levels were indirectly measured through the use of an ATP based FRET (Florescence/Förster Resonance Energy Transfer) construct both before and after LTP was induced. It is expected that when BCL-xL is inhibited through use of ABT (navitoclax), there will be little to no change in cell ATP production, directly linking the presence of BCL-xL to the ability of a cell to undergo a change in metabolism after LTP. The supposed action of BCL-xL is to act as a "plug" or "cork" to stop leakage of hydrogen ions through the C subunit of ATP synthase. During this experimentation, idealized cell growth parameters for ATP based FRET recording in hippocampal neurons will be examined.

Special Categories Selected by Student:

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Inhibitory effect of D-Psicose on Motility, Growth and Reproductive Maturity of *Caenorhabditis elegans*

Student Name(s): K. Yamashiro

Fair Category

Abstract:

The danger of parasitic infection remains as a significant health concern. Nematode larvae that cause parasitosis are typically more resistant to host factors than adults. Therefore, control of larvae is more difficult than that of adult nematodes. Recently, rare sugars have been identified as anthelmintic compounds. D-psicose has received attention for its inhibitory effect on larvae of nematodes' mobility, maturity and reproductive capability. It is not harmful to animals, and has positive effect on humans. The aim of this research is to determine whether rare sugar D-psicose has an inhibitory effect on *Caenorhabditis elegans* (CE) larvae, and can be used as additive to drugs or food. Colonies of L1-larvae of CE (N2-strain) were obtained by extracting eggs from gravid hermaphrodites, and placed in the starved state prior to experimentation by immersion in M9 buffer. Starved larvae were then grown in liquid S medium, mixed separately with 1M rare sugar solutions (8:1 ratio). In addition to D-psicose, other rare sugars include D-tagatose, L-sorbose, and D-allose. For each sugar, CE L1-larvae motility and reproduction were evaluated for the 3-day juvenile period, and compared to a control. While D-glucose and other rare sugars promoted reproductive maturity by as much as 100% in 72hr, D-psicose led to negligible egg-bearing of pre-existing larvae in the same time period. Typical length of L1-larvae was 194µm, while mature nematodes measured 1152µm. Those subjected to D-psicose were 265µm, demonstrating suppressed growth. L1-larvae and mature nematodes demonstrated full sinusoidal movement; those in D-psicose demonstrated wiggling of tails and heads.

Word Count

Special Categories Selected by Student:

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4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In the experiment, The Genetic Touch, three families were used to compare fingerprints and thirteen people were used. The purpose of this experiment was to see if fingerprints were inherited from one's parent to their offspring. The hypothesis was: If genes are inherited through parents, then, fingerprints must be inherited from the parents just as genes are. The procedure was extremely simple to do: gather all of the members needed and have them wash their hands. Have them place one of their fingers on an ink pad and then press it against a piece of blank paper and have then put their name beneath it. Finally, analyze each individual fingerprint under a magnifying glass to see if any relations arise. The results concluded that fingerprints are inherited from parents because of the extreme similarities in parent and offspring fingerprint patterns.

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title: Design and use of region specific primers for the Cytochrome
Oxidase Subunit One (COX1) gene in cnidarians

Student Name(s): L. Blum

Fair Category

Word Count

Abstract:

Coral species are often misidentified because their appearances can vary significantly with environment. The purpose of this experiment was to design and test Polymerase Chain Reaction primers for the Cytochrome Oxidase Subunit 1 gene(COX1) in various cnidarians, with the eventual goal of obtaining DNA sequences for segments of the gene. These could then be used to not only identify coral but also to study the evolution of the gene in different species. Using the National Center for Biotechnology Information's primer-BLAST, nucleotide sequences universal to a variety of cnidarians were selected. DNA was extracted from a variety of stony and soft coral species using the Qiagen DNeasy Blood and Tissue Kit. DNA sequences found to be universal among all of the species were used to design region specific primers. Three pairs of primers were chosen, each copying adjacent regions of the COX1 gene. PCR reactions were run on the extracted DNA samples and visualized on a 2% agarose gel. Successful PCR products were extracted from the gel and purified using the Qiagen MinElute Gel Extraction kit. The desired gene segment could potentially be sequenced using this purified DNA.

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Bioluminescence is the production and emission of light, from living organisms or of biological origin. This word originates from the Latin roots “bio” and “lumen; the root “bio” translates to mean “living”, while the root “lumen” translates to “light”. So in all actuality the word “bioluminescence” means “living light”. Fittingly, bioluminescence can only and will only transpire in living organisms. Bioluminescence occurs throughout terrestrial and marine biomes, but is most common in the oceans’ twilight zones, in which 80-90% of marine life documented utilizes bioluminescence in some way, shape or form. This “living light” is employed by an array of species for five main reasons: attraction, repulsion, illumination, communication, or camouflage. Bioluminescence happens to be the byproduct of a relationship between Luciferin and the catalytic enzyme, Luciferase. The point of this experiment was to test and learn about how varying circadian rhythms would affect the duration of dinoflagellates luminescing. This experiment tested three different amounts of time. Twelve hour, six hour, and eighteen hour trials were tested. In theory this experiment would show what happened when these glowing alga were exposed to more or less light. The first attempt of this experiment went poorly seeing as the first culture received was quite dead, and the second culture luckily arrived quite alive but the hypothesis was proven incorrect. The dinoflagellates luminesced for almost exactly the same amount of time in the twelve and eighteen hour trials and the six hour trial luminesced very weakly.

Special Categories Selected by Student:

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Attention span is very important in kids today because paying attention in school is necessary to learn. ADHD is becoming more prevalent and many people are looking into what causes ADHD and how they can treat it. In this experiment the researcher tested the attention span of 16 and 17 year old high school students with different birth orders. Subjects took an online survey that measured their attention span level. In addition, subjects took an objective test to measure their focus. First, second and third born children took the tests and the data was recorded. The results showed that the significance level was less than .05 and that the data wasn't statistically significant. Overall, the data revealed that there isn't a significant difference in attention spans between first, second and third born children.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3120

Student Name(s):

Fair Category

Word Count

Abstract:

Zebrafish are considered good model organisms to study because they're vertebrates and can be used to compare human development. With an increase consumption of energy drinks it became an area of interest to study the effect of their ingredients on embryonic development. The embryos were treated with caffeine, Taurine and Inositol. I observed morphological differences and recorded heart rate. The embryos exposed to caffeine had the highest heart rate (5µL-106 bpm and 10µL 112 bpm). These embryos had irregular heart rhythms. I concluded this because caffeine is a stimulant and irregular heartbeats can be caused from stimulation. In comparison to the control embryos which had a heart rate of 89 bpm, the other substances did not have a significant change. The embryos affected with Taurine had heart rates of 92 bpm at 17.5µL and 82 bpm at 35µL and embryos affected with Inositol had heart rates of 96 bpm at 2.5µL and 76 bpm at 5µL. In these trials, the heart rate decreased with higher concentrations. Through morphology I observed that all the embryos had spotted heads and tails. Embryos exposed to Taurine had misshaped yolks. Caffeine also affected the embryos by having smaller body appearances than the control. The embryos exposed to Inositol at lower concentrations appeared smaller than embryos exposed at higher concentrations. The control embryos appeared to be healthy. It would be interesting to study if the concentrations of Taurine and Inositol were increased even more would the heart rate of the zebrafish embryos decrease more.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

A certain type of mantis shrimp, *Squilla empusa*, resides in the muddy flats of the long island sound which is the same substrate that is ideal for many marine animals. This study is focused on examining the general diet of *Squilla empusa* in the Long Island Sound. It was investigated whether the mantis shrimp takes on a specific species as its prey or targets all organisms. Since these are nocturnal animals and only come out of their deep burrows in the night, they most likely feed on other nocturnal organisms as well. However, they could also be feeding on a variety of organisms that are relatively common in the area such as the Asian Shore Crab or the Green Crab (both of which are invasive). A trawling vessel was used to collect the mantis shrimp from the Long Island Sound off of Milford Connecticut. They were then euthanized and had their stomachs examined for the contents. It was found that in the ones that did have contents, almost all had traces of Asian Shore Crab carapace. This shows that the *Squilla empusa* in the Long Island Sound might have been preying on Asian Shore Crab specifically.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3122

Student Name(s):

Fair Category

Abstract:

The purpose of this study was to investigate the etiology of Paget's Disease of Bone (PDB). Familial PDB has been linked to mutations in Sequestosome 1 (SQSTM1). However, it was hypothesized that mutations in genes other than SQSTM1 can cause PDB and these mutations could be detected by distinctive expression patterns in key signaling pathways. Such alterations in expression of key genes could be specifically targeted by novel drugs to potentially cure the disease with minimal side effects. RNA samples from pagetic bones with and without SQSTM1 gene mutations were screened by micro-array analysis to identify genes with differential patterns of expression. Using a systems biology analytical approach, the list of genes showing differential expression was analyzed for changes in patterns of co-expression, genetic and physical interactions. Associations with known genetic pathways were created that showed the interactions and relationships of the differentially expressed genes to each other and to the networks of signaling pathways. The results showed that most of the associations between the differentially expressed genes were found in the networks associated with PSEN, SFRP, Wnt, and DnaJ. These upregulated pathways have all been linked to bone regulation by previous research. A subset of the dysregulated genes was chosen for further validation and study. These differentially expressed genes are all involved in cell signaling pathways. Gene-specific DNA primers were developed that will be used in validation experiments by RealTime quantitative PCR amplification. Following validation, these genes will also be tested in an in vivo transgenic mouse model.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The energy drink industry has grown considerably in the past few years. Taurine, an amino acid found in most energy drinks like Red Bull or Monster, has been found to have very negative effects on animals. If the energy drink industry continues to rise at such a large scale, then there will be considerable amounts of Taurine in our waste, which will end up in the Long Island Sound. One of the most prevalent types of crabs in the Sound is Pagurus pollicaris. I tested 500 mL and 100 mL of pure Taurine on the crabs by dissolving it in their water, and found that it had very severe effects. The hermit crabs lost their appetite and became very anxious and active. They circled around their tank, and their level of activity and movement increased greatly. An increasing input of Taurine in the Sound could severely offset the balanced ecosystem. Thus, it is vital to ensure that there will not be large amounts of Taurine in the Long Island Sound.

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CSEF Official Abstract and Certification

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Two seaweeds were tested for antibacterial properties against *Vibrio fischeri*, *Sacharina latissima* (Kelp) and *Gracilaria tikvahiae*. Extracts were made using 3 types of solvents, laboratory grade methanol, ethanol and acetone to determine which seaweed is the most effective antibacterial agent as well as which solvent would maximize the antibacterial potential of the seaweeds. A zone of inhibition test was performed by soaking paper discs in an extract, then placing them in the center of the first quartile of the petri dish selected for that extract. Control discs were made including a paper and solvent control. Data was collected as the approximate area of inhibition (AAI) (cm²) and the Distance from the center of the disc to the closest visible Bacterium (DCB) (cm). Results were recorded at 24 hour intervals for the first 72 hours. Kelp Acetone presented the most effective antibacterial properties of all extracts and solvents. Kelp Acetones' AAI was 59.59% larger than that of the Acetone control at 24hrs and 98% larger after 72hrs. The DCB of Kelp Acetone was 73.35% larger than that of Acetone at 24hrs and 60.51% larger after 72hrs. Kelp Acetone had the largest AAI for all time periods, except for Ethanol up to 48hrs, and the longest DCB of any extract or solvent at all time periods. The extracts' results reduced at a different, slower rate than that of the solvent control, therefore, the antibiotic properties being observed are different from those of the solvent. Results are applicable to pharmacology and bioengineering.

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CSEF Official Abstract and Certification

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Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

G-Protein Coupled Receptors (GPCRs) have become of great interest to researchers because of their pharmaceutical potential. GPCRs are integral membrane proteins and their primary function is to transduce extracellular stimuli into intracellular signals, producing cellular responses. Chemokines are a family of small cytokines that have the ability to induce chemotaxis in cells, and their receptors are GPCRs. One chemokine and receptor are CXCL12 and CXCR4, which both serve vital functions within the body and influence proliferation of tumor cells. CXCR4 is only stable with its antagonist bound to it, and thus is challenging to crystallize. This project tests if mutating the tyrosines on the N-terminus of CXCR4 to glutamic acid has the same effect as if they were sulfated. Sulfation is a post-translational modification that strengthens protein-protein interactions accomplished by tyrosylprotein-sulfotransferases (TPST). Mutant versions of CXCR4 were created, expressed on the membranes of *E. coli* and *S. cerevisiae*, and an assay was performed to determine the effect on ligand-receptor binding. The results show that the mutations decrease binding, proving that this is not an alternative method to create a sample of CXCR4/CXCL12 for x-ray crystallography. TPST now needs to be expressed in *S. cerevisiae* to sulfate the tyrosines on the N-terminus to increase the affinity of CXCR4 for the ligand. Due to the fact that *S. cerevisiae* it is not a natural system for TPST or CXCR4, it is labor-intensive to set up samples with both and confirmation of sulfotyrosines will be necessary before the ligand can be added.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

I tested a green tea catechin, epigallocatechin gallate (EGCG), which had previously been shown to limit the expression of pro-growth oncogenes and induce apoptosis in breast cancer populations in vitro. I tested EGCG on mouse breast cancer at three concentrations, 10 μ M, 40 μ M and 80 μ M. My results indicate that breast cancer is highly responsive to prolonged exposure to EGCG, even at such low concentrations. Over a period of four days, breast cancer cell populations dropped significantly in each plate. Near total cell death was noted in the 40 μ M and 80 μ M after the first day. By the fourth day of treatment, even the 10 μ M plate was largely devoid of healthy, adhered cells. These results demonstrate the potential efficacy of EGCG as both a powerful chemotherapeutic agent and a dietary supplement to conventional treatment methods.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title: PRIMARY CRANIOFACIAL OSTEOSARCOMA'S
REPRESENT A MALIGNANT TRANSFORMATION OF

Student Name(s): N. Scalise

Fair Category

Word Count

Abstract:

Osteosarcomas of the craniofacial skeleton arise from osteoblasts that are derived from neural crest stem cells, and are slow growing and rarely metastasize. The neural crest is a multipotent population of cells that arise at the neural plate border in the vertebrate embryo. Some of these neural crest cells migrate to the developing skull and become craniofacial bone through the process of membranous ossification. However, a small fraction of cranial neural crest stem cells persist into adulthood as a population of dormant stem cells with a high capacity for self-renewal. The goal of my project was to examine the hypothesis that primary craniofacial osteosarcomas represent a malignant transformation of these persistent neural crest-derived stem cells and that these malignantly transformed stem cells could become the cancer stem cells in the craniofacial osteosarcoma. In order to test this hypothesis, genes known to be expressed in neural crest stem cells were analyzed in a craniofacial osteosarcoma tumor sample. The genes selected for this study were SOX9, SOX10, Snail, Slug, Twist2, Wnt1, Notch1, Nanog, Lin28, and Nestin. Homogeneous populations of craniofacial osteosarcoma tumor cells were captured by laser capture microdissection and RNA was isolated. cDNA was then synthesized from the isolated RNA and linearly amplified. This amplified cDNA was then used to study the expression of the candidate genes by quantitative RealTime PCR. Gene expression for these candidate genes was then compared to gene expression in mesenchymal and osteogenic lineage cells.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Leucine is an amino acid that has been marketed as a supplement to improve muscle growth and to decrease cardiovascular risks. The purpose of my research project is to determine the effects of leucine on growth and development of the zebrafish embryo, with an emphasis on examining effects on muscular development and the cardiovascular system. Zebrafish embryos are a great model organism to examine the effects of compounds on developing organisms. I had hypothesized that increasing the concentration of leucine would increase the muscle mass in the embryos. I was able to assess effects of leucine on muscular portions of the developing organisms in the zebrafish embryos. The embryos were in two separate groups. One group consisted of a control group of embryos. The other group had the three concentrations of leucine affecting the embryos. For this experiment, the embryos' hearts were continuously observed. The concentrations of leucine tested on the embryos were 1mM, 7.5mM and the highest concentration was 10mM. Using the microscope, I was able to see the muscle mass maintained, furthermore allowing me to perceive how the muscles were affected. Additionally, as part of my experiment, I successfully measured the heartbeat of the embryos. The heartbeats increased due to the effect of the leucine in each of the concentrations. The experiment showed prevention in muscular breakdown, which is especially essential for humans. Further investigation would examine the muscle fibers of the embryos using fluorescent protein in the zebrafish embryos. This would show gene expression in the embryos.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Many people try to choose the healthiest options when selecting their food. Often, oils such as olive oil and canola oil are considered to be healthy alternatives to vegetable shortening or butter. However, when these oils are used to cook protein rich foods, such as meat, on a metallic surface, there may be other considerations. This is because all oils have a smoke point, the temperature at which an oil or fat begins to break down into glycerol and free fatty acids and the nutritional content of the oil begins to rapidly degrade. When oils are used in high temperature cooking methods, such as frying, they are often heated past their smoke point, altering the active ingredients of the oil and, thereby, potentially resulting in mutagenic activity. This experiment tested for mutagens in four different types of oil; olive oil, canola oil, vegetable shortening, and butter, which were used to pan-fry chicken. The presence of mutagens was determined using the Ames test, which identifies potential carcinogens by studying the frequency with which they cause histidine-producing genetic back-mutations in bacterial colonies of the genus *Salmonella typhimurium* initially lacking the ability to synthesize histidine. It was hypothesized that olive oil and canola oil, high in unsaturated fats, would produce more carcinogens than butter and vegetable shortening, high in saturated fats, since unsaturated fats tend to have lower smoke points. The hypothesis was partially supported by the data as canola oil was the only oil to produce carcinogens when used to pan-fry chicken.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

My experiment is basically to test one specific tendon in the human body's leg. This tendon is scientifically known as the patellar tendon and it extends from your thigh, over the knee cap, and slightly onto the shin. It helps allow motion to the knee as well as stability. I performed my test by first building a model of a human knee because it would be more accurate than using a human subject, during visual examination. Once all construction was finished, I proceeded to move the knee at specific angles and measure how far a spring, acting as the patellar tendon, would extend to allow movement. The U channel guide on the model, helped stabilize the leg bending, just as the human hip and torso would. I wanted to see how much our stance, affects the actual tension being applied in our bodies, and the knee, seemed like a simple test subject in this proposed experiment. The concept is similar to any human tendon and ligament and they all have the same base rule of extension causing increased tension, like a rubber band.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3134

Student Name(s):

Fair Category

Word Count

Abstract:

Through (physical) morphological analysis, lizards were compiled into a Lizard Tree of Life. However, the recent publishing of the “Deep Scaly” Project which used molecular (DNA) analysis, data suggested that iguanians are higher in lizard phylogeny than previously thought. Molecular analysis then seemed to disprove morphological phylonology. The position of the joint between the backbone – the sacrum – and the hip (i.e., ilium) offered up new insight. Thus the question posed was: is the position of the ilio-sacral joint in comparison to the ilio-femoral joint a viable mean of proving positioning of iguanas on the Tree of Life? Samples from 200 lizard species used in Deep Scaly were examined using a SZH10 Research Stereo Microscope. The location of ilio-sacral joint in comparison to the ilio-femoral joint was noted by a “0” if it is overlapping and a “1” if they were separate. This evidence was combined with the ~1,000 morphological characters already in existence to generate a lizard tree of life to compare against the morphological one long established. It was hypothesized that the joint positioning can in fact be used to support the believed position of Iguanas on the morphological lizard Tree of Life. Through analysis/comparison, it was established that the above characteristic supports the hypothesized position of Iguanas in the morphological tree of Life. This characteristic adds to the fundamental knowledge of lizard phylonology. It will help scientists be able to streamline and make already established information more accurate and reliable.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: An Assessment of the Reefs in the Windward Islands due to the Presence of Pterois volitans

Student Name(s): M. Kantor

Fair Category

Abstract:

One of the most serious threats to the ecosystem in Atlantic waters is Pterois volitans, or the red lionfish. They are an invasive species from the Indo-Pacific that have a ravenous appetite, reproduce quickly, and have no natural predators. These fish now range in location from Massachusetts to the Caribbean. This study was performed in the Windward Islands, the southernmost part of their range that they have not invaded as heavily. It was hypothesized that as lionfish numbers increase, native fish species go down. Fish counts were done at numerous sites in St. Lucia, St. Vincent, and the Grenadines, where both the lionfish and the total biomass of the reef were taken into account. Additional data was used from the public organization, REEF, where focus was put on lionfish, predatory fish, and algae controlling fish. However, the results from the data showed that lionfish had not made a significant presence in the Windward Islands, as they were scarce in St. Lucia with a few being spotted on some dives. Below St. Lucia in the southern part of the Windward Islands, the lionfish were not present, which is beneficial to the ecosystem. A lack of predatory fish was also recorded, while algae controlling fish were abundant. Fish counts showed that the reefs were healthy and only a few had signs of coral bleaching, but the lack of predatory fish leaves an open spot for this invasive species to take over without regulation.

Word Count

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

There are many chemical pollutants dumped into the environment, from industrial wastes to leaking gasoline from cars. While we can observe the detrimental effects of these chemicals on plants—evidenced by their stagnated weakened growth—we still do not know the exact extent of this damage. Does road salt only harm the plant through water loss? This experiment tests if road salt, poured during the wintertime, would alter the function of amylase, an enzyme involved in the hydrolysis of starches. The hypothesis predicts that a solution of road salt with amylase would slow down the rates at which starches are broken down and simple sugars (like glucose) produced. To see this change Benedict's solution was used as the indicator. Once the experiment was performed, it concluded that the hypothesis was rejected; both the starch solutions with and without road salt showed the same breakdown by amylase. One drawback to this experiment was its reliance on qualitative data. Also, testing the function of amylase in a simple solution does not fully simulate amylase working in a cellular environment. Also, this experiment holds potential for future ones dealing with other environmental chemicals such as sulfur, gasoline, cadmium, and ammonia. Other enzymes can be tested for, including cellulase, bromelain, actinidin, ficain, urease, papain, etc. for which more research is required.

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Num

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Num

Title: Investigating the Phytoremediation of Lead: The Type of Plant Species Versus the Rate of Lead Extraction in Hydroponic Media

Student Name(s): E. LoPreiato

Fair Category

Abstract:

Lead intoxication remains a significant global problem in children. A cost-effective, eco-friendly method to remediate contaminated soil (phytoremediation) should be proposed. Three known lead absorbing plants (Brassica Juncea, Zea mays, and Colonial bentgrass) were grown in lead acetate-infused hydroponic media. The concentration of lead in the media was measured via flame atomic absorption spectrophotometry over time to determine the most effective extractor of lead. The lead removing abilities of the plants were measured over two starting concentrations (6.3 mg/L and 24.4 mg/L) at two interval cycles (every 3 days and every 12 hours respectively). In each case, the lead was removed more quickly than anticipated (<1.0 mg/L @ 9 days and 60 hours, respectively). Brassica Juncea displayed the best ability in both settings. It displayed the most apparent biomass at high concentrations of lead exposure, as evident by its superior growth, measured by mean plant tip length (MPTL). Zea mays and Colonial bentgrass, exhibited good lead removing abilities, however both displayed possible lead releasing qualities at high concentrations at later intervals. Based on the data, Brassica Juncea is the best phytoremediator of lead in both settings. Colonial bentgrass may be used in residential low contamination remediation. Seasonal planting and replanting of contaminated sites may reduce their lead levels to non-toxic amounts. Harvested plants may be brought to recycling centers to reutilize their lead. Adjuvants may aid Brassica Juncea in its abilities while genetic engineering may be used to increase the plant's biomass, thereby enhancing the efficiency of phytoremediation.

Word Count

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Title:

Student Name(s):

Fair Category

Abstract:

Studies have shown that some common perfumes contain harmful chemicals that are not listed on the label of their product. Many of these chemicals have been shown to be harmful to humans, as they are absorbed through the skin and enter the body. Diethyl phthalate (DEP) is used in a variety of these perfumes, as well as in many other consumer products, such as home furnishings, medical devices, and children's toys. It is also known to be a contaminant of freshwater and marine ecosystems. I examined the effects of DEP on the embryonic development of zebrafish. I tested a range of concentrations—a control, 4.5×10^{-5} μM , 4.5×10^{-3} μM , and 4.5 μM —that zebrafish might be exposed to in their natural environment. Using light microscopy, I measured heart rate and observed morphological changes to see if embryonic development is abnormal or unchanged during a 3 day exposure. The exposed embryos had heart rates of 124 bpm, 140 bpm, and 168 bpm, respectively, compared to the control group with a heart rate of 122 bpm. There did not seem to be any significant morphological differences between the exposed embryos and the control group, although the embryos exposed to 4.5 μM of DEP appeared slightly smaller than the other embryos. These findings suggest that DEP causes an increase in heart rate, but does not affect the overall development of the embryos during a 3-day period. It would be interesting to see if a longer exposure to DEP affected brain development, as well as overall development.

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3140

Student Name(s):

Fair Category

Word Count

Abstract:

Heat acclimatization (HA) results in positive adaptations that enable athletes to better handle exercise heat stress. The influence of HA is well documented; however, it is unknown if Ironman athlete's training climate predicts overall performance. PURPOSE: To determine if the differences between an Ironman athlete's training climate and the race day climate are related to attaining the athlete's goal performance in the race. METHODS: Seventy-five athletes (63 male; 12 female) competing in the Lake Placid Ironman Triathlon in 2012 (n=36) and in 2013 (n=39). 2012 and 2013 combined: Age=38.01±7.85yrs, Height=176.3±8.54cm, Body mass=74.69±10.38kg; Finish Time=749.43 ±94.43min. All climate data was compiled from the two weeks prior to the respective race day and training locations. Temperature (T), relative humidity (rH) and heat index (HI) were all collected for training days and compared to race day environmental data using a weather service database. Subject race experience, predicted and actual race time was collected. Pearson bivariate correlations and linear regression analyzed relationships between race performance (defined as the percent difference between goal race time and actual race time (%ΔT)) and: 1) training and race environmental condition differences, 2) Ironman experience. RESULTS: %ΔT was significantly correlated with average training hours (r=-0.24, p=0.037), but was not with differences in T, rH, or HI (p>0.05). Average training hours and number of Ironmans completed predicted 17% of %ΔT. T, rH, and HI were not significant predictors of ΔT. CONCLUSIONS: Training hours was the greatest predictor of Ironman performance.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Stem cell differentiation research is crucial, as applications in medicine are seemingly infinite. Unfortunately, in order for this technology to be applicable in humans, more research needs to be done in regard to the mechanics of differentiation. This study sought to explore this through research on the effect of circadian rhythm on murine bone marrow-derived stem cell differentiation. It was hypothesized that circadian rhythm would have an effect through variance of optimal time point for transplantation. Consisting of two parts, this experiment began in September and was repeated in June. B6.SJL mice were light entrained in 12-hour light/dark boxes for two weeks, then sacrificed at different time points (measured in hours after light onset, HALOs). The bone marrow of the B6.SJL mice was then isolated and injected into C57BL/6J (host) mice, which had been exposed to 100 cGy total body irradiation. Subsequently, the C57BL/6J mice were placed in cages at normal 12-hour light/dark schedules and maintained for up to twelve months. C57BL/6J host leukocytes are CD45.2-positive and B6.SJL donor leukocytes are CD45.1-positive, and can therefore be easily distinguished by flow cytometry with specific anti-CD45.1 and anti-CD45.2 antibodies. At two-month intervals, the peripheral blood chimeras of the host (C57BL/6J) mice were analyzed with flow cytometry, and it was concluded that the optimal transplantation time points were HALO 8 (September experiment) and HALO 24 (June experiment), thus supporting the hypothesis, as the time-points varied. This research could be especially applicable in finding an optimal human time point for bone marrow transplants.

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CSEF Official Abstract and Certification

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Proj.
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Proj.
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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In 2012, approximately thirty-five percent of American adults were obese (“Obesity and overweight for professionals”). A potential therapeutic treatment for obesity is to convert white adipose tissue into brown adipose tissue, referred to as the browning of white adipose tissue (Wu et. al, 2012). Brown adipose tissue increases energy expenditure and protects against diet-induced obesity (Enerbäck, 2010). Researchers have found that the membrane protein FNDC5 is cleaved to release the hormone irisin that promotes the formation of brown adipose tissue (Boström et. al, 2012). The purpose of this report was to investigate the in vivo functions and expression of FNDC4, a close homologue to FNDC5/Irisin. FNDC4 has 86% identity in the functional domain to FNDC5 (Teufel et. al, 2002). Interestingly, FNDC4 is more stable and bioactive than FNDC5 (Boström, 2012) and therefore, could serve as a better potential treatment against obesity. Herein, we investigated the expression, regulation, and possible browning function of FNDC4. Quantitative real-time polymerase chain reaction and western blot were methods used to analyze tissue samples from exercised mice, mice fed a high fat diet, and mice injected with FNDC4-FC recombinant protein. It was found that FNDC4 was expressed in the liver, and the expression was reduced after a challenge of a high fat diet. Moreover, the data suggests that FNDC4 is able to promote the conversion of white adipose tissue into beneficial brown adipose tissue. Therefore, this preliminary study indicates that FNDC4 could be an interesting therapeutic possibility for enhancing energy expenditure and thus a potential therapy for the treatment of obesity and type II diabetes.

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CSEF Official Abstract and Certification

Fair Category

Proj.
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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

I have completed a study exploring how ellagic acid effects breast cancer cells. Ellagic acid is also a natural phenol antioxidant that has been found to have numerous health benefits. It occurs naturally in several types of fruits, vegetables, and nuts. After several weeks of culturing mouse breast cancer cells, they were treated with 0, 3, 40, and 90 micro moles of ellagic acid. Over five days, the cells were observed and it was found that ellagic acid was indeed detrimental to cell proliferation and survival, and the severity of it's effects was proportional to higher concentrations of it. Based on my experiments and results, ellagic acid is effective inhibiting cell proliferation and inducing cell death in breast cancer, and therefore does have a good deal of potential in future treatment and control of cancer.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Teaching English Language Skills via Interactive Storytelling with a Spanish Speaking Robot

Student Name(s): O. Khan

Fair Category

Abstract:

Children raised in non-native English-speaking households face a severe preparatory disadvantage relative to their native-speaking peers. Effective English as a Second Language (ESL) education is vital to leveling the playing field for children raised as non-native speakers. The purpose of this study was to investigate the potential educational benefits of utilizing a personalization algorithm programmed into a robot English Tutor on native Spanish-Speaking kindergarten-age students. Robots are fast growing technology and are significantly cheaper to deploy than expert human tutors. For this experiment, tutoring software for the robot was developed to communicate with students and assess their language skills. Students participated in five sessions of fifteen-minute adult-supervised interactions with the robot, Keepon. The first and fifth days were diagnostic; the robot tutor did not offer any lessons. The middle three days were instructive; the robot provided the experimental group with personalized lessons tailored to each student's learning process by addressing the English usage errors the student made. The control group received predetermined and identical lessons. The effectiveness of the personalization approach was then analyzed by comparing differences in first and last day performances. Data thus far shows that the experimental group exhibits a higher improvement and success rate compared to that of the control group. Furthermore, receiving personalized lessons yields significantly faster and more engaged responses. Therefore, by creating software that can be widely distributed to areas in need of ESL education, a viable option for teaching a second language during the critical age for learning has been created.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3145

Student Name(s):

Fair Category

Word Count

Abstract:

Biological nanoparticles have become increasingly popular as anti-cancer drug delivery systems. Though not inherently toxic, nanoparticles are very effective in delivering drugs to tumors, partially due to their ability to fit through the leaky vasculature associated with tumors. Also, nanoparticles are able to circulate for long periods of time in the blood stream, which increases particle and therefore drug accumulation in tumors. Lipid nanoparticles are widely used because they are both highly biocompatible and can be designed using tumor specific antigens to target specific tumor cells. Exosomes, a nanoparticle naturally secreted by most cells, are totally biocompatible vesicles that are part of the body's intercellular communication system. They have the potential to facilitate dispersion and multicellular treatment of tumors with anti cancer drugs. Prior experiments have attempted to incorporate tumor growth inhibiting substances, specifically siRNA, into exosomes to treat cancer. However, it has proven very difficult to effectively incorporate therapeutic drugs into exosomes. Our research proposes to develop a hybrid nanoparticle that fuses lipid and exosome to form a particle that is both naturally biocompatible and capable of being engineered to target specific tumor cells. We have completed experiments to test the viability of this hybrid nanoparticle, including the dosing of different formulations of lipid-siRNA-exosome nanoparticles onto B16F10 mouse melanoma cells and MDB-MB -231 human breast cancer cells. These preliminary experiments have shown that this combination can cause increased tumor cell death compared to lipid-siRNA or siRNA alone. Further experiments are necessary to develop a system that is effective in vivo.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3146

Student Name(s):

Fair Category

Word Count

Abstract:

The diversity of colors in nature, be it in flowers or fruits are all attributed to pigments. Pigments are compounds with diverse functions: harvesting light, energy capture and photo-protection. Fruits are the only plant structure that undergoes distinct and prolonged changes in color during their growth and development. Therefore, the process of ripening offers a good model system to study pigment biochemistry because it involves changes in pigment composition. The aim of this project was to analyze pigment compositions in red, black and green grapes in order to assess changes therein (indicated by changes in absorption spectra) during ripening and look for possible correlations with shelf life. Another factor that can indicate their suitability for storage is cell respiration and this was analyzed (CO₂ production) alongside ripening. Each colored grape had a pigment combination that resulted in a unique absorption spectrum. It was observed that green grapes had very little absorbance to begin with, their absorbance decayed fastest and they were the first to start decomposing after about two weeks (an observation that correlates with the overall reduced absorbance of these grapes). Cell respiration in black grapes (greatest absorbance) was lower than in red grapes and overall, in terms of shelf life black grapes seemed to be the best under both slow and accelerated ripening conditions. Thus black grapes seem to have the longest shelf life, and further experimentation can offer insights for creating genetically modified grapes that have better shelf lives.

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CSEF Official Abstract and Certification

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Student Name(s):

Fair Category

Word Count

Abstract:

The project's goal was to find a way that could successfully remove arsenic from water. It is important to investigate how to remove arsenic from water in order to save lives in many different countries, specifically Bangladesh. Tests were run by using a copper chloride solution, the arsenic surrogate and running the solution (10 mg copper chloride/ 1 ml water) through a filtration device to see how much was removed (see figure 2). The amount of copper chloride left in the water was measured by using a standard curve made up of different dilutions of copper chloride(see figure 1). The results were positive and were consistent with no outliers. The positive control was galvanized iron nails it removed all of the copper chloride. The other independent variables were parsley which removed 8g/l of Copper Chloride, garlic which removed 1.84g/l, cilantro which removed 7.84g/l, and cabbage which removed 7.5g/l. These results show a possible cheap and effective way of purifying water. The next steps in this experiment would most likely be to try to use a solvent to figure out what part the plants are making the chelation occur.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In America, animal therapy is very popular to treat children of varying social, emotional, or mental disabilities or disorders. But the question is, why are animals so popular for therapy and what conditions provide for the best therapeutic outcome? In other terms, who benefits most from animal assisted therapy and how? This study uses a survey to compare the opinions of teenagers on animal behavior. To achieve this goal, a survey with 6 hypothetical scenarios is administered to teenagers from ages 12-18. Each example on the survey illustrates a hypothetical animal behavior which will be rated (on a scale 1-10) how positively or negatively they view the behavior. In addition, age, gender, whether or not they own pets and current mood are documented for basis of comparison. 21 teens were surveyed at Oxford High School. After administering the survey, it became clear that people who do not own pets, regardless of gender, view animal behavior more positively. Additionally, females view animal behavior more positively than males, and mood does not correlate directly with the opinion on animal behavior. These comparisons can be used to provide a basis for animal therapist specialists to determine who would benefit most from animal assisted therapy. For example, females may benefit more positively from animal assisted therapy than males and non-pet owners may benefit more than pet owners. This data can provide a basis for determining who should receive animal assisted therapy.

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CSEF Official Abstract and Certification

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Num

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Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

It is estimated that 4% of adults and 8% of children in the U.S. have a life-threatening food allergy. According to a study released in 2013 by the Center for Disease Control and Prevention, there has been a 50% increase in children developing allergies between 1997 and 2011, and scientists do not know what is responsible for triggering the allergic response. Research indicates that while there is a higher concordance rate between identical twins than fraternal twins sharing the same food allergy, the concordance rate is not 100% in either case. (Sicherer). This indicates that both genetics and the environment may contribute towards the development of a food allergy. It is hypothesized that food allergies are an epigenetic disease. Epigenetic changes result from a biological response to an environmental stressor (Cloud), and it is through epigenetic marks that environmental factors such as diet, stress, and pre-natal nutrition can alter gene expression (Lieber et al). The purpose of this experiment was to identify environmental risk factors that could contribute to an epigenetic change and thus the development of a food allergy. Surveys were distributed to mothers of at least two children, one of who had an allergy and the other did not. A statistical analysis was run on the 263 completed surveys to determine which variables showed significant differences between the siblings with food allergies and the siblings without food allergies. It was found that increased courses of antibiotics and consumption of a soy formula was significantly higher among the children with food allergies. It was found that children with a peanut allergy were exposed significantly earlier in life to peanuts than children without a peanut allergy. The overall findings suggest that environmental factors play a role in the development of a food allergy.

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CSEF Official Abstract and Certification

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Therapeutic methods of treating glioblastoma multiforme (GBM), an aggressive glioma with a median survival of 15 months, have continually suffered low efficacy in clinical trials over the last fifty years. The combination of GBM's varied resistance to therapeutics, and the lack of an effective therapeutic delivery mechanism to tumor sites has stagnated development of treatments that demonstrate high efficacy and low cellular toxicity. Engineered stem cells that encapsulate and deliver therapeutic agents directly to tumor resection cavities have shown high efficacy in in vivo mouse models, yet the efficacy of stem cells in clinical studies has not been fully realized due to the heterogeneous response to specific therapeutic agents. In this study, we explore the antiglioma effects and mechanisms of the thoroughly studied cytokine interferon beta (IFN β) with in vitro assays and real-time in vivo luciferin-luciferase imaging. This study investigates the in vitro effectiveness of IFN β to tumor necrosis factor related apoptosis-inducing ligand (TRAIL) resistant primary and established GBM cell lines (U373, GBM4, LN229, LN319, U138), supports a new pathway mechanism for IFN β , shows IFN β drives cells to senescence, and demonstrates the ability of IFN β to stagnate tumor growth. We also explore the potential of a newly engineered IFN β -TRAIL fusion protein for further study.

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Student Name(s):

Fair Category

Word Count

Abstract:

High-grade serous ovarian carcinoma (HGSOC) is the most lethal gynecologic cancer because of its chemoresistance and recurrence. The aim of this research was to test if calcium, a common dietary supplement, could be a chemosensitization therapy for chemoresistant HGSOC cells. The response of chemoresistant cells to a new combination therapy of calcium and cisplatin was determined. Supplementing chemotherapy with the activation of calcium signaling improved the chemo-response of HGSOC cell lines. The mechanism behind this positive chemo-response is possibly due to the cleavage of p53 by calpain, an enzyme activated by calcium. This was assayed by western blots of chemosensitive cells when calcium signaling was inhibited. The cleavage of p53 is associated with chemosensitivity, and it has been suggested that by inducing p53 cleavage, calcium can help induce cell death. Calcium has the potential to be developed into a chemosensitization therapy which will eliminate chemoresistance and therefore significantly increase the survival rate of HGSOC patients.

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Student Name(s):

Fair Category

Word Count

Abstract:

Studies have suggested that boys and girls are treated differently in school from an early age and how this can impact their behavior in class. It has also been shown that students with more behavioral issues are not as successful in school. This study looks at whether teachers treat students differently based more on gender or on how many behavioral issues they have. My hypothesis was that the teacher would treat students based more on behavior and that, the more behavioral issues a student has, the more negatively the teacher will treat him or her. For this project, I observed a third grade class and quantified the data by analyzing each student-teacher interaction on two scales and calculating the ratio of the two. This allowed each interaction to be rated on how positive or negative the teacher responded to the student. I used this data to show a relationship between the positivity of the interaction and the number of behavioral issues the student had during that class. The trend was that, the more behavioral issues a student had, the more negative feedback the teacher gave to that student.

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Word Count

Abstract:

H19 is a paternally-imprinted gene that varies directly with the expression of several enzymes in the steroidogenic pathway. Aromatase is an enzyme key to the biosynthesis of estrogen. The inhibition of aromatase eliminates estrogen production, which has been correlated with a decrease in cancerous tissue. This project aimed to identify whether H19 could be used to regulate the expression of aromatase and lead to a potential cancer preventative. KGN cells were cultured from an existing cell line until at least 80% confluent. Half of them were transfected with the H19 gene, and half of them with a vector gene to simulate a control. After 72 hours, a PCR was performed on half of the cells to amplify DNA signals, and a western blot was performed on the other half of the cells to show protein signals. Results of the PCR showed a thirteen-fold increase in aromatase expression once H19 had been transfected into the cells. Results of the western blot showed higher levels of protein signals of aromatase from the H19-transfected cells than the vector cells as well. The dramatic increase in aromatase expression and protein signals in both the PCR and the western blot of the H19-transfected cells shows a clear direct relationship between H19 and aromatase. If aromatase levels can be manipulated through the down-regulation of H19, overproduction of estrogen and therefore the cancerous tissue it produces can be decreased. This could have many beneficial implications for people suffering from breast and ovarian cancer.

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Word Count

Abstract:

Despite legislative advances in gender equality, the majority of people have inexorably internalized gender norms. According to Erikson's stages of emotional development, adolescents are plagued by the conflict of identity vs confusion. As they progress through this stage, adolescents are likely to use gender as a major factor in constructing their self-image. According to social identity theory, as one identifies more with a particular in group (in this case, one's gender), one is liable to form negative biases against the opposing out-group (in this case, the other gender). These biases can beget negative social relationships between the sexes. This cross-sectional study compared the level of implicit and explicit gender bias present in prepubescent and postpubescent adolescents. Through the use of established psychological inventories, the Implicit Association Task (IAT) and the BEM Sex-Role Inventory, the levels of implicit and explicit gender bias were measured in a random sample of males and females of both demographic groups. It was hypothesized that adolescents would score as highly gender biased.

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Student Name(s):

Fair Category

Word Count

Abstract:

Cancer, or out of control cell growth, is one of the most well-known and broad diseases threatening the human race. Thankfully, large portions of science are dedicated to researching and developing chemotherapy drugs to combat the ailment. However, effective chemotherapy often requires the assistance of gram-positive bacteria. Lipoteichoic Acid, an element of the cell wall of these bacterium, will trigger an immune response that aids the body in fighting the cancer when these prokaryotic microorganisms of the gut are released into the bloodstream. In this experiment, the effect of different environments on the average area of bacillus cereus cells was investigated, as a larger cell size will theoretically yield a larger cell wall. A portion of the bacteria was grown at 23 degrees Celsius and at 35 degrees Celsius. Two other groups had 1mL of buffer solution with a pH of 4 and 7 mixed into their tryptic soy agar base. Samples were then taken daily and stained using a methylene blue stain. Using a microscope and iPhone 5, photographs were taken of the slides under 1000 power. The photographs were then analyzed using the ImageJ program. The areas of all of the cells within the photo were totaled then totaled and divided by the number of cells in the image in order to determine and compare the average size of the bacillus cereus cells under different conditions. Preliminary results have shown little correlation between environmental factors and the average size of the bacillus cereus cells.

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Word Count

Abstract:

Many food companies around the world use food additives to ensure preservation and quality of taste in food. Three common additives are Sucralose, Maltodextrin, and Monosodium Glutamate (MSG). There has been controversy as to whether or not these chemicals contain health hazards. The effects of these chemicals were studied through Zebrafish (Danio Rerio) embryonic development. They were prepared and added to the embryos along with embryo medium. The development was observed over the course of three days (at four days a Zebrafish embryo is hatched) under microscopy and heart rate monitoring. The chemical that had the most effect on the Zebrafish embryonic development was MSG. On the third day, the embryo looked to be less than a day old, but still alive. Sucralose did not have as significant of an effect. However, there was a difference between concentrations used. The higher concentration, 250 micro liters, seemed to have progressed embryonic development by a few hours (relating to weeks in a developmental human fetus). Maltodextrin caused a greater progression of development. At 3 micro liters of Maltodextrin in day three of development, the embryo hatched, while the control hatched on day four. The highest dose of Maltodextrin caused a lower heart rate, but the other chemicals generally had no effect on heart rate. Zebrafish embryos contain a similar physiology to human fetuses, allowing a helpful comparison. In conclusion Sucralose, Maltodextrin, and MSG can affect the development of a fetus. MSG will have the most harmful effect, containing the highest health hazard.

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3159

Student Name(s):

Fair Category

Word Count

Abstract:

Inteins are self-splicing molecular parasites that infect host DNA and hijack its replication cycle. Inteins are often compared to introns but there are two important differences. First, the homing endonuclease that is unique to full inteins allows transfer across species and is the method by which inteins invade DNA. The second difference is that introns are spliced out by the cell itself at the RNA level and inteins are self-splicing and remove themselves at the protein level. Inteins have the ability to make two distantly related taxa seem closely related due to their horizontal gene transfer via homing endonuclease. Identification of horizontal gene transfer through intein tracking is critical for creating accurate gene and species trees. This paper will explain how the metagenome database, MG-RAST, was used in conjunction with previously collected intein alignments to perform psi-BLAST searches that found the number of inteins in various metagenomes and their taxonomy information. I analyzed the taxonomic information to look for anomalies that could indicate horizontal gene transfer. In addition, I conducted statistical analysis to identify possible correlations between alpha diversity or GC content and the quantity of inteins in a metagenomic environment. At this point no correlation has been found. My research was supported by the Gogarten lab at the University of Connecticut.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Connexins are proteins that help construct gap junctions. Gap junctions play a vital role in cell communication, proliferation and growth. A specific connexin, Connexin 43 (Cx43) is abundantly present in the myocardium of heart, and it also regulates cardiac development. Mice that have Cx43 completely knocked out in their cells die at birth. In this experiment, Cx43 was deleted only in the endothelial cells. Two litters of mice were observed: one with Cx43 present, and the other with Cx43 deleted in the endothelial cells. Lung sectioning, retina staining, and image analysis (both quantitative and qualitative) were done to observe the effect of the deletion. The deletion of Cx43 showed a slight change in vascular outgrowth and a dramatic increase in hole size. This result further embellishes the importance of Cx43, showing that the deletion of this protein leads to a branching defect, which can lead to issues in cell proliferation. This information can be used by future researchers and drug companies for creating disease models for conditions such as cancer: because vessels without connexin 43 are weak, a tumor cannot be vascularized on vessels that display characteristics similar to vessels without Cx43. Another disease model can be made with cardiac ischemia - one of the most prevalent conditions in the U.S. - as this deals with improper function of the myocardium, a structure in which Cx43 is abundantly present, as stated before.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Characterization of TC-2153 Inhibition on Striatal-Enriched Protein Tyrosine Phosphatase (STEP) in Human Cell Lines

Student Name(s): A. Rajagopalan

Fair Category

Abstract:

Striatal-Enriched Protein Tyrosine Phosphatase (STEP) is a brain specific enzyme, implicated in neuronal disorders such as Alzheimer's disease, schizophrenia and fragile X syndrome. Increase in STEP activity is associated with some of the pathophysiology of these disorders; therefore developing an inhibitor for STEP has potential therapeutic value. We have developed a small molecule inhibitor (TC-2153) against STEP. In this research, we propose to test this inhibitor in different human cell lines to address its specificity against STEP, measuring the phosphorylation status of extracellular regulated-signal kinase (ERK) and protein kinase 2 (Pyk2), well-established STEP substrates. We hypothesize that if TC-2153 is specific to STEP, the changes in the phosphorylation of extracellular regulated-signal kinase (ERK) and protein kinase 2 (Pyk2) in these cell lines will be independent of the effect of various concentrations of TC-2153 used. To test this, various human cell lines (human embryonic kidney (HEK), HeLa, fibroblast, and liver) were stimulated with different concentrations (0, 0.1, 1, and 10 μ M) of TC-2153, and tested using western blots to determine the ratio of phosphorylated to non-phosphorylated amounts of ERK and Pyk2. The results show an increase in this ratio as concentrations of TC-2153 increase for all cell lines and substrates except for ERK in HEK cells, in which there is a decrease in this ratio as concentrations increase. These findings suggest that TC-2153 is not specific to STEP, as the changes in phosphorylation of ERK and Pyk2 are not independent of the concentrations of inhibitor used.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Use of a Pre-Chemotherapy/Radiotherapy Regimen of Glutamine and Probiotics to Prevent Oral Mucositis

Student Name(s): A. Ng

Fair Category

Abstract:

Oral mucositis or stomatitis is the debilitating effect of high dose chemotherapy and radiotherapy treatment that affects the mucous membrane (mucosa) of the oral area such as lips, throat, and inside cheeks. The high mucosal toxicity of chemo/radiotherapy causes inflammation in the mucous membrane ranging from redness and irritation to severe ulcerations. In extreme cases of oral mucositis, the patient is unable to tolerate foods or liquids and is more prone to mouth infections, both of which may force chemo/radiotherapy treatment to be delayed or altered. A common but unreliable treatment of oral mucositis is cryotherapy, the use of ice chips to induce rapid cooling of the oral cavity to reduce blood flow to the area and assuage inflammation once symptoms are present. This research investigated the use of an alternative, specifically a pre-chemo/radiotherapy regimen of glutamine and probiotics to prevent and/or reduce the severity of oral mucositis. Sus scrofa mucosal cells were used as a model, and cultured in DMEM medium, containing 4.5 g/L glucose, and varying concentrations of L-glutamine (0-4 mM) and probiotics (0.2-1.5E6 cells/ml). Cell proliferation was measured daily via light microscopy for 11 days. The medium containing 3.9 mM L-glutamine and 1.5E6 cells/ml probiotics demonstrated the greatest promotion of cell growth (351% relative to control), and is therefore best as a topical pre-chemo/radiotherapy regimen. This novel regimen is favorable to cryotherapy, as it instead promotes cell growth, and can be administered as a preventative measure prior to the onset of oral mucositis symptoms.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3501

Student Name(s):

Fair Category

Abstract:

Scientists can use DNA barcoding to determine the authenticity of products that humans are consuming. DNA barcoding is a method that uses a short genetic region in an organism's DNA to determine if it belongs to a certain species. In this study, the aim was to analyze various meat samples from both the United States and abroad to detect if mislabeling had occurred. Because meats may be hard to distinguish based on appearance, DNA barcoding can play an important role in affirming or refuting the content of a particular meat product. Since past studies have discovered meat and fish mislabeling in the United States and abroad, the hypothesis for this study was that certain samples will be found to be mislabeled. Specifically, the samples that were tested included dried and raw meats from shops in New York City (Chinatown), biltong from the United States and South Africa, and meat jerky from supermarkets and online stores in the United States. DNA was extracted from the samples and amplified using PCR. Gel electrophoresis was used to confirm that amplification was successful. Samples were sent for sequencing and then analyzed using the web-based DNA subway tool. Results thus far demonstrate that meat products are being mislabeled, especially in the category of exotic, nontraditional meats. This study is imperative to determine the authenticity of meat products because mislabeled meat is not only against the law, but could possibly be dangerous to human health.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Num

Student Name(s):

Fair Category

Abstract:

For many years the basic source for paper is from trees, but besides trees people tried to use many other sources unfortunately it did not work and now it has affected the Earth's entire ecosystem with humanities overwhelming usage of paper. Since the before 1947 the Earth was covered in 5.9 million hectares of forest. Then the paper industry exploded. Since then 3 million hectares of trees have been cut down and thousands of species have been lost. Our project is based on; a way to find a new and ecologically beneficial way to construct paper through various melon endocarp layers. If we use melons in the place of trees to make paper, then the amount of trees being cut down, the amount of species being destroyed, and the amount of oxygen in our air would go in the opposite direction because of the dramatic decrease of trees being cut down. They cut hundreds of years old trees to make paper but in order to grow melon, it only requires 3-4 months. We have taken the endocarp out of melons and mix that layer with homemade glue and flatten it into a thin paste layer. Then later, dries it out into a piece of paper. The end result of this project is the full sized A5 paper that you can be able to write on. Ultimately our project is totally harmless to ecological systems, because instead of cutting down of trees we will use fiddling waste product of melon.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Harmful Algae Blooms have occurred in increasing numbers in Long Island Sound since the 1980's due to nitrate runoff. These HABs cause a condition called hypoxia, in which the oxygen level in the water is decreased and marine animals can suffocate. With this issue in mind, the aim of this project was to create a living filter containing algae-consuming copepods that could decrease the overall algae concentration of a system. To create this filter a model system of tetraselmis algae and tigrionus californicus copepods was used. We determined that transmittance measurements taken using a spectrophotometer were a viable way to measure algae concentration and therefore detect changes. We also determined that a filter bag of 180µL pore size was able to trap copepods while letting algae flow through. We then confirmed that without a filter, copepods consume algae. We then set up an experimental system with our living filter in a beaker containing algae and took transmittance measurements to detect changes in algae concentration over time. When we compared the algae concentration in both our large-scale and small-scale models, our measurements of the experimental beaker and untreated beaker each showed trends of increase in algae concentration. However, the algae concentration in the experimental beaker increased at a much lower rate. In our large-scale model the algae concentration in the experiment beaker increased by 15.5%, while the algae concentration of the control beaker increased by 49.6%. We determined that these results effectively show a proof of concept of the living filter.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Nonrenewable energy sources are predicted to run out within the next 70 years, so it becomes vital for humans to find a new type of energy source that is renewable. However, some countries have limitations because they either don't have enough space, don't get enough sunlight, or have scarce water supplies. Because of this, our goal is to find the renewable energy source which can function despite these limitations so that small countries like Taiwan, dark countries like Iceland, and dry countries like Chile can produce the most energy possible to run their country. Our hypothesis is; if fuel cell, solar, biomass, and wind energies are all compared then the most efficient of the four would be biomass energy because it can function in both day and night, is not incredibly harmful to the Earth, takes up little space, has no restrictions as to where it can be created, and will produce a fair amount of electricity. In order to conduct this experiment, we tested solar, biomass, and fuel cell energy and we researched extensively to get results for wind, gasoline, and oil. We compared our renewable energy results as well as comparing it to the often used nonrenewable resources. Our results concluded that we were both correct and incorrect because while biomass is the most efficient because it can run in nearly all conditions, wind and solar both produced more energy than it did.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3507

Student Name(s):

Fair Category

Word Count

Abstract:

Bacterial resistance to the β -lactam continues to rise; however, it does for all antibiotics in wide spread clinical use. A major source for resistance to β -lactams is provided by β -lactamase enzymes that cause hydrolytic destruction of these antibiotics. The focus of the project is the virtual screening of non-covalent inhibitors for the Class C β -lactamase from Enterobacter cloacae, P99. The digital file of the enzymes was prepared using computer programs such as PDB viewer and AutoDock tool. The Compounds from NCI diversity set III were virtually screened against the active site of Class C β -lactamase from Enterobacter cloacae using AutoDock Vina and PyRx®. A total of 1400 molecules were screened using AutoDock® and PyRx®. The molecules with a binding energy of less than -7 kcal/mol were subjected to experimental studies. The cephalothin, which can be readily hydrolyzed by β -lactamase is used as a substrate in the enzyme kinetics. The preliminary data shows many of them to be promising inhibitors.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: PCR amplification of Cnidarian DNA using primers designed to target conserved regions of APP gene.

Student Name(s): J. Ariyibi, M. Sorbaro, A. Makam

Fair Category

Abstract:

Alzheimer's is the 6th leading cause of death in the United States as of 2013, and 5 million people are living with its consequences. A pertinent gene, Amyloid Precursor Protein, or the APP gene causes Alzheimer's by forming plaques on the brain. Our goal is to try to clone and sequence fragments and to hopefully prove that there is a homologous APP gene in Cnidarians. To accomplish this, we aligned homologous APP sequences in evolutionary different organisms and looked at conserved sequences to design PCR primers. We used the primers to extract the DNA from hydra, did PCR and then put them through gel electrophoresis. After gel, we transformed the bands that were successful from the gel into a plasmid. Currently we are going to extract the DNA from select bacteria colonies, do PCR and gel electrophoresis and finally sequence the bands that were successful. So far, our gel results signify that the bands are most likely to be homologous APP sequences, however, we are not completely certain of this fact. Furthermore, the transformation results of white colonies of bacteria show that sequence we extracted does in fact fit into the plasmid and create recombinant DNA. Since the start of our research project, we have all come to understand the APP gene, the techniques used in our procedure, and our task in greater depth.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: External Digestion of Cellulose Utilizing Enteric Symbionts from the Termite gut

Student Name(s): N. VanBelle, E. Ganshaw

Fair Category

Abstract:

The purpose of this study was to isolate the cellulose-digesting microbes from the termite gut in an effort to optimize growth, metabolism, and environmental conditions for external cellulose digestion. It was hypothesized that the enteric symbionts from the termite gut could be isolated, an optimized cellulose-rich environment created, and the cellulose digested into reducing sugars, i.e. d-glucose units. Experimentation consisted of three main steps. First was the creation of an optimized cellulose-rich, nutrient broth. Second was the isolation of the microbes for each trial by removing the gut of 10 termites (family Termitidae) and combining them with 2.5 mls of broth and .5 mls of Qualitative Benedict's Reagent in a culture cuvette. Cuvettes were capped and placed in the dark at 250C. Cellulose digestion was monitored using Qualitative Benedict's Reagent as a presumptive indicator for the presence of reducing sugars, while quantitative transmittance and absorption readings were recorded with a colorimeter. Qualitative and quantitative results indicate no presence of reducing sugars with a 3.4% transmittance and 1.4% absorbance. In conjunction with a presumptive color change, 2.4% transmittance and 2.0 absorbency indicated a moderate concentration of reducing sugars while a .4% transmittance and 2.8% absorbance indicated a high concentration of reducing sugars. It was concluded that under semi-anaerobic, cellulose-rich conditions, enteric symbionts from the termite gut can be isolated, and used to externally digest cellulose, but only minimally. Further research should focus on maximizing digestion as well as microbe lifespan and reproductive ability.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Synergistic effect of different antibiotics change the outcome of how effective an antibiotic is on E. coli

Student Name(s): D. Patel

Fair Category

Abstract:

How does the synergistic effect of different antibiotics change the outcome of how effective an antibiotic is on E. coli? In order to investigate this problem question, we had used the Kirby Bour method, and then placed combinations of each antibiotic on the paper disk and after a day we measured the inhibition zone. My findings show nalidixic acid and streptomycin worked much more effectively in isolation than in combination with ampicillin. Nalidixic acid yielded an inhibition area of 3.37 cm², while streptomycin had made an inhibition area of 3.5 cm². However, Nal. and Amp. combined only yielded an inhibition area of 2.7 cm²; Strep. and Amp. yielded an inhibition area of 3.0 cm². I believe the reason for this is because Amp. prevents cell wall synthesis, while Nal. prevents the cell from making any proteins. Both of these antibiotics prevent reproduction, so in result, the antibiotics are both doing the same thing, which isn't very effective. Also Strep. and Amp. both prevent cell wall synthesis, which again, isn't very effective since they are both doing the same thing. Further research opportunities include investigating the effectiveness of silver-nanoparticles in overcoming antibiotic resistance.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3511

Student Name(s):

Fair Category

Abstract:

Bacteria are found everywhere and are inevitably present in some amounts in the foods we consume. These can sometimes cause food poisoning and have very unpleasant health effects. Processes such as Pasteurization have greatly decreased the incidence of such food borne illnesses. In our experiment, we wanted to test whether a *Nigella sativa* (black seed) oil extract and its main constituent, thymoquinone, could be used to inhibit the growth of *Escherichia coli* bacteria. Thymoquinone has been found to have anti-cancer, anti-inflammatory and antioxidant properties. We hypothesized that if black seed oil extract inhibited bacterial growth, it could safely be added to foods prior to consumption to make them safer to eat. We used different dilutions of black seed oil and thymoquinone in a bacterial kill zone assay. We added the liquids we were testing to filter discs and placed them on agar plates that we had spread with overnight cultures of *E. coli*. We measured kill zones the next day. We used ethyl alcohol and water as controls for our experiment. Our results indicate that black seed oil has antibacterial properties comparable to those of ethyl alcohol. We attribute those effects to the thymoquinone present in the oil. In addition to being a potent antibacterial natural compound, it has many other health benefits that make it appealing as a food additive.

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CSEF Official Abstract and Certification

Fair Category

Proj.
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Title:

Student Name(s):

Fair Category

Abstract:

There is a need for a clean energy source in the world we live in today. A hydrogen economy on organic waste would theoretically satisfy the necessity of a clean alternate energy source. However, the two major current methods to obtain hydrogen are either producing pollutants and/or are too expensive for industrial production. (Evers, 2007). (Levene, Kroposki, Sverdrup, 2006). There is a need for a new method to obtain hydrogen that can be an efficient, inexpensive, alternative energy source. The bacterium (Clostridium in soil) were placed in a 30 ml test tube with growth medium obtained by boiling corn-stalks. These test tubes were inverted and then placed under varying conditions including a heat lamp, the addition of fertilizer to the soil and with iron filings around the test tube to serve as an insulator. The biogas was collected using a syringe and analyzed using a mass spectrometer to verify it was indeed hydrogen and which conditions provided the highest yield. (Dreszer, 2004) A heat lamp, fertilizer, and iron filings will all aid in gas production. If growth conditions are improved (i.e. heat), then the gas yield of the anaerobic bacteria will increase because the bacteria will be more efficient in their hydrogen output. This hypothesis was support by the data. It was found that although the addition of the fertilizer did increase hydrogen output, it was not as substantial as the increase when the heat lamp and iron filings were added.

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CSEF Official Abstract and Certification

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Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Abstract:

According to the World Health Organization, the corruption or contamination of herbal products may be harmful to the consumer. There is currently no practice in place to identify plant species in herbal products. DNA barcoding has been used to identify the mislabeling of commercial teas, fruit species in yogurt, and fruit residues in juices, but more research needs to be done. In addition, it has been found that herbal supplements may contain rice fillers, but herbal plant products and powders have not been widely studied. This barcoding project investigated the integrity of herbal products from different sources and in different forms to determine the most trustworthy product and source. Samples of Ginkgo Biloba, Korean and American Ginseng, Devil's Claw, St. John's Wort, and Echinacea were tested, both in supplement, powder, and plant form. Samples were collected, and the DNA was extracted and then amplified using PCR. The samples underwent gel electrophoresis for confirmation, and were sent out for sequencing. The results were then analyzed using the DNA subway website database. Thus far, it was found that supplements mainly contain rice fillers and that the herbal powders were mostly labeled accurately. However, some mislabeling was detected in the powder samples. It was also determined that the methodology for the plant products needs to be varied in order to obtain results, and this will be the focus of future study.

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Proj. Title:
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Student Name(s):

Fair Category

Abstract:

The McGurk effect occurs when incongruent auditory and visual components of speech are dubbed together so they are perceived as one sound. Normally, the visual is perceived rather than the auditory. However, are people with early musical training less susceptible to the McGurk effect? Answering this question yields insight about how different musical backgrounds affect the brain. Initially, 34 students were surveyed about their level of musical training. From this, participants were categorized into two groups (independent variable): early musical training (defined as 4 or more years of musical training before age 13) and no musical experience (outside of the required school curriculum). Participants that did not meet the criteria for either group did not continue in the study. The qualifying participants individually watched a McGurk effect video while recording the sounds they perceived. How accurately participants identified the speech in this video served as the dependent variable. In the first block that the McGurk effect was present, musicians had an average of 6.7 out of 10 correctly interpreted trials while non-musicians scored 5.5. In the second block, musicians averaged 8.6 while non-musicians averaged 7.0. The averages support the hypothesis, although results are inconclusive due to small sample size and high p-values. This study exposes a hidden benefit of playing a musical instrument: it can improve auditory skills that can be useful throughout life. If significance is found, future research involving EEG testing is intended to find the neurological differences in musicians causing their higher performance in this study.

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Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Who would have thought that brain eating amoebas would be found in the water supply that is used by individuals around the world? How can we prevent this from occurring? This experiment focuses on finding an effective and affordable material to use in filters. A material which could be added as an additive to decrease the amount of amoebas found in the water supply after filtering. Rocks, aluminum, plastic and copper were used. Amoebas were filtered through four different filters, each filter contained a separate material. Samples were gathered and they were ran through a Fluorescence Activated Cell Sorting (FACS) machine which quantified the number of amoebas and counted the number of events. We hypothesized that plastic would be the best material to use as an additive in filters, based off of our previous science fair experiment. After conducting all the sample tests by using the FACS machine, we focused on the standard deviation to explain and analyze data. The FACS machine provided us with numbers of events, so we looked at one standard deviation above and below the average. This allowed us to see if the material was effective compared to the control. The data gathered suggested that plastic would be the best additive to use in filters. The control was 1509 events and the standard deviation was 1171.8 above and 1007.54 below the mean. We arrived at a solid conclusion that plastic is the most effective material that would keep individuals safe from brain eating amoebas.

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3518

Student Name(s):

Fair Category

Abstract:

Fertilizing plants is either too expensive or an environmental hazard. It is important for us to explore more efficient, cost-effective ways to fertilize plants. Using fruit-derived fertilizers is just one way. Our experiment determines if seeds that benefit humans, could also benefit plants by enhancing growth. In this experiment, the growth of plants was tested using various fruit fertilizers- papaya, pumpkin, and pomegranate- because of their ability to improve human health. We also compared plants grown with biochar soil additives in order to determine if fruit seed fertilizers were the most efficient method for plant growth enhancement. There were 15 pots, 3 for each group- biochar, pumpkin, papaya, pomegranate, and the control. After three weeks, the heights and number of plants were recorded. For each trial of the control group, the average height was 9.76cm. The papaya fertilizer group had the highest average height of 10.36cm. Plants given pomegranate seed fertilizers had an average height of 8.53cm. For plants fertilized with pumpkin seeds, the average height was 8.76cm. Plants given biochar had the shortest average height of 6.3cm. In regards to the number of plants grown for each group, the control averaged 13 plants, the papaya averaged 12, the pomegranate 9, and the pumpkin fertilizer grew the most plants-15 in each trial. Biochar had an average of 12 plants. Based on this experiment, papaya and pumpkin seed fertilizers show the ideal result for enhancing plant growth. They are not only the most efficient fertilizer, but also cost effective and efficient.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

The purpose of this project was to test for horizontal gene transfer of the Alfalfa *rbcl* gene into the Rapa genome by way of organelle capture. It was hypothesized that the Alfalfa's *rbcl* gene would not horizontally transfer into the Rapa genome even if grown in a pot containing ground and tilled fragments of the Alfalfa. The Alfalfa and Rapa plants were purchased and planted in individual flower-pots. Once these plants were grown, DNA from each plant was isolated, the *rbcl* gene amplified using PCR, and the product sequenced at Genewiz in order to obtain control sequences for which to compare potentially altered sequences. Next, previously grown alfalfa plants were ground and tilled into the soil, and a new generation of Rapa was planted in the same soil. Once these Rapa plants flowered, DNA samples were isolated and the *rbcl* gene amplified and sequenced. These same Rapa were then cross-pollinated and resulting seed pods developed and dried. The seeds were planted in a pot with more ground and tilled Alfalfa. Once the next generation grew, DNA samples were isolated and the *rbcl* gene amplified and sequenced. All sequences were compared and analyzed in order to identify changes in the original *rbcl* sequence (perhaps by gene transfer) of the Rapa. Results indicate that the two generations of Rapa showed no evidence of horizontal transfer of the *rbcl* gene from the Alfalfa. Although the hypothesis was proven, the study should be extended over many generations to solidify improbability of horizontal gene transfer.

Word Count

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Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3520

Student Name(s):

Fair Category

Abstract:

The aim of this project is to find cheaper, less harmful, and more efficient alternative to the current oil spill cleaning methods in contaminated oceans and seas, a global problem that is overlooked and thus leading to the death of many biotic and abiotic marine species. In order to accomplish this, we have researched natural absorbents. 10 different natural materials (sawdust, peanut shells, corn cob, coconut shards, chicken feathers, sheep fur, goat fur, human hair, sunflower seed shells and pumpkin seed shells) were found that seemed to have high absorption rates and were deemed waterproof. Several water tanks filled with saltwater were used and crude oil was added to them. Then, materials were dipped in the oil for specific periods of time. Then, materials were weighted again and the purity of the water inside the tanks was measured. Following that, tested absorbent materials were placed inside a centrifuge and measured how much oil each of the materials had absorbed. After a look at the recorded results, we came to the conclusion that chicken feathers have had the greatest amount of oil absorbed, with 0.32 liters per 100 grams of water. This shows that softer materials have better oil absorption rates, and surface area may contribute to this. This experiment has also shown that the amount of feathers does not affect the ratio of oil collected. All in all, this method should be put into effect immediately, so no more harm is caused by oil onto the marine life.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Truly Vegetarian? Using DNA Barcoding to Detect Possible Contamination of Vegetarian Products

Student Name(s): K. Askew, E. Novick

Fair Category

Abstract:

It is not always safe to assume that certain processed foods on the shelves are vegetarian-friendly, even when labeled as such. Manufacturers may be allowing meat-based ingredients into products that are labeled as vegetarian. This type of contamination usually originates from shared production lines rather than the deliberate act of adding a high cost ingredient such as meat. The aim of this study was to use DNA barcoding to decipher possible mislabeling of vegetarian products that are on the market today. Research in Europe has deciphered meat products in vegetarian food, so there is a possibility that American foods are contaminated as well. It was hypothesized that non-organic vegetarian foods will experience more contamination than organic. Our samples were taken from a variety of grocery stores and included different brands and product types. DNA was extracted, amplified by PCR, analyzed using gel electrophoresis, sequenced, and compared to sequences in a web-based DNA Subway database. In our analysis, we discovered if traces of animal species are in the vegetarian foods, and also determined from which animal the DNA is originating. Results have demonstrated contamination in several non-organic processed vegetarian products tested. Since there is little research in the United States that has studied if meat and animal-based products are in products labeled as vegetarian, our hope is to continue investigating if meat is added to vegetarian foods. This is important research, especially for individuals wishing to adhere to a meat-free diet.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Worms! Nature's best way to decompose biodegradable plastic into nutrient rich soil. We picked this project to investigate how fast biodegradable plastic could decompose, while using a variety of materials to help the process. We chose this project because as you may know, landfills are repleted with all sorts of debris especially plastic. If the biodegrading process can be excelled and made more environmentally friendly, the Earth will be a cleaner and more enjoyable place to live on. We took the plastic, cut it into three miniature squares, placed the cut plastic into glass containers filled with dirt and placed three different substances into each container. One container had just water in it as the extra material, another had soda, and the third had water and worms. Our hypothesis was that the container with worms and water would help the process of decomposition faster than the soda or water. We descried each of the containers and concluded that our hypothesis was proven correct. The container with worms helped the plastic decompose the fastest, in a matter of four weeks. This experiment was tested for a month. Only the container with the worms decomposed all of the plastic. The one's with soda or water barely decomposed the plastic. It is believed that if we continued testing the soda or water containers with the plastic, over time, the plastic would decompose. But, this could take a couple of months with soda, and years with just water.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Abstract:

Can a solar oven turn salt water into fresh drinkable water? The hypothesis is that if a handmade solar oven can purify salt water then it will be drinkable. This could help impoverished countries that do not have an adequate supply of fresh water but have access to salt water. Using salt water collected from the Atlantic Ocean, sixteen ounces of salt water was placed in the pan inside of the homemade solar oven (controlled variable) each day on four different days (independent variable). The solar oven was placed outside in the morning and returned back inside late afternoon. Each collection day was successful and the results varied from 0.5 ounces to 5.3 ounces of fresh water (dependent variable) collected. We concluded that it is possible to turn salt water into fresh water using simple household items. Once the solar oven concept was understood items could be substituted with equivalent items that were available. Each day yielded different result.

Word Count

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

While looking through a National Geographic magazine we found an article that showed an orange powering a light bulb. That got us thinking. Could we possibly use different kinds of fruit with only two nails and one wire connection to power a light bulb? We then began to research the acidity of fruits and electrochemical cells and came up with the problem statement: "Which type of acidic fruit has enough voltage to power a single Christmas tree light?" In our hypothesis, we stated that the orange would produce the most voltage. To try and light the bulb, we inserted a copper and zinc nail into the fruit of our choice. Then we used a volt measure to calculate the voltage that the fruit gave off. We then placed the Christmas tree light onto the nails to see if it would light up. We repeated these steps three times with each fruit and averaged out the voltage. During our experiment, there was a common trait in all of the trials; the bulb wouldn't light up. The fruit was giving off voltage, but there weren't enough volts to power the bulb. Overall, the pineapple had the most volts at .964. Although the pineapple wasn't the fruit with the most acidity, it had the most voltage. Our hypothesis was wrong, but we accept the results. Gasoline is a nonrenewable resource. When the gasoline runs out, what will we fuel our cars and lights with? Based on our results, fruit could be a possibility.

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Foods can be healthy and unhealthy, but how do we know ourselves, without the FDA's years of research? The purpose of this project is to determine which foods have a higher specific heat coefficient. This experiment will prove there is a more efficient way to see if a food is healthy or not. We believe that the higher specific heat a food has, the healthier it is. We invented a procedure to quickly find a specific heat coefficient of a food. The foods were tested using a weight scale, precise heat thermometer, microwave, and foods based off the food pyramid. We used a 100 grams of each food/combinations we chose. We then put one of the food items in the microwave for 60 seconds after we measured the temperature. After receiving the new temperature of the heated food we found the specific heat coefficient of the food using the formulas, specific heat coefficient equals energy divided by mass times deltity (difference between temperatures) and energy equals mass times deltity times coefficient. Our coefficient in the energy formula came from water since it was neutral. After solving the math for each food, we observed that all the foods that were proved healthy had higher specific heat coefficients than unhealthy foods. With the results, it proves our hypothesis right. Our project saves years of research and costly expenses. It is a quick, easy, and inexpensive project which contributes to the study of food science.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Most people drink hot drinks such as coffee, tea, and hot cocoa, but the problem is trying to keep them hot for a long period of time. For our project we tested which type of cup made out of styrofoam, ceramic, and metal thermoses would insulate hot water for the longest period of time. We hypothesized that the styrofoam cup would perform the best. We boiled hot water and poured it into one styrofoam, one ceramic, and one metal thermos. We put a thermometer into each cup every two minutes over a period of an hour and recorded the temperatures. We repeated this procedure two more times. After testing the types of cups three times each we averaged the temperatures for the cups and compared them. Our results showed that our hypothesis was incorrect it was the metal thermos that kept the water hottest for the longest amount of time. For example after 30 minutes the metal was 14 degrees hotter than styrofoam. If you are going to drink a heated beverage, the best option would be to drink it in a metal thermos.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

ABSTRACT We were successful in solving our “Sulfite Plight” of preservatives. Using sulfite test kits, we first found levels of sulfite in a variety of common foods (as several fruits); number of drops of indicator revealed levels in ppm (parts per million). After analyzing sulfite quantities we discovered: •Items high in sulfites delayed bioavailability; •Levels of Vitamin C were lowered in Sulfite foods; •Levels of sugar remained constant; •Cinnamon proved to be a very effective preservative, even increasing the rate of bioavailability; •Citric acid is also a good preservative, but did not increase bioavailability as much as cinnamon. We recommend cinnamon as a good solution to those allergic to sulfites, our “Sulfite Plight”.

Word Count

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
4010

Student Name(s):

Fair Category

Word Count

Abstract:

Occasionally there may be two routes that have the same distance but take different amounts of time to travel through. This is because the routes may contain different amounts of turns, which results in different completion times. We tested this theory by developing a problem: How does the shape and amount of turns in the maze effect the amount of time it takes a robot to go through the maze from start to finish? To test our problem we first had to construct three mazes (triangle and square) and a control (straight) that all had an equidistant perimeter of 8 feet. Next, we built and programmed a robot to collect our data by traveling through our mazes. To collect our data we placed the robot at the start of the maze and timed it until it completed one lap of each maze. Our hypothesis was, if we test two different mazes and a control, then the robot will go through the triangle-shaped maze in the least amount of time because it has the least amount of sides and turns. Our hypothesis was proven correct because the robot traveled through the triangle maze the fastest at 69.60 seconds (average), excluding the control. After conducting our experiment we now can conclude that the amount of turns in a maze or any route does have an effect on the completion time. Bibliography "How to Make Your First Robot." Let's Make Robots! N.p., 30 Jan. 2008. Web. 24 Feb. 2014.

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CSEF Official Abstract and Certification

Fair Category

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Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Our purpose was to find out which out of five shapes that we chose, including a cube, a sphere, a pyramid, and two stealth planes, was going to be the least visible by our measurer, the LUX meter 50,000. We put the shapes into a cardboard box and shone a standard LED light onto each shape and took notes of how much light was reflected back into the detector of the LUX meter and was displayed in the measurement of LUX. We repeated this process with each of the shapes and carefully noted down our results. The experiment was conducted five times for each shape and in the end, each shape had an average amount of light that it reflects. In our hypothesis we stated that the sphere would reflect the least light therefore being the most stealthy, but as it turns out the stealth plane #2 was the stealthiest. As we later realized, it was not as much the curve on the shape that affected the reflection of light but more the amount of surface area that was facing the flashlight and the measurer. The results were that the second plane was the stealthiest. It had an average of 8.2 LUX while the other plane, in second place, the other plane had 10.8 LUX. In order for least to greatest each of the other shapes were pyramid with 11.2 LUX, the sphere with 14.2 LUX, and the cube with 16.6 LUX.

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CSEF Official Abstract and Certification

Fair Category

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Abstract – Cole Riegle I noticed the growing problem of smog all around the world. My lab partner and I brainstormed and came up with multiple ideas to try to create a filtration device to remove smog from the air. We ultimately designed a filter that uses an electrostatic field to attract negatively - charged smog particles. We did this by attaching a 9-volt battery to a copper wire that we wove through a soot filter. We taped the wired filter to both sides of a polyvinyl chloride (PVC) pipe. We conducted the experiment by placing three filters in three separate locations for one week. Every day we observed each device, recording observations about weather conditions and temperature. After one week, we recorded the color shade of the filter using a gradient scale that we created, which measured amounts of color change from light to dark. During the week of the experiment, one of the devices went missing. Of the remaining two filters, one had a slight color change and the other had a greater color change. There were a variety of variables that could have contributed to these results and therefore we could not easily determine how much of the color change was the direct result of smog attracted by the electrostatic field that collected on the filter.

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Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Stirling engines have been around for over 200 years. They are very efficient but not powerful which is possibly why they are underutilized. In this experiment, I tested how the differences in temperature can affect the speed of a Stirling engine. Although I only looked at the LTD Stirling Engine, the Stirling Engine can be made in many different styles and configurations to be used in a variety of different applications, anything from charging you're I-Phone with a hot cup of coffee to nuclear/Stirling Engine power submarines.

Word Count

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

According to studies done by the American Academy of Pediatrics, finger amputations account for 91.6% of all amputations in the United States. However, commonplace prosthetic limbs can cost thousands of dollars. The objective of this project was to improve an inexpensive prosthetic limb invented by Richard Van As, a South African carpenter who used cables and a puppet hand design to invent a hand that was functional and cheaper than what had been created before. Using a 3D printer, the necessary parts of the prosthetic hand were designed and created using the CAD modeling program TinkerCad and the 3D printing and modeling program Makerware. The hand is powered by normal wrist motion that causes the fingers to grab and release objects, a motion which is essential to normal functionality. Major improvements that were made to the design created by Richard Van As include a ball and socket joint replacement of the hinge joint formerly attaching the thumb to the “bones” of the hand. This allows for further flexibility and an increased ability to grasp objects. Wider fingers allowing better grasping abilities so small objects do not slip through the gaps of the hand’s fingers were also added. Finally, a mechanism was added that allows the prosthetic to be in an “open” position when relaxed so as to better mimic a human hand and allow for stronger grasping of objects. These changes allow an improved design that allows its wearer a stronger grip using an inexpensive design.

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Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of our science fair project was to see what happens when fudge is crystallized cooled at different temperatures. Our hypothesis was that the room temperature fudge would form the largest sugar crystals. We conducted this experiment by first following the recipe to make the fudge. After that, we poured the fudge into nine different containers to cool. We put three in the refrigerator, three in the freezer, and three in a room temperature area. After the fudge cooled, we studied all the fudge by rubbing it between our fingers to test its graininess. The grainier it was, the larger the sugar crystals. Finally, we then determined which temperature formed the most crystals in the fudge. Our hypothesis was correct in that the room temperature fudge had the most crystals and the fudge in the freezer had the least amount of crystals. The reason for this is that in the room temperature area, it takes longer to cool so the crystals have a longer time to grow than the freezer which cools quickly. In conclusion we found it was best to cool the fudge in the freezer because it will be the smoothest and best to eat.

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Num

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Num

Student Name(s):

Fair Category

Word Count

Abstract:

Have you ever been outside on a hot summer day wearing a black shirt? Has anyone ever told you wearing black shirts in sunlight made you hotter? In our experiment, we put this theory to the test. We predicted that darker colors, such as black and blue, would have a greater temperature increase, as opposed to lighter colors, such as yellow and white. In our experiment, we wrapped a different colored piece of paper around six different jars. The colors that we tested were black, white, red, green, yellow, and blue. We left each jar 15 centimeters from an incandescent light bulb for 45 minutes. Our group conducted the experiment for each color three times through and averaged out the results. The results indicated that black, the darkest color, rose the most, and white, the lightest color, rose the least. The reason for this is because black is absorbing a combination of every color on the visible spectrum. White, on the other hand, is a combination of every color on the visible spectrum too, but reflected off of a surface. Every other color, however, rose the same amount. We believe there were miniscule differences between these colors, but they were too slight to measure. At the end of the day, does it matter what color shirt you wear? According to our results, it doesn't, unless you're wearing black.

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Student Name(s):

Fair Category

Abstract:

During the winter, roads freeze and people put different substances on roads to try and melt the ice, but which substance will melt the ice the fastest? This experiment looked at if deicing salt, iodized salt, cat litter, or sand will melt the most amount of ice the fastest. Water was poured into five different cake pans. The cake pans were then placed in a freezer until the water was completely frozen. Then we cut a slit in one corner on each of the five different cake pans. After the water was frozen, we took the cake pans out of the freezer and took each sheet of ice out and placed it in the cake pans with the slit. Then each melting agent was poured on separate sheets of ice. At intervals of five minutes, we recorded how much water was in the beakers and recorded the room temperature until 90 minutes was reached. After performing the experiment, the deicing salt melted the most amount of water. It melted 380 mL of water, the iodized salt melted 330 mL, the cat litter melted 150 mL of water, and the sand melted 150 mL of water. During the process, the cat litter and the sand absorbed some of the melted water that was not accounted for.

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

The main purpose of our experiment is to determine whether or not sound is a potential form of propulsion on a large scale. It is proven that sound propulsion itself is possible, but we want to know; Can we move a vehicle, like our boat with it? We want to prove to people that motors or engines aren't the only way to go. If sound, as thrust energy, took off on a large scale, there would be less pollution, and the frequency could be such a high tone that it is hardly even heard by the human ear. Using a Christmas ball, the sound should disrupt the air inside in such a way that it moves the platform along. The reason why we chose a boat rather than a car is because there is less friction with water than there is on land, with wheels. The goal is to maximize power. Overall, our project is to see if sound propulsion could be a form of transportation, whether it be cargo or passengers. Unfortunately, the sound was not powerful enough to move the boat. There are multiple things that could have created problems, such as: speakers that are not powerful enough to propel the object, or the frequency we used is not the correct pitch to aggravate the air molecules inside the ornament. Our group hopes to do research in times to come.

Word Count

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Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Our science fair project's purpose was to see what type of room candles will burn fastest in. Our problem asked: Will a candle burn fastest in the cold room, the room temperature room, or the warmest room? We made a hypothesis that the candles would burn fastest in the warmest room. We tested the candles in 3 rooms with different temperatures. The candles were previously measured and we made sure they were from the same manufacturer, the same color, same length, and were unscented. 3 candles were placed into one of the rooms and lit. The candles were spaced 5 to 6 inches apart and were allowed to burn for 30 minutes. Then, after time was up, we blew the candles out and let them cool for 4 to 5 minutes. We measured the new length, which was then recorded into our notebook. We followed the same procedure for each of the other rooms. The candles that measured the shortest (after being burned) were the ones that had burned the fastest. We observed and noted that the candles in the rooms burned very close to the same rate, 1.3 inches, but the candles in the coldest room burned fastest and were the shortest, about 1.4 inches. We concluded that the cold temperature is a factor in a candle burning at a faster rate.

Word Count

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CSEF Official Abstract and Certification

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Proj.
Num

Proj. Title:

Proj. Num

Student Name(s):

Fair Category

Abstract:

Abstract Our goal was to analyze the ignition and burn times of various types and brands of artificial fingernails. Using a safe flame hood/vent/filter set-up, we first tested all nails “plain” (no flame retardant), completing 3 trials of each. Then we re-tested all nails with nail polish added. We found that all of these nails had quick ignition times and lengthy burn times, obviously a flaming danger. Next we wanted to investigate a “safe coating” for all nail samples. We used silicon liquid, kaolin (a type of loose clay), chitosan (shrimp shells), and brominated vegetable oil (gatorade). We discovered: •Silicon and chitosan delayed ignition times •Kaolin generally increased ignition times; they did not flame, but melted •“Tips” (French nails) only melted; other styles had quick burn times or none •Brominated vegetable oil delayed some ignition times It is important, especially in science labs, to control “Fire at your Fingertips.”

Word Count

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This experiment was an idea for a school science project, thought of us when the project was announced. our project is an experiment to find what chemical reaction can propel a toy car the farthest. We did the experiment on a handmade wood track at one of our houses. We gather 3 different pair of chemicals that, when combined, create great amounts of pressure; Mentos and Coke, Alka-setzer and water, and baking soda and vinegar. We put each pair in to a plastic capsule on the back of a wood car. Then we put the back up against a backstop and waited for the reaction to occur. After the reaction occurred, we measured the distance it went in centimeters. The averages of the distances are 58.75cm, 9.85cm, and 24.35cm. Some of the reactions took at maximum of 5 minutes to occur, but others took less than 15 seconds. The reaction that went the farthest was the baking soda and vinegar. The reaction that went the shortest distance was the Mentos and Coke.

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CSEF Official Abstract and Certification

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Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Abstract:

Loosely Coupled Inductive Power Transfer (LCIPT) systems are used to distribute energy from a stationary primary source to a movable secondary load by magnetic coupling. These technologies have a wide variety of applications, including the charging of personal electronic devices. Our purpose was to investigate the issues of efficiency, charging speed, and inadequate range, using magnetic resonant coupling and the possible application of resonant repeaters. We first created a circuit that generated a variable square wave of approximately 1 to 500 Kilohertz. When connected to an LC circuit, an oscillating magnetic field was created at a specific resonant frequency, forming our primary circuit. Another LC circuit was created to act as the secondary, and was set to oscillate at the same frequency as the primary. The secondary's AC current was then converted to DC for use with most electronic devices. When the secondary coil was positioned relatively close to the primary, a current was induced in the secondary coil. After testing, we concluded that changing the operating frequency of the system had a nonlinear effect on the wattage of the secondary's output, but increasing the frequency generally equated to more wattage. Also, the optimal position of the two coils relative to each other was with no axial misalignment and within close range. Transmitting power across large distances was relatively impractical because of low efficiency and slow charging speed. Despite these limitations, LCIPT is a very useful technology that can allow for practical, effortless charging of portable electronics.

Word Count

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CSEF Official Abstract and Certification

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Proj. Title:
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Student Name(s):

Fair Category

Word Count

Abstract:

To improve the sound of ensemble playing, we tested three factors affecting the sympathetic vibrations a stringed instrument induces in another stringed instrument. The three variables we changed were frequency (octaves), distance, and size. To test the amplitude of the sympathetic vibration, a control of a G on the G string with 2 violins exactly 10cm away from each other was measured. The control averaged 0.076 dBSF (decibel full scale). We predicted the three factors that if the frequency/size/distance increased, then the volume of sympathetic vibration would decrease. Also, we thought that the distance would affect the sympathetic resonance the most. We put two instruments together at a constant distance and matched the pitches, then played. We stopped the vibrations on the first, as the sound continued on the second, and recorded that sound. The hypotheses were not supported by our data. The different frequencies created the most difference in sympathetic vibrations. This means the different octaves people choose to use in musical performances, like a high C or low C, more greatly affect the richness of the sound and the performance. Despite having difficulties with playing exact pitches and using audacity in the beginning, the data are as accurate as they can be, as we tuned it. We plan to use sympathetic vibrations in the large ensembles and in our small classes, where each instrument is vital to the sound. Greatly impacted by these conclusions, we hope to change the way music is played and received by the audience.

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Proj. Title:

Student Name(s):

Fair Category

Abstract:

Our project about piezo electricity. so we did some experiment with guitar.
We made piezoelectric pickup and then put in acoustic guitar. So we can connect with amp.

Word Count

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Yes No

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Student Name(s):

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Word Count

Abstract:

The objective of this project was to demonstrate that in the future, robots can teach children to write. To accomplish this objective, a robot, capable of drawing a line, was designed, constructed, programmed, and tested. The outer-shell and base of the robot were designed with TinkerCad, a 3D design program, and fabricated with the school's MakerBot 3D printer. An Arduino Uno, a microcomputer, was programmed to control the robot. Before programming or designing, it was necessary to learn the basics of the Arduino language. After analyzing programs from bildr.com and the Arduino library, a unique program, utilizing C++ language, was created to control the movements of the robot. The sizes for the pieces of the shell were carefully measured but had to be scaled down due to size limitations of the printer. After overcoming those problems, the shell was fabricated. All components were then attached to the base and covered with the shell. A Sharpie marker was connected to the robot using a servo motor, a type of motor that can rotate between 0 and 180 degrees, allowing the robot to draw a line with a pen. In the future, this type of robot may be further developed to create a similar one that can write more sophisticated characters or letters. This is the fundamental building block for a possible and worthwhile innovation of the future.

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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Proj. Title:

Student Name(s):

Fair Category

Abstract:

"Rubber Bones" is about which substance can make bones flexible. This project interested us because we wanted to know more about bones and what substances/liquids can effect the bones. We took five containers and fives bones. Then we poured each liquid in each container which was diet soda, vinegar, salt water, bleach, and vegetable oil . We waited five to six days and then checked each day to see what happened. The vinegar made the bone rubbery and flexible so you can bend it in different ways, also it started to stink really bad. The vegetable oil made it stink really bad, it started growing white stuff. The salt water made the bone stinky and changed it to a purplish and grayish color. The bleach made the vine entirely white and started breaking down the calcium in the bone. The diet soda turned the bone a black color, started breaking down the knuckles of the chicken bone, and it didn't smell to bad.

Word Count

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Earth has a fragile balance, interfering with which can harm all living things. When people burn fossil fuels, the fumes go up into the atmosphere and contamination can occur. This turns the water droplets into acid rain. This rain can have negative effects on all living or non-living things when it falls. This experiment focused on one aspect of this damage. This experiment identifies how the pH of freshwater affects the shell formation of shellfish. Because these shells are made of calcium carbonate, our purpose was to see how the pH of water affects the dissolving rate of calcium. Our hypothesis was that the lower the pH, the slower the calcium tablet would dissolve. We thought that there would be a linear relationship. We used lemon juice and water to imitate acid rain with a pH ranging from 5-2. We then timed how long it takes for a 600mg calcium tablet to dissolve. We found that the lower the pH, the faster the calcium tablet dissolves. This contradicts the hypothesis. Our experiment shows that lowering the pH of water increases the dissolving rate of calcium. From this we inferred that lowering the pH of any body of water increases the dissolving rate of calcium in the water. We then inferred that since the shells of shellfish are made from calcium carbonate, these shells would start dissolving because of the decreased pH. If we were to continue this research we would see how acid raid affects other ecosystems and man-made objects.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Novel Methods for Water Desalination by Harnessing Solar Energy using a Solar Oven With Flat Mirrors, Fresnel Lens and a Parabolic

Student Name(s): N. Kasem, A. ElSherbini, K. Rahman

Fair Category

Abstract:

Water is a vital source of life for all living things. About 780 million people do not have access to potable water. Although planet Earth is covered with water, most water needs to be desalinated before consumption. Desalination is a process that removes salt from water. Current desalination methods that burn fossil fuels produce pollution, whereas those methods that use membranes are very expensive. Solar energy is renewable, inexpensive, and readily available in many places. In this experiment, we compare three methods to harness the Sun's energy for desalination: a Fresnel lens, a parabolic mirror, and a solar oven with flat mirrors. A Fresnel lens focuses the light onto one point, a parabolic mirror collects and reflects the light, and the mirrors attached to the oven reflect light into the box surrounded by insulation which traps heat. Our hypothesis was that the Fresnel lens would evaporate the most water because it can focus sunlight to a point. However our experiment showed the solar oven was most effective, collecting 80ml in 5 hours. The insulation and glass on top helped trap heat and the mirrors reflected the Sun's rays as the Sun moved. Desalinating water using solar energy was proven to be feasible. These methods can all be further developed and implemented in larger scale in countries with access to saltwater and not enough potable water. They are simple, inexpensive, and use renewable energy which will not be depleted nor harm the environment.

Word Count

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4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The main purpose of this experiment was to test whether different frequencies of light contain different amounts of energy. For our experiment, we chose to measure the rate that isopropyl alcohol evaporates under three different colors of light: red, green and blue. To do this experiment, first, we traced a dime with a pen to make circles on a napkin where we would put small drops of the alcohol. Next, we used the toothpick to spread just enough alcohol to dampen the circle drawn on the napkin. We then held the blue LED over the drops of alcohol until the alcohol evaporated. We recorded how long it took for the alcohol to evaporate. We repeated these steps nine more times, and then did the same with the green and red LED lights. Our results showed that the blue LED with the shortest wavelength of 470 nanometers evaporated the alcohol the fastest in an average of 47.1 seconds. The green LED with its wavelength of 525 nanometers evaporated the alcohol second fastest at an average of 58.6 seconds. And the red LED with longest wavelength of 624 nanometers took the longest to evaporate the alcohol at an average of 90.0 seconds.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

We were inspired to investigate the topic of friction after watching an episode of "Myth Busters." We hypothesized that interlocking book paper creates more friction than interlocking magazine paper. Holes were drilled in the spine of each book/magazine. We tied a rope to the spine of each book, then fed it through a pulley and hung the rope over each side of a board. Each rope was tied to a basket. We began by interlocking the pages of two books in five page increments. We added equal weights to each basket until the interlocked books separated. The key result of our observations and recordings was that more weights were required to separate the non-glossy pages. It took 37-42 lbs. to separate the interlocked non-glossy books versus the 5 lbs it took to separate the glossy magazine pages. We also observed that the more pages we had interlocked, the more weights were required to separate the books. In conclusion, we found that more friction existed when non-glossy pages were interlocked than when the glossy pages were interlocked. We concluded that the more pages we interlocked, the greater the friction. In reflection, it is important when developing needles for an IV or a shot to have a clean, smooth surface that won't cause friction or pain to the patient. Also, there are some sports where minimizing friction is very important. In luge, they polish and sharpen the blades of the sled to minimize friction with the ice and maximize the sled speed.

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Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of the project was to determine whether a modified knee brace could generate electrical energy via movement. The experimental procedure involved the removal of a dynamo (an electrical generator) from a crank flashlight and its placement on the uppermost part of the knee brace. A 3D printed "gear rod" was created and placed on the lowermost part. When a step was taken, the rod would move and turn the gear on the dynamo, resulting in the generation of a measurable quantity of electrical energy. The range of motion was 80 degrees of the knee. Thirty steps with the left leg (one step is between when the foot is first airborne and when it returns to the ground) was taken with the knee brace on, (60 in total, one brace) and the maximum voltage within each step was recorded with a multimeter. After 30 steps, it was determined the mean maximum voltage created in each step was .0927. The total voltage produced (which was determined by adding the maximum voltages was 2.78. The range of the voltages produced was 11, the maximum being 14, and the minimum being 3. The results demonstrate that the knee brace successfully converted physical energy to electrical energy. The principle that energy created by human movement can be stored and later used for practical purposes has been established by the research and further research may enable this device to be used for various useful, practical purposes.

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Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The Effect of Different Antenna on the Reception of a Homemade Radio The purpose of this experiment is to understand the relationship of radio reception to antenna type on a homemade radio. This will be done by testing the reception of a homemade antenna versus using household items such as a bicycle, metal garden rake, and rain gutter as an antenna. It is predicted that the homemade radio's homemade antenna (a 30 cm piece of wire) will provide better reception than the household items. A radio was constructed from household items and recycled materials. There were four types of antennas tested, the white wire antenna (a 30 cm of white wire), a metal garden rake, a bicycle, and a piece of rain gutter. It was predicted that the homemade antenna, a 30 cm piece of white wire, on a homemade radio would generate more decibels than household items. It is concluded that the hypothesis is incorrect. The homemade antenna produced the lowest amount of decibels of all the antennas, only 45 decibels. The metal rake used as an antenna produced the highest amount of decibels, 50 decibels. The metal rake's success as an antenna is attributed to being tall and it was easy to attach the antenna to it. If the experiment could have been moved to a more open area at a higher elevation better reception may have been achieved. This experiment also proved that it is possible to build a working radio out of household and recycled items.

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of my experiment was to test if certain scents can have an effect on a person's short term memory. I'm trying to test if I have someone smell a scent and then have them perform a memory activity to see if the smell improved or worsened the person's ability to recall information. In my experiment, I performed several different trials on ten people, five being girls and five being boys. I had them breathe in different scents as they performed a memory test; to read a set of words and repeat them back to me. I measured how quickly the person can repeat back to me the words (including the time after inhaling the different smells.) I decided to execute this experiment because some people have had more trouble studying or recalling information this past year because of all the new info and overwhelming amount of notes. I personally have difficulty studying lots of information at once, so I was wondering what else I can do to improve my studying. I thought that maybe smelling specific scents will increase short term memory. After I have performed my experiment, I'm hoping to be able to help myself and fellow classmates with new tips for studying.

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Word Count

Abstract:

For this project I wanted to determine the reason for when wearing darker clothing I was warmer versus when I wore lighter colors. I used jars covered with construction paper to test my hypothesis. My hypothesis was that the jars with darker colors for example, red would absorb more heat and the lighter colors for example; yellow would absorb the least amount of heat. For my first trial I used water and was perplexed when the temperatures of jars barely changed and my hypothesis wasn't correct. So I decided to use air for my second trial. When I used air my results changed a lot more drastically. I put each jar in front of the light for 15 minutes during each trial. During my first trial while the jar covered with green absorbed the most heat and during my second trial the jars covered with red and green absorbed the most heat. The light was my source of heat during my project making it an important very important factor.

Special Categories Selected by Student:

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Word Count

Abstract:

The purpose of this experiment was to determine if ice blocks with soot would melt faster than ice blocks without soot. It was predicted that ice blocks with soot would melt faster than ice blocks without soot. The experiment was conducted by making same-sized ice blocks and then dividing them into two groups, one with soot and the other without. The groups were placed under sunlamps for a specified amount of time. The resulting melted water was measured. The independent variable of this experiment was whether or not soot covered the ice block. The dependent variable was the rate at which the ice block melted. The control in this experiment was the ice block without soot. The constants were the size of the ice block, the amount of sunlight, the amount of time under the sunlamps, the amount of water used to create the ice blocks and the amount of soot used on the soot blocks. The melted water that resulted was measured to determine which of the ice blocks melted faster. The results of this experiment showed that the ice blocks without soot melted faster than those with soot. The hypothesis was not supported. After carrying out three trials of this experiment, it was found that the rate at which the ice blocks melted was affected by whether or not soot covered the ice blocks. Future experiments could improve by using a larger sample size, conducting the experiment over a longer period of time, and carrying out more trials.

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Word Count

Abstract:

The purpose of my experiment “The Parabolic Trajectory Analysis of Projectiles Using Catapults” is to determine which angle a projectile should be launched from a catapult for the projectile to travel maximum distance. The hypothesis was: If I launch a marshmallow from a catapult at different angles, then the marshmallow will travel the most horizontally if the launch angle is 45° or more. Also, when the angle with the most distance is found, it will have the greatest velocity. For my experiment, I constructed an onager catapult and launched a projectile from different angles. I measured the distance the projectile traveled from the launching point to where it made first contact with the floor. Using other collected information as well as a formula, I calculated the firing velocity of each angle. According to my experiment, my results partially support my hypothesis. The angle (IV) able to project the marshmallow to the farthest distance (DV) is a 45° angle. The second part of my hypothesis was proved incorrect. I realized that the velocity was increasing as the angle values grew smaller. I can predict that the angle with the highest velocity was the 1° angle. I also would have liked to research possible modifications to make my catapult more accurate and effective. I would also look into constructing different kinds of catapults, that way observing how the differences affect the catapult’s performance. A 45° angle is the most efficient angle when launching a projectile using a catapult.

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Cool, Cool Chlorides: A comparison of ice melting chlorides as de-icers and their effectiveness as an antifreeze.

Student Name(s): K. Sholomicky

Fair Category

Word Count

Abstract:

We've had many snow and ice storms in the past few years. Icing can cause dangerous driving and walking conditions. To deal with these problems, we use de-icers. I compared the 3 best-selling de-icers: Calcium Chloride, Magnesium Chloride, and Sodium Chloride. I wanted to answer the following: Which chloride compound melts the most ice? Does the air temperature affect the amount of melting? Do any of the chloride compounds work as an antifreeze? I filled containers with water and froze them overnight. I put each de-icer on a container and let them sit at 3 different temperatures: 0 degrees F, 27 degrees F, and 69 degrees F for 30 minutes. I measured the amount of melted water for each. I did a second trial with the calcium and magnesium at 27 degrees and 69 degrees only, due to a possible mix-up. As a control, I let the ice sit 30 minutes at 27 degrees and 69 degrees without any de-icer, then measured any melted water. Overall, calcium chloride melted the most ice, but magnesium chloride melted almost as much. In the second part of my experiment, I put each ice melt in a container, then added the water and froze them overnight. My results showed that calcium chloride worked the best as antifreeze and that air temperature was not a significant factor in the amount of ice melting. Although magnesium chloride is an effective de-icer, calcium chloride will work to -25 degrees F.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment was to see how the magnetism in an electric motor effected the Revolutions Per Minute (RPM). My hypothesis was if I add more magnets to the battery then the motor will speed up because electric motors produce electric energy which is then converted into mechanical energy. When the copper wire touches the magnets it causes a rotational force. This means with less magnets the engine will not turn as fast. In the first part of the experiment I took copper wire about 27 cm long and tied the wire around a screwdriver. After I linked it to one magnet on top of the battery/voltage. Then I attached the given number of magnets to the bottom of the battery depending on what control or variable I was testing. In second part I measured the RPM. I took reflective tape about 2 cm long and attached one piece to each of the four batteries. Then brought out my laser tachometer and started up the motor. Once the motor was started, I measured each RPM by directing the laser on the reflective tape. I completed three trials before averaging all the results for the final RPM on the control and three variables. After completing the experiment I looked at the results. The motor with the four magnets had the most RPM, and the motor with one magnet (the control) had the least RPM. These findings supported my hypothesis. This experiment demonstrated relationships between magnets, direct current, and force.

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Proj. Title:

Student Name(s):

Fair Category

Abstract:

This project was performed to determine which energy source produces electricity the fastest: wind or sunlight. I hooked up two solar panels to a copper wire and connected it to a small light bulb. For the wind turbine, I am used two magnets and a copper wire to light the light bulb. I guessed that wind would produce more electricity, but be less efficiently. I gathered all my material and built the windmill to produce electricity. I hooked up two small solar panels to copper wire to do the same and light the lightbulb. My results were that the solar panels were faster AND more efficient because the wind turbine just didn't seem to generate and/or store the electricity well enough. I had some trouble generating enough energy to keep the light bulb lit, it only flashed a bit. This experiment proved my hypotheseis as incorrect.

Word Count

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Student Name(s):

Fair Category

Word Count

Abstract:

Title: The Best Media One day, I was drinking water from my refrigerator and I wondered, what does the water that we drink get cleaned with? Then, I decided that this would be a good idea to investigate a little bit more on. My project tests which media is best for filtering acid out of water. I researched that Charcoal can remove dangerous organic chemicals and is extremely porous and is good at absorbing chemicals. Also it is the most common media. I later hypothesized that if I pour acidic water into a tube with charcoal in it and all of the water has filtered through, then it will neutralize the acid in the water better than any other medias. After that, I came up with my procedure. I created four filters and filled each filter with a different media: Charcoal, Limestone, Granite, and coffee filters. Then, I poured three cups of tap water with a neutral pH into each filter to flush it out. Next, I poured three cups of acidic water into each filter and let it sit for five minutes. After five minutes, I took a sample from each filter and tested it to find the pH. In my results, I found that Charcoal did do the best job and in all three tests the outcome was the same. In conclusion, my hypothesis was correct because in all three tests Charcoal was the best and the results barely changed.

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Title: THE INVESTIGATION OF THE PRESENCE OF PLASTIC
MICROSCOPIC FIBERS IN EFFLUENT SEWAGE WATER

Student Name(s): C. Herrick

Fair Category

Abstract:

When synthetic clothes, clothing made of polyester, fleece, nylon, spandex, acrylic, and rayon, get washed they release microscopic plastic fibers into the water supply, (Browne et al., 2011). Wastewater treatment plants do not have the necessary equipment to remove microscopic plastic pollutants from the water. The polluted water ends up in our aquifers and oceans contaminating the world's water ecosystems. An experiment with samples of effluent water from a household washing machine, the Long Island Sound, The Newtown Wastewater Treatment Plant, and the Pootatuck River was conducted in search of microscopic plastic fibers. The samples of effluent water from the washing machine had micro-plastic fibers in different colors. The other water samples were examined to find fibers that looked similar to this baseline. The experiments consisted of filtering the water in each sample through Millipore filters with a porosity specification of 0.05 mm. The filters were dried, weighed and examined under a dissecting microscope. The filters had grids of 0.3 mm square which enabled classification and counting of fibers into short and long fibers. A camera attached to the dissecting microscope was used to view, count and classify the fibers that were collected onto the filters. Because this was a controlled experiment using synthetic clothing in the washing machine, the washing machine had the most contamination. The contamination in the samples from the Pootatuck River and the Newtown Waste Treatment Plant were found to be significant compared to the L.I.S and the tap water.

Word Count

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Proj. Title:

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Student Name(s):

Fair Category

Abstract:

In this experiment I tested the relationship between temperature and magnetism. By exposing a rare earth magnet to different temperatures and testing the magnetic strength by determining how many nails the magnet could pick up. I found that the strength of the magnetism increased with increasing temperature.

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Word Count

Abstract:

Dry ice is a complicated material that constantly releases gasses, though hazardous, my question was if I could put this material into a car airbag. Using three hot, cold, and room temperature water, three cups, three bowls, insulated gloves, the top of a water bottle, a balloon, a timer, a thermometer, and of course the dry ice. The procedures for the first and second experiment were basically the same, I set three cups out with the hot, cold, and room temperatures waters and placed three chunks of dry ice into the cups at the same time and then put on the timer and waited for the chemical reaction to stop in all three cups while recording each one's time. The third way I did this was I used the tops of the water bottles as funnels and put smaller pieces of dry ice into the balloon and quickly tied the balloon and put it into the bowls of different temperatures of water. My hypothesis was that the hotter water would release the gas the fastest which it did but it melted the fastest as well. The hypothesis was correct and the hotter dry ice melted faster and the dry ice in cold water in the second experiment did something I still don't understand which was the dry ice covered itself in regular ice and because the gases were trapped inside the gases exploded.

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Word Count

Abstract:

I was curious about how ships transporting large amounts of mass overseas were buoyant enough to get through the water without sinking. I wondered if certain water conditions helped support buoyancy, thus inspiring my project. I created a vessel to see how well it floated in water under different temperature and salinity conditions. I believed that if the water was colder and saltier, then the boat would be more buoyant; thus able to hold more weight without sinking. The vessel was tested in three pots containing different salinity amounts. I recorded the vessel's draft at selected temperatures and found that the pot containing the most salt allowed the boat to be more buoyant. As the temperature decreased in each pot, the vessel drafted less, indicating it was more buoyant. I concluded that colder water and water with higher salinity allow a vessel to be more buoyant.

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Student Name(s):

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Word Count

Abstract:

In Acceleration Explanation I wanted to explain and demonstrate acceleration with a ball and a ramp. What I did first was mark a 30cm mark, 60cm mark, and 90cm mark on the ramp starting from the top. I started the stop watch at 0cm as I dropped the ball. I stopped the watch at the 30cm mark and repeated it three times. I did the same thing again, but I stopped the ball at the 60cm mark. I also did this with the 90cm mark, each three times. Then I got the average time for each distance. I used the formula, distance over time, to get the speed for each section. Finally I compared the 30cm and 90cm speeds and times by subtracting the 30cm average speed from the 90cm average speed and subtracting the 30cm time from the 90cm time. Then I got my acceleration. This experiment shows that as the ball rolled down the ramp, it gradually got faster. The ramp was split into three sections: 0 to 30cm, 30 to 60cm, and 60 to 90cm. The ball was going its fastest in the third and final section, 60 to 90cm.

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Abstract:

Infections of all kinds, some serious, can be picked up at doctor's offices. Many offices are aware that cleaning regularly is necessary, however, some subspecialties may not. I am testing to see which type of doctor's office specialty will have waiting rooms with the most bacteria. My hypothesis was that the ER and the Pediatrician's offices would have the most bacteria, with the least being in the Psychiatrist's office because the ER and Pediatrician see many sick patients. My independent variable was the doctor office's specialty, and the dependent variable was the bacteria amount. I went into the waiting rooms of a General Practitioner, Emergency Room, Cardiologist, Pediatrician, Psychiatrist, Dermatologist, and a Dentist and swabbed a Magazine, Pen, Chair Arm, and Door Knob. I then used those swabs to streak the bacteria onto petri dishes. I later transferred the colonies onto blood agar. I found that the Pediatrician, along with the Cardiologist, were the offices with the most bacteria, having both cultured an average of four colonies per plate. The least was the GP, with an average of 1.25, followed closely by the Psychiatrist, with an average of 1.5 colonies. Also, the ER Chair Arm, the Psychiatry Magazine and Doorknob, and the Dermatology Magazine and Pen all had infectious bacteria. This data supports part of my hypothesis, because the Psychiatrist's office had the second least bacteria, and the Pediatrician had the most. My experiment shows that the Pediatrician needs to clean more, as do subspecialties like the Cardiologist.

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Student Name(s):

Fair Category

Word Count

Abstract:

I chose to do this project because I have always been interested in knowing if electricity could be produced from fruit. My hypothesis states that potatoes produce more electricity than lemons and bananas when tested as fruit powered batteries. In my research I learned that fruit powered batteries can produce electricity with the right materials which will make electrochemistry. Fruit batteries use electrolytes (acids in the fruit) to generate voltage. Fruit powered batteries also need electrodes made of conductive material like copper and zinc metals. I decided to test the voltage in lemons, potatoes, and bananas to see which one produced the highest amount of voltage. I used a digital multi-meter to test the electricity of all 3 fruits. I made 3 different fruit batteries for my test trials. Product A was a lemon fruit battery made from 3 lemons. Product B was a potato fruit battery made from 3 potatoes. Product C was a banana fruit battery made from 3 bananas. I used conductive materials in my fruit batteries such as copper and zinc metal rods, wires, and alligator clip wires. Product A (lemon battery) produced an average of 2.55 volts. Product B (potato battery) produced an average of 2.56 volts. Product C (banana battery) produced an average of 1.37 volts. In conclusion, I learned that my test results agreed with my hypothesis. Potatoes do produce more electricity than lemons and bananas.

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Word Count

Abstract:

I tend to forget a lot of things (lunchboxes, homework, random objects) so I decided to make a device that would help people make sure that they bring all the things they need to a location. The device would have to be compact and easy to carry. I decided to use an Arduino Uno for these reasons. This device is meant to be able to be used by anyone who needs to make sure certain items are placed in a bag or compartment. Some examples of this may be textbooks, journals, lunchbox etc. The way it works is that one attaches a Radio Frequency Identification Tag to each object that needs to be remembered. There is a distinct switch that corresponds to each tag. After the items are tagged, one would need to flip the switch, which indicates to the device that one needs to remember that particular item. The device is activated by pressing a button before loading the bag. The tags are scanned by a small antenna as they approach scanning range (within 1"). If a tag is read, the object is presumed to be in the bag. After two minutes, if any object one needs has not been scanned, the device will beep loudly. The beeping will stop when all required objects have been scanned, or two minutes have elapsed. Unfortunately, the device is currently nonfunctional and behaves unpredictably. I believe this is due to a software bug.

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Student Name(s):

Fair Category

Word Count

Abstract:

My love of rock candy motivated me to research how it's made, which lead to studying crystal growth through nucleation. I used salt instead since it's available in various types. I hypothesized that if I used pure water and salt to produce crystals, then I would get larger and clearer crystals because nothing artificial is added to hinder their growth. I used three salts, sea, iodized, and rock salt combined with two waters, distilled and tap. A string was dangled into a glass of the salty solutions for 21 days. I monitored the crystals' quality and growth in all six samples. On day 21, I checked to determine which was the largest and clearest. The iodized salt combined with distilled water produced the largest crystals; however, the sea salt with distilled water produced the clearest crystals. When comparing salts, the iodized salt produced the largest sized and most amount of individual crystals; the sea salt made the clearest. When comparing waters, distilled water produced the clearest crystals with the three salts. The all pure materials produced the clearest crystal, but not the largest. Impure materials produced the most number of crystals. In the iodized salt the addition of iodide, caused the salt to crystallize in the largest forms. All impure materials resulted in the smallest, the least number and cloudiest crystals. Materials with certain additives have the potential to grow larger but often are not the best quality like many foods. Further research can investigate how temperature affects crystal growth.

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Abstract:

Abstract: In this experiment, I observed the growth of crystals. I mounted these crystals in three different temperatures: room temperature, in the refrigerator, and in an ice bath. The purpose of this project was to see in which of these temperatures the crystals would grow the largest. I did this experiment by mixing borax and water together, in which acted like the elements in growing natural crystals. I did this procedure three times in the three unlike environments. I let all of my crystals grow in soda bottles for eight hours. After doing this experiment, I noticed that crystals grow the best in room temperature rather than in an ice bath or in the refrigerator. I chose this type of topic for the science fair because I have always wanted a crystal making kit, and growing crystals for this project, would give me experience in order to grow large crystals from the kit. From this project, I have learned that crystals grow in warm temperatures. The hotter the heat, the grander the crystals will grow. Knowing which temperatures crystals grow the best is beneficial for many people including jewelers, engineers, technicians, customers, and people just like me who had the idea to grow crystals.

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Abstract:

Abstract Buying batteries is extremely expensive but you can make your own battery instead of buying those batteries. In this experiment, I wanted to see which combination of metals made an efficient battery. How many coins/washers in the voltaic pile will make the most electricity? My hypothesis was that the battery that used only metal pennies will last the longest. This is because the penny that is sanded down has 0.40 (mA) which was the highest current of all the metals. For this experiment I measured the amount of time it took for each calculator to die out and found out the battery that used only pennies as the only source of metal took 3.5 weeks. The other combinations of metal took 1 to 2 weeks to die out with the combination of pennies and steel washers taking the second longest amount of time to die out. My results supported my hypothesis. If I was to improve the experiment and to increase validity of my conclusion the next time I executed it, I would like to run the experiment more times and for longer period of time

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Abstract:

The purpose of this experiment was to see if there was a reliable way to tell if something was an acids or a base. While there are different ways to determine if something is an acid or a base, this experiment focused on a method known as “color indicator”. After some initial research, several websites mentioned this method as being the most reliable and visually interesting method. Based on research, the stated hypothesis was if acid was added to the beaker, the water would stay clear and if base was added to the beaker, the water would change to a specific color indicator. In order to test this hypothesis, a dilute acid was mixed, and the color indicator added. Dilute base and dilute acid were then added to the mixture back and forth and any changes in color were observed. The solutions would begin clear, change to the color indicator when base was added, and then change back to clear when the acid was poured in again. The different color indicators and different liquids created a rainbow that would appear and disappear depending on whether there was more acid or base in the beaker. In conclusion, every time acid was added, the liquid would turn clear; and every time base was added to the liquid, it would turn into its color indicator.

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Abstract:

Purpose: Models of the flat bridge, the Warren truss bridge, and the suspension bridge were built and tested to answer one question: What type of bridge supports the most weight? It is hypothesized that the Warren truss bridge will be strongest because it has more materials and will flex less.

Procedures: Models were built using large popsicle sticks. Each bridge was supported by 2 step ladders. The weight rig (an 8 inch long 2 x 4 board with a steel hook and a 5 gallon bucket) was placed on the bridge deck; the bucket hung below. Seventeen pounds of weight was in the bucket, then 1 pound of water was added quickly in 15 second intervals until the bridge broke.

Observations, weight, and time to bridge failure were recorded. Results: The strongest bridges had the most flex. The suspension bridge held the most weight - 78.6 lbs- because it was specially designed so it could flex. The Warren bridge's inability to flex and more rigid deck caused it to fail the fastest. It held the least amount of weight, only 59.1 lbs. The flat bridge was able to flex more than the Warren, so it was able to hold more weight - 68.1 lbs. **Conclusion:** The more flex a bridge had, the more weight it could carry, regardless of stick count. The hypothesis -that the Warren truss bridge would be strongest because it had more materials and would flex less- was only partially correct. Flexing less made it the weakest.

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Abstract:

Can Viscosity Affect Surface Tension? The first step is to get all of your supplies. Once, you have all of the supplies you will 10 ounces of water, orange juice, and motor oil into 3, 16 ounce cups. Once you have your cups filled with the liquids, you will then put a ruler behind each cup and hold the needle 5 inches above the surface of the liquid. Next, you will need to ask a parent, friend, or classmate to start your timer. Then, you will drop the needle and the person doing the timing will press start. When the needle hits the bottom of the cup then you will stop the timer. After that you will multiply the weight of the needle with the time it took for the needle to hit the bottom of the cup. You will do this on each of the 3 liquids. The motor oil had the highest surface tension, orange juice had the second highest surface tension, and water had the lowest surface tension. This means that your hypothesis is correct because mtor oil has the highest viscosity and had the highest surface tension.

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2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Proj. Num

Student Name(s):

Fair Category

Abstract:

The experimental question is how much vinegar makes the most casein plastic when mixed with warm milk. This topic is useful because it is an easy way to make small plastic items. To do this experiment, heat milk up to at around 40-50°C and pour milk into each container containing different amount of vinegar to be tested. Then measure the curds formed. The result showed that 2 tsp vinegar to 1 cup of milk making the most plastic.

Word Count

Special Categories Selected by Student:

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Word Count

Abstract:

This experiment asked the question, "Which light source will power a solar car for the longest period of time; incandescent, LED, florescent, or natural sunlight?". The hypothesis of this experiment is that if different light sources are used to charge a battery; incandescent, LED, compact florescent, or natural sunlight, then the battery charged with natural sunlight will power a battery operated car for the longest period of time. During this experiment, trials were run charging batteries with different light sources; natural sunlight, fluorescent, LED, and incandescent lighting. A solar battery charger was used with rechargeable batteries. The solar charger was exposed to the different light sources for 8 hours. At the end of the charging time, a multi-meter was used to measure the battery charge. The batteries were then installed in a battery operated car and it was run until they would no longer power the car to run. The level of charges and run times were noted in a log. Data from this experiment shows that trials completed with fluorescent lighting charged up to levels closest to the trials completed with natural sunlight. But, even though the batteries were charged up close to the same levels, they did not run the car for as long as the batteries charge using natural sunlight. The trials run using LED lighting charged the batteries the least. This experiment supported the hypothesis as the data shows that batteries charged by natural sunlight powered the battery operated car for the longest period of time.

Special Categories Selected by Student:

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

My invention is called the Weather Warrior which is an automobile cover that solves two weather related problems during summer and winter. During summer, car parts such as the dashboard, car seats, and steering wheel heat up, making the car's inside temperature unbearable. My car cover will help cool the car's interior, because it's outer layer is made up of a reflective surface, reflecting the sun's rays away from the car. During the winter, snow and ice accumulates on the top of automobiles, covering the hood and windows, and it is extremely hard to remove. People have to scrape the ice of their vehicle which is tedious and damaging. The main element of the car cover's winter purpose is is a heating pad which melts the snow and allows the snow and ice to slide off. This can be removed in the summer. Creating my invention was a challenge... - First I tried using christmas lights, but they didn't generate enough heat and were a fire hazard. And what if I had to change the light bulbs. It was all very impractical. - Then I tried heating wires that go on top of roofs, but they got too hot and became a fire hazard. - Then I found a heating mat that worked perfectly, so I used it. In conclusion, my invention keeps your vehicle cool in the summer and eliminates snow and ice from accumulating in the winter by melting it, saving time and money.

Special Categories Selected by Student:

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
5029

Student Name(s):

Fair Category

Word Count

Abstract:

Our world is facing many problems today; pollution, depletion of resources, energy and water crises, just to name a few. I aimed at designing and improvising an energy-efficient, self-sustained device which when used at a large scale or individual level could solve some of these problems. The purpose of the device is to produce hydrogen fuel from renewable resources. Hydrogen is the simplest element with the highest energy content by weight. To be used as a fuel, it can either be burnt directly, or used in a fuel cell. Currently most H₂ is being produced by reforming the hydrocarbons in natural gas or by electrolyzing water powered by fossil fuels. The use of H₂ as a fuel would improve air quality by decreasing greenhouse gases. Scientists have tried combining renewable resources to make self-sustained devices. I combined energy from mud and wind in a hybrid device to run the electrolysis of water. Various household liquids were added to water to test if any of them would increase H₂ production, if any. Hydrogen-Peroxide, Vinegar and Ammonia were used in 3 separate experimental groups for this purpose. All the experimental groups did produce more H₂ than water alone. Confirming my hypothesis; the Ammonia Electrolysis Cell produced the most H₂. An added benefit of this device was the purification of sewage water in the Microbial Fuel Cell. This Wind-Microbial Hybrid Device can produce H₂ for fuel, using no external voltage, depending only on 2 renewable resources for electricity, purifying water in the process.

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4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

An average family needs 20,000 kWh of electricity per year, equivalent to 45 solar panels or a 10-kW wind turbine. For the experiment, solar panels were placed on the blades of a wind turbine to determine if it is a viable idea to make the blades of a wind turbine out of solar panels to utilize both wind and solar power. First, a wind turbine was assembled and produced an average of 0.92 volts of electricity. Next, solar panels were acquired. The average electricity produced under a steady light source by a single solar panel was measured at 0.89 volts. Finally, the same solar panels were installed on the blades of the wind turbine. The average electricity produced by the wind turbine and a single solar panel was 1.57 volts. The experiment demonstrated combining solar panels and wind turbines produced more electricity than using solar panels or wind turbines alone. However, the solar panels affected the aerodynamics of the blades and the rotation of the blades reduced the surface area of solar panels facing the sun, so both systems are less effective when combined than if they were installed separately. Additional research was performed to find other options of combining wind turbines and solar panels. A prototype was constructed with 2,800 square feet of solar panels arranged around a 20'x20'x10' WindCube. The prototype reduces installation costs and effectively uses both wind and solar energy. This experiment confirmed it is possible to combine wind turbines and solar panels into one unit.

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CSEF Official Abstract and Certification

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Proj.
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Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of the experiment was to identify the existence of mathematical patterns, ratios and sequences in classical compositions. Forty-eight compositions were selected (six classical compositions per country) to see if the Golden Ratio, numbers from the Fibonacci sequence, 1/f, and Beta could be found within the piece. Public domain MIDI files were selected.

Mathematica was used to convert the MIDI files to musical notes that showed which section of the piano the note was being played on, the frequencies of the note, and the duration of the note. Maple was used to convert the Mathematica output into a text file that Excel could import for note counting, graphing and analysis. Garageband converted the MIDI files to MP3s so Audacity could be used to analyze the audible version of the song. The audio track was plotted as a waveform and spectrogram, and analyzed using a Spectrum algorithm with a Hamming Window. It was observed that most pieces contained 1/f, Beta, numbers from the Fibonacci sequence, and the Golden Ratio. Audio track waveforms for certain composers were visually similar. Various patterns were examined and investigated, including the relationship between the frequencies in the plots, the audible range for human hearing, and the range of frequencies of the 88 keys on the piano.

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CSEF Official Abstract and Certification

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Proj.
Num

Proj.
Num

Title: MEASURING ELECTROLYTE CONDUCTANCE IN SPORTS DRINKS, ORANGE JUICE AND TAP WATER AS COMPARED

Student Name(s): J. McDermott

Fair Category

Word Count

Abstract:

The purpose of this experiment is to compare the electrolyte conductance in: Gatorade®, Propel®, Powerade®, Tropicana® orange juice and tap water vs. distilled water. Every trial is measured with the same conductance sensor, but is cleaned with distilled water after each trial. It is predicted that Tropicana® orange juice will have more electrolytes than Gatorade®, Propel®, Powerade®, distilled water and tap water. The electrolytes in each fluid is tested by the conductance sensor by picking up the direct current in each trial. Each drink is tested five times, and the data is recorded each time after washing and drying the conductance sensor. To begin this experiment you must first fill up the container with 480ml. of a fluid. Then measure the drink with the conductance sensor. After measuring, record the direct current levels in each drink. The five drinks this experiment consisted of was Gatorade®, Tropicana® orange juice, Propel®, Powerade®, tap water and distilled water. It was observed that after analyzing the data there was a wide range of results from the testing. Distilled water's average was 1.29, tap water's average was 11.01, Gatorade's® average was 43.5, Powerade's® average was 58.7, Propel's® average was 25.62, and Tropicana® orange juice's average was 76.12. This experiment could be improved if more sport's drinks or drinks were tested for electrolyte conductance, which would mean more trials completed.

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

The objective of my project was to show what concentration of lemon juice in distilled water will stop highly and lowly acidic apples from turning brown. I hypothesized that if the lemon juice and distilled water solution with the highest concentration of lemon juice is put on the apple with the highest acidity, then the apple will turn brown the slowest because there is the most amount of acid to stop the reaction between enzymes and oxygen from happening. I tested my hypothesis by preparing different concentrations of lemon juice and distilled water and spreading them on apples of different acidities. During predetermined time intervals, I observed visually and recorded how brown each apple was. I then graphed my measurements and analyzed the results. When looking at the graphs, one could see that the apples with the highest and lowest acidities behaved almost exactly the same. In retrospect, I realized that my measurements were qualitative and therefore not reliable in terms of proving or disproving my hypothesis.

Word Count

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CSEF Official Abstract and Certification

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

I tested whether local levels of air pollution in changed from urban to suburban areas. I hypothesized that urban regions, which have more roads and traffic than in a suburban region, would have more pollution in. I set up air pollution collectors at eight different locations, four suburban, and four urban, around Norwalk, CT. I exposed a total of 24 pollution collectors over four weeks. I examined my pollution collectors under a microscope, to view carbon, dirt, plants, and bug particles that had been caught on the pollution collectors. On average, there were 73.75 pollution particles per collector in suburban areas, and an average of 96.90 pollution particles per collector in urban areas. Graphs of my results seemed to support my hypothesis, but to test this, I used MiniTab, statistical software. I ran a two tailed t-test, and found that, although the averages of the two samples look quite different, the difference is not statistically significant. The t-test yielded a t-value of 1.17 (at 20 DF), which is below the t-value of 1.74 at a 90% confidence level ($p=0.05$), so I have to reject my hypothesis that there is more pollution in urban areas than suburban areas. The reason for this is because there isn't much of a difference in traffic patterns between urban and suburban areas in Norwalk. My hypothesis would have been more accurate, had the traffic patterns been of that of a much more populated area, because the difference between urban and suburban areas were too small.

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Student Name(s):

Fair Category

Word Count

Abstract:

For my experiment, I wanted to find out which mixture of dish soap, glycerin, and water was the best for finding a leak in a bicycle tire. I believed that out of the following, the Dawn with glycerin would work the best for making bubbles to find the source of a leak. Variables:: One cup water, 1/8cup Dawn dish soap (original, blue), 1 teaspoon glycerin, One c. water, 1/8 c. Dawn dish soap (original, blue One c. water, 1/8 c. Palmolive dish soap (orange scent, orange), 1 tsp glycerin One c. water, 1/8 c. Palmolive dish soap (orange scent, orange)One c. water, 1/8 c. AJAX dish soap (lime scent, bleach-alternative, green), 1 tsp glycerin One c. water, 1/8 c. AJAX dish soap (lime scent, bleach-alternative, green). My experiment went overall as planned. If I did this experiment again, I would use more variables such as pure soap, no soap, different kinds of soap, different air and water temperatures, and outside versus inside. If I had done this on a summer day, the results probably would also be different due to the difference in humidity, but I still think that Dawn would work the best.I think if I had a more elaborate system for measuring the bubbles and mounting the bicycle tube, the results may have turned out differently, but the conditions were fairly consistent. In conclusion, in this study, Dawn soap with glycerin makes the best bubble for a variety of purposes.

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Student Name(s):

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Word Count

Abstract:

The purpose of my project is to determine how much weight can be supported by boat hulls of various volumes and how this relates to the density of water. My hypothesis is "if I use the larger boat with a triangular hull then the boat will be able to float "(The independent variable: The different size boats, the dependent variable: How many pennies it takes to sink the boat, the controlled variables: The amount of water, the experimenter, the density of each boat). First I constructed my boats by using aluminum foil, calculated the density of each boat, and then measured the buoyancy of each boat hull. Then, I calculated the density of each boat after sinking. Lastly, I made a line graph of buoyancy and a bar graph of the density of each hull before sinking. My project's results came out to prove my hypothesis wrong. My hypothesis stated that the larger boat with the triangular hull will hold the most weight. The results proved that the larger boat with the rectangular hull held the most weight. In conclusion, my project proved that the boat with the most weight can hold the most weight. If I were to do this project over again I would have done more trials so that my experiment would be more valid.

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Student Name(s):

Fair Category

Abstract:

Have you ever wondered why the same size rubber band stretches different lengths at different times? My project was to see how far a rubber band stretched under certain temperatures. My hypothesis was based on past research the rubber bands in hot water are most likely to grow because the atoms inside the rubber band are as concentrated and the rubber band stretched easier. My hypothesis was proven correct. For the procedure you need to put 650 milliliters of cold water into a graduated cylinder and check the length every 3-5 minutes. You also had to do the same thing with the hot water. To check the length attach a two oz. fishing weight to pull the rubber band. For the final results the hot water rubber band stretched from the starting length of 10 cm to 11 1/2 cm. In the cold water the rubber band shrunk to 9 1/2 cm.

Word Count

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment is to see whether or not the brands of non-fat powdered milk affect the amount of carbohydrates in milk. It was predicted that the non-fat powdered milk Brand C will have the most carbohydrates. There were six beakers, every two beakers were labeled the same per brand. Once the powder was dissolved in the beakers, its temperature would be brought up to 40°C. 10% acetic acid was added to each beaker, and then immediately calcium carbonate was added. After the solution was boiled it was filtered into its other corresponding beaker. After the solution was filtered the filtrate was supposed to be boiled down to 10 mL. This step could not be done because when it was attempted to boil the solution down to 10 mL it kept splattering out of the beaker, and this was a potential safety hazard. After this step 95% ethanol was supposed to be added to each beaker, and each beaker was then going to be heated to 70°C. The solutions would be filtered again and left to sit for two days. After the two days were up the lactose crystals would be filtered off. The crystals would then be weighed. Lactose crystals would be grown because lactose is the main carbohydrate in milk. In conclusion, this experiment could not be finished because the procedure could not be fully accomplished.

Special Categories Selected by Student:

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

My project aimed to determine whether different angles of incidence affected the output of a solar cell. The output of energy represents my dependent variable. I set out four solar cells with different angles of incidence (30°, 45°, 60° and 90°). These angles are my independent variables. I tested the output of the solar cells during different times of the day (10 am, 12pm, 2pm and 4pm) to see if power output varied or was consistent. The times of day represent my constant variables. I did this over a three-day period. My last experiment was to keep the cells at the four above angles, but to track the path of the sun during the testing period. Before my experiment, I believed that the smallest angle (30°), which was the flattest, would produce the greatest voltage. I was incorrect. My results determined that 45° was the optimal angle for fixed solar cells, yielding the greatest electrical output. I also found that the greatest output was during the 10am to 12pm timeframe. I then determined that tracking solar cells were better at maintaining consistent output over the entire testing period than fixed solar cells. Again, the 45° angle was optimal. My experiment proved the hypothesis that the sun's angle, represented here by the different angles of incidence, does affect the output of solar cells. I learned that it is very important to position the solar panels at the optimal angle to yield the greatest electrical output.

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CSEF Official Abstract and Certification

Fair Category

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Scientists have discovered that water, when chilled below its freezing point without freezing transforms into a new form of liquid known as a “liquid-liquid” phase. To reach the “liquid- liquid” phase, water must be chilled through a process called supercooling. When disturbed, supercooled water transforms into ice. This process is known as snap-freezing. But what kinds of water snap-freeze the fastest? In this project, I will determine whether bottled or distilled water snap-freezes the fastest. My hypothesis is that bottled water snap-freezes the fastest because it has more impurities than distilled water and those impurities act to nucleate or trigger the formation of ice. The experimental results support my hypothesis and show that bottled water snap-freezes more than two times faster than distilled water. Supercooling water is not just a fun science experiment. It has practical application to the scientific world. For example, knowing the freezing point of supercooled water is important for climatologists because it may help to explain cloud formation and assist climatologists in constructing climate models for the future of the Earth. Also, supercooled water is also used in the process of cryoprotection which is the preservation of tissue or cells by liquid nitrogen.

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Plastic freezer bags always get disposed after one use, creating negative environmental and economic impacts. A reusable freezer bag for food storage/transport that can alleviate these problems is not readily available on the market. The purpose of my experiment is to design an environmentally and economically friendly reusable freezer bag with low wettability, satisfactory freezer food preservation, and easy decontamination. Cloth was used because it is natural and not harmful to food, unlike plastic. My hypothesis is that from regular cloth, wax-coated cloth, moisture-absorbent cloth, and silicone-cloth bags, silicone-cloth would be the best choice due to its hydrophobicity and resistance to large temperature variations. The experiment involves the measurement of the bags' wettability through contact angle, food preservation in freezers, and decontamination of the bags to determine bacteria presence after many uses. My data showed that the silicone-cloth bag had the least wettability with contact angles approximately 150° , best food preservation, and minimal bacteria growth following decontamination. I concluded that silicone-cloth was the best material at the given criteria. New cloth can be reinserted after few uses. But, the same silicone bag can be used for 10 years, decreasing the overall cost and the amount of bags going into the landfills. Further experiments I would carry out include finding materials that can withstand deep freezing for long periods of time, finding materials that can withstand a freezer as well as a microwave, and finding materials that will not yield any bacteria growth after decontamination following freezer food preservation.

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- Yes No

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Num

Proj. Title:
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Student Name(s):

Fair Category

Word Count

Abstract:

I like to bake and wondered what type of baking sheet material produced the best cookies. I wondered if cookies were baked on a variety of different cookie sheet materials, that then the outcome of the corresponding batches of cookies would be affected. I prepared a sugar cookie dough according to a recipe from How Baking Works by Paula Figonia. After baking and cooling the cookies, I measured the height of the cookie in centimeters using a ruler and record. While the cookies were still on the sheet, I evaluated the amount of browning on each cookie using a scale 1-5, 1 being the lightest. Next, I flipped the cookies over to see how dark the bottoms were, using a scale of 1-5, 5 being burnt. Then, I pressed on the cookies to determine their hardness on a scale of 1-5, 1 being soft. Finally, I tasted the cookies to see if there was a difference in how they tasted. My results found that baking sheet material did have an impact on the outcome of the cookies. The cookies baked on the aluminized steel baking sheet had the best overall outcome. This result is consistent with what I expected. The cookies baked on the paper surface were the poorest in quality. If I were to repeat this experiment, I would standardize the sizing of the various baking sheets tested. I also wonder if these results would be replicated if using a different type of cookie dough with different ingredients.

Special Categories Selected by Student:

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Evaporation Situation By Ronald Jai Robinson Thomas My project was designed to study the rate of evaporation of different liquids. I wanted to see whether three different types of liquid – vinegar, water and Pepsi Cola – would evaporate at the same rate and whether placing a cap on the test tube would prevent the liquid from evaporating. My hypothesis was that the uncapped water would evaporate the fastest. First, I obtained four test tubes with caps. Next, I filled each tube with liquid. In one tube I put water and left the tube uncapped. In another tube I put water and capped the tube. In another tube I put vinegar and left the tube uncapped. In another tube I put Pepsi Cola and left the tube uncapped. I observed the tubes over the course of five days, taking photos every other day. On the final day I measured the liquid and learned that the tube with the uncapped water evaporated the quickest. The tube with the Pepsi Cola evaporated the second fastest. The tube with the vinegar evaporated the slowest. The tube with the capped water did not evaporate at all. I concluded that the water evaporated the fastest because water does not contain all the ingredients that vinegar and Pepsi Cola contain. Because vinegar and Pepsi Cola contain other materials besides H₂O, they took longer to evaporate. In the next phase of the experiment I would like see how temperature variations effect the evaporation process.

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2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Purpose of Experiment-While researching the properties of paint, I became interested in what properties benefited the paint's lifespan and therefore would be the most weather resistant. Procedure used: I used twenty pieces of pine wood and four different brands of exterior paint. I put three pieces of wood, each with four different types of the paint outside, in water, under light, in front of the fire, and in the freezer (-2 degrees), and in a drawer. The pieces in the drawer were the control. I observed these pieces of wood four times over a period of approximately five weeks I recorded my observations three times. I ranked the paint's appearance from one to four, with four being the best. Observation/Data- Behr Premium Plus (BP) contains VOC like all of the paints I used which is volatile organic compounds. Studies have shown VOC benefits paint's lifespan and weather resistance. My hypothesis was that the paint with the highest VOC level would perform the best against the elements. My hypothesis was correct because BP had the highest VOC level and it performed the best against the different re-created weather conditions. Conclusion-In conclusion, the paint brand BP performed the best in all the weather conditions. It ranked number 4 (having the best performance) in 10 out of 15 of its observations charted. Although, the results were all close, BP was top ranking for its all-around weather resistance.

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

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3. This project was conducted at a Registered Research Institution. Yes No

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CSEF Official Abstract and Certification

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This experiment was to determine which of eight residentially available ice melts liquified the most ice. In the first trial, ten pie pans were lined with concrete, 500 milliliters of water, and frozen overnight in a freezer. The frozen pans were brought to the classroom, at 20 degrees C. Ice melt was applied and the meltwater was measured at 15 minute intervals for one hour. Short-term corrosion testing was conducted. For visual testing, each piece was studied with a hand lens. Impact tests were done by tapping the pieces with the head of metal scissors to see if any concrete flaked off. Roofing nail and fingernail scratch tests were performed. The concrete slabs were then left outside for three weeks to check for any additional corrosion caused by freeze-thaw cycles. A second trial was conducted to eliminate variables from trial one. Trial Three used ice slabs prepared in a similar manner, but ice melt was observed outdoors. Lastly, melt water was examined for the density and chemical properties of each fifteen minute interval for one hour. In trial one, the leading melt was Merlin Melt. It had the highest melting rate, and second best total volume of water. These results were confirmed in Trial Two. Cheese Brine had the overall lowest results, and in addition has undesirable properties. In general, elements listed on ingredients labels were detected in the meltwater. There were some differences in ice melt performance under outdoor conditions.

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3. This project was conducted at a Registered Research Institution. Yes No

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Word Count

Abstract:

The research question for the electrolysis efficiency test is “How does salt and voltage applied to the electrolysis process change the rate at which hydrogen is produced?” This is a relevant topic because with a future energy crisis coming, electrolysis offers a relatively safe and efficient way to produce hydrogen. Also the more polluted the water is, the more efficient the process becomes so that could be a bonus in future years. Think about a car powered by electrolysis. All you do is put in salt, water and electricity and the car runs on hydrogen. In order to perform this experiment, one needs different concentrations of salt and different voltages. They are 10, 20, and 30 grams of salt and 1.5, 3, 4.5, and 6 volts. The data shows that salt concentration and voltage increase the production of hydrogen. After several tests, corrosion started to appear on the wires and after about 15 rounds of tests the wires eroded and needed to be renewed.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

Using the iPad application, oScope, sounds from two different guitar manufacturers were recorded and analyzed to determine if they were at all different. The spectrum analysis showed that it was hard to differentiate the two acoustic guitars. However, individual notes and chords were compared and each were shown to have unique characteristics. The project highlights these results.

Word Count

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CSEF Official Abstract and Certification

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Proj.
Num

Proj. Title:

Proj. Num

Student Name(s):

Fair Category

Abstract:

I was wondering if you could reveal fingerprints with or without using a moisturized hand when dusting with baby powder. The main steps I followed in this project were, I had my test subject moisturize his hands, then I had him make fingerprints on one side of the mirror, then he washed his hands and made fingerprints without using lotion, then I took his fingerprints on a police fingerprinting paper, lastly I observed and compared the prints. The key results of my project were that I found out that fingerprints taken with a moisturized hand were much clearer crisper and more visible when dusting with baby powder. The conclusion based on my results is that when you have a set of fingerprints made using a moisturized hand they will be much clearer and easier to observe when you dust them with baby powder.

Word Count

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

The purpose of this experiment is to find out if putting duct tape on a wiffle ball bat increases or decreases the power of the bat. Each trial will have different amounts of duct tape on the bat; no duct tape, one layer, and five layers. It was predicted that five layers of duct tape will decrease the power of the bat the most. The bat with no tape will have the most power and will not decrease the power at all. Begin this experiment by building a machine to swing the bat. Attach the bat to the machine for it to swing. Put the ball on the tee and release the bat to hit it. Record how far the ball goes with a meter stick. Then repeat these steps with one layer and five layers of duct tape. It was observed that the bat with five layers of duct tape decreased the power of the bat the most. The bat with no tape had the most power. It is concluded that the hypothesis was correct. This experiment could be improved if there was not ice on the ground when it was conducted. Also if it was indoors so wind was not a factor.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Background: Glow sticks create light through a chemical reaction. The goal of this experiment was to see what effect temperature has on the chemical reaction that takes place in a glow stick. By looking at differences in the amount of light produced by glow sticks stored at different temperatures, the effect of temperature on the chemical reaction could be assessed. I hypothesized that glow sticks kept in a cold condition would last the longest but would not be the brightest. Procedure: Label, activate and place four glow sticks in their assigned storage conditions: 5°F, 40°F, 68°F and 100°F. Every two hours, take all four glow sticks, to a darkened room to record the relative brightness of the glow sticks. Observations were to be conducted for a minimum of 24 hours. Results: Two pilot experiments were conducted to determine the best study conditions, the results presented here are from trial 3. In trial 3, the glow stick kept at 100°F went dark by hour 10 while the glow sticks kept at 5°F, 40°F and 68°F provided light for the entire 26 hour observation period. By hour 20 however, the glow stick kept at 5°F was the brightest and remained so until the end of the 26 hour experiment. Conclusion: I believe my hypothesis was correct, the coldest storage condition appeared to slow the chemical reaction which allowed it to be the brightest glow stick at the end of the observation period.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment is to determine which is the best way to hit the cue ball on the break in billiards: with neutral spin, top spin, or back spin. The best break in billiards is when at least one ball that is not the cue ball goes into a pocket. In this experiment, hitting the cue ball with neutral speed on the break resulted in the most balls going into pockets. Also, hitting the cue ball with neutral spin resulted in the most balls within 6" of a pocket and the least amount of balls that were further away than 6" from a pocket. Overall, the results from this experiment indicate the following: hitting the cue ball with neutral spin gives the best chance of getting the most numbered balls in a pocket, top spin gives the second best chance of getting balls in, and back spin gives the least chance of getting balls in. Based on these results, hitting the cue ball with neutral spin is the best way to hit the cue ball on the break in billiards. My theory to explain the results of this experiment is that when hitting the cue ball with neutral spin, the cue ball will move with a lot of momentum to scatter the other balls further, than if the cue ball had been hit with back spin or top spin. The neutral spin transferred the most energy from the cue ball to the other balls after contact.

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2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The world's supply of fresh water is being used up every day, as all humans need fresh water to survive. The global population grows by 80 million per year, and soon there may not be enough fresh water to support the demand. Desalination could be one of the only solutions to provide enough fresh water. The problem is current methods of desalination are very expensive and use a lot of energy. What we do not realize is that the fresh water on this planet can and will be used up. For my project I wanted to find an easier way to get salt out of water. I created a salt solution of approximately one teaspoon salt per cup of water. I then used this solution and passed it through different materials to see if it would lower the salt level. I tried passing the salt solution through different materials, including sand, carbon, microfiber, and even nylon. I measured the liquid after it passed through each type of material using a hydrometer that measures salinity in parts per thousand (PPT). My results showed that sand worked best because it lowered the PPT salt in the solution compared with the other materials tested. I think that it worked best because the small little pieces of salt get trapped in the sand grains. The sand filtered out less salt each successive trial, which suggests this material has limited workload.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

My project was to determine which produce products would generate more voltage, lemon or potato. If I cut the produce in half will it affect the amount of voltage produced? I tested the voltage of a full Lisbon lemon, Sweet Meyers lemon, Idaho potato and Sweet potato. This was my Independent variable. Then I cut each produce in half to see if that would affect the amount of voltage produced. This is my dependent variable. What I did for my experiment was use copper rods and zinc bolts. I attached them to my produce. After attaching the copper rod with zinc bolt to the produce, I used my multimeter to measure how much voltage was produced in the full/half version of the produce. The constant variables for my experiment were: a multimeter, zinc bolts, copper rods and alligator clips. After completing my experiment my results showed that the Idaho potato produced the most voltage followed by Lisbon lemon, Sweet Meyers lemon then last the Sweet potato. Overall, my data revealed that the different types of produce have different levels of acidity which affects the amount of voltage it can produce. I observed that the Sweet Meyer Lemon and the Sweet Potato had low levels of acidity and the Idaho Potato and Lisbon Lemon had much higher levels of acidity. The produce that generated the most voltage was the Idaho Potato followed by the Lisbon Lemon. The Sweet Potato and Sweet Meyer Lemon were in third and fourth place.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Word Count

Abstract:

There are many different types of light bulbs, including compact fluorescent lamp (CFL), fluorescent, halogen, and light emitting diode (LED). The packaging of light bulbs includes a light intensity factor, called lumens, which allows a consumer to compare the brightness of various types of light bulbs. In this study, the relative brightness of different types of light bulbs claiming to have similar lumens was measured. The hypothesis was that CFL light bulbs would measure a higher intensity than other light bulbs of similar lumens and that incandescent light bulbs would cast light farther. A light sensor was used to measure the relative brightness of 19 light bulbs, including seven different wattages (or wattage equivalents) and three pairs of light bulbs of similar lumens. Experiments included light intensity at fixed and various distances from the light source. Three feet was determined as the best distance from the light source for the fixed distance experiment. CFL light bulbs were found to have approximately 65% lower light intensity compared to incandescent light bulbs of similar lumens. Incandescent light bulbs cast light at least 45 feet, but CFL light bulbs lost their brightness at shorter distances. When compared to light bulbs with claims of similar lumens, the CFL light bulbs measured a lower light intensity, and incandescent bulbs cast light farther. It was found that looking at the labeled claim of lumens on the packaging of light bulbs is not a good way to compare the brightness of different types of light bulbs.

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Fair Category

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment was to test whether igneous, sedimentary, or metamorphic rocks are damaged the most by the process of repetitively freezing and thawing. If the results of this experiment are put to use, it will help builders determine the safest and most durable rocks for building with. It was predicted that metamorphic rocks would be damaged the most. Two types of each rock were put in aluminum containers, filled with water, and frozen in a freezer for eight hours. The rocks were then removed from the freezer and thawed for four hours at room temperature, melting the ice. Once the rocks had thawed, the damage done to them by freezing and thawing was measured and recorded. The damage was measured by observing the new cracks, measuring the new cracks with a centimeter ruler, and pressing Silly Putty[®] on the rocks. The Silly Putty[®] showed what new marks the freezing and thawing had made on the rocks, and they were then photographed, measured, and results were recorded. After three trials with observations made after each trial, the average amount of damage from new cracks and holes resulting by damage was 17mm from the igneous rocks, 29mm from the metamorphic rocks, and 49mm from the sedimentary rocks. In conclusion, the prediction was inaccurate, as the sedimentary rocks were actually damaged the most by the repeated process of freezing and thawing. This experiment can be improved with more trials and more types of each rock and each rock classification.

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Fair Category

Proj.
Num

Proj. Title:

Proj. Num

Student Name(s):

Fair Category

Abstract:

In this experiment I wanted to test the affect of drag and determine the relationship between drag and the distance a plane could fly. Several paper airplanes were prepared with various wing design and adjustments were made to the airfoil in order to increase or decrease the drag on the wings' surface. The delta wing design similar to the F-14 Tomcat had the least drag of the wing designs and flew the greatest distance.

Word Count

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

If someone asked you to describe a robot, what would you say? How would you describe it and what could it do? Are there some things that animals are good at that a machine cannot do? Are there some things that a robot can do that an animal cannot do? In this project I the scientist Cari Marchak will see which light source attracts the robot at the fastest speed on three different days. This project is a bio-inspired robot that mimics the behavior of animals. This robot follows the light; like a bug that buzzes around a light at night. The dependent variable was to see which type of light would be used to attract the robot at the fastest speed. The independent variable was the light sources. The robot will be tested with 5 different lights (Flashlight (1), low; Flashlight (2), medium; Flashlight (3), high; a lamp; and the sun). It will be tested on a sunny, a cloudy, and a partly cloudy day.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Which type of grocery bag, plastic, paper, or recycled paper biodegrades the fastest?

Student Name(s): D. Pires

Fair Category

Abstract:

This project investigates biodegradability of materials such as paper, recycled paper, and plastic used in manufacturing grocery bags. Research of this topic included the amounts of each type of bag that are produced each year and the negative effects of producing and discarding the materials on the environment. A material that is biodegradable breaks down, or decomposes, returning the item to the environment. If a grocery bag is composed of natural plant tissue, such as paper or recycled paper, then it will biodegrade. A grocery bag that is composed of plastic, or synthetic material will not biodegrade. The experiment to test this hypothesis consisted of placing paper, recycled paper, and plastic bags in bins filled with natural soil. Measurements and observations of the bags were taken at the start of the experiment, after one and two months. The bins were of the same size and type and contained the same amount and type of soil. The soil contained earthworms. Water, oxygen, sunlight and temperature were controlled. The bags placed in the bins were of the same dimensions however, masses varied due to the materials. After one month the paper and recycled paper had completely biodegraded. The plastic bag remained unchanged. The experiment was repeated checking the bags more frequently. The results were similar. This topic has been of concern for many years due to the negative effects of materials that do not biodegrade. These products create many environmental problems including soil and water pollution, and hazards to wildlife.

Word Count

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4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment was to see which launch angle and how many rubber bands (tension) would cause a ping pong ball and whiffle ball to hit the target, by using a catapult. I built a catapult out of wood and other household materials with an 8 foot course and a bowl as a target. My catapult's design made it easy to measure how far the ball was launched and repeat the process to find the right angle and the number of rubber bands it would take to hit the target. Using different angles with a protractor and a different number of rubber bands, I launched various ping pong balls and whiffle balls to try to hit the target (get the ball into the bowl). After various launches, the catapult hit the target 80% of the time when using ping pong balls, using the most rubber bands and using the widest angle (30 degrees).

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
5503

Student Name(s):

Fair Category

Abstract:

Excessive stomach acid is a problem in today's society. It can be diet related, stress related, or a side effect of our busy life styles. I wanted to do an experiment to do an experiment to examine which over the counter antacid was the best acid neutralizer. I used 0.1M HCL acid, pH 1- 2, to simulate stomach acid. It was added to beakers containing water using a pipette. The TUMS brand was the most effective. This was due because TUMS active ingredient is calcium carbonate. Calcium carbonate is a strong base and highly soluble in water which allows it to be highly effective.

Word Count

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

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CSEF Official Abstract and Certification

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

During the winter, my violin is always out of tune if I accidentally leave it in the car for a few days. This is because wood expands and contracts as the temperature changes, causing the strings to be loosened or tightened. I wanted to see if the relationship between temperature and the frequency of the strings was linear. To test this, I would put my violin, in tune, in places of different temperatures (i.e. the garage, basement, outside, etc.) for 24 hours each. Then, I recorded the temperature of the area and the frequency of each of the strings by plucking them. I would leave the violin at room temperature, which is always constant, for 4 hours in between each temperature change so that it always started at the same temperature, and then tune it before switching the place. My hypothesis was not supported because the relationship was not linear, but polynomial instead, which means that once the temperature reaches a certain degree, the violin won't be able to expand anymore and will instead contract, thus causing the frequency changes. The G-, D-, and A-strings all had third-degree polynomial relationships between temperature and frequency of the strings, but the E-string had a second-degree relationship, which may be because E-strings are made up of different materials and structures than G-, D-, and A-strings, which have the same structure and materials. I ran out of time to do multiple trials of the experiment, but that would be an improvement to make.

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CSEF Official Abstract and Certification

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Proj.
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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this science project was to find out whether the amount of magnet wire changes an electromagnet's strength. I made electromagnets by wrapping different amounts of magnet wire around iron bolts. When I made my first electromagnet, I turned the magnet wire around the bolt 25 times. The next three electromagnets had 50, 75, and 100 turns. When I clipped alligator clips from the ends of the magnet wire to a lantern battery, the electromagnet was magnetic. I tested the magnetic pull of each electromagnet by comparing how many paper clips each bolt could attract. For each electromagnet, I conducted 5 trials. I concluded that the more magnet wire there is wrapped around an electromagnet, the stronger its magnetic pull.

Special Categories Selected by Student:

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this project was to find which nut had more energy. I tested, almonds, peanuts, cashew, chickpeas, and kidney beans. My hypothesis is that peanuts and chickpeas will produce the least amount of energy; cashews and kidney beans the most energy because of size. I researched food labels for information about calories, carbohydrates, proteins and fats in beans and nuts. To build the calorimeter I used two cans. Holes were drilled around the bottom of the large to make it like a chimney in order to heat the smaller can filled with water. I weighed 10 nuts to calculate the average weight of 1 nut. Water in the small can was weighed each time. The nut or bean was placed on a needle and ignited. The calorimeter was placed over the burning nut and a thermometer was used to measure water temperature change. Ten of each were burned. This data was recorded for each nut and bean. The change in temperature was calculated for the weight of each nut. The little calorie was multiplied by 1000 to get big Calorie. This experiment shows the cashew had more calories than the other nuts and beans. The cashew had an average end temperature of 60.7 degrees C and the nut weighed 1.5. Peanuts had the least amount of calories. I think the peanuts burned the least carbohydrates and fats. The chickpea had more calories than the kidney beans, but they had the least amount of calories.

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The point of this present study is to test the efficiency and durability of a quartz piezoelectric generator and lead magnesium niobate-lead titanate (PMN - PT) to create a new piezoelectric generator that takes traits from both generators. Piezoelectricity is an effect where energy is produced when mechanical stress is placed on certain objects. After extensive research, I have decided to test these piezoelectric generators. I took into account the cheapness, durability, and efficiency of each material. I believe there will be a significant difference in the electrical output from the commercial piezoelectric generators with respect to a piezoelectric generator that uses hydraulic pressure to increase pressure, and therefore increase the energy output. The reason that the world needs a more efficient and cleaner source of energy is because our world is currently based on using gasoline as the main energy source. However, gasoline is extremely harmful for environment. By creating a new piezoelectric generator, the world will be able to collect energy from a cleaner source without losing efficiency. I believe there will be a significant difference in energy output with respect to quartz piezoelectric generator and lead magnesium niobate-lead titanate (PMN - PT). From the results of the experiment, shown on the diagram; it can be concluded that using lead magnesium niobate-lead titanate (PMN - PT) as a piezoelectric generator is better.

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
5508

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment was to create a strong algae-based bioplastic film that would improve upon the starch-based bioplastic films created last year. Seaweed is an underdeveloped resource that doesn't require arable land or food crops for production. Formulas were tested, molding methods were explored to control film consistency, and a drop dart impact tester was designed and modified to evaluate impact resistance. Phase -1 used agar, homemade agar, glycerin, water, and vinegar to create and cure 83 samples using 9 formulas. Samples were evaluated for impact resistance on a self-designed, homemade drop dart impact tester and compared to the resistance of commercial plastic films. Bioplastic samples from each formula were tested for their ability to photodegrade in Phase-2. Samples were weighed, before and after photodegradation. The best bioplastic sample was determined by measuring impact resistance, flexibility, durability, degrading potential and consistency in production. 68.7% of the samples created were testable for impact resistance. 100% of these had a ratio of agar to water in the range of .04 - .08. Several samples shrunk during curing. In Phase-1, the average impact resistance weight was 127g. No outliers were observed outside 1.5 times the interquartile range. The bioplastic film samples were ranked for ability to biodegrade. 60% of the samples showed signs of degradation after 48 hours. In conclusion, it's possible to make improvements upon starch-based bioplastics by using seaweed to create biodegradable and impact resistant algae-based bioplastic films. These are stronger than commercial versions.

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The Purpose of this experiment is to find out if you put a funnel to the left or to the right side of the box if the marbles will fall to that side. I chose this topic because when I went to the Boston Science Museum I saw the Bell Curve and I thought it would be different to try and see if you put the funnel to the left or right if the marbles would fall down to that side of the box. 1.buy materials 2.take the large piece of wood and make a pegboard 8 rows deep and 20 rows across. 3.glue rectangular pieces down 4.spray-paint 5.glue on top plexiglass piece 6.stand box up vertically 7.pour marbles into box 8.record data 9.pour out marbles and repeat steps 6-8. The average number of marbles when the funnel is in the middle of the box it is (slot 1-15)
2,2,4,10,18,29,31,33,27,24,11,6,3,1,1 in the left
29,26,26,38,28,27,15,9,3,1,0,0,0,0 in the right
0,0,0,0,2,4,6,11,23,28,28,34,23,22,19. In conclusion my hypothesis was correct. When I dropped the marbles in multiple times the outcome was almost the same as the other trials. When I put the funnel in the middle most of the marbles would go to the middle. When I put the funnel to the right most of the marbles went to the right. When I put the funnel to the left most of the marbles went to the left.

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Viscosity and Melting Profile of Dairy and Non-Dairy Ice-Cream
and the Development of Appealing Ice-Cream to Lactose Intolerant

Student Name(s): C. Piraneque

Fair Category

Abstract:

It is hypothesized that non-dairy milk changes ice-cream consistency defined here as viscosity of the solution and melting profile of each ice-cream. Viscosity was found using the Stokes formula. This experiment was completed in two phases. Phase one removed milk but kept dairy cream in the mixture. Phase two replaced dairy cream with soy creamer to yield a non-dairy ice-cream. In each phase, the ice-creams were made using rice, almond and 2% regular milk, with either creamer (soy or dairy). Second, the melting profile was recorded. Third, each solutions' viscosity was measured at three different states (milk alone, solution prior to aeration, solution post melt). In the end, two key factors were observed to make ice-cream. The right amount of fat globules and emulsifiers prevent frozen water or cold fat mixture. Since dairy cream was used in phase one, the resulting texture was similar to dairy ice-cream. In phase two, the viscosity of the ice-cream solution with soy creamer was expected to be lower than the ice-cream solutions with dairy cream. However, the viscosity data does not support this expectation (further investigation is needed). While melting the soy-based ice-cream, it was observed that the ice-creams seemed shiny, icy in texture and took longer to melt. In conclusion, it was found that the hypothesis was correct: rice and almond milk do change the consistency of ice-cream. Furthermore, it was found that changing the creamer greatly impacts the consistency of ice-cream

Word Count

Special Categories Selected by Student:

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of my experiment was to find how much weight it took to separate two paperback books and two phonebooks with their pages interlaced so only friction would hold them together. I hypothesized that the phonebook would be able to hold more weight within the first few pages than the paperback book. I also hypothesized that both types of books would be able to hold more weight with more pages interlaced together. I tested this by taking two phonebooks and two paperback books that are about the same size and interlacing ten pages at a time with a gallon jug tied to the books and kept adding four ounces of water until the books separated. The data proved that the books were able to hold more weight as I interlaced more pages, but it also proved that my first hypothesis was wrong. The data I collected showed that the frictional coefficient of the paperback book was higher, so the data had a steady result. The phonebook however has a lower frictional coefficient but the compression of the pages from the beginning of the book caused the frictional coefficient to increase causing a huge spike in the data. The phonebook was able to hold a one-gallon jug filled to the top with only 100 pages interlaced to hold them up. I could find larger books to see if the paperback book would be able to have a large spike in the data.

Special Categories Selected by Student:

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The goal of performing this type of experiment was to show that there may be a cheaper and easier way of alleviating minor household flooding conditions using crosslinked polyacrylamide crystals (“ghost crystals”). These crystals can be used to reduce flooding in areas such as basements, on window sills, in flower pots, garages, and sliding doors. Other than alleviating flooding, these crystals are much easier to store than sand bags, and they are ready to use. Measuring the amount of water a one centimeter crystal can absorb leads to knowing how many crystals it would take to absorb pints or even gallons of flooded water. The data collected during the process of experimenting this project showed that one crystal, measuring between half a centimeter to about one centimeter, could absorb up to 20 milliliters of water within four days. This measurement was then followed by an experiment testing how many crystals it would take to alleviate a flooding level of 500mL (2 cups, 1/8 gallon, 1 pint). My experimentation showed that not only can crosslinked polyacrylamide crystals reduce household flooding levels, but they can also change back to their original state, by evaporating the water they soaked up into the air. When changing back from a gel-like water filled crystal to its original state, the color of the crystal changes from a clear white to a golden yellow shade. I concluded that crosslinked polyacrylamide crystals can alleviate the level of flooded water in minor household flooding situations.

Special Categories Selected by Student:

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2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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CSEF Official Abstract and Certification

Fair Category

Proj.
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Proj. Title:
Num

Student Name(s):

Fair Category

Word Count

Abstract:

How much salt is in water? The purpose of my project is to see how much salt is in one cup of fresh, salt, and brackish water. I also wanted to see which sample of water had the most salt, the least salt, and an amount in between. To test this question I first collected one fresh, salt, and brackish water sample. Then I measured the weight of an empty quart jar, measured out a cup of each sample, placed them in separate jars, and measured the jars with the samples in them. Then I subtracted the amount of the empty jar from the weight of the jars with the samples, boiled a pot of water, put the jars in the water until the samples were evaporated, measured the jars again, and subtracted the amount of the empty jar from the weight of the jars with the evaporated samples. This gave me the salinity of each sample. Lastly I compared the salinity of each sample visually and with measurements to find my results. When I completed my project I found that the salinity of the salt water sample was 7.6 grams and both the brackish and fresh water had 0 grams of salt, but the brackish water did end up having a few grains of salt on the bottom of the jar. In conclusion, the salt water had the most salt, the fresh water had the least, and the brackish water had an amount in between.

Special Categories Selected by Student:

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This experiment studies the effects of greywater on the growth of Narcissus (Paperwhite) bulbs. Its purpose is to determine if greywater could be an applicable substitute for freshwater when watering plants. If the greywater is beneficial to the bulbs, it can substitute freshwater. This would reduce the use of freshwater by 50% and reduce the strain on water treatment plants and septic systems. The Narcissus bulbs were divided into two groups of ten, each of which grew under the same grow light. The first group was watered with a vial containing 10 mL of greywater and another vial containing 10 mL of freshwater watered the second every other day for eight weeks. Their heights were measured with a ruler in centimeters once a week, and the data was recorded in a notebook. Average heights were obtained to find the growth of each group over the eight weeks. During the first four weeks, the bulbs watered with greywater had an average height of 5.05 cm while the freshwater bulbs had a height of 4.89 cm. Within the next week, the freshwater bulbs grew an average of 1.54 cm and surpassed the greywater bulbs' height. By the fifth week, the greywater seemed to dehydrate the bulbs and had an average height of 5.85 cm, while the freshwater bulbs had a height of 6.43 cm. With a final height of 12.31 cm, the freshwater bulbs had a taller height than the greywater bulbs' height of 8.23 cm.

Special Categories Selected by Student:

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2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Removal of Phosphate Using Renewable and Biodegradable Resources: An Application for Water Effluent Treatment, Kidney

Student Name(s): M. Geradi

Fair Category

Word Count

Abstract:

Municipal and industrial water effluents contain high phosphate levels, which must be removed by Environmental Protection Agency (EPA) mandated standard to <0.5 ppm. The purpose of my project was to investigate if and how various renewable and biodegradable resources, such as chitosan (chitin derivative), eggshell and sawdust, can remove phosphate. In part 1, I treated 1 gram of eggshell with vinegar and put it in 200 ppm phosphate solution and put another 1 gram of eggshell directly into phosphate solution. In part 2, I created a sawdust filter, by cutting a plastic bottle, tying a cheese cloth on one end, packing sawdust in, washing it and passing 133 ppm phosphate solution through it. In part 3, I treated 60 milligrams of chitosan with vinegar and put it in 133 ppm phosphate solution and compared with just chitosan in phosphate solution. I found that vinegar treated eggshell and vinegar treated chitosan (it forms a gel) both brought phosphate levels to <10 ppm, but just eggshell and chitosan (without vinegar) did not work. Surprisingly, washed sawdust also brought levels to <10 ppm. I had tested the remaining phosphate levels in solution using phosphate test strips. Possible applications of this project: 1) This could be useful for inexpensively removing phosphate from water effluents 2) vinegar treated eggshell (calcium acetate) could serve as a phosphate binder for kidney patients 3) I further did an experiment to stop precipitation of calcium phosphate, by varying pH and phosphate levels, which can be used for parenteral fluids.

Special Categories Selected by Student:

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In this day and age, many people have become more conscious of the foods that they consume, and by doing so, most end up counting calories. How do we derive these calories from the foods we eat? In my project, I decided to explore the process that scientists have created in the hopes of obtaining similar outcomes by using a variety of different snack foods and deciding which of these foods would end up producing the most calories by the end of the experiment. To discover the amount of calories found in each food I first assembled a calorimeter. Then, I simply burned each sample of food and measured the temperature of the water before burning the sample and then again after burning the sample. By then putting the results into the formula $Q = mc\Delta T$, where m = mass of water, c = specific heat capacity of water, ΔT = change in temperature in degrees Celsius, I was able to calculate its caloric content. I had predicted that the Cheeto would end up producing the most calories, but by the end of my experiment, I had discovered that the cashew had surprisingly created the most calories out of the snack foods that I had chosen to use in this experiment. So in conclusion, I have realized that the amount of fatty oils that are naturally found in the nuts had invariably raised its caloric value, leaving the cashews along with some of the other nuts with the most calories.

Special Categories Selected by Student:

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Num Title:

Student Name(s):

Fair Category

Abstract:

ABSTRACT In my project, the “Wiser De-Icer”, I wanted to find out a better de-icer when the roads are full of ice or snow. I wanted to find a natural and environmentally safe way to way to clear the roads of ice.. I predicted that beet juice would be the fastest and best way to clear the road of ice, without damaging soil or plant nutrients. •I discovered that 100% beet juice solution with 0% salt on black top and 70% beet juice solution with 30% salt solution on black top were the fastest. They each took 35 minutes. •Cheese brine was also effective, but molasses proved to not be very effective. •Black Top allowed ice to melt more quickly than concrete •There were medium to high levels of phosphates, sulfates, and nitrates in both soil and plants after my natural de-icing. I have committed myself now to always pour beet juice solution on my ice. I learned that beet juice is a very effective, natural, and safe de-icer.

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

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2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Word Count

Abstract:

Studies show that each enzyme can dissolve many molecules and that each enzyme has an area of specialty. There are three areas to specialize in. The hypothesis: Laundry detergents in enzymes will work better than those without. Typically, detergents have all three types of enzymes in them, so all areas of specialty will be covered. If all areas are covered, then all types of stains can be removed, therefore making laundry detergents with enzymes the better cleaners. In the experiment, there were six detergents used. Two had enzymes, two did not, one was a powder, and the last one was a pre-treatment detergent spray. Some concerns were the powder and the pre-treatment spray. The rest of the detergents were liquid, so the powder would need a different procedure, and the pre-treatment spray would probably work differently than the rest of the detergents since it was meant to be sprayed before washing with detergent. In the experiment, a total of 52 cloths with spaghetti stains were tested on. Eight were used for each detergent, four in hot water and four in cold water, and there were four controls, two hot and two cold. The process was to soak the cloths in with soapy detergent water for a set amount of time, then rinse and dry. When the data was analyzed, it showed that for all the detergents, the hot water worked better than the cold water. The detergents with enzymes also worked better than the ones without enzymes.

Special Categories Selected by Student:

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Analysis of "Super Spices" Effect on Cell Absorption, Antioxidant Levels, and pH.

Student Name(s): F. Meltzer

Fair Category

Abstract:

ABSTRACT The goal of my project was to analyze the health benefits of different herbs and spices frequently used in cooking and baking. I tested the herbs and spices for antioxidant quantities, "cell" bioavailability; each was tested with water and also 0.1M HCl (simulation of stomach acid). The following show the results and correlations. •There was a positive correlation between the dried spices tested for "cell" bioavailability and the antioxidant quantities in the Xanthophyll group especially with spices such as turmeric •The antioxidant test performed on the fresh spices generally had higher ueq (micro equivalents) than dried spices •In testing both dried and fresh spices, the "cell" bioavailability with 0.1M HCl (simulation of stomach acid) had higher absorption rates Spices and herbs have many health and nutritional benefits. Let's all have a "Life of Spice"!

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this project was to see which brand of batteries last longest. To test this, these steps were followed: Go to hardware store, buy 6 identical Gordon flashlights. Buy 6 different brands of D alkaline batteries: Duracell, Energizer, Eveready, Dorcy/Diehard, Rayovac, Sunbeam. Put two of the same batteries in each flashlight. Turn on each flashlight and record the time. Observe, record what time the flashlights burned out, to the nearest quarter hour. Repeat procedure 3 times. Record data. Below are the average prices for brands used in this project: •Sunbeam - \$1.00/3 pack, •Rayovac - \$9.61/4 pack, •Eveready - \$12.55/4 pack, •Energizer - \$7.78/4 pack, •Diehard - \$6.99/4 pack, •Duracell - \$9.68/4 pack Looking at the prices one would have thought Eveready would have lasted the longest, but one of the cheaper brands, Dorcy/Diehard, lasted the longest. The Sunbeam batteries, a 3-pack of which can be bought at the Dollar Store, while seems like a great bargain, lasts less than a third of the time that the Dorcy/Diehard brand lasted. A Sunbeam battery costs approximately \$.33 while a Dorcy/Diehard battery costs approximately \$1.75. My hypothesis was false because Duracell batteries did not last longest. Dorcy/Diehard lasted the longest by an average of .75 hrs. Rayovac came in second falling only an average of .25 hrs. Behind Dorcy/Diehard. Energizer came in fourth behind on an average of 3 hrs. Eveready was behind on an average of 6 hrs. Sunbeam came in last falling behind on an average of 8.75 hrs.

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

It was hard to decide which topic to focus on for the 2013-14 Science Fair Project. I wanted to create an experiment that could one day benefit the world and I thought to myself, "How can I create an alternative for one of the most talked about topics in our nation today: the energy crisis?" Then my topic to find the best, most powerful, efficient bio battery emerged. I tested Citrus Fruits (Lemon, Orange, Avocado), Potatoes (Russett, Red, Sweet) and High-Sodium Beverages (Pepsi ®, Coke ®, Salt Water) and hypothesized that the Citrus Fruits, specifically the Lemon would be the most efficient bio battery because of its citric potency. I would test for the amperage and voltage by sticking a clean, copper penny and a steel screw into my consumable product and measuring the amps and volts with my digital multimeter. Afterwards, I cut my consumable good in half (citruses) or thirds (potatoes) and measure it in series. Then, I tested the high-sodium beverages with a similar but different method (I used copper wire and a piece of aluminum made from the soda can) but, the voltage/amperage was very low. When I concluded the experiment, I found my hypothesis was incorrect because the potatoes were the "top three" bio batteries, specifically the Russett Potato measured to have the most amperage and voltage. In conclusion, I found that Potatoes are the most efficient bio battery, and I hope further studies can turn this Science Project into energy for the future.

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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Student Name(s):

Fair Category

Word Count

Abstract:

It's interesting to note that some commonly used items such as fruits and vegetables can generate electricity. An example of such an item is the potato. The purpose of this project was to find out if a potato(s) could generate enough electricity to power an LED bulb. A single potato with electrodes such as zinc and copper gives out volts in a series or parallel circuit. Potato juice contains water soluble chemicals that may cause a reaction with the electrodes, and so, electricity may be generated from that. For this project, copper and zinc electrodes were inserted into up to 5 potatoes. Alligator Clip leads were used to connect the electrodes and then connect the last 2 leads to the LED bulb to create a closed circuit. The results are that 3 potatoes are enough to power an LED bulb if they are ordered in a series circuit, not a parallel circuit. A parallel circuit does not produce as much voltage as a series circuit. Five potatoes produce more power therefore the light will be much brighter. Also if 5 potatoes are left to power an LED bulb, it will power the bulb for 5 straight days before you start to see a significant dimming in the bulb's light. It is now proven that potatoes are more powerful than most people think and that they can power LED bulbs for significant periods of time. It would also be interesting to use potatoes to power other devices such as a clock.

Special Categories Selected by Student:

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2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Abstract:

My project was to see what this design was able to support the most amount of weight. I use the arch bridge and the trust bridge. I think this was interesting because I know these bridges are used all over the world and I would like to know which bridge design is best for different places. Popsicle sticks were used to build arch bridge and the truss bridge, they were fastened together with a hot glue. I used books as weights to be placed on top of the bridges to measure what the breaking point bridge was. My experiment demonstrated that the arch bridge is able to support 52 pounds and the truss bridge supported 33 pounds.

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
5524

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this project was to investigate the amount of alternative energy produced by a model wind turbine and determine if different shaped and sized blades affected the voltage it produced. After experimenting with gear ratios and designing possible blades, a model wind turbine was constructed. Four of each blade design (oval, rectangle, and triangle) were constructed. The blade that came with the wind turbine kit was also tested. Originally, testing was to take place outside but after not having enough wind to test, a new and better testing location was found. Testing took place in an open room with a fan. Tests were performed with every blade design on every fan speed. A total of 36 of these trials were performed. Another goal was to get the turbine to power a sound and light board. It was discovered that the sound and light board takes at least 2V to run. The hand built blades did not allow the turbine to produce enough energy, but the blade that came with the kit produced just enough. The blade that came with the kit gave the best results. Out of the hand built blades, the oval blade gave the best results and the rectangle blades gave the worst results.

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CSEF Official Abstract and Certification

Fair Category

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

My science project is about the effects of a gear size on speed. I predicted if I increase the size of the first gear, the speed of the second gear will increase. I worked with four gears of different sizes and compared two gears at a time. I manually turned the gears counting the rotations of the gears. The bigger the first gear and the smaller the second gear caused the speed to increase. When the speed of the first gear is smaller and the second gear is bigger than the second gear will rotate slower than the first. If the second gear is half the size of the first gear then the second gear will turn twice as fast. When the first gear was turned to the right, the second gear rotated to the left. This experiment showed that the bigger the first gear and the smaller the second gear that the speed will increase. If I am going to ride my bike and I want to get more speed I will use the larger gear (where peddles are) and the smaller gears (where the tire is).

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

We are always looking for newer ways to power our homes with renewable resources. These production methods are solar power and generators moved by water and wind. Along with those there is the powerhouse of the world's toys, batteries. The problem is what energy production method will produce energy better over time. This experiment comprises of a daytime and night time sequence in witch would simulate a whole day. In this experiment, I tested batteries, a solar panel, and a generator. When the connections to light bulbs were made there was then an electrical draw. That was necessary to take power from the circuit. To create the day and nighttime sequences I used a lamp focused over the setup not only for that but to allow the solar panel to produce energy. Then after I switched the sequence to night time by bringing the lamp further away for a sort of moonlight effect. During the nighttime simulation as I thought the solar panel suffered in the controlled environment as there is not as much light. The batteries overall did well but the generator did the best with the constant mechanical energy being supplied. In conclusion renewable resources such as solar panels have limitations over periods of time but are being further developed while batteries can be trusted for certain amounts of time depending on the demand. The generator had done well and can be implemented into different mechanical devices and have been implemented into hydroelectric dams and windmills ever day.

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Proj. Title:

Student Name(s):

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Word Count

Abstract:

February 4, 2014 ABSTRACT GREENERGY The purpose of this experiment was to test household foods and drinks (lemons, potatoes, coke®, and concentrated lemon juice) to determine if they can be used as alternative energy sources. The hypothesis stated that if the concentrated lemon juice is tested, then the amount of volts generated will be greatest because a stronger chemical reaction will occur. A digital direct current (dc) volt meter was used to measure the amount of volts generated after a 1½ minute time span, and the findings were compared to the volts generated by a single Duracell® AA battery. It was observed that the average test results showed that the dc volts recorded after 1½ minutes were 0.71 for the lemon, 0.93 for the concentrated lemon juice, 1.42 for the potato, and 1.60 for the coke®. The coke® generated more direct current (dc) volts than any of the other household foods and drinks. These readings were then compared to the average dc volts recorded for the Duracell® AA battery after 1½ minutes (1.56 volts). The coke® produced more volts than a single Duracell® AA battery (1.60 versus 1.56). These household foods and drinks can be considered as alternative energy sources as dc volts of electricity were produced during this experiment. It is concluded that the hypothesis was refuted.

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CSEF Official Abstract and Certification

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Proj. Title:
Num

Student Name(s):

Fair Category

Abstract:

During the winter season snow storms may occur and many people do not know what to do when the power goes out. The purpose of this experiment is to show how long it takes to charge devices, such as phones, while using different sources of energy. My hypothesis was that it would take 20 minutes to completely charge a device using a solar panel, and 30 minutes using wind energy. I made a wind energy source from a wooden board, bearing, blades (from a fan), a metal pole, a bike generator, and a power inverter. I put the wind energy source into different wind speeds and first measured the speed of the wind. Then I used my timer and timed how long it took for the device to charge completely. I also used a solar panel as another source of energy. I took the solar panel into different types of weather and measured the time it took for device to charge completely and I also measured the watts of the solar panel. This topic is very interesting for me and it was fun experimenting with it.

Word Count

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In this project two reactions were conducted to determine which absorbed more energy. If the change in temperature caused by the reaction is positive, the reaction is exothermic. If the change is negative, it is an endothermic reaction. The amount of energy transferred is measured by calculating the amount of temperature change caused by the reaction. The mixtures used in this experiment are baking soda and vinegar, and water and ice.

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CSEF Official Abstract and Certification

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Proj.
Num

Proj.
Num

Title: Which calcium carbonate antacid will neutralize gastric acid more effectively?

Student Name(s): T. Saviano

Fair Category

Abstract:

My grandfather has always had heartburn, so he wants an antacid that works effectively. Many different antacids relieve heartburn, but not all people get relief from the same antacid. Is there a difference between name brands and generic antacids with the same ingredients? I compared Tums with 3 store-brand antacids. I crushed one dose of each antacid and stirred it into 100 ml of water for 2 minutes. I poured 5 ml of the mixture into fifteen different test tubes and added four drops of the bromocresol purple indicator, which is purple in a base and yellow in an acid. I placed the tubes in a water bath at 37°C. After that, I added simulated stomach acid until the purple solution turned clear yellow, and recorded the drops of acid added. I repeated the procedure 3 times for a total of 45 measurements for each antacid. My hypothesis was that Tums will neutralize gastric acid more effectively than equivalent generic antacids. I averaged my data and also used a statistics test (ANOVA) to see if my results were valid. The average drops of acid added for the 3 generics were 25, 15, and 20, while Tums was 28. The ANOVA test showed the difference was significant ($p < .05$). Tums neutralized the most acid, so it works most effectively, supporting my hypothesis. These results could help people realize name brands are worth the extra money. If I were to continue my research, I would test other name brand and generic equivalents.

Word Count

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Proj. Title:
Num

Student Name(s):

Fair Category

Word Count

Abstract:

What I wanted to find out from my research is how well filtered bottles actually work, and if they produce water with less particles and lower chlorine levels than water produced from the tap. I chose this topic for research because I see many people these days using filtered bottles. I, myself, do not use them and so I decided that a great experiment would be to find out what the craze is all about, and if those bottles really do give “cleaner” water than the tap. To conduct the experiment, I observed and tested a glass of tap water with water testing strips. Then, I observed and tested a glass of tap water that had been filtered through the bottle with the water testing strips. I compared my results. Though the filtered tap water had much less particles in it than the pure tap water, both had the same results in regards to the testing strips. In conclusion, the filtered bottle produced cleaner water in terms of particles than the tap. However, the bottle did not lower the chlorine levels of the water.

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Rainfall is frequent and expected in the northeast. The ecosystem is dependent and linked very closely with the rain. But, in some aspects, rain may be harming the environment. Human and natural processes increase the concentration of acid producing oxides in the atmosphere. These oxides react with water to produce acid causing rain which impacts aquatic life and vegetation. This study utilizes data taken by a pH meter to test the effect of rainfall on pH levels in bodies of water. The data received was then carefully analyzed and interpreted. The results, when presented to environmentalists, can provide a better understanding of the effects of excessive rainfall and may make its way to an improved ecosystem. By discovering the change in the water's acidity, certain measures can be taken to prevent harmful changes in the ecosystem. Further studies include testing and examining various effects of rainfall on bodies of water.

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CSEF Official Abstract and Certification

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Student Name(s):

Fair Category

Word Count

Abstract:

Many decisions need to be made in the process of building a house. Choosing an insulation may seem like a small decision at the time, but did you know this choice can save you a lot of money on heating your home? This experiment was conducted to determine which insulation is truly the best at holding in heat. Fiberglass, cellulose, and spray foam were the three types of insulation tested in this experiment. My hypothesis was that the spray foam insulation would hold in the most heat, because of it has a high R-value. To test the insulations, a sealed box containing a light bulb was built. Then, the insulations were applied to the top of the box and the box was heated to forty-one degrees Celsius (approximately one hundred five degrees Fahrenheit), using the light bulb. When the inside of the box reached forty-one degrees Celsius, the light bulb was turned off and the temperature was recorded in five minute intervals for thirty minutes. Spray foam insulation maintained the highest temperature, proving that a higher R-value is important in maintaining heat. Fiberglass and cellulose insulation showed no significant difference in temperature, because of their similar R- values.

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Student Name(s):

Fair Category

Word Count

Abstract:

The project's purpose was to find out the ability of storing power from a pedal' powered generator into rechargeable lead-acid batteries to power an LED light. The experiment also explored the feasibility of storing the energy in hydrogen and oxygen using water electrolysis and fed into a small PEM fuel cell. The pedal powered generator, or PPG for short, was constructed using a permanent magnet DC motor connected to a bicycle for power. The voltage and amperage, created by normal pedaling, was measured and used to determine the battery's configuration. The batteries were then discharged, and their starting voltage was measured. We had 4 batteries. The batteries were then connected and recharged by pedaling for a fixed amount of time measuring average voltage. The ending voltage of the batteries was measured, and the batteries were then discharged individually through an LED light, and the time per battery to return to its starting voltage was recorded and measured. Based on the average pedal powered generator's volts and amps, the four lead acid batteries were connected in a series to the pedal power generator. A formula (Number of Minutes Pedaled + ((5.85 – Voltsstart) 2*5) was developed and proved accurate in estimating how much pedaling time was needed to power the LED light for a certain amount of time. Although the storage of energy in the batteries was efficient, the project demonstrated the feasibility of a pedal powered generator to recharge batteries to power LED lights.

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Student Name(s):

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Word Count

Abstract:

The purpose of this science project was to determine whether the temperature of seawater has an effect on the level of the pH in the water. To begin my experiment, I collected seawater from the ocean. I poured a portion of the seawater into a cup which I heated on a hot place. The water was heated to ten various predetermined temperatures ranging from 20°C to 65°C. At each temperature level, I tested the water's pH level with pH paper and recorded the results. The data led to findings that determined that as the temperature of the water increased, the levels of pH decreased. Through my research, I learned that water molecules function as both an acid and a base. One water molecule acting as a base can accept a hydrogen ion from another molecule acting as an acid. A hydroxonium ion and a hydroxide ion are formed. Because one is a strong acid, and one is a strong base, they react to produce more water. The effect is that an equilibrium is set up. The formation of the ions is an endothermic process, meaning that it is a chemical reaction that is accompanied by the absorption of heat. Henry Louis LeChatelier proposed that if you make a change to the conditions of a reaction in dynamic equilibrium, the position of the equilibrium moves to counter the change. Therefore, if you increase the temperature of the water, the equilibrium moves to lower the temperature by absorbing the extra heat.

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Student Name(s):

Fair Category

Word Count

Abstract:

The burning of fossil (petroleum-based) fuels has been the primary source of energy for modern transportation since the early 1900's, but fossil fuels are not renewable and are running out. Therefore, there has been a lot of research to find alternative renewable bio (plant-based) fuels as suitable substitutes. The objective of this project is to compare three bio fuels to two fossil fuels in terms of energy output, and evaluate if any particular bio fuel can be an effective substitute to fossil fuel using a model steam engine. The physical properties such as energy content (kJ/g) and cost data were first collected for the five test fuels - bio (peanut oil, olive oil, and vegetable oil) and fossil (lamp oil, and oil candle C14 paraffin). Each fuel was burned to heat 100 mL of water and data on its heat release was captured in terms of water temperature change over time. An efficient fuel for an engine should be one with the highest energy content and fastest heat release. Of the three bio fuels, it was predicted that peanut oil would have the most potential as a fossil fuel substitute because of its relatively higher energy content. However, the steam engine testing showed that it was too sooty to be practical, although it may work in another engine design. The olive oil and vegetable oil, currently, would not make a good fossil fuel substitutes due to cost and lower energy content.

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Student Name(s):

Fair Category

Word Count

Abstract:

For my project I have been experimenting with bubbles. I made six different bubble mixes. One, I used as a control so it was just normal toy bubble mix. The other five bottles were 50% bubble mix. There other 50% of the other bottles were something else. Them being bubble bath, dish soap, melted glycerin, laundry detergent and corn syrup. The point of this experiment was to see which bubbles are the most fun to use and to see which ones, last longest, colorful and easy to blow. I really enjoyed testing the different kinds of bubbles. I just blew the bubbles so I could compare them. But I also used a bubble machine to test how long each bubbles lasted. In the end I found the toy bubbles the best original way. Mostly because it made for that purpose and is safer.

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Student Name(s):

Fair Category

Word Count

Abstract:

We, as humans, have reached a point in our existence when we can no longer rely on slowly diminishing sources of power. After all the fossil fuels are done, what will we do? That is why we have to start NOW. We have to find ways to improve the efficiency of renewable energy such as hydropower, geothermal power, and most importantly Solar Power. President Obama is committed. He is taking action to build the foundation for a clean energy economy and to protect the environment. In 1839 Alexandre Becquerel discovered the photovoltaic effect. He said that "shining light on an electrode submerged in a conductive solution would create an electric current." Over a hundred years later, in 1941, Russell Ohl invented and patented the first solar panel but it wasn't very efficient. Solar panels use light energy. They are made of silicon which has four electrons surrounding it and they bond together. One layer is added an impurity like boron and the other layer is added one like phosphorous. This enables the electrons to flow and create a diode which creates an electric flow. I tested different colors and heights of the light to see if they affected the efficiency of the solar panel. This project was just the beginning. I hope to improve and work on this for the rest my life. I hope to conduct experiments in the future to possibly make the solar panels efficient at night or send solar panels to space. The opportunities are endless.

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Word Count

Abstract:

HOW A MAGNETIC LINEAR ACCELERATOR WORKS A magnetic linear accelerator is constructed by using 4 foot pieces of wood, steel balls, magnets and a shoebox. The purpose of the device is to show how kinetic energy transfers through a series of magnets and balls propelling the ball at faster and faster speeds. Three sets of magnets and balls were placed on a wooden rail. One ball was released at a starting point and the first set of magnets pulled the launch ball toward the magnet. Kinetic energy transferred through the magnet propelling the last ball attached to magnet down the rail toward the second interval of magnets. The ball was timed as it travelled from the start to each interval. Kinetic energy caused the ball to accelerate as it passed each interval. Different steel ball sizes were tested. The number of magnets at the intervals was changed from two to three to four. The number of balls attached to the magnets at each interval was varied. The larger ball travelled faster, less magnets made the ball travel faster and the smaller number of balls attached to the magnets made the balls travel faster. Magnets and kinetic energy can be used to cause movement without motors.

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Abstract:

The purpose of this experiment was to determine how much height is needed to build up potential energy to be converted to kinetic energy for a rollercoaster to overcome a loop. I taped ramp to solid object using masking tape with slope of (rise/run) 54"/18", which equals 3" degree angle. I made a splice and created 16" diameter loop, stabilizing it to ground with masking tape and marked height of rise in one-inch increments starting at 12" up to 42". I tested each marble in 6" increments from 12" to 42". I adjusted loop to 11.5" from ground to vertex. Rise and run stayed the same. I tested each marble in 6 in. increments on the 11.5" diameter loop. Made a second loop after first loop also at 11.5", tested each marble in 6" increments on the double loop, and analyzed data. Although the hypothesis was proven correct, the height had to be significantly higher than the diameter than was believed! I decided to use two different marbles to determine if weight made a difference also. The heavier marble was able to loop the loop at a lower height (33") than the lighter marble (35"). When reducing loop by 4.5", there was still a 2" difference in the height between the two marbles needed for success. The heavy marble worked at 20", the lighter marble at 22". Also, with a second loop added, the heavy marble and the light marble had a 5" difference in height needed for success (40" vs 45").

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Word Count

Abstract:

This project investigates and compares a robotic, mechanical, and human arm determining which has the best accuracy and precision when completing a simple task. Robots are designed, built, and programmed for many different uses including; manufacturing, military, medical, and space exploration. Research, lead to the hypothesis; if a robotic arm is programmed to complete a task it will be more accurate and precise than a mechanical or human arm at completing the same task. Precision is the closeness of two or more measurements to each other while accuracy is a measurement of the ability to attain a specific position. Accuracy when throwing a ball at a target will result in hitting the bulls-eye. However, precision results in hitting the target at the same spot even though it may not be near the bulls-eye. Accuracy and precision would result in the ball consistently hitting the bulls-eye. Testing the accuracy and precision of the three types of arms was conducted using a target and ball. The robotic arm was built from a kit. The mechanical arm was designed and built using common materials. A ball was dropped onto a target. The ball's distance from the bulls-eye and distance from each landing position was recorded. The robotic, mechanical and human arms were tested 5 times each from 3 different heights. The target position, ball, horizontal distance of the arm from the target, and location were constant. The results were different than expected. Repeating the experiment to collect more data would be useful.

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Word Count

Abstract:

The purpose of this project is to study which natural cleaning agent has the greatest impact on stain removal. I am doing this project so that when my family does laundry they will know of a natural, but effective method of cleaning clothes. My hypothesis is that vinegar will clean better than lemon juice and baking soda. This experiment was conducted by smearing equal amounts of 3 different stains onto cotton cloths of the same size: chocolate, ketchup, and olive oil. I let each stain set for 2 hours. Then, I put each cloth into it's own jar of water and added one of the 3 natural cleaners into each jar. I also put one stained cloth into a jar of water only, which I used as my control. After shaking each jar in the same way, for the same amount of time, I then let them sit for 20 minutes each. After rinsing each cloth in a sink of cool water and letting them hang dry, I examined which stain was less visible. The results showed that my hypothesis was partially correct. Overall, vinegar and baking soda were tied for being the most effective natural cleaning agents at removing stains. My experiment showed that various natural cleaning agents worked differently on some stains than on others. Acidic stains were cleaned best by alkaline cleaning agents, and vice versa. Understanding the pH of the stain can help determine the best natural stain remover to clean it.

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This project is a result of an experiment on the effects of water's ph., hardness, and alkalinity on the growth of radish seeds. The initial reason for this experiment was to determine if acidic, basic, or neutral water was best for growing plants. This would determine how acidic water should be when growing plants. Ph., hardness, and alkalinity were determined by using testing strips. Ph. was measured on a scale of zero to fourteen. Hardness was measured on a scale of zero to one thousand, and alkalinity was measured on a scale of zero to two-hundred-forty. After finding the ph., hardness, and alkalinity, I planted three radish seeds for every water sample. I had a sample from Newtown, Connecticut, Yorktown, Virginia, Williamsburg, Virginia, Butler, Pennsylvania, and Scottsdale, Arizona. I watered the seeds for one month and recorded the heights every other day. At the end of the month, I concluded my experiment. My plants watered by rainwater from Scottsdale grew the tallest, averaging 8.7 cm. My second tallest plants grew average of 7.7 cm, and were watered by rain water from Butler. The third tallest plants were watered by rain water from Williamsburg, and averaged of 6.8 cm. The fourth tallest plants were watered by rainwater from Yorktown, and averaged 4.1 cm. The shortest plants were watered by rain water from Newtown, and they averaged 2.5 cm. This data concluded that watering plants with a ph. of 6.5 and a hardness and alkalinity of 80 has the best growing results.

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CSEF Official Abstract and Certification

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

I did my experiment to see if water in a soda bottle rocket would fly efficiently, agreeing with flight principles. In real rockets, fuel and weight are forces that keep the rocket grounded. A force called the thrust causes the rocket to fly. The more fuel a rocket contains, the more thrust will be exerted and the longer the rocket will fly. I decided to see if the same principles applied when water acted as fuel in a bottle rocket and air pressure as thrust. For each experiment, there was a different amount of water in the rocket. A rubber stopper with a hole to fit a needle in was placed in the bottom of the rocket. The needle was attached to a bicycle pump with an air pressure gauge, which measured how much air pressure was exerted into the rocket before it flew. When the rocket flew, the rubber stopper detached from the rocket and the water was released. I recorded the time flown with a stopwatch. I conducted two series of experiments because in the first series, there was not an accurate time count. In the second series, I filmed the rockets flying and was able to record my time accurately when watching the tapes. I was able to conclude that Product D, the rocket with the most amount of water, not only flew for the longest time but also had the largest amount of air pressure exerted before flight. This result agreed with my hypothesis.

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Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

This project compared the vocals of three popular female singers, Katy Perry, Rihanna, and Adele using the iPad application, oScope. During their songs, I recorded their peak and highest sustained notes and compared the results to determine which of these three vocalists were able to reach the highest frequency during a song.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

My science project is about how pictures and images are displayed on an LCD computer monitor. For the experiment I made a pair of glasses with polarized film so the pictures are visible on the computer when the polarized filter is removed. My project also shows the significance of the crucial parts of the computer and without those parts, technology would be invisible to the human eye. My hypothesis is that when I take the polarized filter off the glass substrate the screen will be completely invisible to the human eye. Without the top polarized filter I believe the screen would be blank because the image wouldn't be able to focus and make a picture without the polarized filter. The LCD monitor consists of a sandwich of glass. On top and bottom of this multi layered piece of glass is a polarized filter. The top polarized filter groves go horizontal and the bottom ones go vertical. In the middle of the two sheets is liquid crystals. It Bends the light from the back light at a 90° angle so the light can pass through both the filters. Without the liquid crystals the light can't pass through the inter-crossing groves. My biggest question was what happens when you take the top polarizing filter off? With the green, blue, and red pixels on it's highest velocity what color does it turn? White. My experiment proves that the top polarized filter focuses the scattered colored light into images.

Special Categories Selected by Student:

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Fabrication and testing of the power output in a solid state Tesla Coil

Student Name(s): J. Immanuel

Fair Category

Abstract:

It is hypothesized that the wider the ratio of primary to secondary coil windings, the greater the power output. This experiment was done to show what happens to energy transfer between the primary and secondary circuits when the ratio of primary to secondary coil windings is changed. This experiment was done to give a ratio that is best able to transfer energy. This ratio can then be used in larger coils for entertainment, such as lightening shows, or for scientific studies. For this experiment, a Tesla Coil was built using electrical components such as diodes, resistors, and transistors. Primary coils with various numbers of coil windings was built using wire and cardboard. The secondary coil was built using PVC and wire. To test the hypothesis, a 13 watt light bulb was used to see how far away it can be lit from the Tesla Coil. In this experiment, there were 3 primary coils, each with a different number of windings. The secondary coil had the same number of windings for every trial. Three trials were performed for each primary coil. In this experiment, the primary coil with 3 coil windings performed the best, the primary coil with 2 coil windings perform second best, and the primary coil with 5 coil windings performed the worst. Due to these observations it is concluded that the primary coil with 3 windings resonates at the same frequency as the secondary coil, resulting in the greatest transfer of energy between the primary and secondary circuit.

Word Count

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CSEF Official Abstract and Certification

Fair Category

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Do you think it takes sophisticated equipment to measure the speed of light? Think again. I was able to measure the speed of light only using a laser pointer, a calculator, a protractor and gelatin. I used unflavored and uncolored Knox brand gelatin in my experiment because my research showed that others who have done the experiment prior to myself haven't had as good results in their experiments with colored and flavored gelatin. My hypothesis was that if the angle of incidence changed, then the angle of refraction would be different. I shined the laser pointer through the gelatin at three different points and marked where they refracted in the gelatin. Then I took a protractor and measured the angle of incidence and the angle of refraction. I then punched in the angles into a formula that is included with my experiment and calculated the speed of light for each angle. The angle closest to the gelatin, angle 2, had the fastest speed of light. Human error was present as I broke the gelatin by dropping it and ripping it as I picked it up to place it back into the refrigerator after the trial. My hypothesis was proven correct as when the angle of incidence was changed, so did the angle of refraction.

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Fair Category

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Proj. Title:

Student Name(s):

Fair Category

Abstract:

My goal for science fair was to build a drawing robot, which took me about four months. Actually, the proper name for the drawing robot is computer numerical controller (CNC machine). The robot was not made using a kit, only off the shelf parts. In fact, all that's needed to make it is multiple pieces of wood, threaded rods, rods, three stepper motors, bearings, driver boards, and an arduino uno. I built this project to show that so many things that we think will be possible only in the far future can be done now. To show that our technology is better than we can even imagine. What is considered futuristic can be very simple. The most complicated part about this project is the math used to draw a circle. When programing the machine, I am only able to make one stepper motor go at a time. When only one stepper motor moves it only draws me a straight line. Thus making a circle very difficult to draw. What I figured out was that if I make the machine not draw a circle in curves(since it requires two motors to be run simultaneously), but in a very small stair-like pattern, so small that the small stairs can't be seen, I can draw a circle. After many tries, I figured out a mathematical function that if I know what the radius of the circle would be, that I could calculate how far each motor has to go in each turn.

Word Count

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Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment is to see if different shaped airfoils affect an airplane's lift. An airfoil is the shape of an airplane wing when you look at it from the side. Different types of airplanes have different shaped airfoils. The lift refers to an airplane wing being lifted by the wind. I believe that the low camber teardrop airfoil will have the most lift. To do this experiment, I needed to build a wind tunnel and Styrofoam airfoils. I did this using the following materials and tools: First, I constructed the wind tunnel using wood, plexiglas, pvc pipes, cardboard, an electric box fan, 2 Knitting needles and various tools. I then made five airfoils using Styrofoam, a cutting tool and glue. Once I constructed everything, I put one airfoil into the test chamber of the wind tunnel and turned on the fan to low speed. I then measured how far up on the needles the airfoil was lifted. This is the 'lift'. I then did the same for medium and high speed and then I then did the same for the other four airfoils and compared my results. My results supported my original hypothesis that the low camber teardrop airfoil produced the most lift. If this is true, then I think this has real world applications as engineers could develop better wings for fighter pilots that would allow them to climb high as needed.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

I notice that umbrellas tend to break when exposed to winds and wanted to see if I could improve their design for greater wind resistance. I designed a five-sided umbrella made of nylon. Four of the sides are connected, and the fifth side, positioned as the top, is connected to the other sides with Velcro. The frame and shaft of the umbrella are made of metal. I had to test the umbrella's ability to keep dry a person. I used a hose with a rain head to spray water from above the umbrella; I used a spray bottle to check the sides of the umbrella. To test the wind aspect of my design I plan to sit in the passenger seat of a vehicle, driven by my father, in an empty parking lot. While wearing my seatbelt, I will hold the umbrella out the window while the vehicle travels at differing speeds in order to test how much wind is needed to cause the Velcro to release. We will begin travelling at 5 miles per hour (mph), increasing our speed steadily up to and including 25 mph. I will note at which speed(s) the Velcro disconnects from the umbrella frame. Although the Velcro may release in wind (and rain) while holding this umbrella (equals wet person), it is better to get wet for a brief time than have to buy a new umbrella. In this design, the umbrella is re-usable. Once the Velcro releases, it simply can be re-attached.

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

My experiment is about helping the world become free of pollutants by testing whether lenses will increase the voltage output of a solar panel. This could help increase the efficiency of solar panels, and eliminate the need for some coal power plants that release many pollutants into the air. To conduct the experiment, constructed a stand used to place my lens on. I connected the multimeter to the solar panel with alligator clips. Then, I placed the lens on the stand, and shined a 20 W light bulb directly above the lens. I read the number volts on the multimeter, then repeated this process 3 times for each concave and convex lens (with focal lengths of 20, 30, and 50), and with the control (no lens). At the end of the experiment, the concave lenses, averaging at 0.57V, had a much greater voltage output than the convex lenses, which output between 0.12V and 0.27V. The control group had a voltage output of 0.42V. The Concave lens had the greatest voltage output between Concave lenses and no lens. In the future this could be used on solar panel farms to increase the amount of electricity produced.

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CSEF Official Abstract and Certification

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this project was to collect more energy using solar panels and clothing. This required a thick gray sweatshirt and a 5v 25mA Flexible Solar Panel. The panel was placed below the shoulder, so that it could easily absorb energy, especially when it was exposed to direct sunlight. The panel was flexible, so that someone wearing the sweatshirt is still able to make normal movements. To test this, the sweatshirt was taken outside, so that there was plenty of sunlight for the panel to absorb. It was taken outside every hour from 10:30 a.m. to 2:30 p.m. The amount of energy taken in was measured using a multimeter. These panels can be very helpful because they take in sunlight that is not being used as energy in a lot of places. If people wear these, then it would be better for them, because they would collect their own energy and save money. The result of this experiment was that wearing a solar panel around throughout the day will work and can collect energy. However, if you are outside and sitting still, maybe reading a book, then you will not get as much energy as if you were moving around, such as playing basketball on your driveway. That means that if you go outside on a cool morning, you should put on your solar sweatshirt so that you can exercise and at the same time, collect energy you could later use for something else.

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CSEF Official Abstract and Certification

Fair Category

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Num

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Num

Title: Graphene Enhanced Piezoelectric Generator for Environmental Energy Conservation

Student Name(s): G. Mesa

Fair Category

Word Count

Abstract:

The purpose of this experiment was to create an environmentally neutral battery for generating electrical energy through mechanical instead of chemical means taking advantage of a new and promising material, graphene. The result was a piezo-electric battery enhanced with graphene for use in personal use situations such as lighting a home in a rural area during monsoon season where alternative green energy such as solar is not feasible. The first step was researching graphene properties and piezoelectricity. The next step was to determine a method by which the graphene could be combined with a piezoelectric crystal, thus giving it additional strength and conductivity. Many methods of combination were tried including various concentrations of graphene as well as the development of graphene films in different conditions. The next step involved building a device that fit the criteria needed to justify producing and manufacturing it. The device had to be environmentally green, produce sufficient energy for the cost, and work to effectively translate mechanical energy. Then the device needed to be tested for electrical output and durability through mechanical stress testing. Next the battery was evaluated for environmental disposal through soil and water degradation. Finally the battery was put into a live application for demonstration purposes, in this case a light that works without external electricity during a rainstorm. In conclusion, the possibility of having small scale devices self-contained devices that turn mechanical energy into electrical energy is very real with the application of new materials such as graphene to the problem.

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CSEF Official Abstract and Certification

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

My project is to see how many blades will make a windmill produce the most energy by testing various combinations of discs with a variable number of blades. I created discs with 1, 2, 3, 4 and 8 blades to see which one would produce the most energy. I took the base and put it 1 foot away from the fan and adjusted the fan to point at the blades. I then used double-sided tape to secure the blade to the motor. After that, I connected the motor to the digital voltmeter (DVM) to measure the electricity coming from the blades. Next, I turned on the DVM, the fan, and started my stopwatch. I used the stopwatch to see how much energy was produced in a certain amount of time. The testing began with the fan on the low setting, repeating all steps, as many times as needed to get all of the data I needed to collect. All tests were measured in millivolts (mV). I choose this experiment to do because I was always wondering why windmills usually have only 3 blades?

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Title:

Student Name(s):

Fair Category

Abstract:

Across the United States, there are an estimated 33 million households with one or more people suffering from pollen allergies or functional handicaps. Many of these households are faced with costly lawn service options as they are unable to take care of their own lawns. This research project aims to solve this problem for many Americans by using simple robotic and applied engineering concepts to design a practical Hypo-Allergenic Lawn-Care Device – H.A.L.D. Project H.A.L.D. accomplishes several common lawn care activities such as lawn mowing, seeding, and spreading of fertilizers and pesticides. H.A.L.D. is capable of completing this by using various systems working together. The structure is made up of a simple wood frame and basic hardware. The device is operated through the use of radio controls, a mower and spreader attachment, and a wireless camera. For power and movement it uses two motors, a motor controller, and a marine-grade deep-cycle battery. The final design of H.A.L.D. was based on researching strength of various framing materials, power supply options, types of motors/motor controllers, types of wheels for smoother traction and motion, and types of fasteners and support brackets used for durability. Research was also conducted on economic and medical benefits, as well as opportunities for future enhancements such as GPS tracking, motion sensors, and all-terrain options. After initial design, H.A.L.D's size and weight was larger than expected. However, the project did achieve its purpose: it offered a cost-efficient, usable, non-physically-demanding, and allergy-reduced option to care for a lawn.

Word Count

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CSEF Official Abstract and Certification

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In our society, many people can't use computer mice because their hands are disabled. Therefore, disabled people need something else to operate the computer. I decided to make a Foot- Operated Computer Mouse Prototype to help these people. I used a PVC sheet to trace the slipper outlines. I made spaces for the roller lever switches and the mouse for the right and left slippers. I took apart an optical mouse, and took out the scroll wheel and circuit board. After making holes where the marks were drawn, I soldered the wires to the roller lever switches. I secured the mouse with brackets, nuts, and bolts and attached the wires to the components. Then I assembled the top of the foot-operated mouse. I tested my device on ten people. The subjects were asked to do some simple mouse moves. I used the same Windows-based PC for every subject that I tested. I kept the environment as constant as I could. When the Windows screen appeared, subjects were asked to select the windows icon on the lower left. When the menu appeared they clicked "Word." At the top of the screen they clicked "File" and "Save." Afterword, the test subjects were given a questionnaire to provide feedback about the device. Results were mixed. With 4 of the subjects the machine broke, and had to be repaired. People needed a lot of practice to get used to it. I plan to make modifications to make it more reliable and easier to use.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
5565

Student Name(s):

Fair Category

Abstract:

This experiment explored Thistlethwaite's algorithm for solving Rubik's cube. Thistlethwaite's algorithm identifies groups of moves. Moves in a group are related to fixing the orientation of different pieces (edges, corners). Groups include moves like single turns (all faces), double turns (all faces) and other combinations with subsets of faces, and mixes of double turns and single turns. Experimental hypothesis: cubes scrambled with move sequences of parallel sides and double turns will be easier to solve (require less moves) than cubes with adjacent sides. Cubes scrambled with all sides and adjacent faces will require the most moves. This experiment also explored identifying sequences of moves to create simple and complex patterns on the cube, like a cross or cube in a cube. Another investigation searched for sequences of moves that could be repeated multiple times to return the cube to solved. Javascript was explored to display the moves and the patterns. A LEGO® EV3 robot was constructed to solve the cube based on the MindCub3R design. Different test cases for scrambling the cube were selected (representing groups of moves/turns - single, double, adjacent, parallel, random). Time to solve and number of moves were measured for each test case. Results were consistent with hypothesis. Scrambles with doubles required at most 8 moves. Scrambles with parallel sides required up to 10 moves. Scrambles with adjacent sides required 17-26 moves. Random scrambles required 8-26 moves. Move sequences were identified for several patterns. Sequences that could be repeated to solve the cube were also discovered.

Word Count

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- Yes No

CSEF Official Abstract and Certification

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

We live in a world in which many of the resources upon which we rely for transportation are rapidly diminishing. Two naturally occurring renewable resources are wind and magnetic energy. One of the main obstacles to implementing wind-powered energy for transportation is friction. I wanted to design and create a small-scale prototype of a vehicle that was powered by wind and used magnetic repulsion. Using a computer program, I designed a vehicle model that uses the opposite charges of a magnet to make a vehicle lift and travel along an iron rail. The iron rail was embedded with neodymium magnets. I then 3D printed my design using ABS (Acrylonitrile Butadiene Styrene) filament. I used a 12-volt electromagnet powered by a 12-volt battery to lift my design off the rail using like poles to propel it. I put a sail on the front of my design to make it move. To test it, I planned to blow wind on the sail when the electromagnet was off to see if there was friction. Then I would test my design with the electromagnet on to see if friction was eliminated. I am continuing to work toward my testable model as I consider how the battery's voltage is strong enough to allow the magnetic poles to have enough charge to function. What I am hoping for is that one could harness the power of magnets and wind and use them to one's advantage.

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Fair Category

Proj.
Num

Proj. Title:
Num

Student Name(s):

Fair Category

Abstract:

I have always been interested in studying the different wing designs in airplanes such as the fixed-wing airplane, bi-plane airplane, and tandem-wing airplane designs and how to make them faster and more aerodynamic. My hypothesis states that I believe that a tandem-wing airplane design will fly a greater distance than a fixed-wing airplane design or a traditional biplane airplane design when thrust from a catapult-assisted-launching-system (CALs). I built my fixed-wing, bi-plane, and tandem wing airplane designs out of model airplane balsa wood. To get an accurate measurement of distance during the airplane design testing trials I designed and built a Catapult-Assisted-Launching-System (CALs). I based my design of the CALs from the U.S. Navy's Catapult Assisted Take-Off Barrier Arrested Recovery System (CATOBARS) used for launch and recovery of aircraft from the Nimitz-Class carrier U.S.S. Ronald Reagan. Product A, Fixed-Wing Airplane design, had an average flight distance of -44.3 inches. Product B, Bi-plane airplane design, had an average flight distance of 111 inches. Product C, Tandem-Wing airplane design, had an average flight distance of 40.7 inches. In conclusion, I learned that my test results disagree with my hypothesis. After completing my flight tests from a CALs, I can conclude that the bi-plane airplane design flew a greater distance than the fixed-wing airplane and the tandem-wing airplane designs.

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Purpose of experiment is to determine the amount of chemical energy stored in food by burning and capturing the heat given off in a homemade calorimeter. I predicted that a burning marshmallow would have a higher amount of calories than a piece of burnt bread. My procedures are in order to burn the food items I had to construct my own homemade calorimeter, which I did by placing a large coffee can high enough above the bottle cap with the food item, get a needle or wire and push one end in the bottle cap. Afterwards I weight each food item and record the weight, use a graduated cylinder to measure 200 grams of water and pour in coffee to take the temperature before burning the food item. Place the food item being burn on the wire, Place the bottle cap on a non-flammable surface, Light the food item with a lit candle, Allow food to burn itself out, After the food item is burnt completely out stir the water and take the final temperature of the water and record. I repeated all the steps for all the food items. In my data the temperature of water is the independent variable and the food items being burn is the dependent variable and the control was the amount of water because. My conclusion was that the burnt marshmallow does have a higher amount of calories than a piece of bread. My experiment went through smoothly except for the fact that the bread and peanut took a longer time to lit on fire.

Special Categories Selected by Student:

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment was to determine whether the temperature of a copper wire has an effect on its resistance. My hypothesis was that the resistance of the wires would increase as the temperature increases, and the wire with a lower gauge would be less. I thought this because the atoms in a cold material vibrate less than the atoms in a hot material. Also, in a thick wire, the electrons can spread throughout the conductor. To conduct the experiment, two insulated copper wires were taped to the inside of a tray. One wire was 14 gauge, and one wire was 24 gauge. Note that the American wire gauge is used. This is a scale from 0000 to 40 in which the thickest wire is 0000. The tray was filled with cold water. The resistance was measured in Ohms with a multimeter, and this was repeated with the other wire. This process was repeated with water of different temperatures. This experiment supports my hypothesis. As the temperature of the water increased, the resistance of the wires increased. In addition to this, the resistance of the wire with a lower gauge was less than that of the wire with a higher gauge. This experiment is important because it shows the importance of wire temperatures. This shows that wires should not be placed near sources of immense heat because it could impact the quality of the electrical transmission. This is especially true for data and telecommunication wires.

Special Categories Selected by Student:

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CSEF Official Abstract and Certification

Fair Category

Proj.
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Proj. Title:

Student Name(s):

Fair Category

Abstract:

The experiment I am conducting is the Spinning Coin; this experiment is designed to see which coin will spin in the most complete rotations around the balloon. The problem I will be trying to solve is how does the centripetal force affect the amount of times the coins spins around in the balloon? In my experiment I tested different types of coins, such as a penny, dime, nickel, and quarter. These coins have different diameters and are made out of silver or copper. These factors will influence the outcome to see which coin spins the most. The purpose of this lab is to demonstrate and get a better understand of centripetal force. Centripetal force is a force that acts on a moving object in a circular path. Centripetal force is important in our daily life. Examples of this would be driving a car around a corner, on a merry-go-around, roller-coasters or other amusement park rides. Without centripetal forces are daily life would be difficult and would be dangerous. During this lab I will be trying to answer the following four questions. The first question will be which coin has the most spins inside the balloon? The second question is what factors influences the coins spinning? The third question is what is centripetal force? The last question is what are examples of centripetal force in your daily life? This lab helps me get a better understanding of what centripetal force is and how it affects my daily life.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

When a golf ball is in flight there are two main forces that act upon it: drag and lift. The lift force is what lifts the ball into the air, while the drag force pulls it back to the ground. The purpose of this study is to create a golf ball that has a lower drag coefficient than the modern dimpled golf ball allowing the ball to travel a greater distance. In this study a new golf ball was created that has a groove pattern of a soccer ball on the surface rather than the common dimple pattern. Since the dimpled golf ball and grooved soccer ball have such close drag coefficients it was hypothesized that putting the groove pattern on the smaller ball should lower the drag coefficient. The golf ball was created with a symmetrical six groove pattern on SolidWorks and printed on a 3D printer. A grooved and dimpled ball were both tested in a wind tunnel by hanging each by a protractor at the top of the tunnel. The angle each ball was blown to was noted at different wind speeds and used to calculate the drag force. It was found that the dimpled golf ball has a slightly lower drag force on it than the grooved ball. Based on these results the grooved golf ball will not travel as far as the dimpled ball.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

This project is looking for a more efficient way to gauge the age of a star cluster. There are two main ways astronomers today use to find this information. One is to compare stars in the cluster with a main sequence which maps out the age of every different color and luminosity star. The other way is to look at the activity of the cluster in the form of emission lines. Both methods take knowledge of luminosities and positions of the clusters. The idea with this project is to see if the position of the star or the activity of the star is more influential on its age. Taking data from NASA's Extragalactic Database, the project will be looking at two clusters. One is positioned near the center of a galaxy and one positioned near the edge of that same galaxy. The younger cluster is the Palomar 12 and the older one is the Messier 4 cluster. Data from both of these clusters will be examined under both methods to see which method is more efficient. This could save time for astronomers who need this information. This knowledge would set a state for the quickest and easiest way to age things in the sky.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6007

Student Name(s):

Fair Category

Abstract:

There is a need for robots to understand and respond to colloquial human language, especially as these robots begin to interact with non-expert users. A method was developed to verbally control a NAO humanoid robot as it navigates a maze. Code was written to give the robot a wide basis of colloquial language and simple motions to make it easy to verbally guide through a maze without prior vocabulary training. Successful completion of the maze was defined as the robot going from start to finish within the boundaries and solely guided by verbal commands. The method was successful in establishing the framework for the robot to be guided through the maze. As the need for specific keywords decreases and robots are able to understand a wide range of human vocabulary, actuating robots verbally will become much more common. Game playing with robots can improve social and communication skills of children. With the absence of specific keywords robots will be better able to play with children who are not trained specifically how to interact with them. Ultimately the goal is to create robots that are able to interact with humans without a language barrier to improve collaboration with such artificial intelligences.

Word Count

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6008

Student Name(s):

Fair Category

Word Count

Abstract:

Current oil spill remediation methods are costly, and time consuming. This project aims to change that by offering a novel method of remediation. Ferrofluids clean oil spills effectively, yet little research has been conducted on the specific materials that most efficiently magnetize oil. In this study, different carrier liquids were used to suspend ferrous material and used to remediate oil spills an effort to determine which ferrofluid carrier liquid results in the greatest magnetization. Mineral oil was hypothesized to perform best. This was tested by creating suspensions of magnetic nanoparticles and carrier liquids (mineral, vegetable, safflower oil) to create ferrofluids. These were added to a mock oil spill. Strong magnets were used to collect the oil and ferrofluid mixture. The volume of oil remaining in the mock oil spill was subtracted from the initial oil volume in the spill. The results showed that on average, of the 25 mL of oil added to the oil spill, mineral oil extracted 17 mL, safflower oil 9 mL, and vegetable oil 6 mL. According to these results the hypothesis that mineral oil would create the most efficient ferrofluid is supported. One deciding factor that determined the performance of the ferrofluid was the oil's ability to evenly suspend the nanoparticles within it. This is because the carrier liquid in the ferrofluid combines with the crude oil, creating a single fluid. In order for the nanoparticles to be evenly suspended within the new fluid, they first had to be evenly suspended in the carrier liquid.

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6009

Student Name(s):

Fair Category

Word Count

Abstract:

Developed nations are highly dependent on transportation and, as a result, heavily dependent on fossil fuels. There is a significant need for the development of a power dense energy source that is plentiful, readily available, better for the environment, and easy to integrate and distribute using current infrastructure. Usable ethanol made from cellulosic biomass is an ecofriendly alternative to petroleum-based fuels, however its production still requires further development to improve its efficiency and cost effectiveness. In this investigation, cornstalk biomass was treated with lime (CaO, CaCO₃, MgO, MgCO₃) in a household microwave oven at varying power levels (735W, 497W, and 270W) at 2 to 8-minute intervals depending on the power level. After microwave treatment the samples were left for 24-72 hours to simulate large-scale processing and drying time before digestion with enzymatic hydrolysis to obtain the reducing sugar for analysis. Cornstalk treated at 735W for 1 minute produced the best results with a measured absorbance of 1.52 using a spectrometer at 575nm. This result corresponds to 3.98 mM of reducing sugars, promising and similar to testing conducted by other researchers using different processes and chemicals.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Examining the Uniformity of 3D-Printed Fractal Structures'
Performance Under Compression Testing

Student Name(s): M. Jansson

Fair Category

Abstract:

My research began by reading studies on 3D printed fractal structures, which, due to their fractal qualities, are very efficient when bearing weight (This means that fractal structures can hold large amounts of weight without breaking relative to the amount of material that they are made out of). I read a study involving a specific fractal design that was printed on a very cost prohibitive printer and was curious as to whether or not a “consumer-accessible” (i.e. less expensive) 3D printer, such as my own, would be able to produce several copies of said design that yielded consistent results under a compression test. First, I printed copies of the fractal design on my own MakerBot Replicator 2X. Then, I compressed each of the fractals on a scale, noting that in all of the tests I ran, the main break in each fractal occurred when the scale read over 29 pounds (ranging from 29.5 to over 40 pounds). This proves that 3D Printed fractal structures have a weight-bearing threshold that can be exceeded by differing degrees depending on the individual printed product.

Word Count

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This project changes the angles and design of a fresnel lens, can positively effect the efficiencies of photovoltaic solar panels, by providing the panel with a larger range of sunlight throughout the day and at the same time produce more energy than a regular solar panel would. Fresnel lenses are clear, thin pieces of plastic that have a flat side and a side with a pattern on the bottom. When these lenses are placed over solar panels they can concentrate the light and make the panels produce more energy because they would be receiving much more light than usual. The only problem with these lenses is that the only produce this high amount of energy when the sun is directly above the panels. Therefore the have a bad/ small amount of time during the day that the solar panel is producing this extra energy. Scientists have also made very efficient solar panels. The problem with these is that they are really expensive, very complex to make, and just not commercially viable for people. Therefore, by changing the design of the lens to make the range of day that the panel is producing extra energy larger it can solve two problems at the same time. It solves the sunlight day span problem and also fresnel lenses are cheap to produce. Therefore, it would benefit many people because they are very cheaply and easily made. This will allow solar panels to be more efficient for a longer period of time.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6012

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this project is to use carbon nanotubes to create an electro-chemical double layered super capacitor that has the properties of both high specific energy and high specific power. This will allow scientists to create an energy capturing device that will be able to give off large amounts of energy for long periods of time. In order to create the electro-chemical double layered super capacitor, 2 carbon nanotubes sheets were used as electrodes, and a solution of TEA BF₄ and acetonitrile was used as the electrolyte. The electrodes were soaked in the electrolyte and placed in a vacuum cell with a membrane between them. Their capacitance was tested using a Cyclical Voltammetry Scan on a potentiogravastat. Although the double layered super capacitor was expected to have a capacitance of 5 F/g, it only reached a maximum capacitance of 1.5 F/g. Possible sources of error were minimized by annealing the electrodes, by soaking them in acetone, and by baking them at high temperatures to remove impurities. However, the maximum capacitance values were still not achieved suggesting an error that has yet to be discovered. If the EDCL supercapacitor had acted in the manner predicted, it would have a large impact. A supercapacitor with maximum specific energy and specific power will impact many fields such as engineering supercapacitors for aerospace technology and for use in electrical cars. In the future, it is hoped that CNT based ECDL capacitors will answer the need for better energy storage devices.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6013

Student Name(s):

Fair Category

Word Count

Abstract:

Harnessing lightning has often been dismissed because of the extremely high power density attributed with atmospheric electrical discharges. This project examined the possibility of harnessing the power of lightning through a conversion to hydrogen gas. To test this theory, a plasma electrolysis chamber was constructed in conjunction with proper circuitry to support the evolution of a plasma. Plasma electrolysis was proposed as the mechanism to produce the hydrogen gas because certain advantages exist over conventional, or Faraday's, electrolysis. Plasma electrolysis is similar to Faraday's electrolysis, except that plasma electrolysis is not solely dependent on current applied, but rather voltage. At elevated temperatures and voltages, pyrolysis decomposition of water increases hydrogen production. As the gas surrounding the tungsten electrode occupies more surface area on the electrode, the resistance of the potassium carbonate solution increases. A plasma will form and the ionized gas allows direct transfer of high-energy electrons. These properties of plasma electrolysis supported the hypothesis that lightning could be harnessed through conversion to hydrogen gas. The experimental stage of this research project suggests that it is possible to harness lightning in this method. It was observed that at elevated voltages (excess of 150 volts), hydrogen production is much higher than described by Faraday's electrolysis. In order to simulate lightning strikes, capacitors were allowed to discharge through the apparatus. Immediately following the discharge, the hydrogen gas production spiked dramatically. Results support the theory that lightning could be used to drive plasma electrolysis and provide a viable source of hydrogen fuel.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Abstract:

While the Compact Muon Solenoid (CMS) detector has served as a valuable part of the Large Hadron Collider (LHC), and a great asset to experimental physics over the past half-decade, its limits are already being tested. New experimental demands can necessitate more advanced and sensitive mechanisms of detection, and Geant4 provides a powerful and flexible platform for development and testing of detector mechanisms and design. Developed by a CERN collaboration, Geant4 is a versatile framework for building Monte Carlo simulations of the passage of particles through matter. Using both SLC6 and Windows-based developing environments, Geant4 simulations have been constructed and run in order to quantify the secondary emission patterns of charged particles in a solid conductor. In this preliminary experiment, Monte Carlo simulation of the secondary emission of a single electron upon impact with a uniform copper mass yielded distinct and predictable energy and emission scattering and diffusion patterns in the copper. After careful analysis and review using the ROOT data analysis framework and other data visualization and processing tools, the identification of correlation between initial properties of an incident charged particle and its corresponding secondary emission energies and quantities is an important step in developing more sensitive methods of calorimetry for the CMS. Understanding of these secondary emission patterns will allow for design of electromagnetic calorimeters capable of detecting and measuring the properties of other particles by their secondary emissions.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Solar Panels are becoming a very popular way of producing electricity. In order to perform at their peak, these panels need to be tilted at an angle at which they will receive maximum sunlight. This research project involved testing for the optimum tilt angle for a photovoltaic panel during the winter months for the town of Oxford. Voltage readings were taken from the test solar panel every day possible in the same spot at 9:00 A.M. using a multimeter. The angles tested were 20, 30, 40, 50, 60, and 70 degrees. The hypothesis was that a 40 degree tilt angle would be the optimum one, since the latitude of Oxford is approximately 40 degrees and the latitude of the solar panel is theoretically the optimum tilt angle for that location. Weather conditions were recorded during the tests to explain unusual readings. Whether or not the theorized tilt angle is the optimum tilt angle for Oxford was determined.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6017

Student Name(s):

Fair Category

Word Count

Abstract:

This research project was designed in order to investigate the emulsification properties of three stabilizers and hopefully offer a natural stabilizer that is just as effective, if not more, than the synthetic one being used in this project (propylene glycol alginate). This was found by creating a roughly 35% stabilizer to water mixture (m/v) and a 30% oil to water mixture (v/v), and using the resulting emulsion to measure for the emulsification index over twenty-four hours and the percent transmittance and absorbance over one hour. It was observed that while xanthan gum was the most stable over one hour, gum tragacanth was the most stable over a period of twenty-four hours. With this in mind, the data suggests that gum tragacanth is better suited to creating emulsions with a longer shelf life.

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CSEF Official Abstract and Certification

Fair Category

Proj.
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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This experiment was designed to see if permanent magnets strategically placed on a wheel would cause that wheel to spin with the introduction of an external permanent magnet. If so, it was hypothesized that it would be possible to completely eliminate any fuel necessary to keep the wheel spinning. To test this, an ellipse was cut with permanent magnets along the outside. It was determined that an ellipse shape was the best outline to place the magnets on. When an exterior magnet was introduced, a net force was created allowing the wheel to turn. In each quadrant, the polarity of the magnets was switched, such that at the end of the first quadrant, the wheel stopped being pushed and began being pulled in the same direction. This made it possible for the wheel to complete just under one half of one rotation. Second, it was necessary for the exterior magnet to oscillate from the wheel and back. This is because as the ellipse approaches the points along the major axis, it will reach equilibrium, stopping approximately 1/3 of the way around the wheel, when starting at the opposite major axis. To deal with this, the exterior magnets were placed on a dolly which oscillated as the elliptical wheel rotates. In result, it was seen that the wheel was unable to complete a full, or even a half, revolution. Though perpetual motion is just as impossible as it was before, it shows how accurate the Laws of Thermodynamics really are.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Many people theorize that pumping gasoline at a gas station at certain times of the day will yield more gas than if pumped at other times. I decided to test this common theory to determine if the time of day does matter, as well as if the temperature at the time of pumping the gas plays a role. To test the time of day, I went to the gas station at 8:00 AM, 1:00 PM, and 6:00 PM and pumped gas into an EPA-approved gas container until the pump read a quarter of a gallon (approximately 946.35 ml). I then measured to see how many milliliters were pumped by pouring the gas into a series of beakers. I recorded this measurement and repeated for each time of day for three days. I also used this same test, but instead of testing the time of day, I tested the temperature. For nine days, at 11:00 AM, I recorded the temperature outside and used the same procedure of measurement. Through these tests, I was able to come to the conclusion that the temperature did not have any effect, but the time of day did. On average, the most amount of gasoline was pumped at mid-day, at 1:00 PM, pumping an average of 953 ml. Therefore, the peak time of day to pump gas is mid-day, at around 1:00 PM.

Word Count

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6020

Student Name(s):

Fair Category

Abstract:

Due to the harmful effects of broadly used energy sources, alternative energy sources have been widely studied. One area of interest is transferring water's natural kinetic energy into electrical output. In my work, I wanted to address the question of whether more voltage would be created by (rain) drops hitting a piezoelectric surface or by that same volume of water running through a hydroelectric turbine in flow form. To test this, I built an apparatus for my piezoelectric (drops) system, and purchased a small hydroelectric turbine for the flow portion. I used these to measure the amount of voltage generated by drops of water, and compared that data to the voltage created by the same volume of water, dropped in flow form, from the same height, running through a hydroelectric turbine.

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Testable Question: How will the addition of soap impact a model volcano eruption? Hypothesis: If Soap is added, then the eruption will be larger, because the soap will add suds to the "lava." Independent Variable: The addition of soap in mixture #2 Dependent variable: How big the eruption is Control: Mixture 1, A classic volcano lava mixture made up of vinegar and baking soda Constants: Amount of baking soda, amount of vinegar, brand of vinegar and baking soda, model volcano used, temperature experiment carried out in. Procedure: 1)Place baggie in model volcano with 1 tsp baking soda 2) Pour in 1/4 cup vinegar. 3) observe reaction. 4) Remove baggie with extra reactants. 5)Repeat steps 1-3 but add dish soap into the vinegar for mixture #2.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Abstract:

For the future generation the world will be facing two major global problems which will be very vital for population which are "Availability of useful lands and Water". Keeping these facts the proposed project study will expose a new approach to develop wet lands to a useful land without disturbing the environment. Also this study helps to utilize the natural ground water sources. For wet lands, the source of water that makes a land saturated was identified and the process was done to expose the underground water source to ground level in a controlled way. Sand piles are driven on ground to the identified location to a sufficient depth, filled with graded sand which allows water to rise up by the process of capillarity action, which is a combination of cohesion/adhesion and surface tension forces with the effect of upward force. The water rising through the sand piles to the ground and then is connected to a designed filter media, allows the water to flow laterally and horizontally to a lower level on the profiled ground. This water can be diverted to a catch basin to have a controlled flow to the down streams. A mix of graded sand and rock are used as above ground filter media. In conclusion, the compacted layer of back fill will change the wet land to a dry land without disturbing the ground water flow. Also by reducing the exposed surface area of water, the loss of water by evaporation can be minimized.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6023

Student Name(s):

Fair Category

Word Count

Abstract:

Abstract Highly Ionizing Radiation (HZE) particles are a form of space radiation that has been concerning to biological health in astronauts. Astronauts are relatively protected from HZE particles by the magnetosphere in low Earth orbit; however, HZE exposure becomes dangerous in deep space. This is a concern for long duration lunar missions and future trips to other planets such as Mars. There is a concern that radiation of this type might lead to long term consequences potentially including effects on cognition. If cell division in the hippocampus is impaired by radiation, it may severely affect cognition skills. This experiment has investigated if space radiation affects hippocampal neurogenesis, since the tampering of this neurological process can potentially harm astronauts on future missions. Twenty images were taken of the hippocampus in adult mice. Ten images were of healthy mice that were nonirradiated, and the other ten had been taken of mice that had been exposed to 100 cGy of heavy iron particles, a penetrating form of radiation. Following radiation treatment, bromodeoxyuridine was used to stain the dividing hippocampal cells in all the treated mice. An antibody was used to recognize cells labeled with BrdU to visualize the dividing cell populations. These labeled cells were then counted, specifically in the sub granular zone of the dentate gyrus. To ensure unbiased cell counts, images were left unlabeled. Both controlled and irradiated images were compared in a statistical T-test. Irradiated cells had shown decreased cell division, suggesting that space radiation may significantly impact hippocampal neurogenesis.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

This experiment was conducted to determine how to achieve quality nighttime photos, and is applicable to many – from professional photographer to amateur. Photographs were taken nightly between 8-9 pm in three different locations with various lighting– the moon, light pollution, and 28ft from a floodlight. It was likely that the floodlight would produce the best photograph because it provided the most light. The experiment began on January 2nd, 2014. Nine photographs were taken between 8-9pm in three locations (three photos per location). The first location was lit by moon, and the second location was in an area of light pollution from the stars, and from faraway houses. The last location was 28ft from a floodlight. Each photograph was taken with the same settings to allow the most light. The floodlight photographs demonstrated a higher clarity. However, while the light pollution photographs overall were of a better quality than the moonlight photographs, the moonlight photographs were more fully illuminated, while the light pollution photographs only focused on the subject. However, on January 6th, the snow melted and the lighting situation changed drastically. The bottom of the subject was dark, with no snow to reflect off. The quality of the winter night photo is not only determined by the temperature (Jan 6th had 32F, Jan 3rd had 7F), but also the type of light. The most substantial and artificial light – a floodlight – provided the clearest photo, while light pollution (both natural and artificial) was second best.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Chitin is in the shell of shrimp, lobster, crab, and insect exoskeletons. Chitin resembles plastic strongly by being strong and durable, yet flexible and lightweight. Imagine if man could manufacture this wonder material and cast and form it into products that currently are being made from petrochemical plastics. Current plastics pose problems by polluting the air, soil, and water which causes harm to all life forms. If a natural material like chitin were substituted for the present plastics, then chitin would be the answer to the world's needs for a truly degradable, natural plastic. In this quest for making chitin into a plastic that could be used as a thermoformable material, I took two samples of shrimp shells and saw how a strong basic solution would react with chitin. I chose a basic solution composed of lye and water since I wanted to release the chitin from its protein matrix to reshape it. My hypothesis was that lye would be able to break down the protein surrounding the chitin since I knew how caustic lye is when it touches organic material like skin. In order to determine if the lye would change the shrimp shells, I put a lye solution in one sample while keeping the other sample lye free as a control. Although my experiment failed to produce the desired result of a suitable plastic like material in either sample, I will continue on my quest to manufacture a chitin plastic that is a thermoplastic product for industrial use.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

To regulate blood glucose, frequent subcutaneous insulin injections are necessary for Type 1 diabetics; the treatments are strictly regimented, and if protocol is not followed, the diabetic is at risk of hypo/hyper glycemc events. If a bio-sensitive insulin treatment were developed, diabetics would need one daily treatment. Graphene oxide shows promise as an excellent drug carrier and will thus serve as the foundation matrix for insulin encapsulation. The flavin adenine dinucleotide cofactor in the enzyme glucose oxidase catalyzes glucose into gluconic acid and hydrogen peroxide. The glucose-sensitive reaction of glucose oxidase makes it key in a bio-sensing system for the controlled release of insulin. Disulfide linkage was synthesized between esterified insulin and glucose oxidase using 5,5'-dithiobis-(2-nitrobenzoic acid); evidence of linkage was tested on HPLC. The product was added to aqueous graphene oxide, constructing the graphene oxide-glucose oxidase matrix (GOGO) encapsulating insulin. Insulin, GOGO, and GOGO with glucose (iGOGO) were then scanned with FT-IR. The FT-IR spectra showed that peaks in the fingerprint region of GOGO (1031.74 cm⁻¹) were very similar to peaks in the fingerprint region of the insulin (1041.85 cm⁻¹). The same peaks (1031.74 cm⁻¹) were stronger for iGOGO; higher concentrations create stronger peaks in IR spectra. Ellman's Test was performed to quantify the molarity of thiol groups, the result of broken disulfide bridges, to indirectly measure released insulin. Ellman's Test yielded thiol concentrations of 6.03x10⁻⁶ M and 9.04x10⁻⁶ M for the GOGO and the iGOGO respectively. Data concludes that the matrix released insulin in the presence of glucose.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6027

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment is to ascertain whether there are better concentrations of ferric chloride solution to be used while etching jewelry. Such a concentration would either increase the etch rate to speed up the entire process and/or make the solution more transparent so that the jeweler could better determine how long to keep the copper in the etch. Depending on each individual design, it might be desirable only to etch away a quarter of the copper in a certain part or to etch away a half of it. In order to discover a concentration that would be an improvement upon the current norm, I cut out 1 inch by 1.25 inch rectangles of 20 gage copper, and etched them in five different concentrations of ferric chloride to determine etch rate. In order to complete the experiment, I took into account relative transparencies of the ferric chloride, and also changed the concentration of hydrochloric acid that the ferric chloride was dissolved in, then completed statistical analysis to determine the best concentration of ferric chloride for use in acid etching. Decreasing the amount of ferric chloride increases transparency without substantially detracting from the etch rate, while adding extra hydrochloric acid speeds up the process further in order to compensate for the slightly slower etch rate produced by diluting the ferric chloride. Therefore, the best concentration of ferric chloride for use in acid etching was the lowest one tested- .2 M, especially when combined with additional hydrochloric acid.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Num

Student Name(s):

Fair Category

Abstract:

Phosphoric Acids have been shown to have an effect in removing rust. Iron nails were rusted. The nails were used to test whether Coke Cola, Sprite, or Dr. Pepper removed rust. The hypothesis was that Coke would remove rust the best, since it had the lowest pH. The nails were put through three separate experiments. In experiment number one, nails were placed in three equally sized containers filled with the three different sodas. The nails were checked every two hours, and removed when they were completely clean. The time each soda took to completely remove the rust off the nail was recorded. This would test how fast the sodas removed rust. In experiment number two, the setup was the same. However, the nails were left for an exact amount of time predetermined at the start. When the nails were removed, how much rust had been removed was recorded. This would test how much rust could be removed in a limited time. In experiment number three, the setup was again the same, except that there were two containers per soda: one large, and one small container each. This experiment compared the amount of rust removed in each small container, with the large container of the same soda. This experiment tested whether or not the volume of the soda effected rust removal. Based on the experiment's results, Coke seems to have been the best soda for removing rust.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This project investigates which category of natural pigment, when incorporated into a dye-sensitized solar cell, will yield the greatest output of voltage. The three major categories are anthocyanin, porphyrin, and carotenoid. The cells were fabricated identically with the exception of the different pigments used, and to ensure validity, the light source was applied, was at a constant micromoles reading of 600 micromoles. Computer data collection was used, and indicates the anthocyanin category generated respective average voltages of 174.4, 122.1, and 101.1 millivolts. The carotenoid category, which included voltage outputs of 62.4 and 54.5 millivolts. The porphyrin category which yielded voltage outputs of 37.1 and 26 millivolts. With a standard deviation below 0.05 for all tests, the mean of each cell voltage output can be compared accurately. The control cell yielded between 3 and 39.4 millivolts higher than the pigments in both the carotenoid and porphyrin categories, with an output of 65.4 millivolts. Based on the absorption values of the pigments scanned from 190-750 nanometers on the Cecil Spectrophotometer, this project modified with the incorporation of an Ultra Violet (UV) spectrum light source used to further analyze the voltage outputs for these pigments. The majority of the area under the curve was found in the UV range of the electromagnetic spectrum for all 7 pigments. All seven pigments generated a mean output of 5 millivolts, which approaches the limits of validity of the instrument. This demonstrates that targeting the absorption values does not increase the electron exchange for the natural pigments.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

To determine the effect of temperature on the rate of oxygen production by yeast in hydrogen peroxide. In the procedure conducted, a plastic bottle a pvc clear tube attached to the cap was were the yeast and hydrogen peroxide was placed. Using the displacement method to measure the volume of the oxygen production, the hydrogen peroxide in the bottle was placed in a bowl with water heated to the temperature that was to be tested. Then the yeast was measured, placed in half a medicine cup and put into the bottle making sure the substances didn't mix until the timer was set. This process was repeated as needed to record the data of the five temperatures used. Using the temperatures of 10, 20, 30, 40, amd 50 Celsius, the increase of temperature produced more oxygen. To do this experiment with ease, a easier surface would be used so the bottle would not have to be spun a controlled amount of times.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

I wanted to see the strengths of recyclable material. This idea came the three little pigs. I used sawdust and hay to see which one was stronger. I wanted to know if there was an alternate use for sawdust and hay other than starting a fire and I thought why not use it as a building material. My problem statement was how does compression affect the strength of recyclable materials? I had a control variable of blocks of glue, the other blocks were glue and hay, and the rest were sawdust and glue. I thought that the glue block would glue blocks would do the best. I thought that when the glue block would dry it would be sponge like and absorb the pressure. I tested 12 block in total; 4 glue, 4 glue with hay, and 4 glue with sawdust. I made them in a toaster oven at 200 degrees Fahrenheit. I used a soil tester to see the pressure that each was able to take. The glue block almost crushed instantly. The average pressure that the blocks with sawdust was able to take was 5,425 PSI, the glue blocks was able to take 150 PSI, and the block with hay was able to take 1,175 PSI. As you can tell the block with sawdust was able to hold up the best. It was able to resist the pressure the best. My hypothesis was wrong, if these materials are thrown out why not use them to our advantage?

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6033

Student Name(s):

Fair Category

Abstract:

Extensive research is being carried out in the field of nanotechnology. Materials like graphene and nanotubes have applications in electronics as efficient capacitors. This study was motivated by past research discussing the ability of graphene to be used as a dielectric in capacitors. The question being explored is: Which material is a more effective capacitor in terms of storage capacity, graphene or carbon nanotubes? It is hypothesized that carbon nanotubes, due to their unique cylindrical shape, (allowing for extremely high electron mobility and density) are more efficient capacitors than graphene. The independent variable is the type of capacitor (graphene or carbon nanotube). The dependent variable is storage capacity, measured in joules. First, 4 graphene and 4 carbon nanotube based capacitors were made with aluminum plates and glass substrate. A digital multimeter measured their capacitance. The data was converted to joules by charging the capacitors with a battery. Results indicate that the carbon nanotube capacitors have a slightly higher storage capacity than their graphene counterparts. Both capacitors also highly outperformed the control trial with no nanotechnology dielectric. It can be concluded that the inexpensive forms of nanotubes and graphene used can effectively act as dielectrics in capacitors. The implications for this study can be seen in various fields of electronics. With higher quality nanomaterials, electronic devices such as cell phones could be charged in a matter of seconds with capacitors. Similarly, since graphene and carbon nanotubes are solely made of carbon, they are completely biodegradable and do not harm the environment.

Word Count

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6034

Student Name(s):

Fair Category

Word Count

Abstract:

Thermoelectric generator modules, TEG, using the Seebeck Effect are being developed with increasing power conversion efficiencies. Traditional TEG's consist of Bi₂ and Te₃. It is known that thermoelectric materials have the capacity to generate electrical energy. That energy can be utilized for cogeneration, producing electrical power while heating water. A model solar concentrating system, comprised of a parabolic dish, TEG, and water heating system was investigated using inexpensive materials. Measurements were made to assess the value of this alternative method of power generation. The combined efficiencies of electric generation and water heating will surpass solar panels with respect to capturing solar energy. TEG modules were characterized by subjecting the modules to known temperature differences and measuring the output power and internal resistance or losses. A solar concentrator comprised of a 77 cm diameter, 43 cm focal length parabolic mirror, using a manual tracking mount, was used to concentrate solar radiation onto the TEG array. A water circulating system for cooling TEG's was used to provide the heat removal on the cold side to create the temperature difference and produce heated water. The heat energy was calculated with the flow rate and rise in temperature across the TEG cooling block. A 12 watt buck-boost DC-to-DC power converter was used to change the variable output voltage of the TEG to a constant 12 volts for running the circulating pump and providing external power. For solar irradiance of approximately 900 watts per square meter, efficiencies are estimated at 5% electrical and 50% thermal.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title: Analyzing the Effect of Deicers on Connecticut River Water
Quality

Student Name(s): J. Curtis

Fair Category

Word Count

Abstract:

The Aspetuck River is of Connecticut's cleanest rivers and is classified as AA, which means the water is designated as a safe drinking water supply, clean for recreational purposes, and a safe habitat for fish and other aquatic forms. The river, however, runs very close to Poverty Hollow Road for much of its course, and the primary response to snow on Connecticut roadways is deploying de-icers - namely CaCl₂. This raises a question: is de-icer runoff a significant enough problem to affect water quality, possibly even enough that the Aspetuck River does not comply with AA standards during the winter season? This could pose a threat to the environment as a large salt load would sink to the bottom of a pond, leading to a reduction of water circulation, loss of dissolved oxygen, and eventual mortality of bottom-dwellers. This study measured pH, turbidity, flow rate, dissolved oxygen, and spectrum throughout the winter via a Vernier LabQuest2 to ascertain whether or not de-icer runoff appears to be a significant problem. While data showed fluctuating conditions, ultimately, it did not show the river to breach AA conditions. Future tests could measure these same categories during early spring, when melting ice and snow carry more de-icers into the river.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

What if your own footsteps could power our world? The purpose of this project was to test if pressure on piezoelectric crystals would increase voltage output. I was inspired by the company PaveGen's implementation of piezoelectricity. In effort to provide clean energy "one step at a time", PaveGen invented recyclable slabs that converted the kinetic energy of feet into electricity, and stored this energy in a battery for future use. Despite being a great step towards clean energy, they do not harness the entire amount of pressure from the footstep – just the amount of footsteps. From this limitation, I discerned the need to fabricate a pressure-sensitive technology. As the employed pressure upon the slabs increases, more electricity can be harnessed. Five pressures were exerted on piezoelectric crystals and voltage changes at 100, 300, and 500 Pa amounted to averages of 6533.33, 9753.33, and 13856.67 Volts, respectively. The data supports that applied pressure on piezoelectric crystals increases voltage output, strongly confirming the initial hypothesis. This research possesses the potential for mass implementation due to the crystal's ability to produce electricity solely from applied pressure. These crystal slabs can easily be placed on airplane runways, train tracks, bridges, and any other areas where pressure is excessive, serving as an alternate energy source. By installing these pressure-sensitive slabs in strategic areas, we will make great strides in the effort to solve the world's current energy concerns while introducing a reliable, renewable source of energy in places we have never even considered feasible.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

Essential tremors are one of the most common diagnosed movement disorders in the neurological science community. The tremors, also known as action tremors, are characterized by an increased in oscillatory motion as the patient moves to use the hand to pick up and/or manipulate an object. I have designed a brace that can combat the essential tremors by applying a dampening and resisting force to the tremors using dilatant, shear-thickening, fluids. This experiment served to prove the concepts behind this brace. Shear-thickening fluids are Non-Newtonian fluids, meaning that have a non-linear viscometric responses to shear stresses. In my experiment, the cornstarch-glycerol system had a positive correlation to the shear stress, increasing in viscosity as the shear stress increased. This increase provides resistance to a rotor in the center of the brace that then, by transitive properties, resists the torsional motion in the wrist and thus the tremor. SolidWorks 2007 was used to engineer the brace in preparations to manufacture through injection molding.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Solar Water Disinfection in Plastic Containers: Optimizing Reflectors, TiO₂ Photocatalysis, and UV Light Exposure

Student Name(s): E. Dexheimer

Fair Category

Abstract:

Worldwide, the lack of clean water is still a major problem that threatens millions of lives, and a simple but cheap process is greatly needed. The purpose of this study was to improve the disinfection of water using TiO₂-coated plastic containers under UV light compared to plastic containers without coatings. Due to UV photocatalysis, the coatings can result in an increase of eliminating pathogenic organisms. Multiple configurations were placed in either sunlight or artificial light, and the container shape and coatings applied were varied. The survival percentage coefficients by representing data as a logarithmic function of UVA dose reveal a ratio of 6.197 to 1 for nanoparticle TiO₂ to untreated containers respectively. In addition, SODIS has been further optimized using flat dishes instead of traditional bottles. Flat dishes can reduced time needed by more than half, and flat containers had on average one-seventh the survival percentage even with less UVA dose than bottles and both using high-efficiency reflectors. The 48 hour blackroom tests also revealed that TiO₂ can reduce the colony regrowth difference by four to ten times in bottles, and by 100 times in flat containers. The time and UV dose was recorded to measure these configurations against minimum industry standards of 6 hours and 555 W*hr/m² respectively. Ultimately, the object of these experiments has been to compare various setups, a total of 59 distinct configurations, under similar conditions and to provide insight on how to optimize coating surface area while minimizing diffraction.

Word Count

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4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The Engineering object of this project is to construct an underground condenser that can produce predictable amounts of water. Due to the higher heat capacity of soil relative to air, seasonal changes in soil temperature in the ground are much less than and lag significantly behind seasonal changes in air temperature. The condenser is a helical copper coil, which is an effective option for heat transfer because of the high ratio of heat transfer area to occupied space. The condensate will be pumped out of the ground using an airlift pump because of simplicity of design, low maintenance, and efficiency. The project will cover the heat transfer coefficient of the laminar flow inside the condenser, to verify that that it is operating at optimum efficiency. The condenser is predicted to have the ability to condense 1.06 liters per hour. The condenser will operate at varying degrees depending on atmospheric and geothermal conditions. The airlift pump had a calculated output of 9.58 liters per min using the Ingersoll-rand equation which gives the necessary input, in ft³/min and psi, for the maximum output efficiency. The experimental output of the pump was 9.36 with a standard deviation of 0.76, the correlation between the output of the airlift pump and the calculation demonstrate that the airlift pump is working to calculated output efficiency. The application options of the project are discussed such as, agriculture irrigation needs, for household water usage, and as a geothermal heating ventilating and air conditioning (HVAC) system.

Special Categories Selected by Student:

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6040

Student Name(s):

Fair Category

Word Count

Abstract:

As traditional battery designs become increasingly incapable of meeting device energy storage requirements, researchers are looking to “super-capacitors” as the next generation of energy storage devices. Super-capacitors combine the best properties of galvanic cells and traditional capacitors. Their high storage capacity, short times required to charge/discharge, and durability through repeated charge cycles makes super-capacitors attractive replacements for today’s batteries. In this research, a method has been designed by which a solar sensitized super capacitor can be fabricated by combining advancements in both electrostatics and in solar energy generation. By coating the two single-wall carbon-nanotube based electrodes with rubrene and perlyene-based organic semiconductors that together form a heterojunction solar cell, a device has been created that can generate up 1 V of stored electrical energy in 30 seconds from sun source illumination. The experimental super-capacitor design also allows for direct charging via an applied voltage. Fast-scanning rate cyclic voltammetry (FSRCV) and galvanic constant current charging-discharging was performed, using a scanning rate of 20 V/s and a constant current of 20 mA for each respective procedure. Analysis of these evaluations demonstrates that the capacitor has an ESR of 62.5 Ω , a capacitance of 15.48 Farads, and a specific capacitance of 30.34 F/g. This performance places the capacitor amongst the best in literature. Along with its other unique properties—the solar charging capabilities and its lightweight, durable, thin and flexible structure among them—the as fabricated super-capacitor represents a major breakthrough in energy storage technology.

Special Categories Selected by Student:

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3. This project was conducted at a Registered Research Institution. Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment was to test how temperature, pressure, and coolant type affect the tensile strength of extruded high density polyethylene. Extruded high density polyethylene is often used to make bottles, toys, automobile parts, and cutting boards. My hypothesis was, "If the tensile strength of high density polyethylene is increased by increasing crystallinity, then increasing extrusion pressure, decreasing temperature, and decreasing cooling rate will result in stronger polyethylene". I tested 27 samples in the Materials Lab at CCSU. All were extruded using a Tinius Olsen Extrusion Plastometer. One third of the samples were heated to 190° C, another third to 250° C, and the last third to 350° C. A third were extruded into a graduated cylinder of water, a third in ethylene glycol/water mix, and the rest were air cooled. One third had 2.16 kg of weight on top, giving it 2.90 Mpa of pressure. One third had 11.5 kg of weight, and 15.45 Mpa of pressure. The last third had 21.6 kg of weight, and 29.02 Mpa of pressure. Then they were all tested on an Instron Tensile Strength Tester. From this experiment, I could conclude that the sample extruded in the lowest temperature and lowest weight and then air cooled was the strongest. This did not support my original hypothesis, but shows that the slower the polyethylene is extruded, the more it crystallizes, and the stronger it is.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6042

Student Name(s):

Fair Category

Word Count

Abstract:

This study examined the influence of mathematical chaos on habitable planet formation. A computer program to numerically simulate non-relativistic n-body gravitational interactions using a Runge-Kutta algorithm was written and run to generate data from various starting conditions representing star systems of different types. A second script was used to quantify the degree of chaos in the systems via the Lyapunov exponent. Then, another piece of code was used to calculate the habitable zone of the system and determine the portion of time planets spend in it. Finally, the data was analyzed to determine any correlation between degree of chaos and likelihood of planets hospitable to Earth-like life forming. Regression models with several nonlinear terms were generated, and additionally clustering algorithms were run on the data to identify any classes of systems with similar degrees of chaos and habitable planet presence. The study helps to identify the conditions needed for habitable planets, and thus life, to form. In doing so, it suggests where and how searches for extrasolar hospitable planets should be conducted. Additionally, it provides an estimate as to the scarcity of habitable planets and the likelihood that extraterrestrial life exists.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6043

Student Name(s):

Fair Category

Word Count

Abstract:

Understanding the cosmos and the subatomic reaches of our universe has become one of the most crucial and quickly developing scientific fields. The unification of Einstein's General Relativity with quantum mechanics is fundamental in achieving the next major technological advancements, such as super computers based on quantum computing, instantaneous communication, energy harvesters, and teleportation. While string theory has attempted this unification, its requirements of supersymmetry and higher dimensions are as of yet unobserved and computationally impractical. Recently, the theory of Causal Dynamical Triangulation (CDT) has provided a simplified numerical approach to both Einstein's field equations and quantum mechanics. CDT constructs spacetime from building blocks known as simplices and enforces causality by pointing the time edges of the simplices in the direction in which time advances. CDT is remarkable in its ability to transition from discrete space-time at the quantum level to the continuous spacetime described in general relativity by adjusting the triangulation granularity. Because CDT is a computational approach, it is able to solve Einstein's field equations under any geometry without symmetry constraints. Thus, CDT is the most promising theory in the unification of general relativity and quantum mechanics. In this project, we develop new efficient algorithms for CDT implementation and create a complete simulation software for CDT and improve upon existing implementation efficiency. Computational solutions to Einstein's General Relativity and visualization of quantum electrodynamics through our custom software will prove an invaluable tool for research and the application of quantum technology.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

The purpose of this project was to determine the durability of a diabetic glucose meter, to see if it would be possible to place it in the sole of a sneaker. This would make it easier for diabetics to measure blood sugar while exercising, and furthermore would better control their blood sugars. This would prevent diabetics from getting low blood sugars and passing out. This experiment explored the affects pressure had on the glucose meter. In the experiment, the meter was placed in the sole of a shoe, and a contraption was built around it to facilitate the use of the LoggerPro Newton Tester. I hypothesized the meter would be able to withstand enough force not to break. However, the maximum amount of force able to be placed on the meter using the equipment available was 12.057 Newtons, which is equivalent to 2.7 pounds. The meter was easily able to withstand this much force. In order to determine if a meter would be able to withstand the force of a human, more research would have to be done to see how much force there is at different areas of the foot, to see if this is a realistic idea. However the experiment worked very well with 2.7 pounds of force. I also tried putting the shoe on, and running around with it. The meter was able to withstand the force of my body, therefore I believe it would be able to withstand the force of most.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Optimizing Hydrogen Production From a Piezo-electrochemical Water-Splitting Mechanism with Low-Cost Synthesis of ZnO and

Student Name(s): M. Cirino

Fair Category

Word Count

Abstract:

The current energy crisis has sparked many scientists' interest in alternative energy sources, specifically the supplementation of a hydrogen economy that is reliant on fuel-cell technology. Recently, a new water-splitting mechanism called the "Piezo-electrochemical" (PZEC) effect was found to be capable of generating hydrogen by submerging piezoelectric fibers in water and applying an oscillating force. This way, hydrogen can be created from water-splitting using otherwise wasteful vibrational movements found in the environment. Unfortunately, current methods of generating hydrogen through the PZEC effect, using BaTiO₃ dendrites as the piezo material, are highly inefficient. It is predicted that hydrogen production would be significantly increased by selecting chemically stable piezo materials with large aspect ratios and surface areas, allowing for greater electrical charge. This research provides an optimized, low-cost route for zero-emission hydrogen production through the PZEC effect by applying ultrasonic vibrations to ZnO interwoven microfibers and BiFeO₃ nanodendrites. ZnO microfibers were synthesized atop an organic eggshell membrane biotemplate. These microfibers and BiFeO₃ nanodendrites were characterized with SEM/EDS analysis, and separately placed in di-water. An ultrasonic cleaner was used to apply mechanical force to the piezo materials, and H₂-production was measured using GC-TCD. Vibration of ZnO biomorphic interwoven microfibers (0.003g/ml di-water) led to a H₂-production rate of 5.46×10^{-1} ppm/s, which is 102 greater than literature using BaTiO₃ dendrites. The H₂-concentration (% percentage of sample) was found to be, on average, 0.139%. Sonication of BiFeO₃-nanodendrites produced a H₂-production rate of 3.34×10^{-1} ppm/s, which is attributed to charge cancellations resulting from the dendrite morphology.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Momentum Powered Magnetic Generator (MPMG) For Electric Vehicle (EV) Battery Range Applications

Student Name(s): A. Doelp

Fair Category

Word Count

Abstract:

Limited battery range for electric vehicles (EVs) is a universal problem when EVs are applying the friction brake system instead of the regenerative braking system. This research investigates the enhancement of battery range of EVs, using a Momentum Powered Magnetic Generator (MPMG). The loss in energy from the friction braking adds up and the range of the battery decreases. The MPMG is proposed to make up for the lost energy from the friction brakes. The MPMG design used in this research is a long tube that runs along either side of the length of the vehicle. It is wrapped with wire and has a cylindrical neodymium magnet that goes inside of the tube. The amount of wraps as well as the gauge of wire is being optimized in order to get minimal resistance and ultimately maximum electrical power. To date, the small-scale system produces 8.55 volts and 38.4mA at 1500 wraps of 25 AWG magnet wire per inch. In principle, acceleration of the EV will cause the magnet to move forward and for each pass of the magnet through the coil, the MPMG produces electricity, which recharges the onboard battery. Calculations are being performed for full-scale applications for prototype testing.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Num Title:

Student Name(s):

Fair Category

Abstract:

The US commercial casino industry has been on a growth path for a third year in succession, and gamblers are also increasingly investing in gambling, discounting it as a game of luck. The objective of this study was to evaluate if luck or scientific principles and mathematical techniques drive profitability of gambling companies. The hypothesis of the study was that mathematically derived odds of winning are negligible in most casino games and lotteries. Gambling companies capitalize on gambling concepts as gambler's fallacy and randomness and independence of outcomes. The research was designed on two scenario-based experiments related to American Roulette. Using a Roulette Wheel, a game was simulated based on two strategies - a low risk-low return strategy with a high probability of winning, and a high risk-high return strategy with a lower probability of winning based on gaming assumptions and bidding rules. Thereafter, an excel-based model was created to compute the balance amount of money after each bet. The outcomes in both scenarios resulted in a net loss of money by the gambler i.e. 17% in the first experiment and 37% in the second with the actual win rate of 35% and 5% respectively. In both cases, the house edge, ranging between 5.26%-7.89%, kept gradually impacting the gambler's balance because it was deducted on both winning and losing. The hypothesis was thus proven correct as the gambler lost money in the long run. Gambling outcomes are governed by scientifically derived mathematical principles and cannot change their odds of winning.

Word Count

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Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6051

Student Name(s):

Fair Category

Word Count

Abstract:

Fuel cells are a cutting-edge technology applied for storage of energy from renewable sources, such as solar cells. The efficiency of the water-splitting fuel cell depends on the effectiveness of the catalyst that lowers the activation energy in this process. This project describes the search for an effective catalyst. Different catalysts including cobalt, silver, rhodium, zinc, and palladium were tested by coating the nickel anode in each electrochemical cell by addition of each nitrate salt to phosphate buffer while applying ~27v current to the cell. Thus the water-splitting reactions could be increased per volt passed through the cell. Following the assembly of the electrochemical cell as described by Dr. Nocera (Science publication 2008), the cell's effectiveness was first evaluated. The 58% baseline efficiency matched that previously recorded. Attempts to coat the anode with palladium, zinc, or rhodium using their corresponding nitrate salts were not successful, whereas no coating was observed. However, successful coating over the nickel anode was obtained with cobalt nitrate or silver nitrate. The cobalt catalyst has indicated 85% efficiency, while silver nitrate resulted with 90% efficiency. Nevertheless, the lack of adhesion and the high price of silver or its nitrate make it inferior to cobalt. To address these drawbacks, the formation of a new catalyst from the combination of silver and cobalt resulted in a well-coated, well-adhered anode as well as cathode. Interestingly, this combination of catalysts resulted in 97% efficiency, which exceeds the catalytic power of cobalt or silver in their pure form.

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4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Mechanical arms in modern robotics are used to move items and conduct simple industrial jobs. Limited research has been conducted into the implication of a mechanical arm to assist vision. What is needed is the construction of a new mechanical arm designed to view an area or objects out of the range of sight. The experimental goal of this project is to create a mechanical arm that will allow the operator to view object below via camcorder streaming to a computer. The operator will remain above and parallel to the object they are viewing while the mechanical arm will be positioned perpendicular to the ground. The camera is connected to computer by universal serial bus. The created arm has the capability to extend to approximately 71 centimeters. Data shows that the amount of string released that produces the optimal viewing angle is at 30 centimeters. At 30 centimeters of string released, the arm has a radius of approximately 70 centimeters. Success of this project will allow the operator to view objects out of the normal range of vision.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6054

Student Name(s):

Fair Category

Word Count

Abstract:

In recent years, clean energy has become of increasing concern, given the evidence of global climate change as well as the rising price of fossil fuels. Of perspective clean energy technology, Photovoltaic (PV) technology has shown particular promise in that it has reached the point where it can be cost effectively implemented in domestic settings. However, for a prospective PV consumer to invest in this technology, knowledge of the amount of energy which the device is likely to produce is required. In order to address this problem, a program was developed to predict future solar irradiance values in locations across the continental United States, and from these, to calculate future PV system outputs. Monthly average solar irradiance and temperature values from 1991 to 2010 were gathered from the National Renewable Energy Laboratory Database (NRELD) which contains data from monitoring stations across the country. This information was programmatically reduced to 200 stations, based on the variation in irradiance. An Artificial Neural Network was then designed and trained using this data set. Various types and combinations of networks were experimented with in order to minimize error of the network, including ensemble averaging. The values were then predicted forward, and compared against values from 2011 through present in order to confirm their reliability. A program was then created which, given the user's location, the area of the PV system, and the model of PV panel used, was able to produce expected future values for the power output of the PV system.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Identifying the Pigmentation of Tattoo Ink Using Raman Spectroscopy

Student Name(s): J. Yetman

Fair Category

Abstract:

Tattoos are performed by injecting ink under the skin. Ink pigmentation and durability varies by color and brand. Weak inks cause smudging, fading, and the need for touch-ups. Durability is an important criteria for inks. The study of durability is needed in order to produce better long lasting inks. The number of people getting tattoos is increasing and people should know what how long and will their tattoo fade. Also people should be aware how long their tattoo will last and the difficulties in removing the ink from the epidermis. In order to achieve data about pigmentation, Raman Spectroscopy was used to test a variety of tattoo ink colors and to see which color was the most pigmented. From the Raman instrument, line graphs were gained. From the graphs, data about the tattoo's ink pigmentation and which color has the strongest pigmentation was gathered. With this data and information about the removal process of each ink color, the strongest and weakest ink pigments colors will be determined. This knowledge can be used to rethink the color of the tattoo ink a person decides to inject into their skin. People will be able to know how long lasting one color is over another and also serve as a reminder to people about how tattoo ink is durable. Later on these observations and data can be used to determine how weak colored inks pigmentation and durability with can be improved to create more satisfied tattoo customers.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

As the price of clover honey is rising, companies are looking for ways to cut production costs and increase profit margins. One option is for companies to adulterate the clover honey with cheaper substitutes, such as high fructose corn syrup (HFCS), but still market their product as pure clover honey. The objective of this research was to show that Raman Spectroscopy can be used to determine the presence of corn syrup adulteration in honey samples by analyzing the characteristic vibrational peaks of the two materials using multi-variate methods. Six commercial honey samples produced in the United States were obtained for this study. Twenty-four samples of honey spiked with corn syrup (0, 9, 17, and 29% corn syrup) were examined by Raman Spectroscopy using a 785 nm laser fiber optic probe. A Partial Least Squares (PLS1) model was created using the collected spectra. A separate validation set confirmed the model's ability to accurately predict the concentration of HFCS in commercial clover honey products.

Word Count

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CSEF Official Abstract and Certification

Fair Category

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Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

Every year, the population of fish in Long Island Sound decreases and about 180 square miles of Western Long Island Sound become hypoxic. Both of these issues occur because of the tons of pollutants released into the waterways. When stormwater runs off into drainage systems from impervious surfaces, such as driveways, parking lots, and roofs, it can pick up pollutants and bring them into the drainage system. This project focused on determining if rain gardens, one type of low-impact development drainage system, can reduce the level of pollutants in the stormwater runoff. The hypothesis was that the rain gardens will remove significant amounts of total phosphorus, total kjeldahl nitrogen, and total suspended solids from the runoff water. The process to complete this project involved collecting samples from the rain gardens at inflow and outflow points to see if there was a significant difference in the amount of pollutants before the storm water was filtered through the rain garden and after it was filtered through the rain garden. Samples were tested and conclusions were drawn from the data. To date, the rain gardens tested have shown significant reductions in total kjeldahl nitrogen, total phosphorus, and total suspended solids. If the rain gardens continue to prove effective at removing pollutants, they will hold great promise for cleaning up our water resources so that we can keep our bodies of water, like Long Island Sound, beautiful for years to come.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Abstract:

Over a billion people living in developing communities cannot access electricity. Additionally, 2.7 billion people residing in developing communities rely on wood and coal for energy needs. These communities could greatly benefit from renewable energy. However, importing renewable energy is extremely difficult and expensive. By utilizing a new form of wind power called a windbelt, this project aims to design a renewable energy generator that could be reproduced in developing communities using repurposed and recycled materials. A windbelt consists of an aeroelastic ribbon that vibrates in the wind, moving magnets by a copper coil to generate electricity. The recycled windbelt's design features a packing tape ribbon suspended by two blocks of a rigid material. The ribbon is attached to gears from a crank flashlight or crank radio, which provides a generator and reliable electrical storage system. The design features a cover that protects the generator from weather. Two types of small crank devices were tested on their ability to power a lighting system when used in the recycled windbelt design. Testing occurred at wind speeds of 2, 6 and 8 mph, which are average wind speeds in many developing areas. The recycled windbelt design could effectively power a lighting system in both testing situations. The design lends itself to scaling and is very simple to construct, making it viable for application in developing communities. For distribution, an instruction manual is used that consists of logos and diagrams to represent materials and procedure for construction.

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Title:

Student Name(s):

Fair Category

Abstract:

Coronal mass ejections (CMEs) are bursts of mass, energy, and radiation from the Sun that can be extremely harmful to life on Earth. They can destroy valuable satellites, cause major power outages on Earth, harm astronauts in space, and disrupt television, cell phone, and GPS reception. Risks are further heightened due to our increased dependence on technology. In order to combat the potential dangers derived from CMEs, Dr. Roger Dube and I explored ways to predict, more precisely, when CMEs will hit Earth. The purpose of this experiment was to determine if there was a correlation between the speed of a CME and the effect of drag evidenced by exponent "n" of the specific power equation, $a=A(V_{CME}-V_{SW})^n$. My role was to determine the speed of CMEs (using data from the STEREO-A and STEREO-B satellites), to find the time of travel between the Sun and Earth (using proton flux data from the GOES satellites), to calculate acceleration and the corresponding exponent "n" in the power equation, and to identify correlations between the speed of each CME and its respective exponent value. The findings could help scientists more accurately predict when CMEs will hit Earth and therefore minimize any potential threats they pose to society.

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Student Name(s):

Fair Category

Abstract:

Isolated regions are plagued by lack of access to clean drinking water. Atmospheric Water generation is the process of cooling a substrate below the dew point to condense water. Condensed water is safe for drinking. In this research, an atmospheric water generator was constructed using copper substrates and a thermoelectric plate. 8, 40 square millimeter copper sheets were attached to a thermoelectric plate to lower their temperatures below the dew point. A total condensing surface area of 16 square centimeters was achieved. The optimal voltage and power duration of the thermoelectric plate was determined and a method of providing this energy using renewable resources was implemented. The thermoelectric condenser was housed in a bottle that was designed and prototyped using 3d modeling software and a 3d printer which was built for this research. The bottle serves to protect the condenser array and house the solar cells and a lead acid battery. 20, 3x6 inch solar cells were attached to the exterior of the bottle. They charged the lead acid battery which provides power to the thermoelectric plate and a small fan that is used to cool the hot end of the thermoelectric plate. Power was sent to the plate in pulses to conserve energy. This research was successful in running a thermoelectric plate with renewable energy sources to lower copper substrates below the dew point. To condense significant volumes of water, the copper fins must be coated with a polymer bilayer that was theorized but not synthesized in this research.

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Improving our ability to understand and forecast the atmosphere is vital as we move into an era where our climate is rapidly changing and extreme weather is becoming more common. Research will be conducted on how to improve forecasting major weather events by testing the accuracy of two multi-layer global dynamical models, and comparing them to one another to generate a forecast that is significantly more precise. The experiment will begin by using the specific parameters set for short range (24 hours), medium range (72 hours), and long-range (120 hours) time frames, in order to then be able to later analyze how the two models performed in each timeframe. To then show how each model handles different storm systems, textual data will be collected from each forecasting system. After extracting the data from both models, results will then be compared to current observations, and then calculated through percent error to get verification readings. The final results of this experiment has shown so far that between the two multi-layer global dynamical computer models, the Global Forecasting System (GFS) has handled the long range and short range with the most accuracy, and European Center for Medium-range Weather Forecasting (ECMWF) has handled the medium range with the most accuracy. This will allow meteorologists to determine which dynamical global computer model will perform best during certain time periods, particular geographical locations, and different barometric weather events. In addition, by blending the models together in different ways, the overall solution will be notably more accurate.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Synthesis and Microstructure Analysis of Nano-structured Graphene Monolayers and Examination of its Utility for Filtration

Student Name(s): A. Roychoudhury

Fair Category

Word Count

Abstract:

Graphene is a mono-layer of crystalline carbon, 1nm thick, with unique physical and chemical properties. The carbon atoms in graphene are bonded in a tightly woven hexagonal pattern with a cloud of electrons over it. Because of this structure, Graphene could effectively capture more unwanted chemicals than modern day filters, charcoal. For this project, graphene filters were formed and its properties measured and compared. Filter paper and charcoal were compared with graphene and functionalized Graphene. We synthesized Graphene by milling store-bought graphite with dry ice in a ball mill. Functionalized Graphene was made by etching Graphene with boiling nitric acid. Their structures were analyzed via Scanning electron microscope. The filtration capability was experimentally examined with coke, copper nitrate (arsenic analog), and saltwater. The possibility of separating light oils from an emulsion was also examined. The results were analyzed via visual cues, measuring salt concentrations in the filtrate by drying/weighing, and determining the pH. Our results showed that Graphene was a better filter than filter paper or charcoal when coke and salt water were filtered through them. Results for Cu-nitrate did not show higher filtration capability between graphene and filter paper/charcoal. The O₂ functionalized Graphene indicated comparable properties as Graphene. Our results shows promise that Graphene is a better option for desalination and water cleanup. It is cheaper, lighter, readily regenerable for a longer life than commercially available filters. Nevertheless, additional work has to be done to develop high integrity samples at low cost for repeatable, with high retention performance.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The objective of this project is to create a matrix based glove that allows for the input of a hand position to a computer program that can then output information to other devices like a robotic hand. Many modern recording devices such as infrared sensors have a limited area of recording. This device would eliminate that. This glove uses the completion of different circuits to send signals through the finger area of the glove and up to the wrist area for output. This design is being tested and refined with a single articulating pilot finger. This single finger lights up LEDs instead of being connected to a computer. Each lit LED represents a different angle at which the finger is bent. Eventually, joint measurement devices would be placed at all digital interphalangeal, proximal interphalangeal, and metacarpophalangeal joints. Along with the measurement devices, there would be a spring based force feedback system that adjusts spring tension based on environmental contact.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6066

Student Name(s):

Fair Category

Abstract:

The Weakly Interacting Massive Particle (WIMP) theory for dark matter predicts the production of gamma radiation from WIMP annihilation and decay. To examine the possibility of WIMP dark matter, gamma ray sources from M31 are partitioned from Fermi LAT with 5 years of clean and ultraclean cut-data in the 1-300 GeV range. The spectrum is well described by a power law, but the polar averaged radial density is a good fit with a line of sight integral of the Navarro-Frenk-White profile. This profile describes the spatial properties of M31's gamma ray halo.

Word Count

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6067

Student Name(s):

Fair Category

Word Count

Abstract:

A reoccurring issue in deep sea nautical submarines is the loss of anechoic tiles from the hulls. In a majority of naval submarines, especially the COLLINS class, the pressure of the deep sea causes the anechoic tiles to lose adhesion and form disbonds from the hull. This requires regular maintenance of the tiles to ensure the stealth capabilities of the submarines costing a substantial amount of money. The experimentation was then prompted to find a probable solution to alleviate this process and create a cost-efficient pattern. The suggested solution to the disbonds in the anechoic tiles is to have a multilayered zip-fastening design. In this pattern two layers of interlocking tiles will be connected while offset to form a network across the entirety of the hull. This in theory will allow for the tiles resist the forces imparted by the sea and utilize the network to minimize the losses. The testing of the experimental design is done by comparing with a control pattern of a single layer anechoic tile pattern. The two designs were placed in a simulated ocean environment, to an experimental depth of 145 meters using Bernoulli's equations, which allows for the constant monitoring of the tiles disbond thickness. The resulting data was then compared using linear trends to find the disbond versus time. The results show that the experimental pattern did not prevent the disbonds within the tiles.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

There have been many instances in the past when an unexpected accident has occurred that has caused individuals to bleed out. Now imagine how convenient it would be if people could carry around an item that could seal blood; an alternative bandage. This experiment was performed in order to see if UV curing could be a convenient adhesive that could seal blood. Using UV glue, a UV flashlight, and simulated blood I began testing how much pressure the UV glue could suppress. I recorded this by observing how long it took the UV glue to stop the simulated blood to come out of a puncture in a water bottle. I recorded the amount of blood lost and how long it took before the UV glue stopped the bleeding. I repeated this process while increasing the amount of blood by a constant amount each time. I continued this until it got to a point where the UV glue was no longer strong enough to stop the leaking of the blood. Once I got to 350ml, the glue took too long to stop the bleeding and therefore I concluded UV Curing could not handle injuries that have large amounts of bleeding. Possibly with more testing, and modifications to UV glue, UV curing can be a more legitimate way of stopping blood.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The overall purpose of this experiment was to determine the effect that fertilizer posed on the dissolved oxygen levels in pond water. Furthermore, this had to be done in a thorough and constructive manner, so for my research project I chose to experiment with plant food fertilizer droplets inside of samples of pond water. Another reason I chose to complete the experiment in this way is because it is realistic in that pond water can actually be exposed to fertilizer in real-life situations. During the experimental phase of the project, I placed different amounts of plant-food droplets inside of the samples of pond water that had already had their dissolved oxygen levels checked prior to experimentation. After awhile of mixing and observation, I then checked the dissolved oxygen levels of the pond water after it had been exposed to the fertilizer. The data that was available after these procedures had been done, proved my hypothesis incorrect because the more fertilizer that was placed in the samples, the higher levels of the dissolved oxygen. Graphs and tables were created to represent the concluded data and showed a trend between the two variables that was explained before. Therefore, I feel that the experiment thoroughly proved that my hypothesis was incorrect and that the effect of fertilizer on pond water was successfully determined. In each of the trials processed, the results were similar in that the direct correlation between the raise in amount of fertilizer, there was a raise in dissolved oxygen level.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

In a little more than a century, roughly eighty-five percent of our current energy sources will have been exhausted. Clearly, it is vital that an alternative energy source be found that can produce as much electricity as conventional methods do today, and which is reliable, renewable, and safe for the environment. My experiment tests the effects of temperature change on a hydrogen fuel cell. My hypothesis states that “if the temperature of water in a hydrogen fuel cell is increased, then the electricity production will increase”. To execute my experiment, I created a basic hydrogen fuel cell, which breaks water (H₂O) into hydrogen and oxygen via electrolysis. After three minutes, I stopped this process, and recorded the electric output generated by the fuel cell. When the electrolysis stopped, the hydrogen recombined with the oxygen, thereby creating an electric current from the moving electrons inside both the hydrogen and oxygen atoms. I experimented with room, cold, and hot water temperatures (23c, 2c, 100c, respectively). After three trials at each temperature, the average electricity output of the room temperature water was .23v, .15v for the cold, and .23v for the hot water. My results show that the electricity output increases non-linearly with the increase in temperature, thereby confirming my hypothesis. This discovery means that the best place to implement hydrogen fuel cells is away from the cold. Depending upon the correct implementation, hydrogen fuel cells, a green technology, could be the answer to meeting present, and future, global energy demands.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

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Num

Title:

Student Name(s):

Fair Category

Abstract:

Caenorhabditis elegans (C. elegans) have been used as simple organisms that model general biological processes due to the thorough knowledge scientists have of their bodies. Therefore, many variables have been tested on C. elegans and their behavior, including their ability to sense and ultimately move towards food in a process referred to as chemotaxis. This leads to the question of whether their speed of movement is affected by the availability of nutrients. Therefore, when the nutrient availability becomes the variable, the C. elegans' rate of locomotion may change with different circumstances affecting their chemotaxis. By testing the effect that different distances of food, specifically Escherichia coli (E. coli), had on the worms' behavior, it was found that the worms that had to travel the furthest to their food moved the fastest once they reached the food. The worms with food easily accessible were found to move the slowest, if at all. In the absence of food, the worms clearly stopped moving as well. This was observed after a period of 24 hours. After 48 hours, all worms were observed to have decreased significantly in rate of locomotion.

Word Count

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CSEF Official Abstract and Certification

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Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Abstract:

Due to increased pressure on fuel economy, automotive design must be manipulated to achieve maximum efficiency of everyday commuter vehicles. At highway speeds, the largest force acting against a vehicle is the force of air; therefore it is also the largest obstacle to overcome when increasing the efficiency of a car during long distance or high-speed travel. The only way to overcome this force is by reducing drag to its minimum. However, accepted automobile design inhibits the reduction of drag and therefore must be challenged. If maximum fuel efficiency is to be achieved, then non-traditional design methods must be used to reduce drag to a relative minimum. Autocad is used to model automobile designs, wherein they are tested using Computational Fluid Dynamics. Using a half-model of the vehicle in a rectangular prism, a simulated wind tunnel can be generated and pressure zones, total force, coefficient of drag can be calculated. A drag coefficient of .22 or under has been set as the goal, as it is the current lowest drag coefficient seen in a production car. By focusing the design of a car around reducing drag, the vehicle's fuel efficiency can be maximized at high speeds or across long distances.

Word Count

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6074

Student Name(s):

Fair Category

Word Count

Abstract:

Tidal power is a predictable, clean, renewable energy resource with a significant capacity factor. Problems with tidal power systems including harm to marine life, restricted access to open water, and damage by floating debris, have hindered their adoption and implementation. Harnessing the tidal energy of ocean water infiltrating beaches is a viable solution to these issues. This solution captures energy from changes in tides below the beachfront surface, through a variation of the tidal barrage from ocean water infiltrating coastal beaches. This research tests the viability of the system through a three step process: 1) Calculate and Test Water Infiltration/Seepage, 2) Determine Electricity Production, and 3) Build and Test Working Prototype. Seepage and optimal seepage region size were calculated using Darcy's law, which concludes the seepage area can have 5x less volume than the storage area in coarse sand, 10m distance from ocean. The experiments conclude seepage follows local tides at a 1/4" delay in coarse sand (~8.5ft tide) and ~3.5-4" (10m distance, ~6ft tide) in fine/uniform sand. In part two, electricity production was calculated using the formula $E = \frac{1}{2} A \rho g h^2$. A 1000m³ water storage region would generate 16kwh, 26.66kwh and 53.33kwh per day at 3m, 5m and 10m tides respectively. In part 3, a working prototype with a 32-gallon storage tank was tested 10m from the ocean in a fine/uniform sand beach. Electricity output was 0.315 watts (predicted 0.34 watts) at a 20" head height, confirming electricity production calculations and proving adequate seepage in low hydraulic conductivity beaches.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

Inexpensive and reliable, three phase induction machines comprise 69% of US industrial energy consumption. Aluminum rotor bars are commonly used to reduce initial costs, however have high I²R losses, reducing efficiency. The recent financial crisis has renewed interest in improving efficiency, as a 1% increase would save the United States over \$1.4 billion dollars yearly. This has led to research in copper rotor bars, which could potentially reduce rotor resistance by 60%. However, certain high performance situations, such as electrical cars, demand even higher efficiencies. While permanent magnet synchronous motors are typically used in these cases, induction motors would eliminate the high cost and political repercussions associated with rare earth magnets. In such situations, silver, the most conductive naturally occurring metal, may be justifiable as a rotor bar material. Simulations of a 1.5HP, 230V @ 4.1A three phase motor with aluminum, copper, and silver rotor bars were run using FEMM, a 2D finite element method magnetic program, to obtain theoretical I²R losses. Copper and silver were respectively found to have a 33.032% and 37.638% reduction in I²R losses compared to aluminum. As of 2/12/14, aluminum, copper, and silver retained a market value of \$0.80, \$3.20, and \$295. While a significant cost increase, silver rotor based induction motors may be justifiable in extreme situations such as military and aerospace applications.

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

3D printing is predominantly known for printing low volume plastic parts that need to meet specific parameters. 3D printing is preferable in many applications to injection molding due to the fact that it makes specific parts without the many difficulties of molds. By incorporating concrete into this process, 3D printing will increase efficiency and lower the cost to produce the necessities of everyday life. This experiment will specifically be testing the best mixture of concrete to be extruded, for the most effective extrusion, dry time and strength to weight ratio. Also the method of extrusion will be exchanged from the traditional method to “dripping”/extruding it, will hopefully improve strength and practicality on a larger scale. To test this, an apparatus will be constructed to make test blocks that will be tested against concrete that has been poured. Testing will involve a Slump test, Tensile test and a Flexural strength test to determine which of the best mixtures is to use. These future 3D printing applications will help local economies of emerging countries. This system will be able to create anything from household appliances to foundations of a house. A 3D printer extruding concrete will give an engineer/designer freedoms and liberties that traditional pouring concrete would not allow and maybe be able to be powered by solar and wind power.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of my project was to determine how color, concentration, and distance affect conductivity of Gatorade. I used a multi-meter to test seven different colors of Gatorade to see if color was a factor. After that, I diluted the three most conductive Gatorades by increments of ten percent. Using the same three Gatorades, I moved the distance of electrodes by two centimeters, and read the voltage for each distance change. Of the Gatorades tested for color, the white Cherry Glacier (Frost) was the most conductive at 41.3mV. The three Gatorades tested for concentration and distance were Glacier Cherry (Frost), Lemon-Lime, and Strawberry Watermelon. The results showed that the more diluted the Gatorade was the less conductive it is. Also, the further the distance the electrodes were apart the less conductive it was. Also I tested if the conductivity of electrolytes had an effect on people's pulse rates while exercising. I recorded the pulse rates of 60 different people before and after exercise. Trial one was with water and trial two was with Gatorade. The pulse rate for both water and Gatorade after exercise did not show a significant difference with Gatorade at 126.5 bpm and water at 121.5 bpm. My final conclusion was that it is not necessary to drink Gatorade for normal exercise.

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CSEF Official Abstract and Certification

Fair Category

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Ammonia-nitrogen (NH₄⁺ and NH₃) has a variety of important applications. When discharged through wastewater effluent, however, ammonia-nitrogen causes a multitude of environmental problems. The objective of this research is to design, evaluate, and model a novel process and apparatus for wastewater ammonia-nitrogen removal and recovery. In a newly-designed dual-chamber apparatus, increased temperature drives the following net reactions: (#1) NH₄⁺(aq) → NH₃(aq) + H⁺(aq), (#2) NH₃(aq) → NH₃(g). Net reaction #2 is accelerated by depressurization. Together, this constitutes the conversion of aqueous wastewater ammonia-nitrogen to gaseous ammonia-nitrogen, which can be drawn out and reused. The apparatus was tested with synthetic wastewater solutions of pH 10 at varying concentrations. For example, in a 2-hour single round of apparatus operation (final temperature 65°C), the 30mg/L system reached equilibrium, with 26.51% of ammonia-nitrogen removed/recovered. The experimental results were generalized mathematically for all initial temperature, final temperature, ammonia-nitrogen concentration, and pH combinations. Both experimentally and mathematically, it was observed that virtually any desired removal/recovery percentage (i.e. >99%) could be achieved through multiple rounds of operation if the gaseous ammonia product is removed from the system between rounds. In comparison to existing removal and recovery techniques, this new process is advantageous in that it: (1) produces unbonded, uncontaminated ammonia, (2) does not require chemical absorption for recovery, (3) does not depend on environmental/biological factors, and (4) utilizes a simpler and concurrent mechanism. Overall, the process provides the dual environmental benefits of economically incentivized wastewater purification and a viable alternative to the energy-intensive conventional ammonia synthesis process.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6079

Student Name(s):

Fair Category

Word Count

Abstract:

Today, capacitors are known for their quick charging and low storage capacity, commonly used in things like camera flashes and microelectronics. Adversely, batteries have a larger storage capacity but commonly have very slow charging rates inhibiting their capabilities. Proposed Double Layer Graphene Super Capacitors could have fast charging speeds as well as much larger storage. These characteristics will give them future applications in car batteries, where the 12-18 hour charging times are a big issue, and could replace current capacitors for their larger energy densities. Lightscribe media discs, covered in a thin coating of graphite/ graphene oxide, were used in a standard Lightscribe enabled drive for direct laser reduction to graphene. The graphene films were then removed from the discs, cut into 2cm squares and made into capacitors by placing polyvinyl alcohol in between two squares of graphene. They were then tested for voltage, charge time, and energy density. The Graphene Capacitor displayed an average farad rating of 42.12 nF, giving a total energy density of approximately 235.3 nF/g. After charging for 45seconds using a 9v battery the capacitor steadied out at approximately a 2.41 V rating and slowly lowered to approximately 1v where it remained stable. A Graphene super capacitor was constructed and demonstrated that it could hold a charge. This indicates that graphene super capacitors are viable replacements for modern capacitors and some batteries.

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CSEF Official Abstract and Certification

Fair Category

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Num

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Student Name(s):

Fair Category

Abstract:

I have chosen this topic because around the world today many people have celiac disease. I found that celiac disease. I found that the condition is caused by an abnormal immune response nutrient from being absorbed. Symptoms of celiac disease include diarrhea, anemia, bone pain, etc. but celiac disease often has few or no symptoms. In part for that reason, only about 5 % to 10% of cases are diagnosed in the U.S. Choose 3 different types of flour and measure 1 cup of each flour into a small mixing bowl. Observe each flour and record it. Take a bowl and begin to add ½ cup to ¾ cup of water in the bowl with flour. Stir with a fork and then gradually it will become into a rough ball. Sprinkle some flour on the surface you are working at and into your hand, place the ball of flour/ dough and knead it for 5-7 min until it becomes smooth. repeat step 3-4 for the other two bowls of flour – be sure to knead the same amount of time

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Proj.
Num

Title: Solar Computing: Creating a cost-effective off-the-grid laptop for utilization in third world countries

Student Name(s): H. Lightman

Fair Category

Abstract:

This is an investigation into cost-effective, energy-efficient alternatives to computing. Current energy and wealth restrictions in developing areas limit access to modern technology, but a lower-cost solar powered alternative would be able to provide computing access where it is not currently available. The design process entailed the collection of a variety of low-cost components. The final list of parts marked a \$245, cost-effective initial design. The constructed computer is next assessed for energy efficiency through a scientific procedure that determines computer usage times via AC power versus solar power. The computer is discharged and then allowed to charge for a standard time via wall outlet or solar panel. Time taken for the charged computer to discharge is recorded to determine the difference in effectiveness of each charge. Preliminary results suggest a limited solar charging effectiveness. Yet, although charging via direct power outlet offers consistently more efficient charges, observations still suggest solar power to be a viable method of charging the device. The implications here suggest that the construction of an affordable energy-independent computer using commercial consumer parts is entirely feasible. There are areas in which further research can be done to lower cost and optimize production, and further exploration is needed to investigate other issues of technological accessibility in developing areas (i.e. internet connectivity). However, the investigation thus far suggests promising possibilities.

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

In the current “invisible fence” pet containment system, a pet will be shocked if it tries to exit the yard that is bounded by the fence, but it will also be shocked if it tries to reenter the yard after running through the system. So, my goal was to create an electric fence system that only shocks the dog when it exits the yard, and not if it tries to come back in. Upon looking into the design of the electric fence, I found that it works on a transmitter/receiver system – a transmitter is placed in a dry area like a garage, and its signal is run through an antenna loop that makes up the boundary of the system. On the dog’s collar is a receiver, and when the dog gets close enough to the antenna loop for the receiver to detect the signal, the shock correction is issued. I recreated this system using an RF Link transmitter and receiver, both running on 315 MHz and 4800 bps, that were wired to an Arduino board. Then, using code, I programmed the transmitter to send its message to the receiver. My project is not yet finished, but I plan to research and write a modified set of code to program the receiver to shut off after receiving a signal.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

My project is a look into the potential application of magnetic levitation technology in elevators. The resulting elevator would levitate within a magnetic shaft, and different sequences of magnetic firing would allow the elevator to move up or down. Rotational stability could be attained by using circular array of magnets, thus making any kind of out-of-control spinning impossible. The electromagnets involved could propel the elevator upward by alternating electric current directions in the elevator's magnets. This would change their polarity, thus causing the elevator to move upwards in the track. Downwards motion could be achieved with the help of gravity. By alternating the magnets on the elevator (with the exception of the rotational stability magnets) between on and off states, it would cause the elevator to enter a controlled fall. An elevator of this kind could stretch indefinitely high, unlike conventional ones, which stretch to 504 meters tall in the Burj Dubai (818 meters tall). With constructions getting taller continually, a new kind of elevator is necessary. One of the largest flaws with maglev elevators today is their inability to transfer their energy back into the system. With conventional cable elevators, any movement in that cable results in rotational energy at the height of the elevator where the cable is curled. This energy is then used to either help heat the building, or to create electricity. This means that they are almost 100% efficient. With maglev elevators, there is a currently no way to have this kind of efficiency.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Abstract This project took a holistic approach in analyzing the potential for tidal current farms. A specific model detailing tidal stream power density was collected from a research journal. Using two maps, Bathymetry and sea surface current data was then gathered from locations across Long Island Sound. This data was used in conjunction with the equation to produce an estimate of the tidal stream power density for Long Island Sound. Through analysis of the data in QGIS, the best locations for possible tidal currents farms could be determined. By interpolating these results on a map, the author gave a realistic picture of tidal current farm potential, not just in specific locations, but along the majority of Long Island Sound's coastline.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Proj. Num

Student Name(s):

Fair Category

Abstract:

Ferrofluids are liquids that exhibit a variety of common ferromagnetic properties. These materials have a variety of uses in biomedicine; the University of Wisconsin delivered biological agents and flag cells using ferrofluids. However, one obstacle present with using ferrofluids is the possibility of phase separation when placed under a magnetic field, separating the ferrofluid and demagnetizing it. The aim of this study is to have a better understanding of nanoparticle behavior during phases of phase separation. It is hypothesized that if surfactant-free ferrofluids are placed under a magnetic field, then the nanoparticle clusters will form spherical shapes and match the Faraday lines of the magnetic field. In the experiment, a surfactant-free ferrofluid was used with a given nanoparticle-to-oil ratio. They were observed for movements in a transmission light microscope. In order to find the strength of the magnetic field necessary, a micromagnet was made from a small coil of wire hooked up to controllable electrical source (simulating a variable magnetic field). As the field strength increases, the nanoparticles were measured for roundness (eccentricity) and for arrangement similarities to lattices (done with a custom-built Mathematica 9 program). The data gathered thus far supports this hypothesis, with nanoparticle clusters forming spheres across a variety of field strengths. Relations are also present between vicinity of nanoparticles to each other and size with the field needed change eccentricity. A relationship is present between current and nanoparticle distribution, but further statistical analysis is needed so quantitatively state the degree of this.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6087

Student Name(s):

Fair Category

Abstract:

For this project, I decided to build a magnetically levitated elevator. My purpose in doing this project is to show one of the applications of electromagnetism. I started by getting magnet wire from an old washing machine motor. Then, I made my first magnet by wrapping one layer of the magnet wire around 16d Nail and charging it with electricity from a 12 volt battery. This was a conceptual test to get my feet wet see how an electromagnet behaves. Next, I cut six pieces of 5x1x1/16 inch pieces of flat iron. With these pieces of flat iron I experimented with the several variables that I thought were important in an electromagnet. I tried several combinations of layers of wire and layers of metal until I discovered that the layers of wire were the most important factor along with the thickness of the wire after doing some online research. Knowing this information I wrapped 3 layers of 18 gauge magnet wire around two of the metal bars, 3 layers of 16 gauge magnet wire around two of the metal bars, and 4 layers of 16 gauge wire around the last two metal bars. Finally, I mounted these to an elevator shaft I had built forming three sets of two magnets each that faced each other and wired them so that I could control each set separately. I believe that this concept has huge potential. With better equipment and materials this concept could become very practical.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6088

Student Name(s):

Fair Category

Abstract:

Sonicated graphene thin films are comprised of 0.5~1 nm thick by 1~4 nm square graphene flakes. The addition of single and double strand DNA (ssDNA/dsDNA) is investigated as a potential bridging material to electrically link graphene flakes into a more conductive network. This research measures conductivity of graphene films prepared with ssDNA and dsDNA (~9000 base pairs). Results show ssDNA graphene films have improved conductivity when compared to dsDNA, however lower conductivity than baseline graphene specimens. Other surprising observations showed that the addition of DNA enhanced and accelerated the coating process of graphene films. Additionally, added sonication of dsDNA graphene mixtures yielded improved transparency of the thin films but showed poor conductivity. This work plus further understanding of the DNA/graphene conductive mechanism may lead to advanced optical and electronic devices, biosensors, electronic thin films, and accelerated graphene coating methods.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

Tires disposed in secure landfills represent a serious environmental/human health concern on several fronts. These include ground water contamination, soil contamination, long term biodegradability issues and aquatic environment contamination. Microbial Fuel Cells(MFC) are proposed to provide a solution by combining waste tires with marine cyanobacteria to generate electricity. MFCs harness the energy released in bacterial metabolic reactions into electrical energy. Three MFCs were constructed; tire dust alone (control 1), marine sediment (control 2) and marine sediment with tire dust (test cell). The initial design was a sealed MFC and was tested for a continuous 72 hour period. Due to the sealed design, anaerobic off gassing caused the Proton Exchange Membrane (PEM) to lift, limiting contact with the material which decreased the output of electricity. The buildup of the gas led to the design of a gas trap to collect the gas and eliminate any PEM contact disruptions. The MFCs with the gas traps were run for 96 hour trial periods. The control 1 MFC initially rose to almost 0.1V and then decreased and stabilized around 0.05V through the 96 hour period. The control 2 MFC initially output 0.5V and after 72hours decreased to 0.05V. The test cell MFC sustained 0.43V output and after 72 hours it decreased to 0.24V and after 96 hours it was at 0.07V. Concluding, adding the gas trap the test cell maintained output throughout the time period and even though the control 2 generated a higher voltage it output was not sustained as the test cell.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6090

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this study was to investigate the effects of fertilizers on the bioremediating ability of naturally occurring bacteria in a saltwater environment. It was hypothesized that fertilizers containing varying amounts of nitrogen, phosphorus, and potassium would increase the rate and success of bioremediation by naturally occurring saltwater bacteria as compared to the bioremediation by those same microbes in the absence of fertilizers. Each experimental trial included seven, 8 dram vials containing 20mls of seawater. The first contained only seawater, the second seawater and 3mls of motor oil, and the remaining 5 contained seawater, motor oil, and .1g of differing fertilizers. Vials were closed, but not tight to allow for gas exchange, and kept at 25oC. They were vortexed and aerated daily, and then allowed to settle overnight or until the following class period. Qualitative data was recorded regarding color, consistency, and general appearance of vial contents, while quantitative data was collected on the height of the oil layer(s). At the conclusion of three weeks, the oil layers were removed using a serological pipet and total volume recorded to determine how much oil had been degraded. Percent change was calculated. Data and results were inconclusive as statistical differences between each vial could not be determined. It is suggested that future studies concerning the effects of fertilizers on bioremediation in seawater include an increased duration of data collection, an optimized, end-point oil measurement, and a parallel study of the effects of fertilizers on the growth and health of marine microbes.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6091

Student Name(s):

Fair Category

Word Count

Abstract:

Silver Nanoparticles are particles of silver with a diameter between 110-10 nm. Silver Nanoparticles are conductive, and can be used for photovoltaic, biological, and antimicrobial applications. Silver nanoparticles are not currently being produced with a rapid and efficient yield to meet research and application demands when considering time and cost. Producing silver nanoparticles through plasma arcing was investigated to find a rapid, efficient, and predictable technique to synthesize silver nanoparticles. A silver target was arced with a plasma beam between 16 and 36 milliamps (mA) at a constant pressure of 0.1 millibars (mBar). These particles were analyzed through a Scanning Electron Microscope (SEM) to determine the size, shape, and spread of the particles. Arcing time was also varied between 5 and 15 seconds. Uniform and predictable silver nanoparticles were synthesized in 10 seconds at 21mA. This data supports the hypothesis that silver nanoparticles can be synthesized using plasma arcing. At higher voltages, the silver clumped into groupings that exceeded the threshold of the target diameter range and at lower voltages the arcing did not generate a uniform layer of particles. The average diameter of the nanoparticles was 105.06 nm, the mode was 100nm, and the median was also 100nm. In continuation, plasma arcing can be used to produce large quantities of silver nanoparticles at a rapid rate to meet industry demands for physical and biological applications.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6094

Student Name(s):

Fair Category

Word Count

Abstract:

A new phototherapy for internal tumors involves nanoparticle mediated, x-ray induced UVA radiation for the production of psoralen photoadducts which are known to block DNA replication in cancer cells. The purpose of this experiment was to determine what effects the presence of phosphor nanoparticles has on the efficiency of photoadduct formation between aminomethyl trimethylpsoralen (AMT) and DNA. The investigation was conducted by irradiating solutions of AMT in the presence of a custom-designed oligonucleotide (5' ATATATAT) as a control and then irradiating solutions that also included the phosphor nanoparticle. Samples were taken over the course of an hour. A colleague at Ohio State University, Professor Irina Buhimschi graciously accepted to process assays for Matrix-assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometry (MALDI-TOFMS). We were able to analyze the data from this technique for photoadduct formation because photoadduct formation alters the molecular weight of the oligonucleotide. Plotting percentage of intact oligonucleotide against UV radiation dose shows that the presence of phosphor nanoparticles decreased the amount of AMT-DNA photoadduct formation by 83.5% under UVA and 36.5% under UVB radiation. We attribute this to the comparatively large size of the phosphor nanoparticles which would create an "umbrella effect," effectively shielding AMT molecules from much of the UV radiation. Psoralen/UVA (PUVA) has already been established as a therapy for UV-accessible skin diseases. This fundamental information will assist in the future design of clinical trials for the treatment of internal tumors in which the tumor will be perfused with a psoralen/nanoparticle suspension and then exposed to low-dose x-rays.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6095

Student Name(s):

Fair Category

Abstract:

Marine mussel and scallops secrete byssal threads (BT) with adhesive ends in order to stay situated in highly turbid tidal zones. These biodegradable lines are incredibly strong for their slim diameter, remain intact for weeks after the scallop has detached, and have been found to re-heal. Mimicry of these filaments by inclusion of their constituents into new synthetic materials is highly desirable for biodegradable fibers, fishing lines, and fabrics. Due to the scarcity of the threads, however, little research has been conducted to characterize these BT. This research seeks to identify the unique components found in mussel and scallop byssal threads, and later integrate these with additives that will provide enhanced mechanical properties. *Mytilus edulis* and *Lima scabra* threads were harvested and stored at room temperature. The ATR-FTIR spectrum of each BT was collected, identifying keratin as the major component. SEM analysis of the threads highlight each fiber's similarity in growth pattern and structure to hair, which is keratin-based. Keratin was extracted from BT via soaking in acidified ethanol, heated under constant pressure at 135oC, and precipitated as new fibers with the addition of 1M NaOH at 2oC. SEM/FTIR analysis confirms the creation of keratin-only fibers. In the final phase, keratin was extracted from BT, and mixed in solution with chitin, a tough, nitrogen-containing polysaccharide. FTIR analysis of the precipitated composite confirms successful integration of the chitin strengthener into the keratin protein. SEM analysis confirms the homogeneity of the new sheet-like material, which can be used to create biodegradable composites.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
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Num

Title:

Student Name(s):

Fair Category

Abstract:

The goal of my overall project is to devise a new way to harness the perpetual motion of waves and translate it into energy using the most efficient and simplistic means conceivable. The concept revolves around a strong yet lightweight high surface area aluminum plate which reciprocates back and forth on an axle when a wave strikes it. Essentially, as the wave strikes the plate, it will produce rotational energy and as the wave recedes, it will return the plate to its original position also creating energy. The final product is a mechanically efficient machine that harnesses energy from both lateral movements of a wave. To execute this, the plate will connect to a shaft with a large 144 tooth gear on it. This will mesh with a smaller 36 tooth gear hooked to another axle beneath for a 4:1 gear ratio. This allows for optimal speed and torque. Both gears will be helical cut to reduce energy loss via heat friction and made of lightweight 7068 aluminum alloy to reduce rotational inertia. Multiple devices can be configured in parallel via a limited slip differential so each machine can work at its individual pace yet create energy as a whole. This differential will be linked to a generator via a final axle to turn rotational energy into electricity. Both devices will be housed in a tubular cage and fastened to the floor of the body of water so that the wave can strike and move the plate both directions.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Application of Nano-Fibril Structures in Fabrication of Lightweight Materials of High Tensile Strength

Student Name(s): M. Fitzgibbons

Fair Category

Abstract:

Cellulose is the most abundant organic material in the world it is cheap and renewable. Cellulose is the material found in plant cell walls, and is the main component of paper. The intertwining, and pressing of cellulose fibers makes paper. Nanopaper like regular paper is just cellulose fiber intertwined, however the fibers are smaller, because they are treated with the enzyme cellulase, they are nano fibers. The smaller size allows for the fibers to more tightly intertwine, this provides high strength to the paper, equal to that of cast iron. With a material as strong as cast iron, as light as paper, and as cheap as cellulose, there is great potential. In the wake of such tragedies as Sandy Hook, I would like to produce nanopaper structures that can stop a bullet, and apply these lightweight structures to backpacks.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

The purpose of this experiment was to determine the effect of accelerated particles on copper and gold atoms. In order to accomplish this, the samples were bombarded by a constant flow of particles. This was accomplished by designing and building a particle accelerator, based on that of J.J. Thompson's cathode ray tube. It was hypothesized that the samples masses would increase throughout the trials. However, it was experimentally determined that the overall masses were found to have decreased consistently; this rejects the original hypothesis. Since copper and gold are good electric conductors, it could be considered a source of error because they would be more prone to drawing the accelerated particles towards them.

Word Count

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6099

Student Name(s):

Fair Category

Abstract:

In the emerging field of inorganic biology, which has the goal of creating an inorganic cell capable of lifelike function, scientists are working to develop an artificial microtubule to act as a structural and fluid-carrying component in a potential inorganic living architecture. Under the guidance of my mentor Dr. Geoffrey Cooper, I investigated the use of electrophoresis-induced growth patterns to direct the self-assembly of dissolved inorganic polyoxometalate (POM) clusters into robust, hollow tubular networks in real time. Spontaneous and rapid growth of these tubes occurs from crystals of the anionic POM metal immersed in an aqueous solution containing an organic cation. This self-assembly took place within a modified gel electrophoresis kit, in order to examine the effects of an electrical field on the tubes' growth direction. Electrophoresis was found to have an impact on the growth direction of the tubular network, and this effectiveness was in bulk, meaning the electrophoretic force was applied to the entire system. It is known that tube formation is not limited by POM type, and the tubes can be designed to have properties that reflect the parent POMs, including redox potential, catalytic activity, charge and photochemical properties. The hollow yet robust nature of these tubes can be utilized to develop systems in which the self-assembled tubes act as microscopic flow channels, as well as in the self-assembly of metal oxide based semipermeable membranes. In conjunction with more localized control techniques, electrophoresis should be of use in the directed assembly of an inorganic living architecture.

Word Count

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6101

Student Name(s):

Fair Category

Word Count

Abstract:

The facile and cost-effective fabrication of energy-harvesting smart structures is integral for a number of different scientific fields. This study seeks to engineer and optimize an innovative, fully-flexible, and mechanically robust filamentous architecture with combined photovoltaic and piezoelectric energy-harvesting capabilities to derive wearable electricity from human locomotion and solar radiation. Furthermore, the amelioration of device stability to achieve long operational life-times is a prerequisite for the successful application of this versatile and promising technology. Therefore, methodologies for stability enhancement were investigated to address the degradation phenomena apparent in both conventional Organic Photovoltaic Cell (OPVC) and Piezoelectric Nanogenerator (PNG) devices. Hybrid OPV-PNG architectures were successfully engineered by optimizing a film-type PCDTBT:PC70BM organic solar cell for filamentous application on the exterior of a similarly optimized ZnO nanowire/PVDF composite piezoelectric core. Film-type OPVCs exhibited a 160% increase in PCE, after device optimization. Fully-flexible OPVCs paralleled their rigid counterparts in performance, only 1.8% lower in PCE. Optimized PNG cores generated consistent voltages, demonstrating a 61% increase from control devices. Filamentous OPVC architectures produced approximately 590 mV after PDMS thin film encapsulation, exhibiting only a 0-6% decrease in voltage output after 240 hours of storage in air. Two OPV-PNG devices were integrated within cotton textiles to simulate practical application, producing approximately 1.14 V and 310 mV from OPVC and PNG components, respectively. Such energy-harvesting smart structures may be implemented to reliably power battery-operated devices such as cellular phones, pacemakers, prostheses, and hearing aids. The versatility of this technology promises additional applications for energy-harvesting in nature.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Supporting the Cause: The effect of Balsa Wood Support on Truss Bridge Designs

Student Name(s): R. Samuda

Fair Category

Abstract:

The purpose of this experiment was to find out if adding 2, 4, or 6 Balsa wood supports increase the amount of downward force the craft stick bridges can handle? The hypothesis was if these supports were added to the craft stick bridges, each one would last longer with the increasing amount of vertical resistance but 6 balsa wood supports would last the longest. This is due to the fact that when any amount of supports is added to a structure, it becomes more stable. The first group (control) had no balsa wood supports. Under incremental pressure, it held an average 69.25 lbs of force. The next group with only 2 vertical supports, the bridge held 63.75 lbs on average. The next, 4 supports, held an average of 68.25 lbs. The last, 6 supports, held an average of 77.5 lbs. An outlier in the first group held an unpredictable amount of force therefore raising the average. However, the following data increased at a consistent rate as expected. This experiment helps to prove that more supports create more stability within structures. This can be used in real life as many structures are created in danger zones across the world.

Word Count

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CSEF Official Abstract and Certification

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Proj.
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Proj.
Num

Title: Voltage Output of Homemade Nano-Crystalline Dye-Sensitized Solar Cells in Series

Student Name(s): M. Lord

Fair Category

Abstract:

The purpose of this experiment was to create dye sensitized solar cells. The goal was to solder these together and harness as much power as possible, possibly capable of powering a small motor or LED light. Solar Technology is the cleanest, most abundant renewable energy source available, and America has some of the world's richest solar resources. I conducted this experiment because I wanted to research and discover the advantages/limitations associated with solar technology. In order to do this, I used two glass slides, one coated with TiO₂ and dye, the other with Graphite, and combine them to make a solar cell. This process is used for making a dye sensitized solar cell. I heated up the slide with the TiO₂ paste with a heat gun, and coat it with the dye. Then, I coated another slide with graphite. I combined these two slides, and then added electrolyte solution, which acted as a catalyst. I held it up to the light source, and measured the voltage produced. Then, I used my solar cells and experimented with a 10,000 micro-farad capacitor. I wanted to store my electricity.

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6105

Student Name(s):

Fair Category

Word Count

Abstract:

The quality of American infrastructure, especially bridges, has been declining due to its common susceptibility to corrosion. While stainless steel and other iron-based materials have been exclusively used in this industry, their common failure lies in their inability to inhibit rusting. The aim of this study is to provide a mechanical solution to actively protect the iron-based materials used in common infrastructure, especially those that are in constant contact with saltwater. Specifically, it examines whether the wasted mechanical vibrations from passing vehicles could be captured and used to prevent salt-induced corrosion. Therefore, the ability of a single piezoelectric actuator in protecting an iron-zinc cell from corrosion in a saltwater environment was investigated. Two separate electrochemical cells were created by partially submerging equally-sized strips of iron (~9g) and zinc (~3g) in 1L of simulated saltwater (3.1% salt). In the piezo-supported apparatus, the strips were connected to the piezo actuator with a copper wire; in the control, the strips were only connected via a copper wire. A plastic piezo support was designed via 3dsMax, printed, and used to mount the actuator in a custom depression robot, which was used to provide constant, prolonged compressions that would mimic bridge traffic (4comp/sec, each at 31N force, for 16hrs/day). With a piezo output of 0.67V, reduction in mass of the metal strips (corrosion) for each cell was measured daily. After 15 days, the corrosion of iron and zinc metals for the piezo-supported apparatus was 63.07% and 22.7% less than that in the unsupported cell, respectively.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

I chose the topic of erosion of oil paintings because I am interested in the field of white collar crime. I brainstormed the idea of painting over a masterpiece to smuggle it into the country. I was faced with the problem of recovering the original for selling and decided to perform this experiment with common household products. This research is important for restoring a recovered stolen masterpiece so that law enforcers know which substances are best for not damaging it. The goal of this project was to learn which of the following substances is best for eroding a layer of acrylic paint from an oil painting without damaging the oil: water, soapy water, paint thinner and isopropyl alcohol. While this experiment is better suited for a Rothko painting because the oil painting was of a solid color, more experimentation with layering could yield comparable results for a wider range of paintings. I painted a layer of blue oil paint on a canvas with red acrylic paint over it, and tested the different substances for effectiveness. I calculated the percentages of the area of the canvas that was oil paint, acrylic paint and scraped off. My results show that water is the best choice for scraping acrylic paint off oil paint with a sanding block, so as not to damage the oil paint. My hypothesis turned out to be correct; however this is only true with paintings in Rothko style, as far as the specifics of this experiment.

Word Count

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Reducing The Price Of Solar Panels By Changing the Materials They Are Composed Of

Student Name(s): R. Karthikeyan

Fair Category

Abstract:

Solar Panels are a type of renewable energy that can theoretically work for ages. However due to the high price of Solar Panels it is not so commonly used. The purpose of my project was to investigate the other materials by which a Photovoltaic cell can be built in order to increase affordability and electricity generation by increasing the spectrum of light the Photovoltaic cell can absorb. I did this by calculating the amount of energy different wavelengths of light would contain. Then I established a parameter of potential alternative materials to Silicon to be less than 0.5eV because 0.001eV was calculated to be the energy of the longest Infrared wavelength. It was not possible to find a material that would absorb this Infrared light however. Then I calculated the price of my narrowed down materials by their Stoichiometry. Then I decided a ratio of bandgap/price the smallest ratio was the most practical material, this turned out to be the alloy. Ag₂ Te In the future I hope to construct a model of this Solar panel and test it to see if it lives up to the calculations of efficiency.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Due to the need of alternative fuels for cars, this experiment was conducted to find other fuels that cars could utilize. I believe that car engines would be able to accept alternative fuels with modifications to the engines. Alternative fuels would lead to less reliance on removing gas from the earth. Scientists have done multiple experiments on different types of fuels and gases to power cars with limited success. Due to the dwindling of natural resources in the earth, an alternative fuel is needed to preserve the earth's resources. A Redcat nitro buggy racecar was used for this experiment. It was filled with two parts Nitrotane gas and one part vegetable oil. The car was run until the tank ran empty. This procedure was done twice; first with only a full tank of Nitrotane gas and the second time with the mixture. I recorded how long the car ran each time. Although the car accepted the mixture of Nitrotane and vegetable oil, it was not able to run as long. If successful, fuel companies that domestically produce gasoline could make the gas with the vegetable oil as filler and decrease the amount of gasoline produced from the earth's resources. In future experiments, I could make modifications to the car to make the mixture of Nitrotane and vegetable oil run the same amount of time.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6110

Student Name(s):

Fair Category

Word Count

Abstract:

17-Beta Estradiol is an estrogen derivative which is extensively used in hormonal therapy. Excess Estradiol is released through patient urine and concentrated at municipal waste water facilities. Active and efficient treatment of this endocrine disruptor is minimal prior to discharging into the associated aquatic environment. Several research projects have shown that 17-Beta Estradiol is linked to hormonal disruptions in the aquatic environment in amphibians and fish. The characteristics of pine bark were proven to be a successful method for the removal of 17-Beta Estradiol in wastewater. Current research shows that estrogen is present in Long Island Sound due to waste water treatment facilities. In this study, waste water discharge samples were tested using High Performance Liquid Chromatography to determine the baseline of 17-Beta Estradiol and to evaluate if pine bark is a rapid and effective treatment method. A 50mL 200ppm 17-Beta Estradiol standard was placed in a glass jar with 2g of pretreated pine bark and was shaken for two hours and left to sit overnight. The solution was then filtered using Solid Phase extraction and tested using the HPLC. The eluate was then calculated to have a concentration of 12.321ppm; therefore, 93.82025 percent of 17-Beta Estradiol was removed using this technique.

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4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6111

Student Name(s):

Fair Category

Word Count

Abstract:

This experiment was designed to determine which of these three footings: coarse sand, 1/4-inch gravel, or bark mulch best resist erosion caused by livestock in high traffic areas. Gravel drains well and doesn't break down, coarse sand resists wind erosion and drains somewhat well, and bark mulch doesn't become slippery when frozen and is soft on the horses' hoofs. Three paddock gates were taken and the first half of each of the gates were filled with one footing each. Then a strip of rubber was inserted into the ground next to the footing in the middle of the gate, then a different footing for each gate was put down on the other side of the rubber strip. The horses were turned out on the footings and they created the erosion process for each footing. Data was collected each day for one month. Each day it became obvious that livestock had the least impact on sand. By the end, the average remaining sand was 4.67 cm deep, the gravel was 3.17 cm, and the bark mulch was 1.29 cm. The conclusion is that sand erodes the least, then the gravel, then the bark mulch the most. These results beg several questions: "How do these footings erode with rain?" and "How does the slipperiness of the various frozen footings endanger the livestock?"

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Enhancing Water Resistance Qualities of SrAl₂O₄:Eu²⁺, Dy³⁺ Phosphors Using Barrier Coatings

Student Name(s): C. Durno

Fair Category

Abstract:

The strontium aluminate (SrAl₂O₄) material has a long persistence of phosphorescence (it glows in the dark) that makes it useful in applications such as paints, safety signage, and nighttime visibility products. However, SrAl₂O₄ phosphors have a chemical instability in water. Exposure to water results in reduced phosphorescent qualities and decreases potential usefulness. In order to improve water resistance qualities of phosphors, durable fluoride based barrier coatings can be used. The purpose of this investigation is to determine, and improve, the effectiveness of fluoride based barrier coatings for water resistance on SrAl₂O₄ phosphors. Additionally, this study will also examine possible negative effects of this coating on phosphorescent properties. The coating is applied by grinding NH₄HF₂ with SrAl₂O₄ and heating this mixture in a furnace between 500°C and 800°C. The coated phosphor is then added to water. If the pH of the water remains constant, then water resistance qualities of the phosphor have been improved. Data collected at this point indicates that a fluoride based coating increases water resistance properties of the phosphor. Additional tests are being performed to monitor how phosphorescent qualities are affected by the coating.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

A typical New England home is heated/cooled at least 60% of a year, creating a temperature differential between the internal and external air that surrounds the outer-components of the building structure. This temperature-differential can be exploited to create useful electricity by strategically placed thermoelectric (peltier) generators within the structure's building materials. This research will examine the effectiveness of thermoelectric generators in producing useful electricity when installed in a double-pane window, in a climate that is typical of a New England home. To begin, the energy conversion efficiency of a single 1"x1" (TEC1-12706) peltier, embedded in a 1"x1" double-pane of glass, was examined using a modified PCR thermocycler. The relation between peltier output voltage and ΔT (on opposing plates of glass) was determined to be $y = -8E-05x^2 + 0.0109x - 0.0192$; at $\Delta T = 21^\circ\text{C}$, a single thermoelectric window produced 0.174V with 40.5mA current. A 12"x12" simulated double-paned window was then constructed to include nine equally-spaced 1"x1" thermoelectric generators, wired in series. To mimic typical window usage in a New England climate, a heating blanket was used to effectively provide heat to one side of the double-pane, while the opposite side was cooled with controlled 3°C refrigeration. The window's voltage output was then determined as a function of ΔT , and described by $y = -2E-07x^5 + 1E-05x^4 - 3E-05x^3 - 0.006x^2 + 0.1251x + 1E-05$. At a temperature differential that is typical of the winter months ($\Delta T = 21^\circ\text{C}$), the energy-creating window consistently produced $\sim 0.55\text{V}$, with a current of $\sim 63.8\text{mA}$. These results demonstrate the potential of strategically-placed thermoelectric generators as an effective means to create useful electricity from wasted heat energy.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The Oort cloud is a vast cometary reservoir surrounding the solar system. These comets are pristine remnants from the formation of our solar system, and their study provides valuable insights into this early time. A defining feature of an Oort cloud comet is its orbital path. Comet ISON was imaged over a span of nine months at the John J. McCarthy Observatory. The images provided astrometric positions of ISON that were reported to the Minor Planet Center (MPC) to help refine the comet's orbital path. An orbit was calculated using the ten observations reported from the observatory and is nearly indistinguishable from the orbits calculated by the MPC and NASA's Jet Propulsion Laboratory (which each used over 6,000 observations). Another way to study Oort cloud comets is to use spectral analysis to determine the comets' chemical composition. Spectra of Comet Lovejoy were taken after perihelion. The data collected were valid but did not have a high enough signal-to-noise ratio to effectively study the chemical composition. Specific improvements have been identified that will increase the chances of spectroscopic success in the future.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Word Count

Abstract:

Diabetes is a metabolic disorder where blood glucose levels are too high. Having too much glucose in your blood can cause serious problems. It can damage your eyes, kidneys, and nerves. Diabetes continues to spread rapidly around the world, where 1 in 10 people are expected to have the disease by 2035, according to the International Diabetic Federation (IDF). Hence it is very important to monitor and control glucose level in the body. One of the simplest methods to monitor glucose levels is by conducting a blood glucose or urine glucose test. In developed countries, glucose-testing supplies are available for a nominal fee and sometimes available for free through governmental programs. Unfortunately all these technologies are beyond reach of poor people due to cost and environmental conditions. The purpose of my experiment is to create a diabetic test that can be used daily to monitor urine glucose levels with an easy read out of low, normal and high. With this in mind, I modified the Benedict's Reagent Assay onto a paper-based test by creating a method to dry the Benedicts solution onto paper. Then I coated the paper with an exothermic material, which in the presence of glucose solution (or urine) would yield a color change. According to my research this has not been done before. The diabetic test gives a result, which is fast, color-based and most importantly cheap enough to be distributed for free to Diabetes patients through Non-Governmental Organizations (NGO) in developing countries.

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CSEF Official Abstract and Certification

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Our world is slowly being drained of natural resources for energy and in the future we will need an alternative to fossil fuels. With the power of geothermal energy we can have renewable energy for many years and never run out, but the problem we face is harnessing this steam power in an effective way. The situation that faces us is whether or not geothermal energy plants in their current format are effective at harnessing energy compared to what we could get from them. To test this I created a model of a plant used to harness geothermal energy and place it on top of a pot of tin foil covered in tin foil to represent the crust of the earth and poked a hole in it to represent a geyser where steam would come out of. Above the model I placed a pinwheel and count how many times it spun in 20 seconds, then I removed the device and placed the pinwheel just over the geyser. I repeated this 3 times and each time poked more holes in the crust to represent places where steam could escape from the area of focus. From these experiments I concluded that the plants are not getting all of the energy that is there so they are wasting energy. Geothermal energy is the most effective renewable energy source we have today and if we can harness it properly then it will be very useful in conserving the plate.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

The science experiment I have conducted is named Do You “C” This Juice?, and has served the purpose of testing orange juice in different environments to see if different conditions would have different effects on their vitamin C level over time. I placed forty samples evenly separated into two different environments, one with a large heat lamp overhead and kept in a room temperature environment, and the other environment being inside of a refrigerator. Over the course of twelve days, I tested with an indophenol solution to see the loss of vitamin C in each sample. My data showed that steadily, the amount of vitamin C in each of my samples had decreased since the original testing on the first day of my experiment. As found in my conclusions, a heated, light exposed environment will decrease the amount of vitamin C in orange juice much faster and in larger amount over time than in a cold, dark environment.

Word Count

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The human mind emits electrical fluctuations called brain waves, which electroencephalograms can measure and record. In this project, a brain-computer interface in the form of an iOS application was developed to input brain wave data from an electroencephalographic headset and create a text-based character selection system using the processed data. Testing and research were carried out for several months prior to the development of the application. Different programming languages, including Xcode, Python, and C#, were investigated through on-line tutorials. These were used to write programs for testing the blue-tooth interface, before Xcode was selected as the language for implementing the thought translation application. Two applications, the Brainwave Visualizer and the Meditation Journal, were used to collect data to reveal any patterns or notable commonalities in brain wave activity during auditory and visual stimuli. Electrical activity relative to levels of attentiveness and meditation exhibited patterns, which could be exploited for the thought translation application. The program's design was optimized for use by a given individual (myself). In addition, eleven weeks were spent learning to actively manipulate both alpha and beta brain waves, which are utilized to produce the requisite output for the thought translation application. The thought translation application was developed in Xcode for iOS, and was successfully installed on an iPod Touch. The application's functions include establishing an interface through which the user can interact with the application, parsing the data gathered from the electroencephalographic headset, and adapting the information to create morse code, which is then rendered as characters.

Special Categories Selected by Student:

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

This engineering project was done to see how maglev trains were working. Using foam board to build a train and using wood board and steel stud to build track were easy. However building train was difficult. It was complicated to program servos. Also it was hard to get electromagnet that would generate great strength compare to its size. Also it was difficult to find strong magnet tape. As a result train's weight was around 360g, making train hard to proceed on the track.

Word Count

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Fair Category

Proj.
Num

Proj.
Num

Title: The Car of the Future: The Effect of Two Energy Power Sources Charged by Solar Panels on the Mileage and Speed of an RC Car.

Student Name(s): L. Afzaal

Fair Category

Abstract:

In today's society, the gas prices of cars are going up. The average person car runs on gasoline and the usage of all that gasoline is polluting our atmosphere and the environment. Many people can't afford the high gas prices anymore and the pollution is causing global warming. Today, cars that run on an alternative engine are pricey hybrid cars, not everyone can afford them. We need to find an alternative source for cars that are that are already running on gasoline because all those cars will turn to scrap metal if we run out of gasoline. The Purpose of my experiment is to build an RC car that can run on two energy sources and can be charged by solar panels. The RC car serves as a prototype for a real car. I will use the nitro ran RC car test, it for speed and mileage, and then add an electric engine to it that will be charged using solar panels. Therefore, when the RC car runs out of fuel (nitro) you can alter the RC car so it runs on an electric engine. The heat from the sun will charge the batteries for the electric engine. This project will help out people who can't afford high gas prices anymore. It will also require using a natural resource. There is less input than output being used. This new car of the future will be as close to zero emission you can get to without having to completely eliminate gas/nitro.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Designing a circuit board to wirelessly power a Left Ventricular Assist Device (LVAD)

Student Name(s): D. Giebisch

Fair Category

Abstract:

Heart failure is the leading cause of death in the US. A left ventricular assist device (LVAD) is a heart pump that maintains the cardiovascular system in severe cases of heart failure. It requires energy from an inconvenient external battery pack module. Unfortunately, the subcutaneous wire connecting the heart pump to this module is responsible for deadly bloodstream infections. A possible solution to this issue is wireless energy transfer that could decrease infection rates and increase portability for patients by eliminating the subcutaneous wire. A major element of a wireless LVAD is a significantly-miniaturized circuit board that can be implanted alongside the heart pump. This study aims to design a new LVAD motor control circuit that meets these requirements. The project began with a basic block diagram that led to the selection of microcontrollers, motor drivers, and other specific components. Parts were chosen to be the smallest, most energy-efficient components available. Then, Altium Designer, a three dimensional modeling program, was used to produce a schematic design and a printed circuit board model. The board was ordered, printed, and soldered. Testing proved that the board successfully sent power to the LVAD motor. This new circuitry will realize a wireless LVAD that will be significantly safer and more reliable than previous LVADs. The decrease in bloodstream infection risk, along with the improved user experience, could lead to LVADs replacing heart transplants as the most desirable treatment for severe heart failure.

Word Count

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Investigating Alternative Methods Using Magnetism to Power a Four-Stroke Combustion Engine

Student Name(s): Z. Geffert

Fair Category

Abstract:

Today, a major focus is on improving the efficiency of vehicle's engines. This focus pertains to any standard combustion engine, which really lacks in efficiency due to the massive loss of heat to the environment. This experiment is aimed at improving the efficiency of such engine using magnetism. Electromagnets are very useful for this experiment due to their ability to reverse their magnetic fields on command. This would then transformed into having an electromagnet assist in rotating the piston within the engine's cylinder. The electromagnet would help to force the piston down just as the gasoline does when it explodes in the cylinder. In turn, it should work in unison with the gasoline which would significantly reduce the amount of gasoline used to combust. To interpret the changes, a water brake dynamometer would be used to measure the horsepower of the engine. It is expected that with the improvements, the horsepower would increase, showing that the electromagnet does help to compress the piston.

Word Count

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- Yes No

CSEF Official Abstract and Certification

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Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Our project studied the effect of the shape and size of blades on a wind turbine on energy production. We used a kit for the generator part and created the blades out of milk gallon jugs. We then used a leaf blower for the wind and using a light attached to the generator, discovered if certain blades were more effective than others.

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Black ice forms on roadways due to moisture in the air, or on the surface of the roadway and when temperatures are slightly above, at, or below freezing. When the ice forms, it is a single layer and often transparent which makes it extremely slippery and impossible for drivers to see. (<http://www.wisegeek.com/what-is-black-ice.htm>) Black ice is the cause of approximately 467 fatalities in the US every winter. (<http://icyroadsafety.com/fatalitystats.shtml>) These fatalities could be prevented if there was a way of detecting the black ice before drivers encounter the dangerous surfaces. A Class-2-laser of 640-660 nm was directed at surfaces containing both water and ice. A laser receiver was then used to detect the laser beam. It was found that when the laser hit the water it was reflected and shown as a precise dot. When it hit the surface of the ice, the laser beam scattered. It was concluded that if a laser hits a black ice surface, it will cover more of the receiver's surface area and therefore could be used as a warning method for drivers. An alternative receiver needs further investigation and development in order for it to indicate percent coverage the laser has upon reflection from the road surface. The higher the percent coverage, the more scattering, which is indicative of black ice. These receivers could be placed in areas most known for black ice such as bridges and shaded areas. (<http://www.accuweather.com/en/weather-news/black-ice-driving-dangers/22052530>) When fully developed, it can be attached to a multilevel warning device that will alert drivers.

Special Categories Selected by Student:

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 vertebrate animals controlled substances

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6503

Student Name(s):

Fair Category

Abstract:

The objective of this study was to determine a swift and efficient process to accurately identify the diameter's measurement for individual zinc oxide nanowires imaged by a scanning electron microscope (SEM). ImageJ, a free image processing program developed at the National Institute of Health, was implemented on the examination of nanowires in specific images. This freeware offers add-on and self made plugins to help overcome obstacles with certain images, which has made it gain popularity among many science fields. This analytical processing program would also be used to calculate the average diameter as well as generate a normal distribution plot for all zinc nanowires within the sample. Techniques originally used for the analysis of transmission electron microscopy (TEM) images through ImageJ were applied, but these results proved to be not ideal. Novel routes to SEM image processing were then developed through ImageJ and were tested but these techniques increased usage of human subjectivity, misidentification of nanowires in the image, or lack of isolating a significant amount of particles within the image.

Word Count

Special Categories Selected by Student:

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment is to identify a method and problems that might arise in the process of designing and building a system with which one might electromagnetically propel specially designed freight containers into space. Of course, in the experiment, a significantly reduced scale will be used solely for the purpose of measuring the efficiency of the primary parallel rod design. Ideally, an apparatus will be constructed by which a small projectile of iron or an alloy of iron will be launched into the air for a small distance. The mass of the projectile will be compared against the distance it travels and the angle at which it is released to determine the force generated in the test. At this point, the amount of energy used, measured in watts, will be measured. This test will be performed at various currents by using different capacitors in order to assess the relationship between energy expended and force exerted upon the projectile. During the process, the team will attempt to address different issues that may arise and improve upon the design of the launching mechanism. Issues expected to be addressed will be generation of heat by the machine, inefficient usage of energy by a simple projectile rig, and limited levels of acceleration based on the size of the rig. These and other issues will be addressed by modifying the design or arrangement of the rig so as to make the most efficient test of the feasibility of electromagnetic propulsion.

Special Categories Selected by Student:

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Building an Automated Prototype for the USAR Operations and Industrial Applications Using Lego Mindstorm, Tetrax and RobotC

Student Name(s): A. Myrzatay, S. Avci

Fair Category

Word Count

Abstract:

Robots are widely used in repetitive, dull and even dangerous tasks across the world. Robots are useful in factories for mass production due to their ability to perform operations tirelessly. However, many robots at use do not work efficiently when performing domains such as search-and-rescue, construction and/or moving autonomously. The objective was to build a robot that could avoid obstacles and lift objects autonomously. The robot was first built in 3D design using Autodesk Inventor implementing Lego Touch, Ultrasonic sensors and a Color sensor. Then the robot was tested theoretically using Virtual World. After the robot is physically built, it was programmed through RobotC implemented with "Click and Grab system" for automation and Intelligent Tele-Operation as manual control mode for backup in case autonomous programming fails. The robot was monitored through a PC that was connected to the NXT Brick via Bluetooth. The robot's efficiency and ability to autonomously detect, avoid, and lift various objects (2 balls, 2 cubes: blue, red) was tested in an area of 8x8 feet with a fixed amount of time (5, 10, 15 minutes). The robot successfully avoided obstacles (blocks, cliffs, baskets). However, in 5 minutes time the robot failed to detect the colored balls and cubes, in 10 minutes it detected only one ball and no cubes, and in 15 minutes it successfully detected both balls, but one cube. Robot successfully performed tasks such as search-and-rescue, and location-dislocation of the objects autonomously. In a larger scale robot can be successfully used for factory operations.

Special Categories Selected by Student:

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The main scope of our science fair project is to design an innovative pump system that is self-sustainable. If we use a photovoltaic cell to power a deep-well pump, then it will use solar power to run indefinitely and keep the water accessible with minimal supervision. The device has many practical applications in the world today, for example, south of the Brandt line, there is much poverty. In continents like Africa where clean water is scarce and there is an abundance of sun light, this new innovation will be helpful. There will be a photovoltaic cell that will connect to a battery to store the energy that will power a pump system. The system will have an integrated water filtration device that will help prevent Cholera and other pathogens, prevalent in third world countries. The pump system was first designed with a program called Solidworks, where we created a 3-D model. It simulated our design and provided a way to find flaws in the device. Then with help from a local teacher we were able to use a 3-D printer to create the wheel to bring up the water. Our concept is undeniably important because undeveloped countries are in search of clean water, something our device can easily provide.

Special Categories Selected by Student:

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6508

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this engineering project was to create a prototype of a magnetically levitating train system (the maglev). Once built, the rate at which the train traveled down the track was compared to the rate at which it traveled down the same track in a vacuum. The efficiency difference between the two train systems was determined. The project had multiple objectives including: 1) designing and building a successful magLev car and track, 2) the creation of a vacuum over the created maglev system, 3) time and speed trials, and 4) a comparative analysis of efficiency in and out of the vacuum tube. The first phase of track development focused on the levitation and guidance systems which were built using magnetic strips attached to a raised center rail as well as to the inside walls of the track. The propulsion mechanism was an electric motor attached to one end of the track. It drove a rod that spun a belt containing attached magnets whose repelling forces drove the train forward. The vacuum chamber was built by gluing a plastic sheet over the top, back, and front faces of the track. All wood faces were sealed and waxed and a vacuum pump used to remove the air from the train system. Time trials were conducted both in and out of the vacuum. The train traveled minimally faster inside the vacuum. Results were not statistically significant when compared to outside trials which unfortunately led to a poor comparative analysis of efficiency.

Special Categories Selected by Student:

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6509

Student Name(s):

Fair Category

Abstract:

The 21st century has brought many environmental challenges. The purpose of this project was to build a Scale Model of an eco-friendly and self-sustainable city with many ideas put into one. Idea-1: Yeast biosorption was used to clean contaminated water and soil. 5mL of copper sulfate, nickel nitrate, and lead nitrate were mixed in 30mL of distilled water. Then the yeast was mixed with distilled water and then poured into the contaminated area. The metal ion concentration was measured after 48 hours with a flame spectrophotometer. Significant decrease in the metal ion concentration was decreased. Idea-2: Industrially mined coal was taken and placed into a rotating container with distilled water. The water washes out impurities like sulfur. However many impurities are chemically bonded with the carbon inside the coal. To solve this emission problem, the CO₂ was taken to an algae production plant. CO₂ was measured and placed inside the container where the algae were growing. CO₂ levels were measured every hour for 10 hours then placed onto a chart for review. There was a considerable change in CO₂ levels inside the container. Idea-3: Small scales of regular and modified windmills were made. Two fans blew air at them and the energy productions were measured. The standard windmill produced much less than the modified windmill. 4 more ideas that include Green Roof, Wave Energy, Geothermal Energy and PRT were tested and they all showed promising results. In conclusion, all of the ideas posed for this city had strong outcome.

Word Count

Special Categories Selected by Student:

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Harvesting Mechanical Energy: The Creation and Implementation of a Piezoelectric Step

Student Name(s): J. MacFarlane, A. Kern

Fair Category

Word Count

Abstract:

The purpose of this investigation was to create an energy harvesting device that captures mechanical energy using piezoelectricity. It was hypothesized that the output electricity generated by the step device would be able to power electronic devices directly, be stored in a rechargeable battery, and exceed the energy and cost put into the system. An energy-harvesting, piezo step was created with piezoelectric discs, springs, wood, screws, and combined with unique spring holders and disc “compressors” designed in Tinkercad and printed on a 3D printer. A solderless bread board, jumper wires, and a multimeter were also used. After completing the construction of the step, output readings, including amperage and voltage, were measured with a multi-meter and output wattage calculated. The amount of electricity produced by the step, as indicated by the multi-meter was calculated in watts. Knowing output wattage, the efficiency of the step was calculated by comparing the output energy with the force applied to the step, which was then multiplied by the distance of the deformation of the piezo discs (known), and finally divided by the time of the deformations of the piezo-elements. Results indicated inefficiency in the output as compared to the input and a failed attempt to charge a battery. Although the step was able to power a small LED, the entire concept was further derailed when investigators took into account the intense investment of time and funds as compared to the output wattage.

Special Categories Selected by Student:

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

The presence of hard water in many areas of the country is a huge problem for multiple water supply systems. As water passes through different areas of the environment, it picks up various natural occurring minerals. When these specific minerals dissolve in water, compounds that make them up begin to separate into ions. The calcium ion is one of the main causes of water hardness. Water hardness creates a buildup of solid calcium carbonate because of this calcium ion. This particular experiment assesses the use of gravimetric analysis in determining the amount of water hardness in the form of calcium carbonate in various water samples. Here, six samples of calcium chloride were analyzed. For each calcium chloride sample, a sodium carbonate solution was added. A double-replacement reaction occurred and thus resulted in a precipitate of calcium carbonate. Gravimetric analysis (filtration) was used here to isolate the solid calcium carbonate from the water samples and from there, determine water hardness. The experimental data obtained from the experiment was compared to the theoretical amounts of each sample. A balanced chemical equation of calcium chloride and sodium carbonate was referred to while calculating these theoretical amounts. Dimensional analysis succeeded in predicting the amount of precipitate that was supposed to be formed before the actual experiment began. The theoretical amount of the calcium carbonate precipitate and theoretical water hardness was also determined for each sample and then later used to determine the accuracy and sensitivity of gravimetric analysis for water hardness testing.

Word Count

Special Categories Selected by Student:

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The increase in fossil fuel usage led to increases in pollution and global warming. There has also been an increase in obesity and a need to exercise. The purpose of this project is to harness some of the energy released during exercise and generate power that can be used to run different devices, using piezoelectricity. Piezoelectricity is electricity released from certain crystals when pressure is applied on them. Piezoelectric generators (PEGs) can be positioned in a variety of places. The purpose of our experiment was to evaluate the suitability of using piezoelectricity in various exercise scenarios to convert calories to electricity. The first part of the experiment tested the optimum method for placing and connecting the PEGs for maximum power output. The variables investigated included: type of surface to put the PEG on, PEG mounting method, and the electrical connection. We found that softer surfaces were the best for the PEGs. Mounting the PEGs with the crystal sides facing each other generated the most power. Connecting the PEGs in parallel was more effective than in series, in order to increase the current output. The second part evaluated the use of PEGs in different exercise equipment. We placed PEGs inside a kneepad, on the inner side of a belt, and in a treadmill. Placing the PEGs under the treadmill belt was the most effective with an output of 22V and 29.9 μ A. Our findings support the idea that piezoelectricity could potentially help provide energy if integrated on a large scale in gyms.

Special Categories Selected by Student:

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4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Fanplastic Insulation was created to test the quality of plastic bags as insulation. To test this, we built a plywood cube, 24 inches³, with a smaller sheetrock cube inside, 15.5 inches³. Both cubes had a removable top. The smaller cube is elevated by a 3 inch tall box with holes in the sides and top, that was once used to hold oranges. We put the insulation in the 3 inch spaces between all 6 sides created by the cubes. Our 4 types of insulation were no insulation, standard insulation, densely-packed plastic bags, and softly-packed plastic bags. To conduct the tests, we inserted the insulation and used a wireless thermometer device in order to most accurately capture the temperature of the inner box, as well as the temperature outside. The device has a wireless sensor that we placed inside the inner box. It receives input from the wireless thermometer while also acting as a thermometer itself. We could get the temperature of the inside box as well as the temperature outside, which allowed us to see how the three types of insulation affected the temperature drop of the inner box. After conducting all the experiments and collecting all the necessary data, we concluded that plastic insulation was significantly better than no insulation at all, however did not work as well as the standard insulation. By replacing standard insulation with plastic bags in every U.S. home, the estimated 1 trillion plastic bags consumed each year could be recycled and reutilized.

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4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

For our science fair project my group and I wanted to be creative and build something so we came up with the idea of a catapult so that's what we built. Our project wasn't a success but we did learn ways to improve the performance of it. This project took a lot of experimenting and work to perfect.

Word Count

Special Categories Selected by Student:

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4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6516

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this project was to investigate and determine the ideal conditions for halophilic bacteria to most effectively lower the salinity. Varying levels of temperature, pH, and dissolved oxygen were tested upon halophilic bacteria and their ability to reduce salinity in a controlled environment. It was hypothesized that increased temperature, a basic pH, and increased dissolved oxygen levels would yield the greatest percent change in salt concentration of the solution. To create each testing environment, .5mls of suspended halophiles were combined with 5mls of seawater (pH 8.4) and 5mls halobacterium broth in an 8 dram vial. Control vials were created with seawater and broth minus the halophiles. The effect of temperature was investigated by creating a control and a testing vial held at three different temperature: 4oC, 25oC, 37oC. The effect of pH, was investigated by creating a control and a testing vial at three different pH levels: 4, 8.4, 10. The effect of dissolved oxygen was investigated by creating a control and a testing flask with two different DO levels. Salinity of each vial, in each investigation, was measured daily for two weeks. Each variable was then tested in three sets of trials. It was concluded that the hypothesis was correct: increased temperature, a basic pH, and increased dissolved oxygen levels yielded the greatest percent change (a decrease) in salinity of the vials. Future studies may include applying and combining the use of halophiles to the currently implemented, industrialized methods of vacuum distillation and reverse osmosis.

Special Categories Selected by Student:

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The investigation of this topic is being done in order to determine the (cost) effectiveness of near-earth asteroid mining as an industry, as well the possibility of improving the quality of life on earth through the acquisition of water from hydrated clay deposits. The potential effectiveness was decided by researching global consumption and production rates of various resources and estimating their availability in the future given current population growth. The predicted consumption rates and availability determined the stability of future markets. Supply and demand was evaluated in order to decide the amount of resource which can be brought back to earth without ruining economies or the world market. Using the current population and a growth formula the population in 30 years is estimated to be 11.2 billion people, which will dramatically increase the demand for water and other resources. Different types of metals and compounds found within asteroids include phosphorus, carbon, and H₂O. These can be used to grow food or provide safe drinking water on earth or on future settlements in the solar system. The rare earth metals found within the asteroids include gold, platinum, and rhodium which can be used to create fuel cells thereby reducing costs of "green" technology along with potential monetary gain. The future for near-earth asteroid mining looks promising and may lead to gains in technology and profit.

Special Categories Selected by Student:

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment was to investigate the effects of temperature on the strength of adhesive bonds. The initial idea was to test how different extremely cold temperatures affected the strength of glue, but eventually the experiment evolved to testing the strength of three types of glue—Instant Gasket, 5012, and 401— in a set extreme cold temperature. To test this, multiple sets of two planks of wood were glued together with their assigned glue type by a ½ centimeter overlap. The wood pairs assigned for extreme cold conditions were held in dry ice for one minute each. Strength was determined by hooking one of the two planks of wood of each test specimen onto a scale and pulling down with pliers until the bond gave away. The results showed that 5012 could withstand an average mass of 19.17 kilograms. The Instant Gasket withstood an average mass of 13.5 kilograms, and the 401 withstood an average mass of 9.5 kilograms. Averages were determined by finding the mean mass each glue type could withstand between all dry ice trials of the two experiments. Based on averages calculated, it can be concluded that the 5012 is the strongest glue of the three when subjected to extreme cold conditions. The results observed in this experiment can be used to help with deciding which adhesive to use in cold environments or during cold seasons.

Special Categories Selected by Student:

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 vertebrate animals controlled substances

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6520

Student Name(s):

Fair Category

Abstract:

The purpose of this investigation was to prove, through drop weight impact testing, that the dactyl club of the Mantis Shrimp with its helicoidal substructures is a viable model for future impact force dispersal technologies. It was hypothesized that plastic impact specimens created with helicoidal substructures would better maintain their structural integrity than impact specimens utilizing other force dispersal patterns such as "shear thickening liquid." Experimentation involved 4 steps. First came the creation of a stable drop weight system for impact testing using wooden planks and a PVC pipe. The second step was to use CAD software and the the Makerbot Replicator 2 to create three different specimen types. One of the specimens utilized the helicoidal substructures of the Mantis Shrimp by rotating each plate sixteen degrees more than the plate located beneath it. The second simulated the "shear thickening liquid" or so called "custard armor" by changing the infill of the control plate to 10% and filling the resulting hexagonal gaps with a mixture of Elmer's Glue and Cornstarch. The third specimen was a control plate with the same dimensions of the first and second specimens set at 100% infill with zero rotations. The final phase of experimentation assessed and compared damage to the samples after impact in an effort to determine, with statistical relevance, which method disperses and resists the greatest amount of force. It was concluded that the impact specimen containing the helicoidal substructures is a viable model for future impact force dispersal technologies.

Word Count

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

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 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

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4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: A Novel Wind Turbine Design Incorporating Photovoltaic Cells and Piezoelectric Sensors

Student Name(s): A. Ahmed, U. Qureshi, A. Khan

Fair Category

Word Count

Abstract:

The exploration of renewable energy has increased exponentially due to the rapid depletion of fossil fuels. Sustainable resources that are in high demand include wind and water power, geothermal and solar energy, and power accumulated through motion. The objective of the experiment was to design and engineer an innovative wind turbine that incorporated both solar and piezoelectric technologies, as well as a control system that regulated the power generated. The constructed wind turbine, solar panel, and piezoelectric sensors were collectively capable of producing optimal energy to charge our 12-volt lead acid battery. The solar panel yielded 13.77 volts when in a series connection, and an average 0.57 volts per individual cell. The homemade solar cells yielded lower readings than those of the manufactured cells; however, they were more inexpensive and made with readily available materials, which emphasizes the potential of their use in impoverished regions. At low wind speeds, the turbine consistently generated between 0.44 and 0.61 volts. The piezoelectric effect, which occurs when energy is harnessed from motion and vibrations from the turbine, was also incorporated; the sensors used yielded a sufficient voltage from the turbine movement created by low wind levels. Cost was heavily considered during the construction phase of the wind turbine, as the design was intended to perform well in impoverished geographic locations with sufficient wind and solar radiation; the system created was cost-effective and composed of parts easily accessible in such regions. Our results emphasize the potential of the engineering of economical renewable energy systems.

Special Categories Selected by Student:

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 vertebrate animals controlled substances

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3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

We decided on discovering more about the simulated impact of car collisions because it relates to what we are learning in physics class, as well as the fact that thousands of people are killed in car accidents each year, making it a very relative matter. The purpose of our experiment is to better understand the physics of impact behind car collisions. Our hypothesis is if a ramp is raised to 25 inches and a mobile model car is released, then a car at the bottom of the ramp will travel a larger distance, due to the increase of acceleration, helping us understand and calculate its impact. Our procedure for the experiment consisted of two moveable model cars, one stationed at the top of the ramp, and the other stationed at couple feet down the track. When the first car was released, we measured the distance the car at the bottom of the track moved once impacted, relative to the height the other car was released at the top of the track. We raised the height three times for the trials and concluded that the impact distance increased as the height of ramp increased. With the data gathered we were able to use the measured distance, time, and mass to reveal what the impulse and momentum was of each trial. To improve validity, we could have used more heights and trials during the investigation and used a vehicle with less moving parts to avoid issues like friction and inconsistency.

Special Categories Selected by Student:

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply):

- human subjects potentially hazardous biological agents
 vertebrate animals controlled substances

2. Student independently performed all procedures as outlined in this abstract. Yes No

3. This project was conducted at a Registered Research Institution. Yes No

4. Is this project a continuation? Yes No

5. My display board includes photographs/visual depictions of humans (other than myself or my family):

- Yes No

Scientific Disciplines

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Applied Technology

Project Number	Title
1005	Robotic Companions
1006	Analysis of different wood's resistance and how to prevent or delay the decay with natural sources.
2041	3D Printing of Amyloid Precursor Protein: The Gene Mutation that Causes Alzheimer's
2044	Growing Our Future: Using LED Hydroponics to Cultivate Fresh Produce: A Solution for Urban Food Deserts
2507	Analysis of Phosphorus (Fertilizer) Recovery from Varied "Run-off" Sources (Local Rivers and L.I.S.)
2518	Optical Illusions
2527	Your Head, Your Helmet
3014	ACVR1/ALK2 Inhibitors as a Cure for Fibrodysplasia Ossificans Progressiva (FOP)
3016	Brilliant Bioplastic: A Comparative Analysis of Strength in Various Bioplastics
3023	Hydro and Solar Based Hybrid System
3027	Effects of Wi-Fi Signal Radiation on the Development of Brassica rapa (Wisconsin Fast Plants)
3040	Investigation of the Inhibition of E. coli Biofilm Formation on Food-Contact Surfaces via a Brominated Furanone
3051	Analyzing Bacterial Resistance to Antibiotics
3059	Testing how Levels of Mercury in Various Species of Fish when affected by Chlorella.
3070	How Bio-Fuels Compare to Gasoline
3079	The Effects of Sensory Deprivation on Neural Activity for the Psychological and Mental Treatment of various Mental Conditions
3087	Investigating the Efficacy of Bioluminescent Mushroom Panellus Stipticus as a Biosensor to Detect the Toxicity of Water Contaminants
3104	The Remediation of Heavy Metals from Wastewater Using an Aspergillus niger Activated Flow Filter
3115	Inhibitory effect of D-Psicose on Motility, Growth and Reproductive Maturity of L1 larvae of Caenorhabditis elegans
3144	Teaching English Language Skills via Interactive Storytelling with a Spanish-Speaking Robot
3501	Nice to Meet You: Using DNA Barcoding to Detect Mislabeling in the Meat Industry
3504	Creating a Living Filter to Lower Levels of Harmful Algae in Long Island Sound
3512	Effect of Environmental Conditions on Hydrogen Production in Clostridium
3515	Saving the World from Brain Eating Amoebas
3520	A Novel Approach to Removing Oil Spills from Seawater by using Sustainable and Cost-efficient Materials
3521	Truly Vegetarian? Using DNA Barcoding to Detect Possible Contamination of Vegetarian Products
4009	Effect of Sulfites as a Preservative on Cell Absorption and Nutrient Content.
4010	The Effects of a Robot's Speed in Mazes with Different Amounts of Turns
4011	Stealth Shapes
4012	Smog Filter Using An Electrostatic Field
4013	Stirling Engine: The Future
4014	Printed Prosthetics
4018	The Power of Sound
4020	Analysis of Prevention and delay of ignition and burn times of synthetic fingernails
4023	Developing a Practical System for Loosely Coupled Inductive Power Transfer
4024	Have Some Sympathy!
4026	WriteBot
4030	Novel Methods for Water Desalination by Harnessing Solar Energy using a Solar Oven With Flat Mirrors, Fresnel Lens and a Parabolic Mirror
4033	Harnessing Human Movement for Clean Energy
5011	THE INVESTIGATION OF THE PRESENCE OF PLASTIC MICROSCOPIC FIBERS IN EFFLUENT SEWAGE WATER AND THE LONG ISLAND SOUND
5012	How the Strength Of Magnets Varies At Different Temperatures
5017	Which Fruit Produces More Electricity?

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Applied Technology

Project Number	Title
5018	A System for Remembering Generic Items (ASRGI for short)
5029	To Design A Self-Sustained Wind-Microbial Hybrid Device that will Generate Clean Hydrogen for Energy
5032	Measuring Electrolyte Conductance in Sports Drinks, Orange Juice and Tap Water as Compared to Distilled Water
5041	Using Wettability to Develop Reusable Freezer Bags
5045	The Search for the Most Effective Ice Melt
5053	An Easier Way For Water
5057	Drag Effect On An Airplane
5505	Electromagnets
5507	The Efficiency and Durability of Piezoelectric Generators
5508	A Study of the Production, Impact Testing, and Degradation of Seaweed Based Bioplastics
5515	Removal and Recycling of Phosphate from water Using Various Methods: A Sustainability Project
5517	Analysis of natural sources of possible road de-icers and effect on pavement, soil, and plants.
5519	Ananalysis of "Super Spices" Effect on Cell Absorption, Antioxidant Levels, and pH.
5523	What bridge design is strongest?
5524	Wind Turbines: The affects of different blades on a model wind turbine
5525	The Effects of a Gear Size on Speed
5526	A Lot of Power
5529	How long does it take devices to charge when the power goes out?
5530	Robots Evoking Creativity
5537	Burning Calories to Light up the Night
5539	Stock Strategies
5547	Which type of arm; robotic, or human would have 100% accuracy and precision when throwing a ball?
5553	Invisible Technology.
5555	Measuring The Speed of Light Through Gelatin Using A Laser Pointer The Angles of the Laser VS The Speed of Light
5558	Make it Stronger
5561	Graphene Enhanced Piezoelectric Generator for Environmental Energy Conservation
5562	Wind Power
5563	Hypoallergenic Lawn Care Device
5564	Foot-Operated Computer Mouse Prototype
5565	Mathematical Analysis of the Rubik's Cube Using the Thistlethwaite Algorithm and Sets of Moves
5567	Which Model Airplane Flies the Farthest?
6009	Chemical and Microwave Pretreatment of Biomass to Optimize Reducing Sugar Yield for Cellulosic Ethanol Applications
6010	3D Printed Fractal Structures
6011	Optimal Lens Configuration for SunLight Redirection
6013	Development of a Sustainable Energy System that Converts Lightning to Hydrogen Gas through Plasma Electrolysis
6016	Tilt angles affect on a photovoltaic modules voltage output.
6018	A New Spin on Generators
6020	Comparing the energy generated from simulated rain drops on a piezoelectric surface to a hydro-electric turbine in a downspout, using the same volume of water
6024	Quality of Nighttime Photography Based on Light Sources
6028	Finding the Best Rust Remover
6033	Exploring the Storage Capacities of Carbon Nanotube and Graphene Based Capacitors
6034	Evaluating the Performance of a Model Solar Concentrating System Using Thermoelectric Generating Technology

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Applied Technology

Project Number	Title
6038	Solar Water Disinfection Optimization Using Titanium Dioxide Coated Plastics
6040	Design of a Novel Photo-Sensitized Carbon-based Supercapacitor for Capture and Storage of Solar Energy
6041	The Effects of Pressure, Temperature, and Cooling Rate on Tensile Strength of Extruded High Density Polyethylene
6043	Development of a Simulation Model for the Solution of Einstein's General Relativity and Quantum Mechanics Based on Causal Dynamical Triangulation
6045	Optimizing Hydrogen Production From a Piezo-electrochemical Water-Splitting Mechanism with Low-Cost Synthesis of ZnO and BiFeO ₃ Nanostructures
6046	Movie Music
6049	Momentum Powered Magnetic Generator For Electric Car Applications And Free Energy And Perpetual Motion Research
6051	Effective Energy Storage Technology for Electric Power
6052	Construction of a Mechanical Arm with Magnetic Claw
6054	Exploration into the Development of a Mathematical Solar Cell Model in order to Simulate Solar Energy Potential in the United States
6055	Chemically Testing Tattoo Ink using Raman Spectroscopy
6056	Determining Honey Adulteration with Raman Spectra
6059	Construction of a Renewable Energy Generator from Recycled Materials: A Study on Windbelts
6060	OXIDATIVE DESULFURATION OF DIBENZOTHIOPHENE THROUGH THE USE OF TiO ₂ COATED OMS-2
6062	Atmospheric Water Generator From Alternative Energy Sources.
6064	Examining Graphene Nanoparticles for CO ₂ capture and water purification.
6069	Titanium based artificial bone materials
6073	Low Drag Automobile Design
6074	Creation of Tidal Power from Infiltrating Coastal Ground Water via a Novel Tidal Barrage System
6075	On the Minimization of Rotor Losses in the Three Phase Induction Machine
6076	Practical Applications for 3D Printing Concrete Structures
6078	Temperature-Induced Concurrent Removal and Recovery of Wastewater Ammonia-Nitrogen
6079	An Inquiry Into The Use of Graphene as a Superconductor
6081	Solar Computing: Creating a cost-effective off-the-grid laptop for utilization in third world countries
6082	Modifications to electronic pet fence system to allow for safe return into boundaries
6083	The application of magnetic levitation technology on elevator construction
6084	Mapping Tidal Current Farm Potential Along the Long Island Sound
6089	The Development of a Recycled Tire and Marine Cyanobacteria Single Chamber Microbial Fuel Cell
6091	Synthesis of Silver Nanoparticles using Plasma Arcing Atomizing Methods
6093	Synthesis and Characterization of EGCG-PLAGA Conjugates and Mixtures
6095	Synthesis of a Block Co-polymer for the Manufacturing of a Bio-Degradable Monomeric Filament
6096	New Invention to Efficiently Harness Wave Power
6110	Determination and removal of 17-Beta Estradiol in Long Island Sound.
6113	Enhancing Water Resistance Qualities of SrAl ₂ O ₄ :Eu ²⁺ , Dy ³⁺ Phosphors Using Barrier Coatings
6116	Inclusion of Thermoelectric Generators in Glass Building Materials to Produce Useful Energy in New England Homes
6118	A Potential and easy to use, low cost Diabetic Test for use in Developing Countries and Rural Areas
6121	A Novel Approach to The Design of an Electroencephalogram-Based Brain-Computer Interface For Use In Thought to Text Translation
6123	The Car of the Future: The Effect of Two Energy Power Sources Charged by Solar Panels on the Mileage and Speed of an RC Car.
6124	Designing a circuit board to wirelessly power a Left Ventricular Assist Device (LVAD)
6502	Black Ice Road Sensors
6503	Battling Subjectivity - Finding Tools For Nano-Scale Measurement

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Applied Technology

Project Number	Title
6504	Blades of Fury Pt. 2: Weight Efficiency
6506	Building an Automated Prototype for the USAR Operations and Industrial Applications Using Lego Mindstorm, Tetrax and RobotC
6507	Using a photovoltaic cell to self-sustain a clean water pump
6508	Comparative Efficiencies of Magnetically Levitating Train Systems in and out of a Vacuum Chamber
6509	Designing and Building a Scale Model of an Eco-friendly and Self-sustainable city
6510	Converting Mechanical Energy from Cross-walk Traffic Using Piezoelectricity
6513	Calories to Watts: Novel methods that utilize exercising energy using piezoelectric generators
6516	The Effect of Temperature, pH, and Dissolved Oxygen on Halophilic Desalination
6520	The Future of Armor: Inspired by the Dactyl Club of the Mantis Shrimp
6521	A Novel Wind Turbine Design Incorporating Photovoltaic Cells and Piezoelectric Sensors

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Animal Sciences

Project Number	Title
1020	Effect of various temperatures on fly locomotion.
2007	Decreasing Sugar in Horse Treats
2019	Feed The Birds
2025	Aquaponics Terracotta vs Water; Benefits of Grow Mediums
2036	The Affect of Food on an Orb Weaver Spider's Web Spinning
2042	What Substance Attracts The Most Fruit Flies
2520	The Effects of Antioxidants on cell regrowth and regeneration in Lumbricus variegatus
2525	Birds and Color
2531	The Effect of Vitamin A1, B1, B9, B12, C1 & Different Temperatures on the Regeneration of Planaria
2532	The Effects of Bisphenol-A on anxiety, short-term memory, and sucrose preference in adolescent female rats.
2534	Does Whey Protein Effect the Rate of Regeneration of Planaria?
2537	Which liquid (tea, coffee, water, milk, apple juice, Cola) dissolves teeth the most?
2541	Climate Change vs. Mussels: UNFILTERED!
3028	Effect of Light Levels on the Growth of Coral
3033	The Effect of Sea Temperatures On Plankton and the Ocean
3061	Effect of Citrus Paradisi Concentrated Oil and Specific Component d-Limonene on the Dietary Intake of Mus Musculus
3062	An Investigation of the Effects of Cytidine Diphosphate Choline on Parkinson's like Caenorhabditis elegans
3064	The Effect of Anti-TGF Beta and Light Endurance Training on Muscle Regeneration in elderly Female Mice
3076	iShrimp
3080	Investigating Bivalve Bioremediation in a Warming Climate
3098	Biological Control of the Invasive Eurasian Watermilfoil Using Aquatic Weevils
3103	The Effects of Ethanol on Zebrafish Embryonic Development
3109	The affect of different aspects and types of light on Manduca Sexta
3120	The Effects of Active Ingredients in Energy Drinks on the Development of Zebrafish Embryos
3121	The Feeding Behavior of Squilla empusa in the Long Island Sound
3125	How Taurine Affects Hermit Crabs
3129	The Affects of Temperature on the Filtration Rate of Mercenaria mercenaria
3131	The Effects of Leucine on the Zebrafish Embryonic Development
3134	Ilio-sacral and Ilio-femoral Joint Relation in the Positioning of Iguanas in the Lizard Tree of Life
3135	An Assessment of the Reefs in the Windward Islands Due to the Presence of Pterois volitans
3138	The Effects of Diethyl Phthalate on Embryonic Development in Zebrafish
3149	The Two A's: Animals and Autism
3158	The Effect of Common Industrial Food Additives on Zebrafish Embryo Development
3509	External Digestion of Cellulose Utilizing Enteric Symbionts from the Termite gut
4028	Acid Rain: A Silent Killer
5512	Alleviating Minor Household Flooding Situations

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Behavioral and Social Sciences

Project Number	Title
1005	Robotic Companions
1020	Effect of various temperatures on fly locomotion.
2013	How Do You See It? The Effect of Age on Depth Perception
2038	Does the Bouba-Kiki Effect Apply to Real World Objects and Shapes
2503	N.D. Naturopathic doctors and Alternative healthcare vs. M.D. Medical doctors and Conventional healthcare
2510	Words, Words, Colors, Words
2518	Optical Illusions
2521	Can action related video games trigger an adrenaline response as measured by changes in heart rate or blood pressure?
2525	Birds and Color
2528	What Makes Your Heart Beat? Scary vs Neutral Text, Reading vs Listening; A Follow-up Study
2532	The Effects of Bisphenol-A on anxiety, short-term memory, and sucrose preference in adolescent female rats.
2543	Should the Flu Vaccination Program be modified to emphasize vaccination of the young and less emphasis on the elderly?
3001	Can Smells Improve Your Mental Ability?
3002	DNA sequence motifs as biomarkers for genomic disorders.
3004	Remember the Mind
3012	Are You a Righty or a Lefty?
3031	Effect of hours of sleep per school night on subject-specific academic success in high school students
3046	The Effect of Stress on Academic Performance
3061	Effect of Citrus Paradisi Concentrated Oil and Specific Component d-Limonene on the Dietary Intake of Mus Musculus
3063	Dietary Habits as Related to Increasing Numbers of Nephrolithiasis (kidney stones)
3072	Targeting Expression of Histamine 4 Receptors on Microglial Cells to Combat Compulsive Disorders
3073	The Effect of Attentional Demand on Functional Connectivity in the Parietal Lobe
3079	The Effects of Sensory Deprivation on Neural Activity for the Psychological and Mental Treatment of various Mental Conditions
3083	Stress, Stress coping, and Self-Esteem among Asian American Youth
3090	Did You See That?
3095	The Effect of Parental Reading Behavior on Children's Reading Behavior
3102	The Effect of Subliminal Messages on Food Selection
3119	Birth Order and Attention Span
3120	The Effects of Active Ingredients in Energy Drinks on the Development of Zebrafish Embryos
3125	How Taurine Affects Hermit Crabs
3129	The Affects of Temperature on the Filtration Rate of Mercenaria mercenaria
3138	The Effects of Diethyl Phthalate on Embryonic Development in Zebrafish
3140	Examining training climate and Ironman race performance outcomes
3144	Teaching English Language Skills via Interactive Storytelling with a Spanish-Speaking Robot
3149	The Two A's: Animals and Autism
3153	Third Grade Student-Teacher Interactions
3156	Exploring Gender Bias Across Adolescence
3158	The Effect of Common Industrial Food Additives on Zebrafish Embryo Development
3503	The Effect of Health Education on Teen Pregnancy
3514	Does Musical Training Affect Multi-Channel Sensory Integration?
4001	The Effect of Color Schemes and the Age and Gender of A Person on How Quickly The Person Can Read A Stroop Chart
4008	Battle of the Brands

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Behavioral and Social Sciences

Project Number	Title
5002	The Affect of Certain Scents on Short-Term Memory
5527	Can Excercise Really Help Our Brains Work Better?
5530	Robots Evoking Creativity
5547	Which type of arm; robotic, or human would have 100% accuracy and precision when throwing a ball?
6047	Keep your hands on the handle
6053	Horton's Site Native Americans
6118	A Potential and easy to use, low cost Diabetic Test for use in Developing Countries and Rural Areas

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Biochemistry

Project Number	Title
1002	ANTACID POTENCY
1006	Analysis of different wood's resistance and how to prevent or delay the decay with natural sources.
1015	Eliminating Bacteria
1016	Ready Set Grow
2003	Nutritional Value of Smoothies
2005	Processed vs. Unprocessed Foods and Their Effects on Gastric Health
2015	A Structural Approach To Drug Resistance
2024	Bittersweet
2028	Nature's Way of Cleaning Oil Spills in Fresh Water
2034	Seeds Sprout Best...
2037	E-Cigarettes: A New Health Frontier
2044	Growing Our Future: Using LED Hydroponics to Cultivate Fresh Produce: A Solution for Urban Food Deserts
2045	Gluten - A Sticky Situation
2507	Analysis of Phosphorus (Fertilizer) Recovery from Varied "Run-off" Sources (Local Rivers and L.I.S.)
2515	Can You Beat The Heat: The Denaturing of Proteins
2533	A Novel Method To Evaluate The Presence Of Genetically Modified Elements In Seeds.
2534	Does Whey Protein Effect the Rate of Regeneration of Planaria?
3002	DNA sequence motifs as biomarkers for genomic disorders.
3003	Nodule Induction in Arabidopsis to Promote Symbiosis with Rhizobia
3005	The Role of Asymmetric Division in Memory B-Cell Development
3008	Electrolyte challenge Orange Juice vs Energy Drinks
3013	Enzyme/Substrate Concentrations and the Rate of Enzyme-Catalyzed Reactions
3014	ACVR1/ALK2 Inhibitors as a Cure for Fibrodysplasia Ossificans Progressiva (FOP)
3019	Calendula officinalis Naturopathic Treatments for Acne vulgaris Reduction affecting the Glandula sebacea and inhibit the excessive production of Sebum.
3022	An investigation of the effects of high-fructose corn syrup on growth, phenotype, and protein production in <i>Caenorhabditis elegans</i> .
3024	Efficiency of Chlorophyll A and B found in <i>Spinacia Oleracea</i> for Electrical Generation in a Photosynthetic Solar Cell
3025	Gorgonian Coral: A Population Flourishing in a Deprived Environment
3032	An investigation into enteric symbionts and their effects on the interaction between gliadin and anti-gliadin antibodies.
3033	The Effect of Sea Temperatures On Plankton and the Ocean
3037	Review: Systemus Lupus Erythematosus: Updated Treatments and the MYD88 Pathway
3043	Studying the role of neutrophils in preventing the dissemination of <i>Listeria monocytogenes</i> in the intestinal mucosa following oral infection
3051	Analyzing Bacterial Resistance to Antibiotics
3053	The Effects of L-Carnosine on the Lifespan of the nematode <i>Caenorhabditis Elegans</i>
3060	Analysis of Megakaryopoiesis via the Rho/SRF and ROS/Erk Pathways
3064	The Effect of Anti-TGF Beta and Light Endurance Training on Muscle Regeneration in elderly Female Mice
3067	The Effect of ILV Clusters on the Aggregation Propensity of CRABP.
3070	How Bio-Fuels Compare to Gassoline
3075	The Biofixation of CO ₂ and Greenhouse Gases Using Coccolithophorid Algae as a Natural Remedy to the Greenhouse Effect
3077	The Effect of pH on Nutrient Absorption
3078	The Effect of Olive Oil Phenols on the Concentration of Yeast Bacteria in Food Preservation
3079	The Effects of Sensory Deprivation on Neural Activity for the Psychological and Mental Treatment of various Mental Conditions

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Biochemistry

Project Number	Title
3082	Primary Cilia Vesicle Secretion and Resorption Facilitate Cell Communication
3087	Investigating the Efficacy of Bioluminescent Mushroom <i>Panellus Stipticus</i> as a Biosensor to Detect the Toxicity of Water Contaminants
3088	The Use of Bioluminescent Bacteria to Measure Persistent Levels of Water Pollution
3097	The Hydrolyzing Games Hydrochloric Acid vs. Beta-Glucosidase
3105	Expression of DesB and DesZ for the Creation of Cellulosic Biofuels
3108	Targeted Therapy for Lung Cancer
3126	testing for antibiotic properties of the seaweeds <i>Saccharina latissima</i> and <i>Gracilaria trikvahiae</i> against <i>Vibrio fischeri</i>
3127	Structure-Based Analysis of The CXCR4 N-Terminus
3128	Effects of Epigallocatechin Gallate on Breast Cancer Growth Rates
3136	The Effects of Road Salt & Gasoline on Amylase Function
3137	Investgating the Phytoremediation of Lead: The Type of Plant Species Versus the Rate of Lead Extraction in Hydroponic Media
3138	The Effects of Diethyl Phthalate on Embryonic Development in Zebrafish
3145	siRNA-loaded exosome-lipid nanoparticles for in vitro treatment of B16F10 cells
3146	Skin Deep: A Biochemical Analysis of Grape Pigments
3147	The Effectiveness of Plant Material as Metal Chelators
3151	Development of cytokine-based glioma therapies
3158	The Effect of Common Industrial Food Additives on Zebrafish Embryo Development
3160	Photosynthetic Production of an Infinite Oxygen Supply
3162	Characterization of TC-2153 Inhibition on Striatal-Enriched Protein Tyrosine Phosphatase (STEP)in Human Cell Lines
3507	Virtual screening and Evaluation of non-covalent Inhibitors for Class C β -lactamase from <i>Enterobacter cloacae</i> P99
3508	Cloning, sequencing and analysis of potential amyloid beta precursor protein from Cnidarians
3509	External Digestion of Cellulose Utilizing Enteric Symbionts from the Termite gut
3511	The Effects of Black Seed Oil and Thymoquinone on Bacterial Growth
3512	Effect of Environmental Conditions on Hydrogen Production in <i>Clostridium</i>
3515	Saving the World from Brain Eating Amoebas
3517	Hydroponics: Effect of varying Calcium concentration on number of flowers produced by Wisconsin Fast Plants grown in hydroponic media.
3519	An investigation of horizontal gene transfer by way of organelle capture: <i>Arabidopsis</i> to <i>Rapa</i>
4027	Rubber Bones
4028	Acid Rain: A Silent Killer
5011	THE INVESTIGATION OF THE PRESENCE OF PLASTIC MICROSCOPIC FIBERS IN EFFLUENT SEWAGE WATER AND THE LONG ISLAND SOUND
5501	Which type of grocery bag; plastic, paper, or recycled paper, biodegrades the fastest?
5503	Which Antacid can Neutralize the Most Stomach Acid?
5518	Do enzymes make a better detergent?
5519	Ananalysis of"Super Spices" Effect on Cell Absorption, Antioxidant Levels, and pH.
5521	Bio Battery: The Wise Alternative for Future Renewable Energy
5528	Greenery
5541	Soap Mixtures and their Bubbles
6017	The Stability and Activity of the Biosynthetic and Synthetic Emulsifiers of Xanthan Gum, Propylene Glycol Alginate (PGA), and Tragacanth
6026	Bio-sensor drug carrier for insulin
6035	Analyzing the Effect of De-icers on Connecticut River Water Quality
6051	Effective Energy Storage Technology for Electric Power

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Biochemistry

Project Number	Title
6079	An Inquiry Into The Use of Graphene as a Superconductor
6090	An investigation studying the effect of the pseudomonas bacteria in a salt h20 environment
6093	Synthesis and Characterization of EGCG-PLAGA Conjugates and Mixtures
6094	The Effect of Nanoparticles on UVA-Induced Psoralen Photoadducts and their Rapid Detection by Matrix-assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometry (MALDI-TOF MS)
6095	Synthesis of a Block Co-polymer for the Manufacturing of a Bio-Degradable Monomeric Filament
6097	Application of Nano-fibril Structures in Fabrication of Lightweight Materials of High Tensile Toughness
6110	Determination and removal of 17-Beta Estradiol in Long Island Sound.
6511	Shelf Life of Milk.
6516	The Effect of Temperature, pH, and Dissolved Oxygen on Halophilic Desalination

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Cellular and Molecular Biology

Project Number	Title
1003	Common energy drinks and how they effect the development of zebra fish embryo.
1007	Extracting DNA from Strawberries.
1010	Use of a Microbial Fuel Cell to Generate Electricity from Compost
1012	Effects of Ethanol, lemon, peppermint, and ginger extracts on e.coli
1020	Effect of various temperatures on fly locomotion.
2028	Nature's Way of Cleaning Oil Spills in Fresh Water
2037	E-Cigarettes: A New Health Frontier
2041	3D Printing of Amyloid Precursor Protein: The Gene Mutation that Causes Alzheimer's
2514	The Microwave Mistake
2520	The Effects of Antioxidants on cell regrowth and regeneration in Lumbricus variegatus
2523	Does a Magnetic Field Affect Plant Cells?
2533	A Novel Method To Evaluate The Presence Of Genetically Modified Elements In Seeds.
2534	Does Whey Protein Effect the Rate of Regeneration of Planaria?
3002	DNA sequence motifs as biomarkers for genomic disorders.
3003	Nodule Induction in Arabidopsis to Promote Symbiosis with Rhizobia
3005	The Role of Asymmetric Division in Memory B-Cell Development
3013	Enzyme/Substrate Concentrations and the Rate of Enzyme-Catalyzed Reactions
3014	ACVR1/ALK2 Inhibitors as a Cure for Fibrodysplasia Ossificans Progressiva (FOP)
3017	Escherichia Coli's Resistance to a Household Cleaner Through the Zone of Inhibition
3019	Calendula officinalis Naturopathic Treatments for Acne vulgaris Reduction affecting the Glandula sebacea and inhibit the excessive production of Sebum.
3020	The Effect of Flavonoids on Apoptosis, Proliferation, and the inhibition of Nuclear Factor Kappa B of Mouse Breast Cancer Cells
3022	An investigation of the effects of high-fructose corn syrup on growth, phenotype, and protein production in Caenorhabditis elegans.
3024	Efficiency of Chlorophyll A and B found in Spinacia Oleracea for Electrical Generation in a Photosynthetic Solar Cell
3035	Trogocytosis between Toxoplasma and Host Cell Membrane during Invasion
3039	Effects of Estrogen on Nematostella vectensis Regeneration Abilities
3043	Studying the role of neutrophils in preventing the dissemination of Listeria monocytogenes in the intestinal mucosa following oral infection
3044	Differentially Expressed Genes in the Adipose Layer of Skin in Psoriatic Patients
3051	Analyzing Bacterial Resistance to Antibiotics
3053	The Effects of L-Carnosine on the Lifespan of the nematode Caenorhabditis Elegans
3056	Will Lycopene Affect the Growth Rate of Breast Cancer Cells?
3058	The Effects of PTHrP on Mammary Epithelial Cells
3060	Analysis of Megakaryopoiesis via the Rho/SRF and ROS/Erk Pathways
3062	An Investigation of the Effects of Cytidine Diphosphate Choline on Parkinson's like Caenorhabditis elegans
3064	The Effect of Anti-TGF Beta and Light Endurance Training on Muscle Regeneration in elderly Female Mice
3066	The Effects of Herbicides on Nematostella vectensis Development and Regeneration
3070	How Bio-Fuels Compare to Gasoline
3072	Targeting Expression of Histamine 4 Receptors on Microglial Cells to Combat Compulsive Disorders
3074	Exploration of how Perjeta could help treat cancer
3077	The Effect of pH on Nutrient Absorption
3079	The Effects of Sensory Deprivation on Neural Activity for the Psychological and Mental Treatment of various Mental Conditions
3081	Rethinking Biological Modeling: An Online Tool That Enables Researchers, Educators, and Students to Build, Analyze, and Share Rule-Based Models of Varying Complexity

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Cellular and Molecular Biology

Project Number	Title
3082	Primary Cilia Vesicle Secretion and Resorption Facilitate Cell Communication
3087	Investigating the Efficacy of Bioluminescent Mushroom <i>Panellus Stipticus</i> as a Biosensor to Detect the Toxicity of Water Contaminants
3091	Investigation of the BMP4 Culture Conditions Necessary to Produce Mesoderm-Lineage Cells from a Human Embryonic Stem Cell-Derived, Mesendoderm Intermediate
3094	Investigation of the Functional Oligomeric State of the Herpes Simplex Virus type 1 Alkaline Nuclease
3099	Use of Stem Cell Engineering to Test the Function of a Genetic Variant for PTSD
3103	The Effects of Ethanol on Zebrafish Embryonic Development
3105	Expression of DesB and DesZ for the Creation of Cellulosic Biofuels
3107	The Creation of Recombinant Proteins through Liquid Syncytial Endosperm Found in Coconut Water
3108	Targeted Therapy for Lung Cancer
3110	Determining an Optimal Multiplicity of Infection for Adenoviral Transduction of ViraDuctin Introduced 3T3 Fibroblast Cells
3114	FRET based intercellular ATP imaging for testing of BCL-xL as a mitochondrial efficiency enhancer during Long Term Potentiation.
3116	The Genetic Touch
3117	Development and Verification of Primers for the Cytochrome Oxidase Gene in Cnidarians
3120	The Effects of Active Ingredients in Energy Drinks on the Development of Zebrafish Embryos
3124	SQSTM1/P62 Mutation of PDB
3126	testing for antibiotic properties of the seaweeds <i>Saccharina latissima</i> and <i>Gracilaria trikvahiae</i> against <i>Vibrio fischeri</i>
3127	Structure-Based Analysis of The CXCR4 N-Terminus
3128	Effects of Epigallocatechin Gallate on Breast Cancer Growth Rates
3130	Primary Craniofacial Osteosarcoma's Represent a Malignant Transformation of Neural Crest-Derived Stem Cells
3131	The Effects of Leucine on the Zebrafish Embryonic Development
3132	Carcinogens in Oil
3138	The Effects of Diethyl Phthalate on Embryonic Development in Zebrafish
3141	An Analysis of Experimental Stem Cell Differentiation Data
3143	Investigation of the Effects of Compounds in Curcumin, Fruits, Berries, and Garlic on Breast Cancer Cell Survival and Growth
3145	siRNA-loaded exosome-lipid nanoparticles for in vitro treatment of B16F10 cells
3146	Skin Deep: A Biochemical Analysis of Grape Pigments
3151	Development of cytokine-based glioma therapies
3152	Chemosensitization of high-grade serous ovarian carcinoma via calcium signaling
3154	H19 lncRNA-Mediated Regulation of Aromatase Expression in Granulosa Cells
3158	The Effect of Common Industrial Food Additives on Zebrafish Embryo Development
3159	The Population Dynamics of Inteins: Investigative Analysis of Metagenomes
3160	Photosynthetic Production of an Infinite Oxygen Supply
3161	The Role of Cx43 in Vascularization
3162	Characterization of TC-2153 Inhibition on Striatal-Enriched Protein Tyrosine Phosphatase (STEP) in Human Cell Lines
3163	Use of a Pre-Chemotherapy/Radiotherapy Regimen of Glutamine and Probiotics to Prevent Oral Mucositis
3501	Nice to Meat You: Using DNA Barcoding to Detect Mislabeling in the Meat Industry
3502	Alternate Source of Paper from Melons
3507	Virtual screening and Evaluation of non-covalent Inhibitors for Class C β -lactamase from <i>Enterobacter cloacae</i> P99
3508	Cloning, sequencing and analysis of potential amyloid beta precursor protein from Cnidarians
3509	External Digestion of Cellulose Utilizing Enteric Symbionts from the Termite gut
3510	Synergistic affect of combinations of antibiotic v.s <i>E.coli</i> .

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Cellular and Molecular Biology

Project Number	Title
3511	The Effects of Black Seed Oil and Thymoquinone on Bacterial Growth
3512	Effect of Environmental Conditions on Hydrogen Production in Clostridium
3515	Saving the World from Brain Eating Amoebas
3519	An investigation of horizontal gene transfer by way of organelle capture: Arabidopsis to Rapa
3521	Truly Vegetarian? Using DNA Barcoding to Detect Possible Contamination of Vegetarian Products
4027	Rubber Bones
5011	THE INVESTIGATION OF THE PRESENCE OF PLASTIC MICROSCOPIC FIBERS IN EFFLUENT SEWAGE WATER AND THE LONG ISLAND SOUND
6023	Correlation of Hippocampal Neurogenesis and Exposure to Cosmic Ray Highly Ionizing Radiation (HZE) Particles
6038	Solar Water Disinfection Optimization Using Titanium Dioxide Coated Plastics
6090	An investigation studying the effect of the pseudomonas bacteria in a salt h2o environment
6095	Synthesis of a Block Co-polymer for the Manufacturing of a Bio-Degradable Monomeric Filament

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Chemistry

Project Number	Title
1002	ANTACID POTENCY
1008	The Effects of De-icers on Grass Growth
1013	The Effects of Substances on Candies
1018	Which substances will produce the most energy?
2003	Nutritional Value of Smoothies
2007	Decreasing Sugar in Horse Treats
2008	The Mummification of Apples
2009	Don't Drink That
2015	A Structural Approach To Drug Resistance
2027	One Bad Apple Can Spoil The Whole Bunch
2028	Nature's Way of Cleaning Oil Spills in Fresh Water
2037	E-Cigarettes: A New Health Frontier
2502	The effect of processing on vitamin C content in fruitjuices as measured by iodometric titration
2504	Analyzing Soil Components
2533	A Novel Method To Evaluate The Presence Of Genetically Modified Elements In Seeds.
3014	ACVR1/ALK2 Inhibitors as a Cure for Fibrodysplasia Ossificans Progressiva (FOP)
3016	Brilliant Bioplastic: A Comparative Analysis of Strength in Various Bioplastics
3024	Efficiency of Chlorophyll A and B found in Spinacia Oleracea for Electrical Generation in a Photosynthetic Solar Cell
3040	Investigation of the Inhibition of E. coli Biofilm Formation on Food-Contact Surfaces via a Brominated Furanone
3041	Exothermic Reactions: Can They Be Used to Make More Efficient/Environmentally Safe Deicers?
3043	Studying the role of neutrophils in preventing the dissemination of Listeria monocytogenes in the intestinal mucosa following oral infection
3070	How Bio-Fuels Compare to Gasoline
3072	Targeting Expression of Histamine 4 Receptors on Microglial Cells to Combat Compulsive Disorders
3075	The Biofixation of CO ₂ and Greenhouse Gases Using Coccolithophorid Algae as a Natural Remedy to the Greenhouse Effect
3077	The Effect of pH on Nutrient Absorption
3078	The Effect of Olive Oil Phenols on the Concentration of Yeast Bacteria in Food Preservation
3079	The Effects of Sensory Deprivation on Neural Activity for the Psychological and Mental Treatment of various Mental Conditions
3087	Investigating the Efficacy of Bioluminescent Mushroom Panellus Stipticus as a Biosensor to Detect the Toxicity of Water Contaminants
3101	The Effect of TiO ₂ /Graphene Oxide on the Purification of Tris(2-Chloroethyl)Phosphate(TCEP) and CuSO ₄ (CS) Contaminated Water
3108	Targeted Therapy for Lung Cancer
3126	testing for antibiotic properties of the seaweeds Saccharina latissima and Gracilaria tikvahiae against Vibrio fischeri
3146	Skin Deep: A Biochemical Analysis of Grape Pigments
3148	Effects of Disposed Medications on Water Chemistry
3158	The Effect of Common Industrial Food Additives on Zebrafish Embryo Development
3160	Photosynthetic Production of an Infinite Oxygen Supply
3512	Effect of Environmental Conditions on Hydrogen Production in Clostridium
3520	A Novel Approach to Removing Oil Spills from Seawater by using Sustainable and Cost-efficient Materials
4006	Heat it up
4009	Effect of Sulfites as a Preservative on Cell Absorption and Nutrient Content.
4015	Crystallizing Fudge
4017	Meltdown

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Chemistry

Project Number	Title
4019	Burning Candles
4020	Analysis of Prevention and delay of ignition and burn times of synthetic fingernails
4022	Chemical Propulsion
4027	Rubber Bones
4030	Novel Methods for Water Desalination by Harnessing Solar Energy using a Solar Oven With Flat Mirrors, Fresnel Lens and a Parabolic Mirror
5007	Cool, Cool Chlorides...A comparison of ice melting chlorides as deicers and their effectiveness as an anti-freeze
5011	THE INVESTIGATION OF THE PRESENCE OF PLASTIC MICROSCOPIC FIBERS IN EFFLUENT SEWAGE WATER AND THE LONG ISLAND SOUND
5013	Smokey Ice
5019	Fizz, Fizz!
5020	Crystal Clear
5021	Crystals
5023	Acids and Bases: The Rainbow Connection
5026	Turn Milk Into Plastic
5029	To Design A Self-Sustained Wind-Microbial Hybrid Device that will Generate Clean Hydrogen for Energy
5033	Oxidation in Apples
5038	The Amount of Carbohydrates in Different Brands of Non-Fat Powdered Milk
5040	SUPERCOOL
5044	Which Exterior Paint Will Protect Your Home?
5045	The Search for the Most Effective Ice Melt
5046	The Effects of Salt Concentrations and Voltages on the Electrolysis Process
5050	The Effects of Temperature on Chemical Reactions
5501	Which type of grocery bag; plastic, paper, or recycled paper, biodegrades the fastest?
5503	Which Antacid can Neutralize the Most Stomach Acid?
5508	A Study of the Production, Impact Testing, and Degradation of Seaweed Based Bioplastics
5510	Viscosity and Melting Profile of Dairy and Non-Dairy Ice-Cream and the Development of Appealing Ice-Cream for Lactose Intolerant Individuals.
5512	Alleviating Minor Household Flooding Situations
5515	Removal and Recycling of Phosphate from water Using Various Methods: A Sustainability Project
5516	Burn Those Calories
5517	Analysis of natural sources of possible road de-icers and effect on pavement, soil, and plants.
5528	Greenenergy
5531	Comparing Reactions
5533	Which calcium carbonate antacid will neutralize gastric acid more effectively?
5534	Do Water-Filtering Bottles Really Work?
5535	The Effect of Rainfall on Oxygen/ pH Levels in Bodies of Water
5541	Soap Mixtures and their Bubbles
5546	Desalination for a Nation
5548	Clean and Green is (Ph)un
5561	Graphene Enhanced Piezoelectric Generator for Environmental Energy Conservation
6001	Burning Calories: How much energy is stored in different types of foods?
6008	The Effect of Varying Ferrofluid Carrier Liquids on Oil Spill Remediation
6009	Chemical and Microwave Pretreatment of Biomass to Optimize Reducing Sugar Yield for Cellulosic Ethanol Applications
6012	Testing the Use of Carbon Nanotubes in Electrochemical Double Layered Super Capacitors

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Chemistry

Project Number	Title
6013	Development of a Sustainable Energy System that Converts Lightning to Hydrogen Gas through Plasma Electrolysis
6017	The Stability and Activity of the Biosynthetic and Synthetic Emulsifiers of Xanthan Gum, Propylene Glycol Alginate (PGA), and Tragacanth
6019	Are you getting what you pay for at the gas station?
6021	Volcanoes
6026	Bio-sensor drug carrier for insulin
6027	Obtaining Alternative Concentrations of Ferric Chloride for Higher Visibility while Etching Copper for use in Jewelry
6028	Finding the Best Rust Remover
6029	Determining Natural Pigment Category that Leads to the Highest Output of Current and Voltage on Dye-Sensitized Solar Cell
6031	Clear reaction
6035	Analyzing the Effect of De-icers on Connecticut River Water Quality
6038	Solar Water Disinfection Optimization Using Titanium Dioxide Coated Plastics
6040	Design of a Novel Photo-Sensitized Carbon-based Supercapacitor for Capture and Storage of Solar Energy
6041	The Effects of Pressure, Temperature, and Cooling Rate on Tensile Strength of Extruded High Density Polyethylene
6045	Optimizing Hydrogen Production From a Piezo-electrochemical Water-Splitting Mechanism with Low-Cost Synthesis of ZnO and BiFeO ₃ Nanostructures
6049	Momentum Powered Magnetic Generator For Electric Car Applications And Free Energy And Perpetual Motion Research
6051	Effective Energy Storage Technology for Electric Power
6055	Chemically Testing Tattoo Ink using Raman Spectroscopy
6056	Determining Honey Adulteration with Raman Spectra
6057	Baking-Soda Fizz
6060	OXIDATIVE DESULFURATION OF DIBENZOTHIOPHENE THROUGH THE USE OF TiO ₂ COATED OMS-2
6064	Examining Graphene Nanoparticles for CO ₂ capture and water purification.
6069	Titanium based artificial bone materials
6070	The Effect of Fertilizer on Dissolved Oxygen Levels in Water.
6071	Hydrogen Fuel Cells How Changes in Temperature Affect Them
6077	The Power of Gatorade
6078	Temperature-Induced Concurrent Removal and Recovery of Wastewater Ammonia-Nitrogen
6079	An Inquiry Into The Use of Graphene as a Superconductor
6081	Solar Computing: Creating a cost-effective off-the-grid laptop for utilization in third world countries
6086	Studies of Phase Separation using Ferrofluids as a Model
6090	An investigation studying the effect of the pseudomonas bacteria in a salt h ₂ O environment
6091	Synthesis of Silver Nanoparticles using Plasma Arcing Atomizing Methods
6093	Synthesis and Characterization of EGCG-PLAGA Conjugates and Mixtures
6094	The Effect of Nanoparticles on UVA-Induced Psoralen Photoadducts and their Rapid Detection by Matrix-assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometry (MALDI-TOF MS)
6095	Synthesis of a Block Co-polymer for the Manufacturing of a Bio-Degradable Monomeric Filament
6097	Application of Nano-fibril Structures in Fabrication of Lightweight Materials of High Tensile Toughness
6098	Effect of Accelerated Particles on the atoms of Copper and Gold
6099	Inorganic Biology: Direction Control of Polyoxometalate-Based Tubular Microstructures
6101	A Filamentous Organic Solar Cell Based Piezoelectric Architecture for Powering Commercial and Biological Electronic Devices
6105	A Novel Application of Piezoelectricity and Impressed Current Cathodic Protection for Corrosion Prevention
6106	Uncovering Hidden Masterpieces
6110	Determination and removal of 17-Beta Estradiol in Long Island Sound.

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Chemistry

Project Number	Title
6113	Enhancing Water Resistance Qualities of SrAl ₂ O ₄ :Eu ²⁺ , Dy ³⁺ Phosphors Using Barrier Coatings
6118	A Potential and easy to use, low cost Diabetic Test for use in Developing Countries and Rural Areas
6120	Do You C This Juice? How Levels of Vitamin C Deplete Over Time
6511	Shelf Life of Milk.
6512	Gravimetric Analysis of Calcium and Hard Water
6518	The Effect of Extreme Cold Temperatures on the Strength of Adhesive Bonds
6519	Neodymium Magnet vs Copper Pipe

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Computer Science

Project Number	Title
2518	Optical Illusions
2543	Should the Flu Vaccination Program be modified to emphasize vaccination of the young and less emphasis on the elderly?
3002	DNA sequence motifs as biomarkers for genomic disorders.
3044	Differentially Expressed Genes in the Adipose Layer of Skin in Psoriatic Patients
3051	Analyzing Bacterial Resistance to Antibiotics
3079	The Effects of Sensory Deprivation on Neural Activity for the Psychological and Mental Treatment of various Mental Conditions
3081	Rethinking Biological Modeling: An Online Tool That Enables Researchers, Educators, and Students to Build, Analyze, and Share Rule-Based Models of Varying Complexity
3144	Teaching English Language Skills via Interactive Storytelling with a Spanish-Speaking Robot
4010	The Effects of a Robot's Speed in Mazes with Different Amounts of Turns
4014	Printed Prosthetics
4026	WriteBot
5018	A System for Remembering Generic Items (ASRGI for short)
5031	Mathematical Patterns Found in Selected Classical Compositions
5529	How long does it take devices to charge when the power goes out?
5530	Robots Evoking Creativity
5532	The Effect of Different Barriers, Materials and Interferences on the Travel of Radio Waves from a Router to a Computer
5547	Which type of arm; robotic, or human would have 100% accuracy and precision when throwing a ball?
5553	Invisible Technology.
5556	Drawing Robot
5564	Foot-Operated Computer Mouse Prototype
5565	Mathematical Analysis of the Rubik's Cube Using the Thistlethwaite Algorithm and Sets of Moves
6007	Using Verbal Commands to Play the Maze Game with NAO, Humanoid Robot
6015	Geant4 Monte Carlo Simulation in the Development of CMS Calorimetry
6042	A Probe of the Phase Space of Celestial N-body Systems and Its Implications for Extraterrestrial Life
6043	Development of a Simulation Model for the Solution of Einstein's General Relativity and Quantum Mechanics Based on Causal Dynamical Triangulation
6046	Movie Music
6054	Exploration into the Development of a Mathematical Solar Cell Model in order to Simulate Solar Energy Potential in the United States
6062	Atmospheric Water Generator From Alternative Energy Sources.
6065	Computer Hand Input Mechanism
6075	On the Minimization of Rotor Losses in the Three Phase Induction Machine
6081	Solar Computing: Creating a cost-effective off-the-grid laptop for utilization in third world countries
6084	Mapping Tidal Current Farm Potential Along the Long Island Sound
6121	A Novel Approach to The Design of an Electroencephalogram-Based Brain-Computer Interface For Use In Thought to Text Translation
6122	Building a Maglev train using electromagnet
6124	Designing a circuit board to wirelessly power a Left Ventricular Assist Device (LVAD)
6503	Battling Subjectivity - Finding Tools For Nano-Scale Measurement
6504	Blades of Fury Pt. 2: Weight Efficiency
6506	Building an Automated Prototype for the USAR Operations and Industrial Applications Using Lego Mindstorm, Tetrax and RobotC
6508	Comparative Efficiencies of Magnetically Levitating Train Systems in and out of a Vacuum Chamber

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Earth Science

Project Number	Title
1004	Purification Possibilities
1020	Effect of various temperatures on fly locomotion.
1021	Plants on Other Planets: The Effects of Gravity and Atmosphere
2002	The Effect of Magnetism on Plant Growth
2016	Earthquakes
2025	Aquaponics Terracotta vs Water; Benefits of Grow Mediums
2029	Biodegradation: Are We Convinced
2031	Green Growing Alternatives
2034	Seeds Sprout Best...
2037	E-Cigarettes: A New Health Frontier
2044	Growing Our Future: Using LED Hydroponics to Cultivate Fresh Produce: A Solution for Urban Food Deserts
2504	Analyzing Soil Components
2511	It's Raining, It's Pouring, and pH Levels Across Hamden Need Exploring
2535	BioGas: The Future to Alternative Energy
2536	Can I successfully pollinate radish flowers?
2544	Can the color of your house effect your energy bill
2545	Thermohaline Circulation Shutdown
3023	Hydro and Solar Based Hybrid System
3033	The Effect of Sea Temperatures On Plankton and the Ocean
3041	Exothermic Reactions: Can They Be Used to Make More Efficient/Environmentally Safe Deicers?
3055	The Effect of Carbon Dioxide Levels on Oxygen Production in the Diatom Cyclotella meneghiniana
3069	The Nepal Project: The Impact of Soil Degradation on Soil Fertility
3070	How Bio-Fuels Compare to Gassoline
3075	The Biofixaction of CO2 and Greenhouse Gases Using Coccolithophorid Algae as a Natural Remedy to the Greenhouse Effect
3087	Investigating the Efficacy of Bioluminescent Mushroom Panellus Stipticus as a Biosensor to Detect the Toxicity of Water Contaminants
3160	Photosynthetic Production of an Infinite Oxygen Supply
3502	Alternate Source of Paper from Melons
3512	Effect of Environmental Conditions on Hydrogen Production in Clostridium
3518	Observing the Effects of Biochar Soil Additives on Plants Grown with Pumpkin, Pomegranate, and Papaya Seed Fertilizers while Determining the Best Fertilizer for Plant Growth
3519	An investigation of horizontal gene transfer by way of organelle capture: Arabidopsis to Rapa
4002	Worming Around
4003	Using a Solar Oven to Purify Salt Water to Become Drinkable
4005	pH from Scratch
4028	Acid Rain: A Silent Killer
5003	How does Color Affect Heat ?
5005	The Effects of Soot on the Melting of Glaciers
5007	Cool, Cool Chlorides...A comparison of ice melting chlorides as deicers and their effectiveness as an anti-freeze
5010	The Best Media
5020	Crystal Clear
5021	Crystals
5029	To Design A Self-Sustained Wind-Microbial Hybrid Device that will Generate Clean Hydrogen for Energy
5040	SUPERCOOL

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Earth Science

Project Number	Title
5043	Evaporation Situation
5045	The Search for the Most Effective Ice Melt
5049	The Effect of Putting Duct Tape on a Wiffle Ball Bat
5052	How much force will come from changing the polarity of two charged magnetic rocks and how far will they go away from each other?
5056	The Effect of Freezing and Thawing on Various Types of Rocks
5501	Which type of grocery bag; plastic, paper, or recycled paper, biodegrades the fastest?
5508	A Study of the Production, Impact Testing, and Degradation of Seaweed Based Bioplastics
5512	Alleviating Minor Household Flooding Situations
5513	How much salt is in water?
5529	How long does it take devices to charge when the power goes out?
5535	The Effect of Rainfall on Oxygen/ pH Levels in Bodies of Water
5538	Temperature Check of the Sea
5544	Supercooling Water and Snap Freezing.
5546	Desalination for a Nation
5549	The Effect of Different Rain Waters on the Growth of Radish Seeds
6013	Development of a Sustainable Energy System that Converts Lightning to Hydrogen Gas through Plasma Electrolysis
6021	Volcanoes
6022	Development of wet lands and utilization of ground water without disturbing environment.
6024	Quality of Nighttime Photography Based on Light Sources
6032	3 Little Pigs
6035	Analyzing the Effect of De-icers on Connecticut River Water Quality
6039	The Construction and Calculation of an Atmospheric Geothermal Airlift Pump Condenser
6041	The Effects of Pressure, Temperature, and Cooling Rate on Tensile Strength of Extruded High Density Polyethylene
6053	Horton's Site Native Americans
6063	Global Dynamic Numerical Computer Forecasting Models: Comparing the ECMWF to the GFS
6079	An Inquiry Into The Use of Graphene as a Superconductor
6090	An investigation studying the effect of the pseudomonas bacteria in a salt h20 environment
6108	How do Cover Crops affect Soil pH
6111	How the Type of Footing Effects the Impact of Livestock on Soil Erosion
6119	Earth Energy
6502	Black Ice Road Sensors
6509	Designing and Building a Scale Model of an Eco-friendly and Self-sustainable city
6519	Neodymium Magnet vs Copper Pipe

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Engineering: Materials & Bioengineering

Project Number	Title
2015	A Structural Approach To Drug Resistance
2037	E-Cigarettes: A New Health Frontier
2527	Your Head, Your Helmet
2533	A Novel Method To Evaluate The Presence Of Genetically Modified Elements In Seeds.
2544	Can the color of your house effect your energy bill
3009	Electrospun Poly(lactic-co-glycolic acid) Scaffolds Slow Raw 264.7 Macrophage Fusion
3016	Brilliant Bioplastic: A Comparative Analysis of Strength in Various Bioplastics
3040	Investigation of the Inhibition of E. coli Biofilm Formation on Food-Contact Surfaces via a Brominated Furanone
3041	Exothermic Reactions: Can They Be Used to Make More Efficient/Environmentally Safe Deicers?
3070	How Bio-Fuels Compare to Gassoline
3075	The Biofixation of CO2 and Greenhouse Gases Using Coccolithophorid Algae as a Natural Remedy to the Greenhouse Effect
3079	The Effects of Sensory Deprivation on Neural Activity for the Psychological and Mental Treatment of various Mental Conditions
3087	Investigating the Efficacy of Bioluminescent Mushroom Panellus Stipticus as a Biosensor to Detect the Toxicity of Water Contaminants
3093	Immunogenicity and Efficacy of a Nanoparticle-based Lyme Disease Vaccine
3099	Use of Stem Cell Engineering to Test the Function of a Genetic Variant for PTSD
3107	The Creation of Recombinant Proteins through Liquid Syncytial Endosperm Found in Coconut Water
3141	An Analysis of Experimental Stem Cell Differentiation Data
3145	siRNA-loaded exosome-lipid nanoparticles for in vitro treatment of B16F10 cells
3163	Use of a Pre-Chemotherapy/Radiotherapy Regimen of Glutamine and Probiotics to Prevent Oral Mucositis
3502	Alternate Source of Paper from Melons
3509	External Digestion of Cellulose Utilizing Enteric Symbionts from the Termite gut
3515	Saving the World from Brain Eating Amoebas
3519	An investigation of horizontal gene transfer by way of organelle capture: Arabidopsis to Rapa
3520	A Novel Approach to Removing Oil Spills from Seawater by using Sustainable and Cost-efficient Materials
4014	Printed Prosthetics
4029	Dressing Our Energy
4030	Novel Methods for Water Desalination by Harnessing Solar Energy using a Solar Oven With Flat Mirrors, Fresnel Lens and a Parabolic Mirror
4033	Harnessing Human Movement for Clean Energy
5024	Josh's Bridge is Falling Down
5036	Whatever Floats Your Boat!
5041	Using Wettability to Develop Reusable Freezer Bags
5045	The Search for the Most Effective Ice Melt
5057	Drag Effect On An Airplane
5501	Which type of grocery bag; plastic, paper, or recycled paper, biodegrades the fastest?
5508	A Study of the Production, Impact Testing, and Degradation of Seaweed Based Bioplastics
5515	Removal and Recycling of Phosphate from water Using Various Methods: A Sustainability Project
5523	What bridge design is strongest?
5529	How long does it take devices to charge when the power goes out?
5553	Invisible Technology.
5560	Solar Sweatshirt
5561	Graphene Enhanced Piezoelectric Generator for Environmental Energy Conservation
6004	Dermal Denticles in Roofing Material

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Engineering: Materials & Bioengineering

Project Number	Title
6005	An Aerodynamic Investigation of a Six Panel Circularly Grooved Golf Ball
6009	Chemical and Microwave Pretreatment of Biomass to Optimize Reducing Sugar Yield for Cellulosic Ethanol Applications
6010	3D Printed Fractal Structures
6012	Testing the Use of Carbon Nanotubes in Electrochemical Double Layered Super Capacitors
6014	Developing a Low-Cost Method of Manufacturing Heart Valves for Transcatheter Aortic Valve Replacement Surgery
6022	Development of wet lands and utilization of ground water without disturbing environment.
6025	Chitin: Nature's Plastic
6026	Bio-sensor drug carrier for insulin
6027	Obtaining Alternative Concentrations of Ferric Chloride for Higher Visibility while Etching Copper for use in Jewelry
6028	Finding the Best Rust Remover
6029	Determining Natural Pigment Category that Leads to the Highest Output of Current and Voltage on Dye-Sensitized Solar Cell
6033	Exploring the Storage Capacities of Carbon Nanotube and Graphene Based Capacitors
6038	Solar Water Disinfection Optimization Using Titanium Dioxide Coated Plastics
6040	Design of a Novel Photo-Sensitized Carbon-based Supercapacitor for Capture and Storage of Solar Energy
6041	The Effects of Pressure, Temperature, and Cooling Rate on Tensile Strength of Extruded High Density Polyethylene
6044	Glucose Meter Shoe
6045	Optimizing Hydrogen Production From a Piezo-electrochemical Water-Splitting Mechanism with Low-Cost Synthesis of ZnO and BiFeO ₃ Nanostructures
6049	Momentum Powered Magnetic Generator For Electric Car Applications And Free Energy And Perpetual Motion Research
6051	Effective Energy Storage Technology for Electric Power
6052	Construction of a Mechanical Arm with Magnetic Claw
6059	Construction of a Renewable Energy Generator from Recycled Materials: A Study on Windbelts
6060	OXIDATIVE DESULFURATION OF DIBENZOTHIOPHENE THROUGH THE USE OF TiO ₂ COATED OMS-2
6064	Examining Graphene Nanoparticles for CO ₂ capture and water purification.
6068	UV Curing
6069	Titanium based artificial bone materials
6075	On the Minimization of Rotor Losses in the Three Phase Induction Machine
6076	Practical Applications for 3D Printing Concrete Structures
6078	Temperature-Induced Concurrent Removal and Recovery of Wastewater Ammonia-Nitrogen
6088	Graphene Film Conductivity with Single Strand Deoxyribonucleic Acid
6091	Synthesis of Silver Nanoparticles using Plasma Arcing Atomizing Methods
6093	Synthesis and Characterization of EGCG-PLAGA Conjugates and Mixtures
6095	Synthesis of a Block Co-polymer for the Manufacturing of a Bio-Degradable Monomeric Filament
6096	New Invention to Efficiently Harness Wave Power
6097	Application of Nano-fibril Structures in Fabrication of Lightweight Materials of High Tensile Toughness
6099	Inorganic Biology: Direction Control of Polyoxometalate-Based Tubular Microstructures
6101	A Filamentous Organic Solar Cell Based Piezoelectric Architecture for Powering Commercial and Biological Electronic Devices
6102	Supporting The Cause: The effect of balsa wood support on craft stick bridges
6103	Voltage Output of Homemade Nano-Crystalline Dye-Sensitized Solar Cells in Series
6110	Determination and removal of 17-Beta Estradiol in Long Island Sound.
6113	Enhancing Water Resistance Qualities of SrAl ₂ O ₄ :Eu ²⁺ , Dy ³⁺ Phosphors Using Barrier Coatings
6118	A Potential and easy to use, low cost Diabetic Test for use in Developing Countries and Rural Areas

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Engineering: Materials & Bioengineering

Project Number	Title
6124	Designing a circuit board to wirelessly power a Left Ventricular Assist Device (LVAD)
6125	Investigating Alternative Methods Using Magnetism to Power a Four-Stroke Engine
6514	Recycled Plastic Bag Insulation
6520	The Future of Armor: Inspired by the Dactyl Club of the Mantis Shrimp

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Engineering: Electrical & Mechanical

Project Number	Title
2037	E-Cigarettes: A New Health Frontier
2544	Can the color of your house effect your energy bill
3024	Efficiency of of Chlorophyll A and B found in Spinacia Oleracea for Electrical Generation in a Photosynthetic Solar Cell
3076	iShrimp
3079	The Effects of Sensory Deprivation on Neural Activity for the Psychological and Mental Treatment of various Mental Conditions
3504	Creating a Living Filter to Lower Levels of Harmful Algae in Long Island Sound
4010	The Effects of a Robot's Speed in Mazes with Different Amounts of Turns
4011	Stealth Shapes
4012	Smog Filter Using An Electrostatic Field
4013	Stirling Engine: The Future
4014	Printed Prosthetics
4018	The Power of Sound
4021	Charge it up!!
4023	Developing a Practical System for Loosely Coupled Inductive Power Transfer
4026	WriteBot
4033	Harnessing Human Movement for Clean Energy
5001	The Effect of Different Antennae on the Reception of a Homemade Radio
5008	Homopolar Motor From Faraday To Now-A-Day
5009	Wind power vs solar power
5012	How the Strength Of Magnets Varies At Different Temperatures
5017	Which Fruit Produces More Electricity?
5018	A System for Remembering Generic Items (ASRGI for short)
5022	How to power a calculator out of change
5029	To Design A Self-Sustained Wind-Microbial Hybrid Device that will Generate Clean Hydrogen for Energy
5049	The Effect of Putting Duct Tape on a Wiffle Ball Bat
5053	An Easier Way For Water
5054	Which produce generates the most electricity: lemon or potato?
5055	Light Bulbs Which type is brighter?
5057	Drag Effect On An Airplane
5058	Bio-Inspired Robot
5502	Ping Pong and Wiffle Ball Catapult
5505	Electromagnets
5507	The Efficiency and Durability of Piezoelectric Generators
5521	Bio Battery: The Wise Alternative for Future Renewable Energy
5522	The Alternative Battery
5524	Wind Turbines: The affects of different blades on a model wind turbine
5525	The Effects of a Gear Size on Speed
5526	A Lot of Power
5528	Greenergy
5529	How long does it take devices to charge when the power goes out?
5537	Burning Calories to Light up the Night
5543	Magnetic Linear Accelerator
5547	Which type of arm; robotic, or human would have 100% accuracy and precision when throwing a ball?

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Engineering: Electrical & Mechanical

Project Number	Title
5550	Electrostatic Generator
5554	Fabrication and testing of the power output of a solid state tesla coil.
5556	Drawing Robot
5557	Does the Shape of an Air Foil affect the lift of an Airplane?
5561	Graphene Enhanced Piezoelectric Generator for Environmental Energy Conservation
5562	Wind Power
5563	Hypoallergenic Lawn Care Device
5564	Foot-Operated Computer Mouse Prototype
5566	Magnetic Levitation Automotive Wind Rail
5567	Which Model Airplane Flies the Farthest?
6001	Burning Calories: How much energy is stored in different types of foods?
6002	Resistance and Temperature of Wires
6007	Using Verbal Commands to Play the Maze Game with NAO, Humanoid Robot
6010	3D Printed Fractal Structures
6012	Testing the Use of Carbon Nanotubes in Electrochemical Double Layered Super Capacitors
6013	Development of a Sustainable Energy System that Converts Lightning to Hydrogen Gas through Plasma Electrolysis
6014	Developing a Low-Cost Method of Manufacturing Heart Valves for Transcatheter Aortic Valve Replacement Surgery
6015	Geant4 Monte Carlo Simulation in the Development of CMS Calorimetry
6016	Tilt angles affect on a photovoltaic modules voltage output.
6018	A New Spin on Generators
6020	Comparing the energy generated from simulated rain drops on a piezoelectric surface to a hydro-electric turbine in a downspout, using the same volume of water
6029	Determining Natural Pigment Category that Leads to the Highest Output of Current and Voltage on Dye-Sensitized Solar Cell
6033	Exploring the Storage Capacities of Carbon Nanotube and Graphene Based Capacitors
6034	Evaluating the Performance of a Model Solar Concentrating System Using Thermoelectric Generating Technology
6036	Pressure to the Future
6039	The Construction and Calculation of an Atmospheric Geothermal Airlift Pump Condenser
6040	Design of a Novel Photo-Sensitized Carbon-based Supercapacitor for Capture and Storage of Solar Energy
6041	The Effects of Pressure, Temperature, and Cooling Rate on Tensile Strength of Extruded High Density Polyethylene
6043	Development of a Simulation Model for the Solution of Einstein's General Relativity and Quantum Mechanics Based on Causal Dynamical Triangulation
6049	Momentum Powered Magnetic Generator For Electric Car Applications And Free Energy And Perpetual Motion Research
6051	Effective Energy Storage Technology for Electric Power
6052	Construction of a Mechanical Arm with Magnetic Claw
6054	Exploration into the Development of a Mathematical Solar Cell Model in order to Simulate Solar Energy Potential in the United States
6059	Construction of a Renewable Energy Generator from Recycled Materials: A Study on Windbelts
6062	Atmospheric Water Generator From Alternative Energy Sources.
6064	Examining Graphene Nanoparticles for CO2 capture and water purification.
6065	Computer Hand Input Mechanism
6067	The Development of a Multilayer Anechoic Tile Systems to Mitigate the Effect of Disbonds in the Hulls of Submersibles
6071	Hydrogen Fuel Cells How Changes in Temperature Affect Them
6073	Low Drag Automobile Design
6074	Creation of Tidal Power from Infiltrating Coastal Ground Water via a Novel Tidal Barrage System

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Engineering: Electrical & Mechanical

Project Number	Title
6075	On the Minimization of Rotor Losses in the Three Phase Induction Machine
6076	Practical Applications for 3D Printing Concrete Structures
6078	Temperature-Induced Concurrent Removal and Recovery of Wastewater Ammonia-Nitrogen
6079	An Inquiry Into The Use of Graphene as a Superconductor
6081	Solar Computing: Creating a cost-effective off-the-grid laptop for utilization in third world countries
6082	Modifications to electronic pet fence system to allow for safe return into boundaries
6083	The application of magnetic levitation technology on elevator construction
6087	Building a Magnetically Levitated Elevator that can Raise and Lower Objects to Various Heights
6089	The Development of a Recycled Tire and Marine Cyanobacteria Single Chamber Microbial Fuel Cell
6091	Synthesis of Silver Nanoparticles using Plasma Arcing Atomizing Methods
6096	New Invention to Efficiently Harness Wave Power
6100	Power Gear
6103	Voltage Output of Homemade Nano-Crystalline Dye-Sensitized Solar Cells in Series
6105	A Novel Application of Piezoelectricity and Impressed Current Cathodic Protection for Corrosion Prevention
6116	Inclusion of Thermoelectric Generators in Glass Building Materials to Produce Useful Energy in New England Homes
6122	Building a Maglev train using electromagnet
6123	The Car of the Future: The Effect of Two Energy Power Sources Charged by Solar Panels on the Mileage and Speed of an RC Car.
6124	Designing a circuit board to wirelessly power a Left Ventricular Assist Device (LVAD)
6126	LCD Projector Built From Commonly Found Electronics On a Budget
6501	Changing the shape of blades on wind turbines
6502	Black Ice Road Sensors
6504	Blades of Fury Pt. 2: Weight Efficiency
6505	Feasibility of Electromagnetic Freight Systems
6506	Building an Automated Prototype for the USAR Operations and Industrial Applications Using Lego Mindstorm, Tetrax and RobotC
6507	Using a photovoltaic cell to self-sustain a clean water pump
6508	Comparative Efficiencies of Magnetically Levitating Train Systems in and out of a Vacuum Chamber
6510	Converting Mechanical Energy from Cross-walk Traffic Using Piezoelectricity
6513	Calories to Watts: Novel methods that utilize exercising energy using piezoelectric generators
6514	Recycled Plastic Bag Insulation
6515	The Catapult
6521	A Novel Wind Turbine Design Incorporating Photovoltaic Cells and Piezoelectric Sensors

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Energy & Transportation

Project Number	Title
1010	Use of a Microbial Fuel Cell to Generate Electricity from Compost
1018	Which substances will produce the most energy?
2021	Green Energy, Green World
2044	Growing Our Future: Using LED Hydroponics to Cultivate Fresh Produce: A Solution for Urban Food Deserts
2527	Your Head, Your Helmet
2544	Can the color of your house effect your energy bill
3003	Nodule Induction in Arabidopsis to Promote Symbiosis with Rhizobia
3023	Hydro and Solar Based Hybrid System
3024	Efficiency of Chlorophyll A and B found in Spinacia Oleracea for Electrical Generation in a Photosynthetic Solar Cell
3070	How Bio-Fuels Compare to Gassoline
3512	Effect of Environmental Conditions on Hydrogen Production in Clostridium
3520	A Novel Approach to Removing Oil Spills from Seawater by using Sustainable and Cost-efficient Materials
4004	Not Just for Eating
4007	Styrofoam, Ceramic and Thermoses. Oh My!
4010	The Effects of a Robot's Speed in Mazes with Different Amounts of Turns
4013	Stirling Engine: The Future
4018	The Power of Sound
4023	Developing a Practical System for Loosely Coupled Inductive Power Transfer
4024	Have Some Sympathy!
4029	Dressing Our Energy
4030	Novel Methods for Water Desalination by Harnessing Solar Energy using a Solar Oven With Flat Mirrors, Fresnel Lens and a Parabolic Mirror
4031	Light Energy
4033	Harnessing Human Movement for Clean Energy
5003	How does Color Affect Heat ?
5008	Homopolar Motor From Faraday To Now-A-Day
5015	Acceleration Explanation
5027	Light Power!
5029	To Design A Self-Sustained Wind-Microbial Hybrid Device that will Generate Clean Hydrogen for Energy
5030	Solar and Wind Power
5032	Measuring Electrolyte Conductance in Sports Drinks, Orange Juice and Tap Water as Compared to Distilled Water
5039	Does the Sun's Angle Affect the Output of a Solar Cell?
5045	The Search for the Most Effective Ice Melt
5046	The Effects of Salt Concentrations and Voltages on the Electrolysis Process
5049	The Effect of Putting Duct Tape on a Wiffle Ball Bat
5055	Light Bulbs Which type is brighter?
5505	Electromagnets
5507	The Efficiency and Durability of Piezoelectric Generators
5512	Alleviating Minor Household Flooding Situations
5520	Battery Life
5521	Bio Battery: The Wise Alternative for Future Renewable Energy
5524	Wind Turbines: The affects of different blades on a model wind turbine
5528	Greenenergy
5529	How long does it take devices to charge when the power goes out?

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Energy & Transportation

Project Number	Title
5536	Keep the Heat
5537	Burning Calories to Light up the Night
5540	Bio vs. Fossil Fuels
5542	Watts Up?
5545	Kinetic Coaster
5555	Measuring The Speed of Light Through Gelatin Using A Laser Pointer The Angles of the Laser VS The Speed of Light
5559	The Effect of Lenses on a Solar Panel.
5560	Solar Sweatshirt
5561	Graphene Enhanced Piezoelectric Generator for Environmental Energy Conservation
5562	Wind Power
5566	Magnetic Levitation Automotive Wind Rail
6009	Chemical and Microwave Pretreatment of Biomass to Optimize Reducing Sugar Yield for Cellulosic Ethanol Applications
6011	Optimal Lens Configuration for SunLight Redirection
6013	Development of a Sustainable Energy System that Converts Lightning to Hydrogen Gas through Plasma Electrolysis
6016	Tilt angles affect on a photovoltaic modules voltage output.
6018	A New Spin on Generators
6020	Comparing the energy generated from simulated rain drops on a piezoelectric surface to a hydro-electric turbine in a downspout, using the same volume of water
6033	Exploring the Storage Capacities of Carbon Nanotube and Graphene Based Capacitors
6034	Evaluating the Performance of a Model Solar Concentrating System Using Thermoelectric Generating Technology
6036	Pressure to the Future
6040	Design of a Novel Photo-Sensitized Carbon-based Supercapacitor for Capture and Storage of Solar Energy
6045	Optimizing Hydrogen Production From a Piezo-electrochemical Water-Splitting Mechanism with Low-Cost Synthesis of ZnO and BiFeO ₃ Nanostructures
6047	Keep your hands on the handle
6049	Momentum Powered Magnetic Generator For Electric Car Applications And Free Energy And Perpetual Motion Research
6051	Effective Energy Storage Technology for Electric Power
6054	Exploration into the Development of a Mathematical Solar Cell Model in order to Simulate Solar Energy Potential in the United States
6059	Construction of a Renewable Energy Generator from Recycled Materials: A Study on Windbelts
6073	Low Drag Automobile Design
6074	Creation of Tidal Power from Infiltrating Coastal Ground Water via a Novel Tidal Barrage System
6075	On the Minimization of Rotor Losses in the Three Phase Induction Machine
6078	Temperature-Induced Concurrent Removal and Recovery of Wastewater Ammonia-Nitrogen
6079	An Inquiry Into The Use of Graphene as a Superconductor
6081	Solar Computing: Creating a cost-effective off-the-grid laptop for utilization in third world countries
6083	The application of magnetic levitation technology on elevator construction
6084	Mapping Tidal Current Farm Potential Along the Long Island Sound
6089	The Development of a Recycled Tire and Marine Cyanobacteria Single Chamber Microbial Fuel Cell
6096	New Invention to Efficiently Harness Wave Power
6101	A Filamentous Organic Solar Cell Based Piezoelectric Architecture for Powering Commercial and Biological Electronic Devices
6102	Supporting The Cause: The effect of balsa wood support on craft stick bridges
6107	Reducing the Price of Solar Panels by Changing their Chemical Components

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Energy & Transportation

Project Number	Title
6109	Alternate Modal Cars
6112	Blowing in the Wind: Southwestern Connecticut's Potential for Wind Energy Production
6116	Inclusion of Thermoelectric Generators in Glass Building Materials to Produce Useful Energy in New England Homes
6119	Earth Energy
6123	The Car of the Future: The Effect of Two Energy Power Sources Charged by Solar Panels on the Mileage and Speed of an RC Car.
6125	Investigating Alternative Methods Using Magnetism to Power a Four-Stroke Engine
6501	Changing the shape of blades on wind turbines
6504	Blades of Fury Pt. 2: Weight Efficiency
6506	Building an Automated Prototype for the USAR Operations and Industrial Applications Using Lego Mindstorm, Tetrax and RobotC
6507	Using a photovoltaic cell to self-sustain a clean water pump
6508	Comparative Efficiencies of Magnetically Levitating Train Systems in and out of a Vacuum Chamber
6509	Designing and Building a Scale Model of an Eco-friendly and Self-sustainable city
6510	Converting Mechanical Energy from Cross-walk Traffic Using Piezoelectricity
6519	Neodymium Magnet vs Copper Pipe
6521	A Novel Wind Turbine Design Incorporating Photovoltaic Cells and Piezoelectric Sensors

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Environmental Sciences

Project Number	Title
1003	Common energy drinks and how they effect the development of zebra fish embryo.
1006	Analysis of different wood's resistance and how to prevent or delay the decay with natural sources.
1008	The Effects of De-icers on Grass Growth
1009	Plants: CO2 Good For You?
1014	Wood vs. Nature
1020	Effect of various temperatures on fly locomotion.
1021	Plants on Other Planets: The Effects of Gravity and Atmosphere
2001	Effects of Irradiation on Seeds
2026	Survival of Single-Celled Water Organisms in Different Potable waters
2028	Nature's Way of Cleaning Oil Spills in Fresh Water
2032	Restoring Scalzi Park to its Native Plant Population
2034	Seeds Sprout Best...
2035	Colorful Flowers
2037	E-Cigarettes: A New Health Frontier
2039	The Effect of Excessive Nutrients on the Growth of Phytoplankton
2501	Algae-Gro!
2504	Analyzing Soil Components
2506	Too Nutritious?
2507	Analysis of Phosphorus (Fertilizer) Recovery from Varied "Run-off" Sources (Local Rivers and L.I.S.)
2509	Do Different Types of Music Affect the Growth of Vegetables; Spinach, Arugula and Radishes?
2511	It's Raining, It's Pouring, and pH Levels Across Hamden Need Exploring
2516	Planting With Compost
2524	Electromagnetic Fields and Their Affects on Plants
2529	Incandescent v. Fluorescent: Which Light is Most Effective for Growing Corn Plants.
2533	A Novel Method To Evaluate The Presence Of Genetically Modified Elements In Seeds.
2544	Can the color of your house effect your energy bill
2545	Thermohaline Circulation Shutdown
3016	Brilliant Bioplastic: A Comparative Analysis of Strength in Various Bioplastics
3021	The Collemobola Consumes the Fungi: Interaction Between Two Important Soil Species
3023	Hydro and Solar Based Hybrid System
3027	Effects of Wi-Fi Signal Radiation on the Development of Brassica rapa (Wisconsin Fast Plants)
3033	The Effect of Sea Temperatures On Plankton and the Ocean
3038	What is the effect of water sources on plants?
3050	Do zebra mussels colonize Lakes Lillinonah and Zoar from upstream?
3055	The Effect of Carbon Dioxide Levels on Oxygen Production in the Diatom Cyclotella meneghiniana
3069	The Nepal Project: The Impact of Soil Degradation on Soil Fertility
3070	How Bio-Fuels Compare to Gassoline
3071	Shedding Light on Cyanobacterial Population Growth and Regeneration
3075	The Biofixation of CO2 and Greenhouse Gases Using Coccolithophorid Algae as a Natural Remedy to the Greenhouse Effect
3076	iShrimp
3080	Investigating Bivalve Bioremediation in a Warming Climate
3084	The Affect of Pseudomonas putida on the Biodegradation of Plastics
3087	Investigating the Efficacy of Bioluminescent Mushroom Panellus Stipticus as a Biosensor to Detect the Toxicity of Water Contaminants

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Environmental Sciences

Project Number	Title
3088	The Use of Bioluminescent Bacteria to Measure Persistent Levels of Water Pollution
3098	Biological Control of the Invasive Eurasian Watermilfoil Using Aquatic Weevils
3101	The Effect of TiO ₂ /Graphene Oxide on the Purification of Tris(2-Chloroethyl)Phosphate(TCEP) and CuSO ₄ (CS) Contaminated Water
3104	The Remediation of Heavy Metals from Wastewater Using an Aspergillus niger Activated Flow Filter
3106	Biochar - what is it and how it can help improve the CO ₂ balance and increase crop yields
3121	The Feeding Behavior of Squilla empusa in the Long Island Sound
3135	An Assessment of the Reefs in the Windward Islands Due to the Presence of Pterois volitans
3137	Investgating the Phytoremediation of Lead: The Type of Plant Species Versus the Rate of Lead Extraction in Hydroponic Media
3140	Examining training climate and Ironman race performance outcomes
3147	The Effectiveness of Plant Material as Metal Chelators
3148	Effects of Disposed Medications on Water Chemistry
3160	Photosynthetic Production of an Infinite Oxygen Supply
3504	Creating a Living Filter to Lower Levels of Harmful Algae in Long Island Sound
3517	Hydroponics: Effect of varying Calcium concentration on number of flowers produced by Wisconsin Fast Plants grown in hydroponic media.
3518	Observing the Effects of Biochar Soil Additives on Plants Grown with Pumpkin, Pomegranate, and Papaya Seed Fertilizers while Determining the Best Fertilizer for Plant Growth
3519	An investigation of horizontal gene transfer by way of organelle capture: Arabidopsis to Rapa
3520	A Novel Approach to Removing Oil Spills from Seawater by using Sustainable and Cost-efficient Materials
4008	Battle of the Brands
4012	Smog Filter Using An Electrostatic Field
4028	Acid Rain: A Silent Killer
4029	Dressing Our Energy
5003	How does Color Affect Heat ?
5011	THE INVESTIGATION OF THE PRESENCE OF PLASTIC MICROSCOPIC FIBERS IN EFFLUENT SEWAGE WATER AND THE LONG ISLAND SOUND
5016	Contrasting Types of Doctor's Offices Using Amount of Virulent Bacteria
5028	Weather Warrior
5034	Local Air Pollution Variations
5501	Which type of grocery bag; plastic, paper, or recycled paper, biodegrades the fastest?
5512	Alleviating Minor Household Flooding Situations
5513	How much salt is in water?
5517	Analysis of natural sources of possible road de-icers and efect on pavement, soil, and plants.
5529	How long does it take devices to charge when the power goes out?
5534	Do Water-Filtering Bottles Really Work?
5535	The Effect of Rainfall on Oxygen/ pH Levels in Bodies of Water
5536	Keep the Heat
5542	Watts Up?
5559	The Effect of Lenses on a Solar Panel.
5562	Wind Power
6008	The Effect of Varying Ferrofluid Carrier Liquids on Oil Spill Remediation
6009	Chemical and Microwave Pretreatment of Biomass to Optimize Reducing Sugar Yield for Cellulosic Ethanol Applications
6013	Development of a Sustainable Energy System that Converts Lightning to Hydrogen Gas through Plasma Electrolysis
6024	Quality of Nighttime Photography Based on Light Sources

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Environmental Sciences

Project Number	Title
6033	Exploring the Storage Capacities of Carbon Nanotube and Graphene Based Capacitors
6034	Evaluating the Performance of a Model Solar Concentrating System Using Thermoelectric Generating Technology
6035	Analyzing the Effect of De-icers on Connecticut River Water Quality
6038	Solar Water Disinfection Optimization Using Titanium Dioxide Coated Plastics
6041	The Effects of Pressure, Temperature, and Cooling Rate on Tensile Strength of Extruded High Density Polyethylene
6047	Keep your hands on the handle
6054	Exploration into the Development of a Mathematical Solar Cell Model in order to Simulate Solar Energy Potential in the United States
6056	Determining Honey Adulteration with Raman Spectra
6058	A Study of the Removal of Pollutants by Rain Gardens, a Low-Impact Drainage System
6062	Atmospheric Water Generator From Alternative Energy Sources.
6064	Examining Graphene Nanoparticles for CO2 capture and water purification.
6070	The Effect of Fertilizer on Dissolved Oxygen Levels in Water.
6090	An investigation studying the effect of the pseudomonas bacteria in a salt h2o environment
6096	New Invention to Efficiently Harness Wave Power
6108	How do Cover Crops affect Soil pH
6110	Determination and removal of 17-Beta Estradiol in Long Island Sound.
6118	A Potential and easy to use, low cost Diabetic Test for use in Developing Countries and Rural Areas
6123	The Car of the Future: The Effect of Two Energy Power Sources Charged by Solar Panels on the Mileage and Speed of an RC Car.
6509	Designing and Building a Scale Model of an Eco-friendly and Self-sustainable city
6516	The Effect of Temperature, pH, and Dissolved Oxygen on Halophilic Desalination

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Environmental Management

Project Number	Title
1006	Analysis of different wood's resistance and how to prevent or delay the decay with natural sources.
1008	The Effects of De-icers on Grass Growth
1020	Effect of various temperatures on fly locomotion.
2028	Nature's Way of Cleaning Oil Spills in Fresh Water
2029	Biodegradation: Are We Convinced
2031	Green Growing Alternatives
2032	Restoring Scalzi Park to its Native Plant Population
2037	E-Cigarettes: A New Health Frontier
2039	The Effect of Excessive Nutrients on the Growth of Phytoplankton
2042	What Substance Attracts The Most Fruit Flies
2044	Growing Our Future: Using LED Hydroponics to Cultivate Fresh Produce: A Solution for Urban Food Deserts
2501	Algae-Gro!
2512	Water Purification
2513	Wood Fire Frenzy
2539	Goo-Be-Gone
2544	Can the color of your house effect your energy bill
3003	Nodule Induction in Arabidopsis to Promote Symbiosis with Rhizobia
3016	Brilliant Bioplastic: A Comparative Analysis of Strength in Various Bioplastics
3023	Hydro and Solar Based Hybrid System
3024	Efficiency of Chlorophyll A and B found in Spinacia Oleracea for Electrical Generation in a Photosynthetic Solar Cell
3041	Exothermic Reactions: Can They Be Used to Make More Efficient/Environmentally Safe Deicers?
3069	The Nepal Project: The Impact of Soil Degradation on Soil Fertility
3070	How Bio-Fuels Compare to Gassoline
3075	The Biofixation of CO ₂ and Greenhouse Gases Using Coccolithophorid Algae as a Natural Remedy to the Greenhouse Effect
3080	Investigating Bivalve Bioremediation in a Warming Climate
3084	The Affect of Pseudomonas putida on the Biodegradation of Plastics
3087	Investigating the Efficacy of Bioluminescent Mushroom Panellus Stipticus as a Biosensor to Detect the Toxicity of Water Contaminants
3098	Biological Control of the Invasive Eurasian Watermilfoil Using Aquatic Weevils
3101	The Effect of TiO ₂ /Graphene Oxide on the Purification of Tris(2-Chloroethyl)Phosphate(TCEP) and CuSO ₄ (CS) Contaminated Water
3104	The Remediation of Heavy Metals from Wastewater Using an Aspergillus niger Activated Flow Filter
3105	Expression of DesB and DesZ for the Creation of Cellulosic Biofuels
3135	An Assessment of the Reefs in the Windward Islands Due to the Presence of Pterois volitans
3137	Investgating the Phytoremediation of Lead: The Type of Plant Species Versus the Rate of Lead Extraction in Hydroponic Media
3147	The Effectiveness of Plant Material as Metal Chelators
3148	Effects of Disposed Medications on Water Chemistry
3504	Creating a Living Filter to Lower Levels of Harmful Algae in Long Island Sound
3512	Effect of Environmental Conditions on Hydrogen Production in Clostridium
3517	Hydroponics: Effect of varying Calcium concentration on number of flowers produced by Wisconsin Fast Plants grown in hydroponic media.
3518	Observing the Effects of Biochar Soil Additives on Plants Grown with Pumpkin, Pomegranate, and Papaya Seed Fertilizers while Determining the Best Fertilizer for Plant Growth
3519	An investigation of horizontal gene transfer by way of organelle capture: Arabidopsis to Rapa
3520	A Novel Approach to Removing Oil Spills from Seawater by using Sustainable and Cost-efficient Materials

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Environmental Management

Project Number	Title
4003	Using a Solar Oven to Purify Salt Water to Become Drinkable
4012	Smog Filter Using An Electrostatic Field
4028	Acid Rain: A Silent Killer
4029	Dressing Our Energy
4030	Novel Methods for Water Desalination by Harnessing Solar Energy using a Solar Oven With Flat Mirrors, Fresnel Lens and a Parabolic Mirror
5007	Cool, Cool Chlorides...A comparison of ice melting chlorides as deicers and their effectiveness as an anti-freeze
5011	THE INVESTIGATION OF THE PRESENCE OF PLASTIC MICROSCOPIC FIBERS IN EFFLUENT SEWAGE WATER AND THE LONG ISLAND SOUND
5028	Weather Warrior
5029	To Design A Self-Sustained Wind-Microbial Hybrid Device that will Generate Clean Hydrogen for Energy
5041	Using Wettability to Develop Reusable Freezer Bags
5046	The Effects of Salt Concentrations and Voltages on the Electrolysis Process
5501	Which type of grocery bag; plastic, paper, or recycled paper, biodegrades the fastest?
5508	A Study of the Production, Impact Testing, and Degradation of Seaweed Based Bioplastics
5512	Alleviating Minor Household Flooding Situations
5515	Removal and Recycling of Phosphate from water Using Various Methods: A Sustainability Project
5517	Analysis of natural sources of possible road de-icers and effect on pavement, soil, and plants.
5529	How long does it take devices to charge when the power goes out?
5535	The Effect of Rainfall on Oxygen/ pH Levels in Bodies of Water
5540	Bio vs. Fossil Fuels
5542	Watts Up?
5561	Graphene Enhanced Piezoelectric Generator for Environmental Energy Conservation
6008	The Effect of Varying Ferrofluid Carrier Liquids on Oil Spill Remediation
6009	Chemical and Microwave Pretreatment of Biomass to Optimize Reducing Sugar Yield for Cellulosic Ethanol Applications
6013	Development of a Sustainable Energy System that Converts Lightning to Hydrogen Gas through Plasma Electrolysis
6018	A New Spin on Generators
6024	Quality of Nighttime Photography Based on Light Sources
6033	Exploring the Storage Capacities of Carbon Nanotube and Graphene Based Capacitors
6034	Evaluating the Performance of a Model Solar Concentrating System Using Thermoelectric Generating Technology
6035	Analyzing the Effect of De-icers on Connecticut River Water Quality
6036	Pressure to the Future
6039	The Construction and Calculation of an Atmospheric Geothermal Airlift Pump Condenser
6041	The Effects of Pressure, Temperature, and Cooling Rate on Tensile Strength of Extruded High Density Polyethylene
6058	A Study of the Removal of Pollutants by Rain Gardens, a Low-Impact Drainage System
6060	OXIDATIVE DESULFURATION OF DIBENZOTHIOPHENE THROUGH THE USE OF TiO ₂ COATED OMS-2
6064	Examining Graphene Nanoparticles for CO ₂ capture and water purification.
6074	Creation of Tidal Power from Infiltrating Coastal Ground Water via a Novel Tidal Barrage System
6075	On the Minimization of Rotor Losses in the Three Phase Induction Machine
6078	Temperature-Induced Concurrent Removal and Recovery of Wastewater Ammonia-Nitrogen
6081	Solar Computing: Creating a cost-effective off-the-grid laptop for utilization in third world countries
6089	The Development of a Recycled Tire and Marine Cyanobacteria Single Chamber Microbial Fuel Cell
6090	An investigation studying the effect of the pseudomonas bacteria in a salt h ₂ O environment
6091	Synthesis of Silver Nanoparticles using Plasma Arcing Atomizing Methods

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Environmental Management

Project Number	Title
6096	New Invention to Efficiently Harness Wave Power
6103	Voltage Output of Homemade Nano-Crystalline Dye-Sensitized Solar Cells in Series
6108	How do Cover Crops affect Soil pH
6110	Determination and removal of 17-Beta Estradiol in Long Island Sound.
6111	How the Type of Footing Effects the Impact of Livestock on Soil Erosion
6118	A Potential and easy to use, low cost Diabetic Test for use in Developing Countries and Rural Areas
6502	Black Ice Road Sensors
6507	Using a photovoltaic cell to self-sustain a clean water pump
6508	Comparative Efficiencies of Magnetically Levitating Train Systems in and out of a Vacuum Chamber
6509	Designing and Building a Scale Model of an Eco-friendly and Self-sustainable city
6510	Converting Mechanical Energy from Cross-walk Traffic Using Piezoelectricity

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Mathematical Sciences

Project Number	Title
2518	Optical Illusions
2543	Should the Flu Vaccination Program be modified to emphasize vaccination of the young and less emphasis on the elderly?
3033	The Effect of Sea Temperatures On Plankton and the Ocean
3044	Differentially Expressed Genes in the Adipose Layer of Skin in Psoriatic Patients
3051	Analyzing Bacterial Resistance to Antibiotics
3063	Dietary Habits as Related to Increasing Numbers of Nephrolithiasis (kidney stones)
3158	The Effect of Common Industrial Food Additives on Zebrafish Embryo Development
3506	Incarceration rates based on the law of one ounce of marijuana in colorado and washington
5006	Parabolic Trajectory Analysis of Projectiles Using Catapults
5011	THE INVESTIGATION OF THE PRESENCE OF PLASTIC MICROSCOPIC FIBERS IN EFFLUENT SEWAGE WATER AND THE LONG ISLAND SOUND
5015	Acceleration Explanation
5019	Fizz, Fizz!
5031	Mathematical Patterns Found in Selected Classical Compositions
5036	Whatever Floats Your Boat!
5049	The Effect of Putting Duct Tape on a Wiffle Ball Bat
5504	Pitch Not Perfect
5505	Electromagnets
5508	A Study of the Production, Impact Testing, and Degradation of Seaweed Based Bioplastics
5509	Bell Curve
5512	Alleviating Minor Household Flooding Situations
5523	What bridge design is strongest?
5524	Wind Turbines: The affects of different blades on a model wind turbine
5529	How long does it take devices to charge when the power goes out?
5535	The Effect of Rainfall on Oxygen/ pH Levels in Bodies of Water
5539	Stock Strategies
5547	Which type of arm; robotic, or human would have 100% accuracy and precision when throwing a ball?
5555	Measuring The Speed of Light Through Gelatin Using A Laser Pointer The Angles of the Laser VS The Speed of Light
5556	Drawing Robot
5565	Mathematical Analysis of the Rubik's Cube Using the Thistlethwaite Algorithm and Sets of Moves
6010	3D Printed Fractal Structures
6034	Evaluating the Performance of a Model Solar Concentrating System Using Thermoelectric Generating Technology
6035	Analyzing the Effect of De-icers on Connecticut River Water Quality
6043	Development of a Simulation Model for the Solution of Einstein's General Relativity and Quantum Mechanics Based on Causal Dynamical Triangulation
6048	The effect of modifying the probability of adding the two previous numbers in the Fibonacci Sequence on a randomized Fibonacci Sequence's "golden ratio"
6050	Gambling: Science or Luck? - Can gamblers alter their odds? An assessment to determine scientific principles and mathematical techniques used by gambling companies to ensure profits.
6054	Exploration into the Development of a Mathematical Solar Cell Model in order to Simulate Solar Energy Potential in the United States
6056	Determining Honey Adulteration with Raman Spectra
6075	On the Minimization of Rotor Losses in the Three Phase Induction Machine
6084	Mapping Tidal Current Farm Potential Along the Long Island Sound
6096	New Invention to Efficiently Harness Wave Power

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Mathematical Sciences

Project Number	Title
6121	A Novel Approach to The Design of an Electroencephalogram-Based Brain-Computer Interface For Use In Thought to Text Translation
6506	Building an Automated Prototype for the USAR Operations and Industrial Applications Using Lego Mindstorm, Tetrax and RobotC

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Medicine and Health Sciences

Project Number	Title
1003	Common energy drinks and how they effect the development of zebra fish embryo.
1012	Effects of Ethanol, lemon, peppermint, and ginger extracts on e.coli
1019	What deodorant works the best?
2003	Nutritional Value of Smoothies
2005	Processed vs. Unprocessed Foods and Their Effects on Gastric Health
2009	Don't Drink That
2011	How Breathing Control Affects Singing
2014	The Effects of Handsanitizers on Bacterial Growth and Resistance.
2015	A Structural Approach To Drug Resistance
2017	The Effectiveness of an All-Natural Sunscreen vs. Commercial Sunscreens
2023	Cleaning Your Toothbrush the Safe Way
2030	Breaking Down Teeth
2037	E-Cigarettes: A New Health Frontier
2041	3D Printing of Amyloid Precursor Protein: The Gene Mutation that Causes Alzheimer's
2043	Is Your Health Club Making You Sick?
2503	N.D. Naturopathic doctors and Alternative healthcare vs. M.D. Medical doctors and Conventional healthcare
2505	Why we need Digestive Enzymes for optimal health.
2518	Optical Illusions
2520	The Effects of Antioxidants on cell regrowth and regeneration in Lumbricus variegatus
2521	Can action related video games trigger an adrenaline response as measured by changes in heart rate or blood pressure?
2524	Electromagnetic Fields and Their Affects on Plants
2526	Investigation of the Antibacterial Properties of Various Ethanolic Plant Extracts
2527	Your Head, Your Helmet
2528	What Makes Your Heart Beat? Scary vs Neutral Text, Reading vs Listening; A Follow-up Study
2532	The Effects of Bisphenol-A on anxiety, short-term memory, and sucrose preference in adolescent female rats.
2534	Does Whey Protein Effect the Rate of Regeneration of Planaria?
2537	Which liquid (tea, coffee, water, milk, apple juice, Cola) dissolves teeth the most?
2538	Oil or Water Based?
2543	Should the Flu Vaccination Program be modified to emphasize vaccination of the young and less emphasis on the elderly?
3001	Can Smells Improve Your Mental Ability?
3002	DNA sequence motifs as biomarkers for genomic disorders.
3005	The Role of Asymmetric Division in Memory B-Cell Development
3007	Synergistic Antimicrobial Activity of Manuka Honey and Silver Nitrate
3014	ACVR1/ALK2 Inhibitors as a Cure for Fibrodysplasia Ossificans Progressiva (FOP)
3015	Effect of Communal Bathrooms on Rates of Contagious Diseases
3017	Escherichia Coli's Resistance to a Household Cleaner Through the Zone of Inhibition
3019	Calendula officinalis Naturopathic Treatments for Acne vulgaris Reduction affecting the Glandula sebacea and inhibit the excessive production of Sebum.
3020	The Effect of Flavonoids on Apoptosis,Proliferation, and the inhibition of Nuclear Factor Kappa B of Mouse Breast Cancer Cells
3022	An investigation of the effects of high-fructose corn syrup on growth, phenotype, and protein production in Caenorhabditis elegans.
3029	Assessing the Correlation Between a Folate Deficiency During Pregnancy and Low Birth Weight
3030	Eye Color and Colorblindness

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Medicine and Health Sciences

Project Number	Title
3032	An investigation into enteric symbionts and their effects on the interaction between gliadin and anti-gliadin antibodies.
3036	Determining the Effects of Cyberknife Radiosurgery for Trigeminal Neuralgia Part 2
3040	Investigation of the Inhibition of E. coli Biofilm Formation on Food-Contact Surfaces via a Brominated Furanone
3042	The Effect of the Bitter Gourd on Blood Sugar Levels
3043	Studying the role of neutrophils in preventing the dissemination of Listeria monocytogenes in the intestinal mucosa following oral infection
3044	Differentially Expressed Genes in the Adipose Layer of Skin in Psoriatic Patients
3048	Pine Resin Bioadhesive Medical Glue
3051	Analyzing Bacterial Resistance to Antibiotics
3052	App Therapy
3053	The Effects of L-Carnosine on the Lifespan of the nematode Caenorhabditis Elegans
3057	The Effect of Protein on Memory
3058	The Effects of PTHrP on Mammary Epithelial Cells
3060	Analysis of Megakaryopoiesis via the Rho/SRF and ROS/Erk Pathways
3061	Effect of Citrus Paradisi Concentrated Oil and Specific Component d-Limonene on the Dietary Intake of Mus Musculus
3062	An Investigation of the Effects of Cytidine Diphosphate Choline on Parkinson's like Caenorhabditis elegans
3068	The Kinematics of Barefoot and Shod Running
3072	Targeting Expression of Histamine 4 Receptors on Microglial Cells to Combat Compulsive Disorders
3076	iShrimp
3077	The Effect of pH on Nutrient Absorption
3079	The Effects of Sensory Deprivation on Neural Activity for the Psychological and Mental Treatment of various Mental Conditions
3082	Primary Cilia Vesicle Secretion and Resorption Facilitate Cell Communication
3085	The Detection of Photo-oxidation of Guanine in Oligonucleotides Exposed to visible Radiation from Seasonal Affective Disorder Photo-therapy Lights.
3086	How Sound Effects the Human Mind During Sleep?
3087	Investigating the Efficacy of Bioluminescent Mushroom Panellus Stipticus as a Biosensor to Detect the Toxicity of Water Contaminants
3089	Is Reaction Time Dependent on Height
3093	Immunogenicity and Efficacy of a Nanoparticle-based Lyme Disease Vaccine
3096	The Effects of Moderate Altitude on Type 1 Diabetes
3102	The Effect of Subliminal Messages on Food Selection
3107	The Creation of Recombinant Proteins through Liquid Syncytial Endosperm Found in Coconut Water
3108	Targeted Therapy for Lung Cancer
3111	Neuroprotective Effect of Finofibrate in the MPTP Mouse Model of Parkinson's Disease
3114	FRET based intercellular ATP imaging for testing of BCL-xL as a mitochondrial efficiency enhancer during Long Term Potentiation.
3115	Inhibitory effect of D-Psicose on Motility, Growth and Reproductive Maturity of L1 larvae of Caenorhabditis elegans
3119	Birth Order and Attention Span
3120	The Effects of Active Ingredients in Energy Drinks on the Development of Zebrafish Embryos
3122	Differentially expressed genes involved in Paget's disease of bone in response to SQSTM1 status
3126	testing for antibiotic properties of the seaweeds Saccharina latissima and Gracilaria trikvahiae against Vibrio fischeri
3127	Structure-Based Analysis of The CXCR4 N-Terminus
3130	Primary Craniofacial Osteosarcoma's Represent a Malignant Transformation of Neural Crest-Derived Stem Cells
3131	The Effects of Leucine on the Zebrafish Embryonic Development
3133	Stress by the Angle

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Medicine and Health Sciences

Project Number	Title
3138	The Effects of Diethyl Phthalate on Embryonic Development in Zebrafish
3140	Examining training climate and Ironman race performance outcomes
3142	Regulation and Browning Capabilities of FNDC4 in vivo
3145	siRNA-loaded exosome-lipid nanoparticles for in vitro treatment of B16F10 cells
3150	The Effect of the Environment on the Development of a Food Allergy: A Sibling Study
3151	Development of cytokine-based glioma therapies
3152	Chemosensitization of high-grade serous ovarian carcinoma via calcium signaling
3154	H19 lncRNA-Mediated Regulation of Aromatase Expression in Granulosa Cells
3155	Does Age Affect the Severity and Frequency of Concussions in Female Soccer Players?
3157	The Bigger, The Better
3158	The Effect of Common Industrial Food Additives on Zebrafish Embryo Development
3161	The Role of Cx43 in Vascularization
3163	Use of a Pre-Chemotherapy/Radiotherapy Regimen of Glutamine and Probiotics to Prevent Oral Mucositis
3501	Nice to Meat You: Using DNA Barcoding to Detect Mislabeling in the Meat Industry
3508	Cloning, sequencing and analysis of potential amyloid beta precursor protein from Cnidarians
3509	External Digestion of Cellulose Utilizing Enteric Symbionts from the Termite gut
3510	Synergistic affect of combinations of antibiotic v.s E.coli.
3511	The Effects of Black Seed Oil and Thymoquinone on Bacterial Growth
3513	Using DNA Barcoding to Detect the Potential Contamination of Herbal Products
3516	Efficacy of Clobazam in Epilepsies Associated with Genetic Abnormalities
3521	Truly Vegetarian? Using DNA Barcoding to Detect Possible Contamination of Vegetarian Products
4027	Rubber Bones
5002	The Affect of Certain Scents on Short-Term Memory
5011	THE INVESTIGATION OF THE PRESENCE OF PLASTIC MICROSCOPIC FIBERS IN EFFLUENT SEWAGE WATER AND THE LONG ISLAND SOUND
5016	Contrasting Types of Doctor's Offices Using Amount of Virulent Bacteria
5019	Fizz, Fizz!
5510	Viscosity and Melting Profile of Dairy and Non-Dairy Ice-Cream and the Development of Appealing Ice-Cream for Lactose Intolerant Individuals.
5519	Ananalysis of "Super Spices" Effect on Cell Absorption, Antioxidant Levels, and pH.
5533	Which calcium carbonate antacid will neutralize gastric acid more effectively?
5564	Foot-Operated Computer Mouse Prototype
6017	The Stability and Activity of the Biosynthetic and Synthetic Emulsifiers of Xanthan Gum, Propylene Glycol Alginate (PGA), and Tragacanth
6026	Bio-sensor drug carrier for insulin
6037	Application of Shear Thickening Fluids in Orthos for Parkinson's Patients
6047	Keep your hands on the handle
6077	The Power of Gatorade
6080	great globs of gluten
6093	Synthesis and Characterization of EGCG-PLAGA Conjugates and Mixtures
6110	Determination and removal of 17-Beta Estradiol in Long Island Sound.
6118	A Potential and easy to use, low cost Diabetic Test for use in Developing Countries and Rural Areas
6120	Do You C This Juice? How Levels of Vitamin C Deplete Over Time
6124	Designing a circuit board to wirelessly power a Left Ventricular Assist Device (LVAD)

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Microbiology

Project Number	Title
1004	Purification Possibilities
1010	Use of a Microbial Fuel Cell to Generate Electricity from Compost
1012	Effects of Ethanol, lemon, peppermint, and ginger extracts on e.coli
1015	Eliminating Bacteria
2014	The Effects of Handsanitizers on Bacterial Growth and Resistance.
2015	A Structural Approach To Drug Resistance
2022	Effect of Quantum on Plants
2028	Nature's Way of Cleaning Oil Spills in Fresh Water
2037	E-Cigarettes: A New Health Frontier
2039	The Effect of Excessive Nutrients on the Growth of Phytoplankton
2041	3D Printing of Amyloid Precursor Protein: The Gene Mutation that Causes Alzheimer's
2043	Is Your Health Club Making You Sick?
2526	Investigation of the Antibacterial Properties of Various Ethanolic Plant Extracts
2531	The Effect of Vitamin A1, B1, B9, B12, C1 & Different Temperatures on the Regeneration of Planaria
2533	A Novel Method To Evaluate The Presence Of Genetically Modified Elements In Seeds.
2534	Does Whey Protein Effect the Rate of Regeneration of Planaria?
3005	The Role of Asymmetric Division in Memory B-Cell Development
3006	Bacterial Resistance to Vancomycin and Ampicillin
3010	Does Music Attract Bacteria
3011	Bacteria à La Mode
3022	An investigation of the effects of high-fructose corn syrup on growth, phenotype, and protein production in <i>Caenorhabditis elegans</i> .
3032	An investigation into enteric symbionts and their effects on the interaction between gliadin and anti-gliadin antibodies.
3035	Trogocytosis between <i>Toxoplasma</i> and Host Cell Membrane during Invasion
3043	Studying the role of neutrophils in preventing the dissemination of <i>Listeria monocytogenes</i> in the intestinal mucosa following oral infection
3045	The Utilization of Turmeric Gum as a Reducing Agent for Microbes
3051	Analyzing Bacterial Resistance to Antibiotics
3053	The Effects of L-Carnosine on the Lifespan of the nematode <i>Caenorhabditis Elegans</i>
3054	Nin1's Effect on Endoplasmic Reticulum Structure and Nuclear Migration
3058	The Effects of PTHrP on Mammary Epithelial Cells
3060	Analysis of Megakaryopoiesis via the Rho/SRF and ROS/Erk Pathways
3065	A Comparative Study of Pathogenic Bacterial Life in Public Buildings.
3070	How Bio-Fuels Compare to Gassoline
3071	Shedding Light on Cyanobacterial Population Growth and Regeneration
3072	Targeting Expression of Histamine 4 Receptors on Microglial Cells to Combat Compulsive Disorders
3075	The Biofixation of CO ₂ and Greenhouse Gases Using Coccolithophorid Algae as a Natural Remedy to the Greenhouse Effect
3078	The Effect of Olive Oil Phenols on the Concentration of Yeast Bacteria in Food Preservation
3079	The Effects of Sensory Deprivation on Neural Activity for the Psychological and Mental Treatment of various Mental Conditions
3084	The Affect of <i>Pseudomonas putida</i> on the Biodegradation of Plastics
3087	Investigating the Efficacy of Bioluminescent Mushroom <i>Panellus Stipticus</i> as a Biosensor to Detect the Toxicity of Water Contaminants
3088	The Use of Bioluminescent Bacteria to Measure Persistent Levels of Water Pollution
3107	The Creation of Recombinant Proteins through Liquid Syncytial Endosperm Found in Coconut Water

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Microbiology

Project Number	Title
3112	Effects of Natural Antimicrobials on Escherichia Coli Growth
3114	FRET based intercellular ATP imaging for testing of BCL-xL as a mitochondrial efficiency enhancer during Long Term Potentiation.
3118	The Effect of Light Exposure on the Light Emission of Bioluminescent Dinoflagellates
3126	testing for antibiotic properties of the seaweeds Saccharina latissima and Gracilaria trikvahiae against Vibrio fischeri
3132	Carcinogens in Oil
3154	H19 lncRNA-Mediated Regulation of Aromatase Expression in Granulosa Cells
3157	The Bigger, The Better
3159	The Population Dynamics of Inteins: Investigative Analysis of Metagenomes
3162	Characterization of TC-2153 Inhibition on Striatal-Enriched Protein Tyrosine Phosphatase (STEP)in Human Cell Lines
3163	Use of a Pre-Chemotherapy/Radiotherapy Regimen of Glutamine and Probiotics to Prevent Oral Mucositis
3501	Nice to Meat You: Using DNA Barcoding to Detect Mislabeling in the Meat Industry
3504	Creating a Living Filter to Lower Levels of Harmful Algae in Long Island Sound
3507	Virtual screening and Evaluation of non-covalent Inhibitors for Class C β -lactamase from Enterobacter cloacae P99
3510	Synergistic affect of combinations of antibiotic v.s E.coli.
3511	The Effects of Black Seed Oil and Thymoquinone on Bacterial Growth
3512	Effect of Environmental Conditions on Hydrogen Production in Clostridium
3513	Using DNA Barcoding to Detect the Potential Contamination of Herbal Products
3519	An investigation of horizontal gene transfer by way of organelle capture: Arabidopsis to Rapa
3521	Truly Vegetarian? Using DNA Barcoding to Detect Possible Contamination of Vegetarian Products
5011	THE INVESTIGATION OF THE PRESENCE OF PLASTIC MICROSCOPIC FIBERS IN EFFLUENT SEWAGE WATER AND THE LONG ISLAND SOUND
5016	Contrasting Types of Doctor's Offices Using Amount of Virulent Bacteria
5029	To Design A Self-Sustained Wind-Microbial Hybrid Device that will Generate Clean Hydrogen for Energy
5501	Which type of grocery bag; plastic, paper, or recycled paper, biodegrades the fastest?
5534	Do Water-Filtering Bottles Really Work?
6072	The effect of E. coli location and availability on the rate of locomotion in C. elegans
6090	An investigation studying the effect of the pseudomonas bacteria in a salt h20 environment
6509	Designing and Building a Scale Model of an Eco-friendly and Self-sustainable city
6516	The Effect of Temperature, pH, and Dissolved Oxygen on Halophilic Desalination

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Physics and Astronomy

Project Number	Title
1021	Plants on Other Planets: The Effects of Gravity and Atmosphere
2001	Effects of Irradiation on Seeds
2524	Electromagnetic Fields and Their Affects on Plants
4007	Styrofoam, Ceramic and Thermoses. Oh My!
4009	Effect of Sulfites as a Preservative on Cell Absorption and Nutrient Content.
4011	Stealth Shapes
4016	Color, Heat, and Light Absorption
4020	Analysis of Prevention and delay of ignition and burn times of synthetic fingernails
4024	Have Some Sympathy!
4030	Novel Methods for Water Desalination by Harnessing Solar Energy using a Solar Oven With Flat Mirrors, Fresnel Lens and a Parabolic Mirror
4032	Book Friction
5004	Does The Size and Material of a Ball Affect How High It Bounces?
5006	Parabolic Trajectory Analysis of Projectiles Using Catapults
5037	Fantastic Elastic
5047	Comparing Two Acoustic Guitars for Best Sound!
5049	The Effect of Putting Duct Tape on a Wiffle Ball Bat
5051	Putting a Spin on Billiards
5504	Pitch Not Perfect
5505	Electromagnets
5507	The Efficiency and Durability of Piezoelectric Generators
5525	The Effects of a Gear Size on Speed
5543	Magnetic Linear Accelerator
5545	Kinetic Coaster
5547	Which type of arm; robotic, or human would have 100% accuracy and precision when throwing a ball?
5551	How Does Adding Water to A Bottle Rocket Affect Its Flight?
5552	Which Pop-Singer Has the Best Voice?
5555	Measuring The Speed of Light Through Gelatin Using A Laser Pointer The Angles of the Laser VS The Speed of Light
5557	Does the Shape of an Air Foil affect the lift of an Airplane?
5561	Graphene Enhanced Piezoelectric Generator for Environmental Energy Conservation
5563	Hypoallergenic Lawn Care Device
5564	Foot-Operated Computer Mouse Prototype
6003	Spinning Coin
6006	Testing Methods Used to Calculate Stellar Evolutionary Stages in Star Clusters
6011	Optimal Lens Configuration for SunLight Redirection
6012	Testing the Use of Carbon Nanotubes in Electrochemical Double Layered Super Capacitors
6015	Geant4 Monte Carlo Simulation in the Development of CMS Calorimetry
6018	A New Spin on Generators
6023	Correlation of Hippocampal Neurogenesis and Exposure to Cosmic Ray Highly Ionizing Radiation (HZE) Particles
6024	Quality of Nighttime Photography Based on Light Sources
6030	Morphological features of intermediate-mass black holes
6038	Solar Water Disinfection Optimization Using Titanium Dioxide Coated Plastics
6039	The Construction and Calculation of an Atmospheric Geothermal Airlift Pump Condenser
6040	Design of a Novel Photo-Sensitized Carbon-based Supercapacitor for Capture and Storage of Solar Energy

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Physics and Astronomy

Project Number	Title
6041	The Effects of Pressure, Temperature, and Cooling Rate on Tensile Strength of Extruded High Density Polyethylene
6042	A Probe of the Phase Space of Celestial N-body Systems and Its Implications for Extraterrestrial Life
6043	Development of a Simulation Model for the Solution of Einstein's General Relativity and Quantum Mechanics Based on Causal Dynamical Triangulation
6049	Momentum Powered Magnetic Generator For Electric Car Applications And Free Energy And Perpetual Motion Research
6056	Determining Honey Adulteration with Raman Spectra
6061	Coronal Mass Ejections: Determining the exponent of a power law that dictates how drag affects the path of a coronal mass ejection
6066	Partitioning gamma-ray sources in Fermi Large Area Telescope observations for spatial and spectral analysis
6075	On the Minimization of Rotor Losses in the Three Phase Induction Machine
6079	An Inquiry Into The Use of Graphene as a Superconductor
6086	Studies of Phase Separation using Ferrofluids as a Model
6096	New Invention to Efficiently Harness Wave Power
6098	Effect of Accelerated Particles on the atoms of Copper and Gold
6102	Supporting The Cause: The effect of balsa wood support on craft stick bridges
6113	Enhancing Water Resistance Qualities of SrAl ₂ O ₄ :Eu ²⁺ , Dy ³⁺ Phosphors Using Barrier Coatings
6117	The Oort Cloud: A Cometary Reservoir
6118	A Potential and easy to use, low cost Diabetic Test for use in Developing Countries and Rural Areas
6502	Black Ice Road Sensors
6504	Blades of Fury Pt. 2: Weight Efficiency
6505	Feasibility of Electromagnetic Freight Systems
6506	Building an Automated Prototype for the USAR Operations and Industrial Applications Using Lego Mindstorm, Tetrax and RobotC
6515	The Catapult
6517	Harvesting the Resources of Space
6521	A Novel Wind Turbine Design Incorporating Photovoltaic Cells and Piezoelectric Sensors
6522	Simulated Impact of Car Collisions

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Plant Sciences

Project Number	Title
1001	Are Eggshells an Effective Fertilizer?
1008	The Effects of De-icers on Grass Growth
1009	Plants: CO2 Good For You?
1011	How Does Your Garden Grow?
1016	Ready Set Grow
1021	Plants on Other Planets: The Effects of Gravity and Atmosphere
2001	Effects of Irradiation on Seeds
2002	The Effect of Magnetism on Plant Growth
2006	Plant extermination projects
2010	Plant Growth
2012	The Effect of Nitrogen Fertilizer on Grass
2020	The Absorbency of Different Types of Wood
2022	Effect of Quantum on Plants
2024	Bittersweet
2025	Aquaponics Terracotta vs Water; Benefits of Grow Mediums
2027	One Bad Apple Can Spoil The Whole Bunch
2031	Green Growing Alternatives
2032	Restoring Scalzi Park to its Native Plant Population
2033	Radiant Radish
2034	Seeds Sprout Best...
2035	Colorful Flowers
2037	E-Cigarettes: A New Health Frontier
2039	The Effect of Excessive Nutrients on the Growth of Phytoplankton
2040	Greenhouse Gases and the effect on the ozone layer.
2044	Growing Our Future: Using LED Hydroponics to Cultivate Fresh Produce: A Solution for Urban Food Deserts
2501	Algae-Gro!
2506	Too Nutritious?
2507	Analysis of Phosphorus (Fertilizer) Recovery from Varied "Run-off" Sources (Local Rivers and L.I.S.)
2508	How Does Global Warming Affect the Root-to-Shoot Ratio of Plant Growth?
2509	Do Different Types of Music Affect the Growth of Vegetables; Spinach, Arugula and Radishes?
2514	The Microwave Mistake
2522	Fruit Juice for Plants
2523	Does a Magnetic Field Affect Plant Cells?
2524	Electromagnetic Fields and Their Affects on Plants
2526	Investigation of the Antibacterial Properties of Various Ethanolic Plant Extracts
2530	Effect of Quantum on Plant Growth
2536	Can I successfully pollinate radish flowers?
2540	Geotropism and Phototropism with Lima Beans
2542	Do plants grow best with sugar water, tap water, or salt water?
2545	Thermohaline Circulation Shutdown
3003	Nodule Induction in Arabidopsis to Promote Symbiosis with Rhizobia
3016	Brilliant Bioplastic: A Comparative Analysis of Strength in Various Bioplastics
3018	Radish Seeds: Race To The Top

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Plant Sciences

Project Number	Title
3019	Calendula officinalis Naturopathic Treatments for Acne vulgaris Reduction affecting the Glandula sebacea and inhibit the excessive production of Sebum.
3024	Efficiency of Chlorophyll A and B found in Spinacia Oleracea for Electrical Generation in a Photosynthetic Solar Cell
3025	Gorgonian Coral: A Population Flourishing in a Deprived Environment
3027	Effects of Wi-Fi Signal Radiation on the Development of Brassica rapa (Wisconsin Fast Plants)
3033	The Effect of Sea Temperatures On Plankton and the Ocean
3034	Bioengineering of Popular Peppers to Create a Disease-Resistant Hybrid with Prolonged Shelf Life, Increased Biomass, and Capsaicin Content
3038	What is the effect of water sources on plants?
3041	Exothermic Reactions: Can They Be Used to Make More Efficient/Environmentally Safe Deicers?
3042	The Effect of the Bitter Gourd on Blood Sugar Levels
3048	Pine Resin Bioadhesive Medical Glue
3049	Studying the Effect of Light Color on the Rate of Photosynthesis in Aquatic Plants
3055	The Effect of Carbon Dioxide Levels on Oxygen Production in the Diatom Cyclotella meneghiniana
3069	The Nepal Project: The Impact of Soil Degradation on Soil Fertility
3070	How Bio-Fuels Compare to Gassoline
3078	The Effect of Olive Oil Phenols on the Concentration of Yeast Bacteria in Food Preservation
3087	Investigating the Efficacy of Bioluminescent Mushroom Panellus Stipticus as a Biosensor to Detect the Toxicity of Water Contaminants
3098	Biological Control of the Invasive Eurasian Watermilfoil Using Aquatic Weevils
3118	The Effect of Light Exposure on the Light Emission of Bioluminescent Dinoflagellates
3137	Investgating the Phytoremediation of Lead: The Type of Plant Species Versus the Rate of Lead Extraction in Hydroponic Media
3146	Skin Deep: A Biochemical Analysis of Grape Pigments
3160	Photosynthetic Production of an Infinite Oxygen Supply
3502	Alternate Source of Paper from Melons
3509	External Digestion of Cellulose Utilizing Enteric Symbionts from the Termite gut
3512	Effect of Environmental Conditions on Hydrogen Production in Clostridium
3517	Hydroponics: Effect of varying Calcium concentration on number of flowers produced by Wisconsin Fast Plants grown in hydroponic media.
3518	Observing the Effects of Biochar Soil Additives on Plants Grown with Pumpkin, Pomegranate, and Papaya Seed Fertilizers while Determining the Best Fertilizer for Plant Growth
3519	An investigation of horizontal gene transfer by way of organelle capture: Arabidopsis to Rapa
4005	pH from Scratch
5011	THE INVESTIGATION OF THE PRESENCE OF PLASTIC MICROSCOPIC FIBERS IN EFFLUENT SEWAGE WATER AND THE LONG ISLAND SOUND
5508	A Study of the Production, Impact Testing, and Degradation of Seaweed Based Bioplastics
5514	The Effect of Greywater on the Growth of Plants
5521	Bio Battery: The Wise Alternative for Future Renewable Energy
6108	How do Cover Crops affect Soil pH

Composite Scientific Disciplines

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Biotechnology

Project Number	Title
1001	Are Eggshells an Effective Fertilizer?
1002	ANTACID POTENCY
1003	Common energy drinks and how they effect the development of zebra fish embryo.
1004	Purification Possibilities
1006	Analysis of different wood's resistance and how to prevent or delay the decay with natural sources.
1007	Extracting DNA from Strawberries.
1008	The Effects of De-icers on Grass Growth
1009	Plants: CO2 Good For You?
1010	Use of a Microbial Fuel Cell to Generate Electricity from Compost
1011	How Does Your Garden Grow?
1012	Effects of Ethanol, lemon, peppermint, and ginger extracts on e.coli
1015	Eliminating Bacteria
1016	Ready Set Grow
1019	What deodorant works the best?
1020	Effect of various temperatures on fly locomotion.
1021	Plants on Other Planets: The Effects of Gravity and Atmosphere
2001	Effects of Irradiation on Seeds
2002	The Effect of Magnetism on Plant Growth
2003	Nutritional Value of Smoothies
2005	Processed vs. Unprocessed Foods and Their Effects on Gastric Health
2006	Plant extermination projects
2007	Decreasing Sugar in Horse Treats
2009	Don't Drink That
2010	Plant Growth
2011	How Breathing Control Affects Singing
2012	The Effect of Nitrogen Fertilizer on Grass
2014	The Effects of Handsanitizers on Bacterial Growth and Resistance.
2015	A Structural Approach To Drug Resistance
2017	The Effectiveness of an All-Natural Sunscreen vs. Commercial Sunscreens
2019	Feed The Birds
2020	The Absorbency of Different Types of Wood
2022	Effect of Quantum on Plants
2023	Cleaning Your Toothbrush the Safe Way
2024	Bittersweet
2025	Aquaponics Terracotta vs Water; Benefits of Grow Mediums
2027	One Bad Apple Can Spoil The Whole Bunch
2028	Nature's Way of Cleaning Oil Spills in Fresh Water
2030	Breaking Down Teeth
2031	Green Growing Alternatives
2032	Restoring Scalzi Park to its Native Plant Population
2033	Radiant Radish
2034	Seeds Sprout Best...
2035	Colorful Flowers
2036	The Affect of Food on an Orb Weaver Spider's Web Spinning

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Biotechnology

Project Number	Title
2037	E-Cigarettes: A New Health Frontier
2039	The Effect of Excessive Nutrients on the Growth of Phytoplankton
2040	Greenhouse Gases and the effect on the ozone layer.
2041	3D Printing of Amyloid Precursor Protein: The Gene Mutation that Causes Alzheimer's
2042	What Substance Attracts The Most Fruit Flies
2043	Is Your Health Club Making You Sick?
2044	Growing Our Future: Using LED Hydroponics to Cultivate Fresh Produce: A Solution for Urban Food Deserts
2045	Gluten - A Sticky Situation
2501	Algae-Gro!
2503	N.D. Naturopathic doctors and Alternative healthcare vs. M.D. Medical doctors and Conventional healthcare
2505	Why we need Digestive Enzymes for optimal health.
2506	Too Nutritious?
2507	Analysis of Phosphorus (Fertilizer) Recovery from Varied "Run-off" Sources (Local Rivers and L.I.S.)
2508	How Does Global Warming Affect the Root-to-Shoot Ratio of Plant Growth?
2509	Do Different Types of Music Affect the Growth of Vegetables; Spinach, Arugula and Radishes?
2514	The Microwave Mistake
2515	Can You Beat The Heat: The Denaturing of Proteins
2518	Optical Illusions
2520	The Effects of Antioxidants on cell regrowth and regeneration in Lumbricus variegatus
2521	Can action related video games trigger an adrenaline response as measured by changes in heart rate or blood pressure?
2522	Fruit Juice for Plants
2523	Does a Magnetic Field Affect Plant Cells?
2524	Electromagnetic Fields and Their Affects on Plants
2525	Birds and Color
2526	Investigation of the Antibacterial Properties of Various Ethanolic Plant Extracts
2527	Your Head, Your Helmet
2528	What Makes Your Heart Beat? Scary vs Neutral Text, Reading vs Listening; A Follow-up Study
2530	Effect of Quantum on Plant Growth
2531	The Effect of Vitamin A1, B1, B9, B12, C1 & Different Temperatures on the Regeneration of Planaria
2532	The Effects of Bisphenol-A on anxiety, short-term memory, and sucrose preference in adolescent female rats.
2533	A Novel Method To Evaluate The Presence Of Genetically Modified Elements In Seeds.
2534	Does Whey Protein Effect the Rate of Regeneration of Planaria?
2536	Can I successfully pollinate radish flowers?
2537	Which liquid (tea, coffee, water, milk, apple juice, Cola) dissolves teeth the most?
2538	Oil or Water Based?
2540	Geotropism and Phototropism with Lima Beans
2541	Climate Change vs. Mussels: UNFILTERED!
2542	Do plants grow best with sugar water, tap water, or salt water?
2543	Should the Flu Vaccination Program be modified to emphasize vaccination of the young and less emphasis on the elderly?
2544	Can the color of your house effect your energy bill
2545	Thermohaline Circulation Shutdown
3001	Can Smells Improve Your Mental Ability?
3002	DNA sequence motifs as biomarkers for genomic disorders.

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Biotechnology

Project Number	Title
3003	Nodule Induction in Arabidopsis to Promote Symbiosis with Rhizobia
3005	The Role of Asymmetric Division in Memory B-Cell Development
3006	Bacterial Resistance to Vancomycin and Ampicillin
3007	Synergistic Antimicrobial Activity of Manuka Honey and Silver Nitrate
3008	Electrolyte challenge Orange Juice vs Energy Drinks
3009	Electrospun Poly(lactic-co-glycolic acid) Scaffolds Slow Raw 264.7 Macrophage Fusion
3010	Does Music Attract Bacteria
3011	Bacteria à La Mode
3013	Enzyme/Substrate Concentrations and the Rate of Enzyme-Catalyzed Reactions
3014	ACVR1/ALK2 Inhibitors as a Cure for Fibrodysplasia Ossificans Progressiva (FOP)
3015	Effect of Communal Bathrooms on Rates of Contagious Diseases
3016	Brilliant Bioplastic: A Comparative Analysis of Strength in Various Bioplastics
3017	Escherichia Coli's Resistance to a Household Cleaner Through the Zone of Inhibition
3018	Radish Seeds: Race To The Top
3019	Calendula officinalis Naturopathic Treatments for Acne vulgaris Reduction affecting the Glandula sebacea and inhibit the excessive production of Sebum.
3020	The Effect of Flavonoids on Apoptosis, Proliferation, and the inhibition of Nuclear Factor Kappa B of Mouse Breast Cancer Cells
3022	An investigation of the effects of high-fructose corn syrup on growth, phenotype, and protein production in Caenorhabditis elegans.
3024	Efficiency of Chlorophyll A and B found in Spinacia Oleracea for Electrical Generation in a Photosynthetic Solar Cell
3025	Gorgonian Coral: A Population Flourishing in a Deprived Environment
3027	Effects of Wi-Fi Signal Radiation on the Development of Brassica rapa (Wisconsin Fast Plants)
3028	Effect of Light Levels on the Growth of Coral
3029	Assessing the Correlation Between a Folate Deficiency During Pregnancy and Low Birth Weight
3030	Eye Color and Colorblindness
3032	An investigation into enteric symbionts and their effects on the interaction between gliadin and anti-gliadin antibodies.
3033	The Effect of Sea Temperatures On Plankton and the Ocean
3034	Bioengineering of Popular Peppers to Create a Disease-Resistant Hybrid with Prolonged Shelf Life, Increased Biomass, and Capsaicin Content
3035	Trogocytosis between Toxoplasma and Host Cell Membrane during Invasion
3036	Determining the Effects of Cyberknife Radiosurgery for Trigeminal Neuralgia Part 2
3037	Review: Systemus Lupus Erythematosus: Updated Treatments and the MYD88 Pathway
3038	What is the effect of water sources on plants?
3039	Effects of Estrogen on Nematostella vectensis Regeneration Abilities
3040	Investigation of the Inhibition of E. coli Biofilm Formation on Food-Contact Surfaces via a Brominated Furanone
3041	Exothermic Reactions: Can They Be Used to Make More Efficient/Environmentally Safe Deicers?
3042	The Effect of the Bitter Gourd on Blood Sugar Levels
3043	Studying the role of neutrophils in preventing the dissemination of Listeria monocytogenes in the intestinal mucosa following oral infection
3044	Differentially Expressed Genes in the Adipose Layer of Skin in Psoriatic Patients
3045	The Utilization of Turmeric Gum as a Reducing Agent for Microbes
3048	Pine Resin Bioadhesive Medical Glue
3049	Studying the Effect of Light Color on the Rate of Photosynthesis in Aquatic Plants
3051	Analyzing Bacterial Resistance to Antibiotics
3052	App Therapy

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Biotechnology

Project Number	Title
3053	The Effects of L-Carnosine on the Lifespan of the nematode <i>Caenorhabditis Elegans</i>
3054	Nin1's Effect on Endoplasmic Reticulum Structure and Nuclear Migration
3055	The Effect of Carbon Dioxide Levels on Oxygen Production in the Diatom <i>Cyclotella meneghiniana</i>
3056	Will Lycopene Affect the Growth Rate of Breast Cancer Cells?
3057	The Effect of Protein on Memory
3058	The Effects of PTHrP on Mammary Epithelial Cells
3060	Analysis of Megakaryopoiesis via the Rho/SRF and ROS/Erk Pathways
3061	Effect of Citrus Paradisi Concentrated Oil and Specific Component d-Limonene on the Dietary Intake of <i>Mus Musculus</i>
3062	An Investigation of the Effects of Cytidine Diphosphate Choline on Parkinson's like <i>Caenorhabditis elegans</i>
3064	The Effect of Anti-TGF Beta and Light Endurance Training on Muscle Regeneration in elderly Female Mice
3065	A Comparative Study of Pathogenic Bacterial Life in Public Buildings.
3066	The Effects of Herbicides on <i>Nematostella vectensis</i> Development and Regeneration
3067	The Effect of ILV Clusters on the Aggregation Propensity of CRABP.
3068	The Kinematics of Barefoot and Shod Running
3069	The Nepal Project: The Impact of Soil Degradation on Soil Fertility
3070	How Bio-Fuels Compare to Gassoline
3071	Shedding Light on Cyanobacterial Population Growth and Regeneration
3072	Targeting Expression of Histamine 4 Receptors on Microglial Cells to Combat Compulsive Disorders
3074	Exploration of how Perjeta could help treat cancer
3075	The Biofixation of CO ₂ and Greenhouse Gases Using Coccolithophorid Algae as a Natural Remedy to the Greenhouse Effect
3076	iShrimp
3077	The Effect of pH on Nutrient Absorption
3078	The Effect of Olive Oil Phenols on the Concentration of Yeast Bacteria in Food Preservation
3079	The Effects of Sensory Deprivation on Neural Activity for the Psychological and Mental Treatment of various Mental Conditions
3080	Investigating Bivalve Bioremediation in a Warming Climate
3081	Rethinking Biological Modeling: An Online Tool That Enables Researchers, Educators, and Students to Build, Analyze, and Share Rule-Based Models of Varying Complexity
3082	Primary Cilia Vesicle Secretion and Resorption Facilitate Cell Communication
3084	The Affect of <i>Pseudomonas putida</i> on the Biodegradation of Plastics
3085	The Detection of Photo-oxidation of Guanine in Oligonucleotides Exposed to visible Radiation from Seasonal Affective Disorder Photo-therapy Lights.
3086	How Sound Effects the Human Mind During Sleep?
3087	Investigating the Efficacy of Bioluminescent Mushroom <i>Panellus Stipticus</i> as a Biosensor to Detect the Toxicity of Water Contaminants
3088	The Use of Bioluminescent Bacteria to Measure Persistent Levels of Water Pollution
3089	Is Reaction Time Dependent on Height
3091	Investigation of the BMP4 Culture Conditions Necessary to Produce Mesoderm-Lineage Cells from a Human Embryonic Stem Cell-Derived, Mesendoderm Intermediate
3093	Immunogenicity and Efficacy of a Nanoparticle-based Lyme Disease Vaccine
3094	Investigation of the Functional Oligomeric State of the Herpes Simplex Virus type 1 Alkaline Nuclease
3096	The Effects of Moderate Altitude on Type 1 Diabetes
3097	The Hydrolyzing Games Hydrochloric Acid vs. Beta-Glucosidase
3098	Biological Control of the Invasive Eurasian Watermilfoil Using Aquatic Weevils
3099	Use of Stem Cell Engineering to Test the Function of a Genetic Variant for PTSD
3102	The Effect of Subliminal Messages on Food Selection

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Biotechnology

Project Number	Title
3103	The Effects of Ethanol on Zebrafish Embryonic Development
3105	Expression of DesB and DesZ for the Creation of Cellulosic Biofuels
3107	The Creation of Recombinant Proteins through Liquid Syncytial Endosperm Found in Coconut Water
3108	Targeted Therapy for Lung Cancer
3109	The affect of different aspects and types of light on Manduca Sexta
3110	Determining an Optimal Multiplicity of Infection for Adenoviral Transduction of ViraDuctin Introduced 3T3 Fibroblast Cells
3111	Neuroprotective Effect of Finofibrate in the MPTP Mouse Model of Parkinson's Disease
3112	Effects of Natural Antimicrobials on Escherichia Coli Growth
3114	FRET based intercellular ATP imaging for testing of BCL-xL as a mitochondrial efficiency enhancer during Long Term Potentiation.
3115	Inhibitory effect of D-Psicose on Motility, Growth and Reproductive Maturity of L1 larvae of Caenorhabditis elegans
3116	The Genetic Touch
3117	Development and Verification of Primers for the Cytochrome Oxidase Gene in Cnidarians
3118	The Effect of Light Exposure on the Light Emission of Bioluminescent Dinoflagellates
3119	Birth Order and Attention Span
3120	The Effects of Active Ingredients in Energy Drinks on the Development of Zebrafish Embryos
3121	The Feeding Behavior of Squilla empusa in the Long Island Sound
3122	Differentially expressed genes involved in Paget's disease of bone in response to SQSTM1 status
3124	SQSTM1/P62 Mutation of PDB
3125	How Taurine Affects Hermit Crabs
3126	testing for antibiotic properties of the seaweeds Saccharina latissima and Gracilaria trikvahiae against Vibrio fischeri
3127	Structure-Based Analysis of The CXCR4 N-Terminus
3128	Effects of Epigallocatechin Gallate on Breast Cancer Growth Rates
3129	The Affects of Temperature on the Filtration Rate of Mercenaria mercenaria
3130	Primary Craniofacial Osteosarcoma's Represent a Malignant Transformation of Neural Crest-Derived Stem Cells
3131	The Effects of Leucine on the Zebrafish Embryonic Development
3132	Carcinogens in Oil
3133	Stress by the Angle
3134	Ilio-sacral and Ilio-femoral Joint Relation in the Positioning of Iguanas in the Lizard Tree of Life
3135	An Assessment of the Reefs in the Windward Islands Due to the Presence of Pterois volitans
3136	The Effects of Road Salt & Gasoline on Amylase Function
3137	Investgating the Phytoremediation of Lead: The Type of Plant Species Versus the Rate of Lead Extraction in Hydroponic Media
3138	The Effects of Diethyl Phthalate on Embryonic Development in Zebrafish
3140	Examining training climate and Ironman race performance outcomes
3141	An Analysis of Experimental Stem Cell Differentiation Data
3142	Regulation and Browning Capabilities of FNDC4 in vivo
3143	Investigation of the Effects of Compounds in Curcumin, Fruits, Berries, and Garlic on Breast Cancer Cell Survival and Growth
3145	siRNA-loaded exosome-lipid nanoparticles for in vitro treatment of B16F10 cells
3146	Skin Deep: A Biochemical Analysis of Grape Pigments
3147	The Effectiveness of Plant Material as Metal Chelators
3149	The Two A's: Animals and Autism
3150	The Effect of the Environment on the Development of a Food Allergy: A Sibling Study
3151	Development of cytokine-based glioma therapies

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Biotechnology

Project Number	Title
3152	Chemosensitization of high-grade serous ovarian carcinoma via calcium signaling
3154	H19 lncRNA-Mediated Regulation of Aromatase Expression in Granulosa Cells
3155	Does Age Affect the Severity and Frequency of Concussions in Female Soccer Players?
3157	The Bigger, The Better
3158	The Effect of Common Industrial Food Additives on Zebrafish Embryo Development
3159	The Population Dynamics of Inteins: Investigative Analysis of Metagenomes
3160	Photosynthetic Production of an Infinite Oxygen Supply
3161	The Role of Cx43 in Vascularization
3162	Characterization of TC-2153 Inhibition on Striatal-Enriched Protein Tyrosine Phosphatase (STEP) in Human Cell Lines
3163	Use of a Pre-Chemotherapy/Radiotherapy Regimen of Glutamine and Probiotics to Prevent Oral Mucositis
3501	Nice to Meat You: Using DNA Barcoding to Detect Mislabeling in the Meat Industry
3502	Alternate Source of Paper from Melons
3504	Creating a Living Filter to Lower Levels of Harmful Algae in Long Island Sound
3507	Virtual screening and Evaluation of non-covalent Inhibitors for Class C β -lactamase from <i>Enterobacter cloacae</i> P99
3508	Cloning, sequencing and analysis of potential amyloid beta precursor protein from Cnidarians
3509	External Digestion of Cellulose Utilizing Enteric Symbionts from the Termite gut
3510	Synergistic affect of combinations of antibiotic v.s E.coli.
3511	The Effects of Black Seed Oil and Thymoquinone on Bacterial Growth
3512	Effect of Environmental Conditions on Hydrogen Production in <i>Clostridium</i>
3513	Using DNA Barcoding to Detect the Potential Contamination of Herbal Products
3515	Saving the World from Brain Eating Amoebas
3516	Efficacy of Clobazam in Epilepsies Associated with Genetic Abnormalities
3517	Hydroponics: Effect of varying Calcium concentration on number of flowers produced by Wisconsin Fast Plants grown in hydroponic media.
3518	Observing the Effects of Biochar Soil Additives on Plants Grown with Pumpkin, Pomegranate, and Papaya Seed Fertilizers while Determining the Best Fertilizer for Plant Growth
3519	An investigation of horizontal gene transfer by way of organelle capture: <i>Arabidopsis</i> to <i>Rapa</i>
3520	A Novel Approach to Removing Oil Spills from Seawater by using Sustainable and Cost-efficient Materials
3521	Truly Vegetarian? Using DNA Barcoding to Detect Possible Contamination of Vegetarian Products
4005	pH from Scratch
4014	Printed Prosthetics
4027	Rubber Bones
4028	Acid Rain: A Silent Killer
4029	Dressing Our Energy
4030	Novel Methods for Water Desalination by Harnessing Solar Energy using a Solar Oven With Flat Mirrors, Fresnel Lens and a Parabolic Mirror
4033	Harnessing Human Movement for Clean Energy
5002	The Affect of Certain Scents on Short-Term Memory
5011	THE INVESTIGATION OF THE PRESENCE OF PLASTIC MICROSCOPIC FIBERS IN EFFLUENT SEWAGE WATER AND THE LONG ISLAND SOUND
5016	Contrasting Types of Doctor's Offices Using Amount of Virulent Bacteria
5019	Fizz, Fizz!
5024	Josh's Bridge is Falling Down
5029	To Design A Self-Sustained Wind-Microbial Hybrid Device that will Generate Clean Hydrogen for Energy
5036	Whatever Floats Your Boat!
5041	Using Wettability to Develop Reusable Freezer Bags

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Biotechnology

Project Number	Title
5045	The Search for the Most Effective Ice Melt
5057	Drag Effect On An Airplane
5501	Which type of grocery bag; plastic, paper, or recycled paper, biodegrades the fastest?
5503	Which Antacid can Neutralize the Most Stomach Acid?
5508	A Study of the Production, Impact Testing, and Degradation of Seaweed Based Bioplastics
5510	Viscosity and Melting Profile of Dairy and Non-Dairy Ice-Cream and the Development of Appealing Ice-Cream for Lactose Intolerant Individuals.
5512	Alleviating Minor Household Flooding Situations
5514	The Effect of Greywater on the Growth of Plants
5515	Removal and Recycling of Phosphate from water Using Various Methods: A Sustainability Project
5518	Do enzymes make a better detergent?
5519	An analysis of "Super Spices" Effect on Cell Absorption, Antioxidant Levels, and pH.
5521	Bio Battery: The Wise Alternative for Future Renewable Energy
5523	What bridge design is strongest?
5528	Greenery
5529	How long does it take devices to charge when the power goes out?
5533	Which calcium carbonate antacid will neutralize gastric acid more effectively?
5534	Do Water-Filtering Bottles Really Work?
5541	Soap Mixtures and their Bubbles
5553	Invisible Technology.
5560	Solar Sweatshirt
5561	Graphene Enhanced Piezoelectric Generator for Environmental Energy Conservation
5564	Foot-Operated Computer Mouse Prototype
6004	Dermal Denticles in Roofing Material
6005	An Aerodynamic Investigation of a Six Panel Circularly Grooved Golf Ball
6009	Chemical and Microwave Pretreatment of Biomass to Optimize Reducing Sugar Yield for Cellulosic Ethanol Applications
6010	3D Printed Fractal Structures
6012	Testing the Use of Carbon Nanotubes in Electrochemical Double Layered Super Capacitors
6014	Developing a Low-Cost Method of Manufacturing Heart Valves for Transcatheter Aortic Valve Replacement Surgery
6017	The Stability and Activity of the Biosynthetic and Synthetic Emulsifiers of Xanthan Gum, Propylene Glycol Alginate (PGA), and Tragacanth
6022	Development of wet lands and utilization of ground water without disturbing environment.
6023	Correlation of Hippocampal Neurogenesis and Exposure to Cosmic Ray Highly Ionizing Radiation (HZE) Particles
6025	Chitin: Nature's Plastic
6026	Bio-sensor drug carrier for insulin
6027	Obtaining Alternative Concentrations of Ferric Chloride for Higher Visibility while Etching Copper for use in Jewelry
6028	Finding the Best Rust Remover
6029	Determining Natural Pigment Category that Leads to the Highest Output of Current and Voltage on Dye-Sensitized Solar Cell
6033	Exploring the Storage Capacities of Carbon Nanotube and Graphene Based Capacitors
6035	Analyzing the Effect of De-icers on Connecticut River Water Quality
6037	Application of Shear Thickening Fluids in Orthos for Parkinson's Patients
6038	Solar Water Disinfection Optimization Using Titanium Dioxide Coated Plastics
6040	Design of a Novel Photo-Sensitized Carbon-based Supercapacitor for Capture and Storage of Solar Energy
6041	The Effects of Pressure, Temperature, and Cooling Rate on Tensile Strength of Extruded High Density Polyethylene

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Biotechnology

Project Number	Title
6044	Glucose Meter Shoe
6045	Optimizing Hydrogen Production From a Piezo-electrochemical Water-Splitting Mechanism with Low-Cost Synthesis of ZnO and BiFeO ₃ Nanostructures
6047	Keep your hands on the handle
6049	Momentum Powered Magnetic Generator For Electric Car Applications And Free Energy And Perpetual Motion Research
6051	Effective Energy Storage Technology for Electric Power
6052	Construction of a Mechanical Arm with Magnetic Claw
6059	Construction of a Renewable Energy Generator from Recycled Materials: A Study on Windbelts
6060	OXIDATIVE DESULFURATION OF DIBENZOTHIOPHENE THROUGH THE USE OF TiO ₂ COATED OMS-2
6064	Examining Graphene Nanoparticles for CO ₂ capture and water purification.
6068	UV Curing
6069	Titanium based artificial bone materials
6072	The effect of E. coli location and availability on the rate of locomotion in C. elegans
6075	On the Minimization of Rotor Losses in the Three Phase Induction Machine
6076	Practical Applications for 3D Printing Concrete Structures
6077	The Power of Gatorade
6078	Temperature-Induced Concurrent Removal and Recovery of Wastewater Ammonia-Nitrogen
6079	An Inquiry Into The Use of Graphene as a Superconductor
6080	great globs of gluten
6088	Graphene Film Conductivity with Single Strand Deoxyribonucleic Acid
6090	An investigation studying the effect of the pseudomonas bacteria in a salt h ₂ O environment
6091	Synthesis of Silver Nanoparticles using Plasma Arcing Atomizing Methods
6093	Synthesis and Characterization of EGCG-PLAGA Conjugates and Mixtures
6094	The Effect of Nanoparticles on UVA-Induced Psoralen Photoadducts and their Rapid Detection by Matrix-assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometry (MALDI-TOF MS)
6095	Synthesis of a Block Co-polymer for the Manufacturing of a Bio-Degradable Monomeric Filament
6096	New Invention to Efficiently Harness Wave Power
6097	Application of Nano-fibril Structures in Fabrication of Lightweight Materials of High Tensile Toughness
6099	Inorganic Biology: Direction Control of Polyoxometalate-Based Tubular Microstructures
6101	A Filamentous Organic Solar Cell Based Piezoelectric Architecture for Powering Commercial and Biological Electronic Devices
6102	Supporting The Cause: The effect of balsa wood support on craft stick bridges
6103	Voltage Output of Homemade Nano-Crystalline Dye-Sensitized Solar Cells in Series
6108	How do Cover Crops affect Soil pH
6110	Determination and removal of 17-Beta Estradiol in Long Island Sound.
6113	Enhancing Water Resistance Qualities of SrAl ₂ O ₄ :Eu ²⁺ , Dy ³⁺ Phosphors Using Barrier Coatings
6118	A Potential and easy to use, low cost Diabetic Test for use in Developing Countries and Rural Areas
6120	Do You C This Juice? How Levels of Vitamin C Deplete Over Time
6124	Designing a circuit board to wirelessly power a Left Ventricular Assist Device (LVAD)
6125	Investigating Alternative Methods Using Magnetism to Power a Four-Stroke Engine
6509	Designing and Building a Scale Model of an Eco-friendly and Self-sustainable city
6511	Shelf Life of Milk.
6514	Recycled Plastic Bag Insulation
6516	The Effect of Temperature, pH, and Dissolved Oxygen on Halophilic Desalination
6520	The Future of Armor: Inspired by the Dactyl Club of the Mantis Shrimp

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Environmental

Env. Mgmt't & Env. Analysis

Project Number	Title
1003	Common energy drinks and how they effect the development of zebra fish embryo.
1006	Analysis of different wood's resistance and how to prevent or delay the decay with natural sources.
1008	The Effects of De-icers on Grass Growth
1009	Plants: CO2 Good For You?
1014	Wood vs. Nature
1020	Effect of various temperatures on fly locomotion.
1021	Plants on Other Planets: The Effects of Gravity and Atmosphere
2001	Effects of Irradiation on Seeds
2026	Survival of Single-Celled Water Organisms in Different Potable waters
2028	Nature's Way of Cleaning Oil Spills in Fresh Water
2029	Biodegradation: Are We Convinced
2031	Green Growing Alternatives
2032	Restoring Scalzi Park to its Native Plant Population
2034	Seeds Sprout Best...
2035	Colorful Flowers
2037	E-Cigarettes: A New Health Frontier
2039	The Effect of Excessive Nutrients on the Growth of Phytoplankton
2042	What Substance Attracts The Most Fruit Flies
2044	Growing Our Future: Using LED Hydroponics to Cultivate Fresh Produce: A Solution for Urban Food Deserts
2501	Algae-Gro!
2504	Analyzing Soil Components
2506	Too Nutritious?
2507	Analysis of Phosphorus (Fertilizer) Recovery from Varied "Run-off" Sources (Local Rivers and L.I.S.)
2509	Do Different Types of Music Affect the Growth of Vegetables; Spinach, Arugula and Radishes?
2511	It's Raining, It's Pouring, and pH Levels Across Hamden Need Exploring
2512	Water Purification
2513	Wood Fire Frenzy
2516	Planting With Compost
2524	Electromagnetic Fields and Their Affects on Plants
2529	Incandescent v. Fluorescent: Which Light is Most Effective for Growing Corn Plants.
2533	A Novel Method To Evaluate The Presence Of Genetically Modified Elements In Seeds.
2539	Goo-Be-Gone
2544	Can the color of your house effect your energy bill
2545	Thermohaline Circulation Shutdown
3003	Nodule Induction in Arabidopsis to Promote Symbiosis with Rhizobia
3016	Brilliant Bioplastic: A Comparative Analysis of Strength in Various Bioplastics
3021	The Collemobola Consumes the Fungi: Interaction Between Two Important Soil Species
3023	Hydro and Solar Based Hybrid System
3024	Efficiency of of Chlorophyll A and B found in Spinacia Oleracea for Electrical Generation in a Photosynthetic Solar Cell
3027	Effects of Wi-Fi Signal Radiation on the Development of Brassica rapa (Wisconsin Fast Plants)
3033	The Effect of Sea Temperatures On Plankton and the Ocean
3038	What is the effect of water sources on plants?
3041	Exothermic Reactions: Can They Be Used to Make More Efficient/Environmentally Safe Deicers?
3050	Do zebra mussels colonize Lakes Lillionah and Zoar from upstream?

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Environmental

Env. Mgmt't & Env. Analysis

Project Number	Title
3055	The Effect of Carbon Dioxide Levels on Oxygen Production in the Diatom <i>Cyclotella meneghiniana</i>
3069	The Nepal Project: The Impact of Soil Degradation on Soil Fertility
3070	How Bio-Fuels Compare to Gasoline
3071	Shedding Light on Cyanobacterial Population Growth and Regeneration
3075	The Biofixation of CO ₂ and Greenhouse Gases Using Coccolithophorid Algae as a Natural Remedy to the Greenhouse Effect
3076	iShrimp
3080	Investigating Bivalve Bioremediation in a Warming Climate
3084	The Affect of <i>Pseudomonas putida</i> on the Biodegradation of Plastics
3087	Investigating the Efficacy of Bioluminescent Mushroom <i>Panellus Stipticus</i> as a Biosensor to Detect the Toxicity of Water Contaminants
3088	The Use of Bioluminescent Bacteria to Measure Persistent Levels of Water Pollution
3098	Biological Control of the Invasive Eurasian Watermilfoil Using Aquatic Weevils
3101	The Effect of TiO ₂ /Graphene Oxide on the Purification of Tris(2-Chloroethyl)Phosphate(TCEP) and CuSO ₄ (CS) Contaminated Water
3104	The Remediation of Heavy Metals from Wastewater Using an <i>Aspergillus niger</i> Activated Flow Filter
3105	Expression of DesB and DesZ for the Creation of Cellulosic Biofuels
3106	Biochar - what is it and how it can help improve the CO ₂ balance and increase crop yields
3121	The Feeding Behavior of <i>Squilla empusa</i> in the Long Island Sound
3135	An Assessment of the Reefs in the Windward Islands Due to the Presence of <i>Pterois volitans</i>
3137	Investgating the Phytoremediation of Lead: The Type of Plant Species Versus the Rate of Lead Extraction in Hydroponic Media
3140	Examining training climate and Ironman race performance outcomes
3147	The Effectiveness of Plant Material as Metal Chelators
3148	Effects of Disposed Medications on Water Chemistry
3160	Photosynthetic Production of an Infinite Oxygen Supply
3504	Creating a Living Filter to Lower Levels of Harmful Algae in Long Island Sound
3512	Effect of Environmental Conditions on Hydrogen Production in <i>Clostridium</i>
3517	Hydroponics: Effect of varying Calcium concentration on number of flowers produced by Wisconsin Fast Plants grown in hydroponic media.
3518	Observing the Effects of Biochar Soil Additives on Plants Grown with Pumpkin, Pomegranate, and Papaya Seed Fertilizers while Determining the Best Fertilizer for Plant Growth
3519	An investigation of horizontal gene transfer by way of organelle capture: <i>Arabidopsis</i> to <i>Rapa</i>
3520	A Novel Approach to Removing Oil Spills from Seawater by using Sustainable and Cost-efficient Materials
4003	Using a Solar Oven to Purify Salt Water to Become Drinkable
4008	Battle of the Brands
4012	Smog Filter Using An Electrostatic Field
4028	Acid Rain: A Silent Killer
4029	Dressing Our Energy
4030	Novel Methods for Water Desalination by Harnessing Solar Energy using a Solar Oven With Flat Mirrors, Fresnel Lens and a Parabolic Mirror
5003	How does Color Affect Heat ?
5007	Cool, Cool Chlorides...A comparison of ice melting chlorides as deicers and their effectiveness as an anti-freeze
5011	THE INVESTIGATION OF THE PRESENCE OF PLASTIC MICROSCOPIC FIBERS IN EFFLUENT SEWAGE WATER AND THE LONG ISLAND SOUND
5016	Contrasting Types of Doctor's Offices Using Amount of Virulent Bacteria
5028	Weather Warrior
5029	To Design A Self-Sustained Wind-Microbial Hybrid Device that will Generate Clean Hydrogen for Energy

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Environmental

Env. Mgmt & Env. Analysis

Project Number	Title
5034	Local Air Pollution Variations
5041	Using Wettability to Develop Reusable Freezer Bags
5046	The Effects of Salt Concentrations and Voltages on the Electrolysis Process
5501	Which type of grocery bag; plastic, paper, or recycled paper, biodegrades the fastest?
5508	A Study of the Production, Impact Testing, and Degradation of Seaweed Based Bioplastics
5512	Alleviating Minor Household Flooding Situations
5513	How much salt is in water?
5515	Removal and Recycling of Phosphate from water Using Various Methods: A Sustainability Project
5517	Analysis of natural sources of possible road de-icers and effect on pavement, soil, and plants.
5529	How long does it take devices to charge when the power goes out?
5534	Do Water-Filtering Bottles Really Work?
5535	The Effect of Rainfall on Oxygen/ pH Levels in Bodies of Water
5536	Keep the Heat
5540	Bio vs. Fossil Fuels
5542	Watts Up?
5559	The Effect of Lenses on a Solar Panel.
5561	Graphene Enhanced Piezoelectric Generator for Environmental Energy Conservation
5562	Wind Power
6008	The Effect of Varying Ferrofluid Carrier Liquids on Oil Spill Remediation
6009	Chemical and Microwave Pretreatment of Biomass to Optimize Reducing Sugar Yield for Cellulosic Ethanol Applications
6013	Development of a Sustainable Energy System that Converts Lightning to Hydrogen Gas through Plasma Electrolysis
6018	A New Spin on Generators
6024	Quality of Nighttime Photography Based on Light Sources
6033	Exploring the Storage Capacities of Carbon Nanotube and Graphene Based Capacitors
6034	Evaluating the Performance of a Model Solar Concentrating System Using Thermoelectric Generating Technology
6035	Analyzing the Effect of De-icers on Connecticut River Water Quality
6036	Pressure to the Future
6038	Solar Water Disinfection Optimization Using Titanium Dioxide Coated Plastics
6039	The Construction and Calculation of an Atmospheric Geothermal Airlift Pump Condenser
6041	The Effects of Pressure, Temperature, and Cooling Rate on Tensile Strength of Extruded High Density Polyethylene
6047	Keep your hands on the handle
6054	Exploration into the Development of a Mathematical Solar Cell Model in order to Simulate Solar Energy Potential in the United States
6056	Determining Honey Adulteration with Raman Spectra
6058	A Study of the Removal of Pollutants by Rain Gardens, a Low-Impact Drainage System
6060	OXIDATIVE DESULFURATION OF DIBENZOTHIOPHENE THROUGH THE USE OF TIO ₂ COATED OMS-2
6062	Atmospheric Water Generator From Alternative Energy Sources.
6064	Examining Graphene Nanoparticles for CO ₂ capture and water purification.
6070	The Effect of Fertilizer on Dissolved Oxygen Levels in Water.
6074	Creation of Tidal Power from Infiltrating Coastal Ground Water via a Novel Tidal Barrage System
6075	On the Minimization of Rotor Losses in the Three Phase Induction Machine
6078	Temperature-Induced Concurrent Removal and Recovery of Wastewater Ammonia-Nitrogen
6081	Solar Computing: Creating a cost-effective off-the-grid laptop for utilization in third world countries
6089	The Development of a Recycled Tire and Marine Cyanobacteria Single Chamber Microbial Fuel Cell

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Environmental

Env. Mgmt't & Env. Analysis

Project Number	Title
6090	An investigation studying the effect of the pseudomonas bacteria in a salt h20 environment
6091	Synthesis of Silver Nanoparticles using Plasma Arcing Atomizing Methods
6096	New Invention to Efficiently Harness Wave Power
6103	Voltage Output of Homemade Nano-Crystalline Dye-Sensitized Solar Cells in Series
6108	How do Cover Crops affect Soil pH
6110	Determination and removal of 17-Beta Estradiol in Long Island Sound.
6111	How the Type of Footing Effects the Impact of Livestock on Soil Erosion
6118	A Potential and easy to use, low cost Diabetic Test for use in Developing Countries and Rural Areas
6123	The Car of the Future: The Effect of Two Energy Power Sources Charged by Solar Panels on the Mileage and Speed of an RC Car.
6502	Black Ice Road Sensors
6507	Using a photovoltaic cell to self-sustain a clean water pump
6508	Comparative Efficiencies of Magnetically Levitating Train Systems in and out of a Vacuum Chamber
6509	Designing and Building a Scale Model of an Eco-friendly and Self-sustainable city
6510	Converting Mechanical Energy from Cross-walk Traffic Using Piezoelectricity
6516	The Effect of Temperature, pH, and Dissolved Oxygen on Halophilic Desalination

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Engineering

Project Number	Title
2015	A Structural Approach To Drug Resistance
2037	E-Cigarettes: A New Health Frontier
2527	Your Head, Your Helmet
2533	A Novel Method To Evaluate The Presence Of Genetically Modified Elements In Seeds.
2544	Can the color of your house effect your energy bill
3009	Electrospun Poly(lactic-co-glycolic acid) Scaffolds Slow Raw 264.7 Macrophage Fusion
3016	Brilliant Bioplastic: A Comparative Analysis of Strength in Various Bioplastics
3024	Efficiency of Chlorophyll A and B found in Spinacia Oleracea for Electrical Generation in a Photosynthetic Solar Cell
3040	Investigation of the Inhibition of E. coli Biofilm Formation on Food-Contact Surfaces via a Brominated Furanone
3041	Exothermic Reactions: Can They Be Used to Make More Efficient/Environmentally Safe Deicers?
3070	How Bio-Fuels Compare to Gassoline
3075	The Biofixaction of CO2 and Greenhouse Gases Using Coccolithophorid Algae as a Natural Remedy to the Greenhouse Effect
3076	iShrimp
3079	The Effects of Sensory Deprivation on Neural Activity for the Psychological and Mental Treatment of various Mental Conditions
3087	Investigating the Efficacy of Bioluminescent Mushroom Panellus Stipticus as a Biosensor to Detect the Toxicity of Water Contaminants
3093	Immunogenicity and Efficacy of a Nanoparticle-based Lyme Disease Vaccine
3099	Use of Stem Cell Engineering to Test the Function of a Genetic Variant for PTSD
3107	The Creation of Recombinant Proteins through Liquid Syncytial Endosperm Found in Coconut Water
3141	An Analysis of Experimental Stem Cell Differentiation Data
3145	siRNA-loaded exosome-lipid nanoparticles for in vitro treatment of B16F10 cells
3163	Use of a Pre-Chemotherapy/Radiotherapy Regimen of Glutamine and Probiotics to Prevent Oral Mucositis
3502	Alternate Source of Paper from Melons
3504	Creating a Living Filter to Lower Levels of Harmful Algae in Long Island Sound
3509	External Digestion of Cellulose Utilizing Enteric Symbionts from the Termite gut
3515	Saving the World from Brain Eating Amoebas
3519	An investigation of horizontal gene transfer by way of organelle capture: Arabidopsis to Rapa
3520	A Novel Approach to Removing Oil Spills from Seawater by using Sustainable and Cost-efficient Materials
4010	The Effects of a Robot's Speed in Mazes with Different Amounts of Turns
4011	Stealth Shapes
4012	Smog Filter Using An Electrostatic Field
4013	Stirling Engine: The Future
4014	Printed Prosthetics
4018	The Power of Sound
4021	Charge it up!!
4023	Developing a Practical System for Loosely Coupled Inductive Power Transfer
4026	WriteBot
4029	Dressing Our Energy
4030	Novel Methods for Water Desalination by Harnessing Solar Energy using a Solar Oven With Flat Mirrors, Fresnel Lens and a Parabolic Mirror
4033	Harnessing Human Movement for Clean Energy
5001	The Effect of Different Antennae on the Reception of a Homemade Radio
5008	Homopolar Motor From Faraday To Now-A-Day
5009	Wind power vs solar power

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Engineering

Project Number	Title
5012	How the Strength Of Magnets Varies At Different Temperatures
5017	Which Fruit Produces More Electricity?
5018	A System for Remembering Generic Items (ASRGI for short)
5022	How to power a calculator out of change
5024	Josh's Bridge is Falling Down
5029	To Design A Self-Sustained Wind-Microbial Hybrid Device that will Generate Clean Hydrogen for Energy
5036	Whatever Floats Your Boat!
5041	Using Wettability to Develop Reusable Freezer Bags
5045	The Search for the Most Effective Ice Melt
5049	The Effect of Putting Duct Tape on a Wiffle Ball Bat
5053	An Easier Way For Water
5054	Which produce generates the most electricity: lemon or potato?
5055	Light Bulbs Which type is brighter?
5057	Drag Effect On An Airplane
5058	Bio-Inspired Robot
5501	Which type of grocery bag; plastic, paper, or recycled paper, biodegrades the fastest?
5502	Ping Pong and Wiffle Ball Catapult
5505	Electromagnets
5507	The Efficiency and Durability of Piezoelectric Generators
5508	A Study of the Production, Impact Testing, and Degradation of Seaweed Based Bioplastics
5515	Removal and Recycling of Phosphate from water Using Various Methods: A Sustainability Project
5521	Bio Battery: The Wise Alternative for Future Renewable Energy
5522	The Alternative Battery
5523	What bridge design is strongest?
5524	Wind Turbines: The affects of different blades on a model wind turbine
5525	The Effects of a Gear Size on Speed
5526	A Lot of Power
5528	Greenenergy
5529	How long does it take devices to charge when the power goes out?
5537	Burning Calories to Light up the Night
5543	Magnetic Linear Accelerator
5547	Which type of arm; robotic, or human would have 100% accuracy and precision when throwing a ball?
5550	Electrostatic Generator
5553	Invisible Technology.
5554	Fabrication and testing of the power output of a solid state tesla coil.
5556	Drawing Robot
5557	Does the Shape of an Air Foil affect the lift of an Airplane?
5560	Solar Sweatshirt
5561	Graphene Enhanced Piezoelectric Generator for Environmental Energy Conservation
5562	Wind Power
5563	Hypoallergenic Lawn Care Device
5564	Foot-Operated Computer Mouse Prototype
5566	Magnetic Levitation Automotive Wind Rail
5567	Which Model Airplane Flies the Farthest?

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Engineering

Project Number	Title
6001	Burning Calories: How much energy is stored in different types of foods?
6002	Resistance and Temperature of Wires
6004	Dermal Denticles in Roofing Material
6005	An Aerodynamic Investigation of a Six Panel Circularly Grooved Golf Ball
6007	Using Verbal Commands to Play the Maze Game with NAO, Humanoid Robot
6009	Chemical and Microwave Pretreatment of Biomass to Optimize Reducing Sugar Yield for Cellulosic Ethanol Applications
6010	3D Printed Fractal Structures
6012	Testing the Use of Carbon Nanotubes in Electrochemical Double Layered Super Capacitors
6013	Development of a Sustainable Energy System that Converts Lightning to Hydrogen Gas through Plasma Electrolysis
6014	Developing a Low-Cost Method of Manufacturing Heart Valves for Transcatheter Aortic Valve Replacement Surgery
6015	Geant4 Monte Carlo Simulation in the Development of CMS Calorimetry
6016	Tilt angles affect on a photovoltaic modules voltage output.
6018	A New Spin on Generators
6020	Comparing the energy generated from simulated rain drops on a piezoelectric surface to a hydro-electric turbine in a downspout, using the same volume of water
6022	Development of wet lands and utilization of ground water without disturbing environment.
6025	Chitin: Nature's Plastic
6026	Bio-sensor drug carrier for insulin
6027	Obtaining Alternative Concentrations of Ferric Chloride for Higher Visibility while Etching Copper for use in Jewelry
6028	Finding the Best Rust Remover
6029	Determining Natural Pigment Category that Leads to the Highest Output of Current and Voltage on Dye-Sensitized Solar Cell
6033	Exploring the Storage Capacities of Carbon Nanotube and Graphene Based Capacitors
6034	Evaluating the Performance of a Model Solar Concentrating System Using Thermoelectric Generating Technology
6036	Pressure to the Future
6038	Solar Water Disinfection Optimization Using Titanium Dioxide Coated Plastics
6039	The Construction and Calculation of an Atmospheric Geothermal Airlift Pump Condenser
6040	Design of a Novel Photo-Sensitized Carbon-based Supercapacitor for Capture and Storage of Solar Energy
6041	The Effects of Pressure, Temperature, and Cooling Rate on Tensile Strength of Extruded High Density Polyethylene
6043	Development of a Simulation Model for the Solution of Einstein's General Relativity and Quantum Mechanics Based on Causal Dynamical Triangulation
6044	Glucose Meter Shoe
6045	Optimizing Hydrogen Production From a Piezo-electrochemical Water-Splitting Mechanism with Low-Cost Synthesis of ZnO and BiFeO ₃ Nanostructures
6049	Momentum Powered Magnetic Generator For Electric Car Applications And Free Energy And Perpetual Motion Research
6051	Effective Energy Storage Technology for Electric Power
6052	Construction of a Mechanical Arm with Magnetic Claw
6054	Exploration into the Development of a Mathematical Solar Cell Model in order to Simulate Solar Energy Potential in the United States
6059	Construction of a Renewable Energy Generator from Recycled Materials: A Study on Windbelts
6060	OXIDATIVE DESULFURATION OF DIBENZOTHIOPHENE THROUGH THE USE OF TiO ₂ COATED OMS-2
6062	Atmospheric Water Generator From Alternative Energy Sources.
6064	Examining Graphene Nanoparticles for CO ₂ capture and water purification.
6065	Computer Hand Input Mechanism
6067	The Development of a Multilayer Anechoic Tile Systems to Mitigate the Effect of Disbonds in the Hulls of Submersibles

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Engineering

Project Number	Title
6068	UV Curing
6069	Titanium based artificial bone materials
6071	Hydrogen Fuel Cells How Changes in Temperature Affect Them
6073	Low Drag Automobile Design
6074	Creation of Tidal Power from Infiltrating Coastal Ground Water via a Novel Tidal Barrage System
6075	On the Minimization of Rotor Losses in the Three Phase Induction Machine
6076	Practical Applications for 3D Printing Concrete Structures
6078	Temperature-Induced Concurrent Removal and Recovery of Wastewater Ammonia-Nitrogen
6079	An Inquiry Into The Use of Graphene as a Superconductor
6081	Solar Computing: Creating a cost-effective off-the-grid laptop for utilization in third world countries
6082	Modifications to electronic pet fence system to allow for safe return into boundaries
6083	The application of magnetic levitation technology on elevator construction
6087	Building a Magnetically Levitated Elevator that can Raise and Lower Objects to Various Heights
6088	Graphene Film Conductivity with Single Strand Deoxyribonucleic Acid
6089	The Development of a Recycled Tire and Marine Cyanobacteria Single Chamber Microbial Fuel Cell
6091	Synthesis of Silver Nanoparticles using Plasma Arcing Atomizing Methods
6093	Synthesis and Characterization of EGCG-PLAGA Conjugates and Mixtures
6095	Synthesis of a Block Co-polymer for the Manufacturing of a Bio-Degradable Monomeric Filament
6096	New Invention to Efficiently Harness Wave Power
6097	Application of Nano-fibril Structures in Fabrication of Lightweight Materials of High Tensile Toughness
6099	Inorganic Biology: Direction Control of Polyoxometalate-Based Tubular Microstructures
6100	Power Gear
6101	A Filamentous Organic Solar Cell Based Piezoelectric Architecture for Powering Commercial and Biological Electronic Devices
6102	Supporting The Cause: The effect of balsa wood support on craft stick bridges
6103	Voltage Output of Homemade Nano-Crystalline Dye-Sensitized Solar Cells in Series
6105	A Novel Application of Piezoelectricity and Impressed Current Cathodic Protection for Corrosion Prevention
6110	Determination and removal of 17-Beta Estradiol in Long Island Sound.
6113	Enhancing Water Resistance Qualities of SrAl ₂ O ₄ :Eu ²⁺ , Dy ³⁺ Phosphors Using Barrier Coatings
6116	Inclusion of Thermoelectric Generators in Glass Building Materials to Produce Useful Energy in New England Homes
6118	A Potential and easy to use, low cost Diabetic Test for use in Developing Countries and Rural Areas
6122	Building a Maglev train using electromagnet
6123	The Car of the Future: The Effect of Two Energy Power Sources Charged by Solar Panels on the Mileage and Speed of an RC Car.
6124	Designing a circuit board to wirelessly power a Left Ventricular Assist Device (LVAD)
6125	Investigating Alternative Methods Using Magnetism to Power a Four-Stroke Engine
6126	LCD Projector Built From Commonly Found Electronics On a Budget
6501	Changing the shape of blades on wind turbines
6502	Black Ice Road Sensors
6504	Blades of Fury Pt. 2: Weight Efficiency
6505	Feasibility of Electromagnetic Freight Systems
6506	Building an Automated Prototype for the USAR Operations and Industrial Applications Using Lego Mindstorm, Tetrax and RobotC
6507	Using a photovoltaic cell to self-sustain a clean water pump
6508	Comparative Efficiencies of Magnetically Levitating Train Systems in and out of a Vacuum Chamber

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Engineering

Project Number	Title
6510	Converting Mechanical Energy from Cross-walk Traffic Using Piezoelectricity
6513	Calories to Watts: Novel methods that utilize exercising energy using piezoelectric generators
6514	Recycled Plastic Bag Insulation
6515	The Catapult
6520	The Future of Armor: Inspired by the Dactyl Club of the Mantis Shrimp
6521	A Novel Wind Turbine Design Incorporating Photovoltaic Cells and Piezoelectric Sensors

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Sustainability

Project Number	Title
1003	Common energy drinks and how they effect the development of zebra fish embryo.
1004	Purification Possibilities
1006	Analysis of different wood's resistance and how to prevent or delay the decay with natural sources.
1008	The Effects of De-icers on Grass Growth
1009	Plants: CO2 Good For You?
1010	Use of a Microbial Fuel Cell to Generate Electricity from Compost
1014	Wood vs. Nature
1018	Which substances will produce the most energy?
1020	Effect of various temperatures on fly locomotion.
1021	Plants on Other Planets: The Effects of Gravity and Atmosphere
2001	Effects of Irradiation on Seeds
2002	The Effect of Magnetism on Plant Growth
2015	A Structural Approach To Drug Resistance
2016	Earthquakes
2021	Green Energy, Green World
2025	Aquaponics Terracotta vs Water; Benefits of Grow Mediums
2026	Survival of Single-Celled Water Organisms in Different Potable waters
2028	Nature's Way of Cleaning Oil Spills in Fresh Water
2029	Biodegradation: Are We Convinced
2031	Green Growing Alternatives
2032	Restoring Scalzi Park to its Native Plant Population
2034	Seeds Sprout Best...
2035	Colorful Flowers
2037	E-Cigarettes: A New Health Frontier
2039	The Effect of Excessive Nutrients on the Growth of Phytoplankton
2042	What Substance Attracts The Most Fruit Flies
2044	Growing Our Future: Using LED Hydroponics to Cultivate Fresh Produce: A Solution for Urban Food Deserts
2501	Algae-Gro!
2504	Analyzing Soil Components
2506	Too Nutritious?
2507	Analysis of Phosphorus (Fertilizer) Recovery from Varied "Run-off" Sources (Local Rivers and L.I.S.)
2509	Do Different Types of Music Affect the Growth of Vegetables; Spinach, Arugula and Radishes?
2511	It's Raining, It's Pouring, and pH Levels Across Hamden Need Exploring
2512	Water Purification
2513	Wood Fire Frenzy
2516	Planting With Compost
2524	Electromagnetic Fields and Their Affects on Plants
2527	Your Head, Your Helmet
2529	Incandescent v. Fluorescent: Which Light is Most Effective for Growing Corn Plants.
2533	A Novel Method To Evaluate The Presence Of Genetically Modified Elements In Seeds.
2535	BioGas: The Future to Alternative Energy
2536	Can I successfully pollinate radish flowers?
2539	Goo-Be-Gone
2544	Can the color of your house effect your energy bill

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Sustainability

Project Number	Title
2545	Thermohaline Circulation Shutdown
3003	Nodule Induction in Arabidopsis to Promote Symbiosis with Rhizobia
3009	Electrospun Poly(lactic-co-glycolic acid) Scaffolds Slow Raw 264.7 Macrophage Fusion
3016	Brilliant Bioplastic: A Comparative Analysis of Strength in Various Bioplastics
3021	The Collemobola Consumes the Fungi: Interaction Between Two Important Soil Species
3023	Hydro and Solar Based Hybrid System
3024	Efficiency of Chlorophyll A and B found in Spinacia Oleracea for Electrical Generation in a Photosynthetic Solar Cell
3027	Effects of Wi-Fi Signal Radiation on the Development of Brassica rapa (Wisconsin Fast Plants)
3033	The Effect of Sea Temperatures On Plankton and the Ocean
3038	What is the effect of water sources on plants?
3040	Investigation of the Inhibition of E. coli Biofilm Formation on Food-Contact Surfaces via a Brominated Furanone
3041	Exothermic Reactions: Can They Be Used to Make More Efficient/Environmentally Safe Deicers?
3050	Do zebra mussels colonize Lakes Lillinah and Zoar from upstream?
3055	The Effect of Carbon Dioxide Levels on Oxygen Production in the Diatom Cyclotella meneghiniana
3069	The Nepal Project: The Impact of Soil Degradation on Soil Fertility
3070	How Bio-Fuels Compare to Gasoline
3071	Shedding Light on Cyanobacterial Population Growth and Regeneration
3075	The Biofixation of CO ₂ and Greenhouse Gases Using Coccolithophorid Algae as a Natural Remedy to the Greenhouse Effect
3076	iShrimp
3079	The Effects of Sensory Deprivation on Neural Activity for the Psychological and Mental Treatment of various Mental Conditions
3080	Investigating Bivalve Bioremediation in a Warming Climate
3084	The Affect of Pseudomonas putida on the Biodegradation of Plastics
3087	Investigating the Efficacy of Bioluminescent Mushroom Panellus Stipticus as a Biosensor to Detect the Toxicity of Water Contaminants
3088	The Use of Bioluminescent Bacteria to Measure Persistent Levels of Water Pollution
3093	Immunogenicity and Efficacy of a Nanoparticle-based Lyme Disease Vaccine
3098	Biological Control of the Invasive Eurasian Watermilfoil Using Aquatic Weevils
3099	Use of Stem Cell Engineering to Test the Function of a Genetic Variant for PTSD
3101	The Effect of TiO ₂ /Graphene Oxide on the Purification of Tris(2-Chloroethyl)Phosphate(TCEP) and CuSO ₄ (CS) Contaminated Water
3104	The Remediation of Heavy Metals from Wastewater Using an Aspergillus niger Activated Flow Filter
3105	Expression of DesB and DesZ for the Creation of Cellulosic Biofuels
3106	Biochar - what is it and how it can help improve the CO ₂ balance and increase crop yields
3107	The Creation of Recombinant Proteins through Liquid Syncytial Endosperm Found in Coconut Water
3121	The Feeding Behavior of Squilla empusa in the Long Island Sound
3135	An Assessment of the Reefs in the Windward Islands Due to the Presence of Pterois volitans
3137	Investgating the Phytoremediation of Lead: The Type of Plant Species Versus the Rate of Lead Extraction in Hydroponic Media
3140	Examining training climate and Ironman race performance outcomes
3141	An Analysis of Experimental Stem Cell Differentiation Data
3145	siRNA-loaded exosome-lipid nanoparticles for in vitro treatment of B16F10 cells
3147	The Effectiveness of Plant Material as Metal Chelators
3148	Effects of Disposed Medications on Water Chemistry
3160	Photosynthetic Production of an Infinite Oxygen Supply

Scientific Disciplines Selected by Student

2014 Conn. Science & Engineering Fair

Sustainability

Project Number	Title
3163	Use of a Pre-Chemotherapy/Radiotherapy Regimen of Glutamine and Probiotics to Prevent Oral Mucositis
3502	Alternate Source of Paper from Melons
3504	Creating a Living Filter to Lower Levels of Harmful Algae in Long Island Sound
3509	External Digestion of Cellulose Utilizing Enteric Symbionts from the Termite gut
3512	Effect of Environmental Conditions on Hydrogen Production in Clostridium
3515	Saving the World from Brain Eating Amoebas
3517	Hydroponics: Effect of varying Calcium concentration on number of flowers produced by Wisconsin Fast Plants grown in hydroponic media.
3518	Observing the Effects of Biochar Soil Additives on Plants Grown with Pumpkin, Pomegranate, and Papaya Seed Fertilizers while Determining the Best Fertilizer for Plant Growth
3519	An investigation of horizontal gene transfer by way of organelle capture: Arabidopsis to Rapa
3520	A Novel Approach to Removing Oil Spills from Seawater by using Sustainable and Cost-efficient Materials
4002	Worming Around
4003	Using a Solar Oven to Purify Salt Water to Become Drinkable
4004	Not Just for Eating
4005	pH from Scratch
4007	Styrofoam, Ceramic and Thermoses. Oh My!
4008	Battle of the Brands
4010	The Effects of a Robot's Speed in Mazes with Different Amounts of Turns
4011	Stealth Shapes
4012	Smog Filter Using An Electrostatic Field
4013	Stirling Engine: The Future
4014	Printed Prosthetics
4018	The Power of Sound
4021	Charge it up!!
4023	Developing a Practical System for Loosely Coupled Inductive Power Transfer
4024	Have Some Sympathy!
4026	WriteBot
4028	Acid Rain: A Silent Killer
4029	Dressing Our Energy
4030	Novel Methods for Water Desalination by Harnessing Solar Energy using a Solar Oven With Flat Mirrors, Fresnel Lens and a Parabolic Mirror
4031	Light Energy
4033	Harnessing Human Movement for Clean Energy
5001	The Effect of Different Antennae on the Reception of a Homemade Radio
5003	How does Color Affect Heat ?
5005	The Effects of Soot on the Melting of Glaciers
5007	Cool, Cool Chlorides...A comparison of ice melting chlorides as deicers and their effectiveness as an anti-freeze
5008	Homopolar Motor From Faraday To Now-A-Day
5009	Wind power vs solar power
5010	The Best Media
5011	THE INVESTIGATION OF THE PRESENCE OF PLASTIC MICROSCOPIC FIBERS IN EFFLUENT SEWAGE WATER AND THE LONG ISLAND SOUND
5012	How the Strength Of Magnets Varies At Different Temperatures
5015	Acceleration Explanation
5016	Contrasting Types of Doctor's Offices Using Amount of Virulent Bacteria

Scientific Disciplines Selected by Student

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Sustainability

Project Number	Title
5017	Which Fruit Produces More Electricity?
5018	A System for Remembering Generic Items (ASRGI for short)
5020	Crystal Clear
5021	Crystals
5022	How to power a calculator out of change
5024	Josh's Bridge is Falling Down
5027	Light Power!
5028	Weather Warrior
5029	To Design A Self-Sustained Wind-Microbial Hybrid Device that will Generate Clean Hydrogen for Energy
5030	Solar and Wind Power
5032	Measuring Electrolyte Conductance in Sports Drinks, Orange Juice and Tap Water as Compared to Distilled Water
5034	Local Air Pollution Variations
5036	Whatever Floats Your Boat!
5039	Does the Sun's Angle Affect the Output of a Solar Cell?
5040	SUPERCOOL
5041	Using Wettability to Develop Reusable Freezer Bags
5043	Evaporation Situation
5045	The Search for the Most Effective Ice Melt
5046	The Effects of Salt Concentrations and Voltages on the Electrolysis Process
5049	The Effect of Putting Duct Tape on a Wiffle Ball Bat
5052	How much force will come from changing the polarity of two charged magnetic rocks and how far will they go away from each other?
5053	An Easier Way For Water
5054	Which produce generates the most electricity: lemon or potato?
5055	Light Bulbs Which type is brighter?
5056	The Effect of Freezing and Thawing on Various Types of Rocks
5057	Drag Effect On An Airplane
5058	Bio-Inspired Robot
5501	Which type of grocery bag; plastic, paper, or recycled paper, biodegrades the fastest?
5502	Ping Pong and Wiffle Ball Catapult
5505	Electromagnets
5507	The Efficiency and Durability of Piezoelectric Generators
5508	A Study of the Production, Impact Testing, and Degradation of Seaweed Based Bioplastics
5512	Alleviating Minor Household Flooding Situations
5513	How much salt is in water?
5515	Removal and Recycling of Phosphate from water Using Various Methods: A Sustainability Project
5517	Analysis of natural sources of possible road de-icers and effect on pavement, soil, and plants.
5520	Battery Life
5521	Bio Battery: The Wise Alternative for Future Renewable Energy
5522	The Alternative Battery
5523	What bridge design is strongest?
5524	Wind Turbines: The affects of different blades on a model wind turbine
5525	The Effects of a Gear Size on Speed
5526	A Lot of Power

Scientific Disciplines Selected by Student

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Sustainability

Project Number	Title
5528	Greenery
5529	How long does it take devices to charge when the power goes out?
5534	Do Water-Filtering Bottles Really Work?
5535	The Effect of Rainfall on Oxygen/ pH Levels in Bodies of Water
5536	Keep the Heat
5537	Burning Calories to Light up the Night
5538	Temperature Check of the Sea
5540	Bio vs. Fossil Fuels
5542	Watts Up?
5543	Magnetic Linear Accelerator
5544	Supercooling Water and Snap Freezing.
5545	Kinetic Coaster
5546	Desalination for a Nation
5547	Which type of arm; robotic, or human would have 100% accuracy and precision when throwing a ball?
5549	The Effect of Different Rain Waters on the Growth of Radish Seeds
5550	Electrostatic Generator
5553	Invisible Technology.
5554	Fabrication and testing of the power output of a solid state tesla coil.
5555	Measuring The Speed of Light Through Gelatin Using A Laser Pointer The Angles of the Laser VS The Speed of Light
5556	Drawing Robot
5557	Does the Shape of an Air Foil affect the lift of an Airplane?
5559	The Effect of Lenses on a Solar Panel.
5560	Solar Sweatshirt
5561	Graphene Enhanced Piezoelectric Generator for Environmental Energy Conservation
5562	Wind Power
5563	Hypoallergenic Lawn Care Device
5564	Foot-Operated Computer Mouse Prototype
5566	Magnetic Levitation Automotive Wind Rail
5567	Which Model Airplane Flies the Farthest?
6001	Burning Calories: How much energy is stored in different types of foods?
6002	Resistance and Temperature of Wires
6004	Dermal Denticles in Roofing Material
6005	An Aerodynamic Investigation of a Six Panel Circularly Grooved Golf Ball
6007	Using Verbal Commands to Play the Maze Game with NAO, Humanoid Robot
6008	The Effect of Varying Ferrofluid Carrier Liquids on Oil Spill Remediation
6009	Chemical and Microwave Pretreatment of Biomass to Optimize Reducing Sugar Yield for Cellulosic Ethanol Applications
6010	3D Printed Fractal Structures
6011	Optimal Lens Configuration for SunLight Redirection
6012	Testing the Use of Carbon Nanotubes in Electrochemical Double Layered Super Capacitors
6013	Development of a Sustainable Energy System that Converts Lightning to Hydrogen Gas through Plasma Electrolysis
6014	Developing a Low-Cost Method of Manufacturing Heart Valves for Transcatheter Aortic Valve Replacement Surgery
6015	Geant4 Monte Carlo Simulation in the Development of CMS Calorimetry
6016	Tilt angles affect on a photovoltaic modules voltage output.

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Project Number	Title
6018	A New Spin on Generators
6020	Comparing the energy generated from simulated rain drops on a piezoelectric surface to a hydro-electric turbine in a downspout, using the same volume of water
6021	Volcanoes
6022	Development of wet lands and utilization of ground water without disturbing environment.
6024	Quality of Nighttime Photography Based on Light Sources
6025	Chitin: Nature's Plastic
6026	Bio-sensor drug carrier for insulin
6027	Obtaining Alternative Concentrations of Ferric Chloride for Higher Visibility while Etching Copper for use in Jewelry
6028	Finding the Best Rust Remover
6029	Determining Natural Pigment Category that Leads to the Highest Output of Current and Voltage on Dye-Sensitized Solar Cell
6032	3 Little Pigs
6033	Exploring the Storage Capacities of Carbon Nanotube and Graphene Based Capacitors
6034	Evaluating the Performance of a Model Solar Concentrating System Using Thermoelectric Generating Technology
6035	Analyzing the Effect of De-icers on Connecticut River Water Quality
6036	Pressure to the Future
6038	Solar Water Disinfection Optimization Using Titanium Dioxide Coated Plastics
6039	The Construction and Calculation of an Atmospheric Geothermal Airlift Pump Condenser
6040	Design of a Novel Photo-Sensitized Carbon-based Supercapacitor for Capture and Storage of Solar Energy
6041	The Effects of Pressure, Temperature, and Cooling Rate on Tensile Strength of Extruded High Density Polyethylene
6043	Development of a Simulation Model for the Solution of Einstein's General Relativity and Quantum Mechanics Based on Causal Dynamical Triangulation
6044	Glucose Meter Shoe
6045	Optimizing Hydrogen Production From a Piezo-electrochemical Water-Splitting Mechanism with Low-Cost Synthesis of ZnO and BiFeO ₃ Nanostructures
6047	Keep your hands on the handle
6049	Momentum Powered Magnetic Generator For Electric Car Applications And Free Energy And Perpetual Motion Research
6051	Effective Energy Storage Technology for Electric Power
6052	Construction of a Mechanical Arm with Magnetic Claw
6053	Horton's Site Native Americans
6054	Exploration into the Development of a Mathematical Solar Cell Model in order to Simulate Solar Energy Potential in the United States
6056	Determining Honey Adulteration with Raman Spectra
6058	A Study of the Removal of Pollutants by Rain Gardens, a Low-Impact Drainage System
6059	Construction of a Renewable Energy Generator from Recycled Materials: A Study on Windbelts
6060	OXIDATIVE DESULFURATION OF DIBENZOTHIOPHENE THROUGH THE USE OF TiO ₂ COATED OMS-2
6062	Atmospheric Water Generator From Alternative Energy Sources.
6063	Global Dynamic Numerical Computer Forecasting Models: Comparing the ECMWF to the GFS
6064	Examining Graphene Nanoparticles for CO ₂ capture and water purification.
6065	Computer Hand Input Mechanism
6067	The Development of a Multilayer Anechoic Tile Systems to Mitigate the Effect of Disbonds in the Hulls of Submersibles
6068	UV Curing
6069	Titanium based artificial bone materials
6070	The Effect of Fertilizer on Dissolved Oxygen Levels in Water.
6071	Hydrogen Fuel Cells How Changes in Temperature Affect Them

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Project Number	Title
6073	Low Drag Automobile Design
6074	Creation of Tidal Power from Infiltrating Coastal Ground Water via a Novel Tidal Barrage System
6075	On the Minimization of Rotor Losses in the Three Phase Induction Machine
6076	Practical Applications for 3D Printing Concrete Structures
6078	Temperature-Induced Concurrent Removal and Recovery of Wastewater Ammonia-Nitrogen
6079	An Inquiry Into The Use of Graphene as a Superconductor
6081	Solar Computing: Creating a cost-effective off-the-grid laptop for utilization in third world countries
6082	Modifications to electronic pet fence system to allow for safe return into boundaries
6083	The application of magnetic levitation technology on elevator construction
6084	Mapping Tidal Current Farm Potential Along the Long Island Sound
6087	Building a Magnetically Levitated Elevator that can Raise and Lower Objects to Various Heights
6088	Graphene Film Conductivity with Single Strand Deoxyribonucleic Acid
6089	The Development of a Recycled Tire and Marine Cyanobacteria Single Chamber Microbial Fuel Cell
6090	An investigation studying the effect of the pseudomonas bacteria in a salt h2o environment
6091	Synthesis of Silver Nanoparticles using Plasma Arcing Atomizing Methods
6093	Synthesis and Characterization of EGCG-PLAGA Conjugates and Mixtures
6095	Synthesis of a Block Co-polymer for the Manufacturing of a Bio-Degradable Monomeric Filament
6096	New Invention to Efficiently Harness Wave Power
6097	Application of Nano-fibril Structures in Fabrication of Lightweight Materials of High Tensile Toughness
6099	Inorganic Biology: Direction Control of Polyoxometalate-Based Tubular Microstructures
6100	Power Gear
6101	A Filamentous Organic Solar Cell Based Piezoelectric Architecture for Powering Commercial and Biological Electronic Devices
6102	Supporting The Cause: The effect of balsa wood support on craft stick bridges
6103	Voltage Output of Homemade Nano-Crystalline Dye-Sensitized Solar Cells in Series
6105	A Novel Application of Piezoelectricity and Impressed Current Cathodic Protection for Corrosion Prevention
6107	Reducing the Price of Solar Panels by Changing their Chemical Components
6108	How do Cover Crops affect Soil pH
6109	Alternate Modal Cars
6110	Determination and removal of 17-Beta Estradiol in Long Island Sound.
6111	How the Type of Footing Effects the Impact of Livestock on Soil Erosion
6112	Blowing in the Wind: Southwestern Connecticut's Potential for Wind Energy Production
6113	Enhancing Water Resistance Qualities of SrAl ₂ O ₄ :Eu ²⁺ , Dy ³⁺ Phosphors Using Barrier Coatings
6116	Inclusion of Thermoelectric Generators in Glass Building Materials to Produce Useful Energy in New England Homes
6118	A Potential and easy to use, low cost Diabetic Test for use in Developing Countries and Rural Areas
6119	Earth Energy
6122	Building a Maglev train using electromagnet
6123	The Car of the Future: The Effect of Two Energy Power Sources Charged by Solar Panels on the Mileage and Speed of an RC Car.
6124	Designing a circuit board to wirelessly power a Left Ventricular Assist Device (LVAD)
6125	Investigating Alternative Methods Using Magnetism to Power a Four-Stroke Engine
6126	LCD Projector Built From Commonly Found Electronics On a Budget
6501	Changing the shape of blades on wind turbines
6502	Black Ice Road Sensors
6504	Blades of Fury Pt. 2: Weight Efficiency

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Project Number	Title
6505	Feasibility of Electromagnetic Freight Systems
6506	Building an Automated Prototype for the USAR Operations and Industrial Applications Using Lego Mindstorm, Tetrax and RobotC
6507	Using a photovoltaic cell to self-sustain a clean water pump
6508	Comparative Efficiencies of Magnetically Levitating Train Systems in and out of a Vacuum Chamber
6509	Designing and Building a Scale Model of an Eco-friendly and Self-sustainable city
6510	Converting Mechanical Energy from Cross-walk Traffic Using Piezoelectricity
6513	Calories to Watts: Novel methods that utilize exercising energy using piezoelectric generators
6514	Recycled Plastic Bag Insulation
6515	The Catapult
6516	The Effect of Temperature, pH, and Dissolved Oxygen on Halophilic Desalination
6519	Neodymium Magnet vs Copper Pipe
6520	The Future of Armor: Inspired by the Dactyl Club of the Mantis Shrimp
6521	A Novel Wind Turbine Design Incorporating Photovoltaic Cells and Piezoelectric Sensors