

65th Anniversary



**Connecticut
Science &
Engineering
Fair**

March 12-16, 2013

www.ctsciencefair.org

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 2013 Connecticut Science & Engineering Fair. The CSEF reserves the right to withdraw an abstract an any time for modification.**
- **The abstracts are sorted by project number.**
- **In filling out their project registrations, the students identified the scientific disciplines that relate to their project. Those selections - Scientific Disciplines - are indicated in a field below the body of the abstract. A list of codes is provided.**
- **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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1002	Do we influence our dogs?
1003	Does Eating Chocolate Make People Happy?
1004	Little Light Lotta Life
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1006	The Affects of Natural Sorbents on Petroleum
1007	How does smoking affect lung capacity
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1013	The Effect of Certain Physical Activities on Blood Pressure of 13-Year-Old-Femaes
1014	Zap That Zit
1015	Salty Shrimp
1016	Degrading DNA
1017	'Makeup Malfunction
1018	The Affect of the Senses on the Short-Term Memory Ages 12-14
1020	Analysis of Arsenic in Food from Natural Produce, Effect on Cell Bioavailability, and Effect of Chelators on Absorption.
1021	Are papaya seeds an effective fertilizer?
2001	How does the color of the light affect the growth of peas?
2002	Does the Content of an Article Effect the Reader's Heart Rate?
2003	Walking On Eggshells
2004	Is it Swell to Drink from the Well?
2005	Acid Rain And Its Affects on Aquatic Algae
2006	Germ Catcher
2007	What is the relationship between dissolved oxygen and coliform in the Pequonnock River?
2008	"Gross"eries
2009	Static Electricity
2010	Pain Relieving Faster?!
2011	Taste Buds: Are You a Supertaster?
2012	Is audio or visual information remembered better?
2013	Mr. Bouba and Mrs. Ki ki

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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:

Studies show that certain colors can improve academic performance. The color yellow is believed to improve math abilities and the color green is believed to enhance reading abilities. Most assignments students receive are on white paper. If students are having difficulty succeeding, an option can be to change the color of the paper. The hypothesis: If different colored paper is used during a math assessment, then yellow paper will provide a higher score. Twenty-four fifth grade students were tested, eight students per color. All students were at a fifth grade level in math. It was found that the students with yellow paper actually scored the lowest at 82% compared to green paper with an average of 92%. The subjects with white paper scored approximately 86%. It was determined that most students improved with green paper, excluding two below level students. The next step was to consider another color. Research showed that the color blue could calm nerves. The blue colored tests were at a fifth grade level. The students' scores averaged 88%. Although improvement was not as high with blue as with green, there still was improvement over yellow and white colored tests.

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:

Dogs react to many sounds and it can even be excessive at times. We decided to take a closer look to see how dogs react to certain sounds. We wanted to design an experiment to determine if dogs reacted all the same to some common, everyday sounds. Our hypothesis was that if we tested five different types of sounds, using three household dogs, we would find out that they all react differently to the sounds, except for the doorbell; then they would all react similarly. To prove our hypothesis we took the three dogs into quiet separate rooms, and collected the five "sound makers" (doorbell, dog toy, bag of treats, tambourine, drum). Then we tested the individual dogs for each sound three times, with a break of three minutes between repeats. We timed each dog's response to each sound to see the difference in reaction time. In conclusion, the three dogs went to the doorbell the fastest and we found out that the sound of a bag of treats was equally similar. Response times varied with each dog but the averages demonstrated a response pattern that supported our hypothesis. To improve the validity of our conclusion, this experiment would need to be repeated with at least another dozen dogs, which was a resource that was unavailable to us for this study.

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Fair Category

Proj.
Num

Proj. Title:
Num

Student Name(s):

Fair Category

Abstract:

We wanted to see if eating chocolate makes people happy, so we tested a total of 53 people. We tested them by giving them chocolate to eat and then asked them ten questions and assessed their degree of happiness. Our control group did not have chocolate when answering certain questions. Our results indicate that chocolate had no effect.

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:

Bacterial growth is a very fascinating and important topic to study. Bacterial growth teaches us how bacteria affects us and is affected. We were interested in how an ultraviolet light would affect the growth of bacteria for different intervals of time. We swabbed our mouths for bacteria, inoculated the Petri dishes and then put it under the UV light in an incubator. After a certain amount of time in the light, we left it in the incubator for 24 hours. After completing our project we observed that our hypothesis was proven partially correct due to another variable. The variable was that for the Petri dish that we left in the incubator for thirty minutes, we let it grow prior to exposure, while the other ones we exposed immediately. This variable affected the outcome of our project.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

Abstract The experimental question for our experiment is; the types of distraction that drivers may experience during stoplights. With mobile phones, food, make-up or accessories, the dashboard or the mirror, and passengers from the back of the car, there are many distractions for drivers. Distracted driving can be hazardous and fatal in extreme cases. During observation at a local intersection, it was noted that when drivers were distracted, what they were distracted by, and gender. From the data gathered we can conclude that out of 441 drivers, 147 were distracted. That means that exactly one-third of drivers are distracted. Of these distracted drivers, 70 were male and 77 were female. This means that over 50% of the distracted drivers were females. These are alarming numbers and if something does not happen fast more lives will be lost.

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:

One of the most harmful problems to our marine life and water systems are oil spills. The purpose of this experiment was to compare which natural sorbents could quickly and cost- effectively absorbs the most liquid petroleum spilled into water systems. Before choosing which natural sorbents would be tested we ran preliminary trials for possible new innovations for oil cleanup - hay, strawberries, banana peels, white rice, rice paper, Spanish moss, pine litter and active carbon. Four natural sorbents were chosen. It was hypothesized that Spanish Moss when compared to white rice, activated carbon and pine litter would absorb the most petroleum. In the first portion of the experiment the four natural sorbents were wrapped in cheesecloth and placed for 30 minutes in 2 cups of water with 1/8th cup of petroleum. Before and after the sorbents were weighed in grams to determine the absorption rate. The remaining water/petroleum solution was then poured into a graduated cylinder to measure the remaining levels. Over the course of a week, the findings were as follows: Pine litter had absorbed the most oil, then carbon pellets, Spanish moss and white rice. After analysis of the data we concluded that all the sorbents were effective however, containing them with the cheesecloth hampered the way in which the natural sorbents absorbed the petroleum. When white rice was tested in the preliminary trial it was not contained and it absorbed more petroleum. The research provided shows that natural sorbents are effective in cleaning up oil spills.

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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:

In this experiment, the question that is being asked is does age and smoking affect lung capacity? The hypothesis that was predicted was, males' ages between 18-25 nonsmokers will have a larger lung capacity than younger and older males who used to smoke, and who are currently smoking. Non-smoker males ages 18-25 should have better lung capacity because they are not putting toxins inside their body. The process is asking males from ages 18-70 for their lung capacity by blowing into the peak flow meter, which will calculate how much oxygen they will have in their lungs. The lungs can contain about 4 to 6 liters of air. By smoking, you may decrease the amount of air in your lungs and can damage them. The hypothesis was correct, based on the results that were collected, it states that each participant in ages 18-25 non-smokers, past smokers and smokers have reached a higher lung capacity than older males.

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This project was designed to study the how distractions, specifically music, conversation, and a video, affect the amount read for 12-14 year old girls. The experiment was conducted by having 19 12-14 year old females read a book for five minute intervals while listening to music, a person talking, or watching commercials. The data was collected by counting the number of words each subject read for each test, setting the control as 100% to compare the data, and calculating the percentage of words each subject read. These percentages were averaged out and graphed. The average amount of words for each distraction was also found, but was not graphed. After conducting the experiment, it was concluded that commercials distract people the most because the percentage of words read was the least. When the subjects read during the commercials, the average amount of words read was 77.5%. When the subjects read during the person talking, the average amount or words read was 79.7%. which is more words read than with the commercials playing. Lastly, while the music was playing the subjects read the most with 114%. This means that the music actually made the subjects read more. The data clearly shows that the commercials were the most distracting because the least amount of words were read. It can be concluded that this is because the commercials are both visual and audible, allowing the subjects to look up from the reading material and listen to the video.

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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: The purpose of our project is to determine which method of purification, filtration or an evaporation process, is better for purifying water. We tested this by putting samples of water through a filter and an evaporator. We also tested a control sample of water which was not put through any purifying device. The filter was made using gravel, sand, carbon, and coffee filters to take all the dirt out of the water. The evaporation process included a flask on a stove that contained a sample of water, and a tube from the flask into a bag of ice to condense the sample into a beaker. Then we swabbed the samples after each method onto petri dishes and tested for bacteria by placing them into an incubator and allowing them to grow for 4 days. The data proved that evaporation worked better than filtration. This was due to the heat in the evaporation process which killed most of the bacteria. Some bacteria was able to get through the filter allowing bacteria to grow on the petry dish. The filtered water had more bacteria than the control because of exposure to bacteria in the filter.

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Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Our team's project was about food preservation. Our goal was to find what kinds of environments were the most and least effective to preserve food. The procedure was to cut the different foods, which were cheese, lettuce and strawberries, into pieces and place them into containers and then place the containers into three environments: heated with natural light, refrigerated and dark, and normal temperature with natural light. The data we have collected is as follows: on the first day, the chilled foods had very little to no spoilage, the room temperature foods had little to no spoilage, and the warm temperature foods had some spoilage and no mold. The following day, the conditions of the chilled foods hadn't changed, and the normal and high temperature foods' conditions decreased slightly. The same progression was true with the rest of the days, and eventually, after six days, we had to dispose of the warm temperature foods because they had grown mold and were unsafe to keep. Our conclusion is that cold dark environments are best to preserve food in and should be used, as they most commonly are.

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Proj.
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Proj.
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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This science project investigated the Greenhouse Effect. The question was: "Which surface conditions have the least amount of temperature increase due to the Greenhouse Effect?" Five different surface materials were used to test this experiment. The independent variables were the surface materials being test as follows: grass, water, sand, soil, and fireplace ashes. Fireplace ashes were tested to act as pollution. Before each test, the temperature of each jar was taken to make sure they were approximately the same for each material tested. The surface materials were placed in a circle under the lamp. During the test, the temperature of each jar was taken at fifteen minute intervals for two hours. The test was performed three times for better accuracy. The hypothesis was that grass would show the least amount of temperature increase, and therefore reduce the greenhouse effect. The results indicated that the hypothesis was proven correct.

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The reason for investigating this topic was to learn of the effects of exercise on female teenagers. The hypothesis predicted that if participants do push-ups/running then blood pressure will increase because exercise consumes more oxygen, therefore the blood must spread it throughout the body faster. It also predicted if participants do yoga for the same amount of time, then their blood pressure will decrease because deep breathing relieves stress, often the reason blood pressure increases. First, participants and a registered doctor were recruited. Then, the doctor took the participants' blood pressure reading. Next, the participants did yoga, push-ups, and running for five minutes each and had their blood pressure taken after each, by the registered doctor; this was done with five minute breaks between each activity to bring the blood pressure down to the resting rate. The hypothesis that running and push-ups increase blood pressure was supported; in most of the participants, as they ran or did push-ups, their blood pressure increased compared to the resting blood pressure. The data refuted the hypothesis that yoga decreased blood pressure; in all of the participants there was a very slight change of 5-10, in comparison to the resting blood pressure, which is not enough to call it a decrease. In this experiment, running and push-ups increase blood pressure, and yoga has little or no effect on blood pressure.

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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 identify the most effective acne treatment. This informs acne sufferers what product to use in order to rid themselves of acne and prevent the proliferation of future acne. Of the three medications, Neutrogena, Clearasil, and Clean-and-Clear, we hypothesize that Neutrogena will work the best. We believe that Benzoyl Peroxide is more effective than Salicylic Acid because it is a base rather than an acid. To prove our hypotheses, we swabbed a test subject four times, inoculated four Petri dishes with the specimens, and cultivated the sample. We placed sterile disks dipped in the acne treatments in the center of the three Petri dishes and cultivated the samples over the course of three days. Once we completed our experiment, we compared the zones of inhibition to each other to determine which acne treatment was the most effective. The results of our experiment proved that Neutrogena was the best acne treatment. Clearasil was the least effective because it had the smallest zone of inhibition, while Neutrogena had the largest zone of inhibition. We were incorrect when we assumed that Benzoyl Peroxide worked better than Salicylic Acid. Neutrogena and Clearasil had a main ingredient of Benzoyl Peroxide, while Clean and Clear's main ingredient was Salicylic Acid. Neutrogena and Clearasil should have worked better than Clean and Clear, however Clean and Clear halted the growth of bacteria better than Clearasil. The zones of inhibition for Neutrogena and Clean and Clear were more apparent than Clearasil's.

Word Count

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Student Name(s):

Fair Category

Word Count

Abstract:

Brine shrimp are joint-legged invertebrates that belong to the crustaceans (lobster ,crab ,and shrimp).They live in Great Salt Lake and live in hypersaline (of, containing, or resembling common table salt; salty or saltlike) lakes in which the salt content may be 25%.Where they live they have a little bit of predators. Depending on the water temperature, the brine shrimp remain in the same stage for about 12 hours. The temperature depends on when the brine shrimp will release and open. Brine shrimp are also called sea monkeys because they were raised in aquariums for their entertainment value. During this project we will be testing to see which amount of salt will grow and hatch the brine shrimp eggs the most in different amounts of sea salt. The purpose of my project is to see how salty does the water has to be to make brine shrimp would grow the most. My hypothesis supports my data that I collected because when we did it the amount that we predict won. Our results is that we got from our project is that 15 grams of salt grew the most and hatched less (about 20 grew and 5 hatched). The 10 grams of salt grew the least and hatched the most (about 5 grew and about 12 hatched). The 20 grams, 25 grams, and 5 gram of sea salt did not hatch or grow. The 25 grams and 20 grams of sea salt did not grow due to the snowstorm that we had so we could not feed them. If we could change anything in our experiment it would be that we leave the shrimp in longer. This project was very interesting and we learned many new things.

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Yes No

CSEF Official Abstract and Certification

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Num

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Student Name(s):

Fair Category

Word Count

Abstract:

Our experiment tests the integrity of onion DNA after being exposed to acid, bases, boiling for 5 minutes, and boiling for 10 minutes. The purpose of this project is to help us learn more about the way onion DNA behaves differently when exposed to different conditions. We conducted our research by looking at websites and asking Eli Powell the questions we have prior to our project. For our project, We did the extraction of DNA using the procedure on sciencebuddies.org and give it the following treatments while it maintains in a microcentrifuge tube: 5 microliters of distilled vinegar, 5 microliters of Clorox Bleach, left in boiling water for 5 minutes, and boiling water for 10 minutes. We flicked the tube to ensure that it mixes well for the best results on how much it can break down the DNA. We then had to look at how much the DNA degraded through gel electrophoresis. Our conclusion from this experiment was that the DNA exposed to base treatment had the most degradation and the sample exposed to vinegar had the least degradation. Sodium hypochlorite, a chemical found in most bleach or disinfectant detergent, can break down DNA structure. Studies in Department of Anthropology, University of California, 2004, showed that sodium hypochlorite can be used to destroy DNA contamination on surfaces. We exposed onion DNA to different conditions to see which of the treatment will affect the integrity of it the most.

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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 our project was to determine whether the age of newer and used cosmetic products affect the amount of bacteria that they grow. When we performed this experiment we first gathered information about the project to educate ourselves about the different aspects. Then we heated and cool the agar so that is formed a gelatin-like consistency. Next we poured the agar into a petri dish and labeled them with the different cosmetic products. Then we swabbed each cosmetic product with a sterile swab and separately inoculated 12 petri dishes. Lastly, we placed 12 inoculated petri dishes into the incubator. As a result in performing the experiment, the outcome of the hypothesis was proven incorrect, because after we finished the entire procedure, we discovered that it does not depend on the age of the makeup, it depends on the brand. People should buy high end quality cosmetic products for a safer, long lasting use. This project is important to society because, it raises awareness for the prevention of women having to suffer the gruesome side affects of using cosmetic products that have been contaminated with ton bacteria. Now that we have successfully completed our project, we are able to educate ourselves and others about the harm that using expired cosmetic products can do and the importance of monitoring the time period in which they can keep their makeup.

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Fair Category

Word Count

Abstract:

Our experiment tested the effect of the 5 senses on the human short-term memory. We made up a simple short-term memory test that tested different factors of the senses. We hoped to prove our theory that if the senses make up memories then they influence the focus of a short term memory. Hypothesis- If we can remember sights, smells, tastes, feelings, and sounds, then the senses affect the short-term memory because the senses create the memory recall. Procedure- We made a memory test, had the person look over it for 30 seconds, they wrote down what they remembered, and we scored them. We repeated this process with different variables that tested a sense each time. Conclusion /Data -From the data, we can conclude that our hypothesis is correct. For example, Allora's constant was a perfect score however in the stuffed animal test she scored 7/10. Sara's constant was a score of 9/10. However, her stuffed animal score was 8. Julia's constant score was 7. Her stuffed animal score was 6/10. This shows that soft touch may play a factor in any negative outcomes of focusing. We found that classical music improves the memory comparatively to Skrillex. With the skrillex music, Sara's score became 5/10, and Allora's score became 7/10. With classical music, Julia's score was 8/10 and Allora's score stayed 10/10. While drinking lemon juice, Allora's score lowered to 5/10 and Sara's score lowered to 4/10. During the dark color sight test, Allora's score became 7/10, Sara's was 5/10, and Julia's was 6/10.

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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 Arsenic in Food from Natural Produce, Effect on Cell Bioavailability, and Effect of Chelators on Absorption.

Student Name(s): B. Lipsker, D. Hodakov

Fair Category

Word Count

Abstract:

The goal of our experiment was to investigate arsenic levels in common grains, fruits, vegetables, baby foods, and beverages. Arsenic is in a wide variety of foods, coming from natural sources in our environment. Then we tested each variable with selected chelators, (“grabbers” of metals like arsenic). We used zeolite, EDTA, natural cilantro, and no chelator; we also included commonly heated variables. The variables containing the most arsenic are: •Welch’s Grape Juice (More than 500 ppb) •Berries (500 ppb) •Carrots (300 ppb) •Corn (300 ppb) The variables containing the least arsenic are: •Wheat (50 ppb) •Green Beans (50 ppb) •Grapes (60 ppb) All the chelators were effective in removing arsenic and thus increasing the cell bioavailability. However cilantro, the natural chelator, was most efficient. •Zeolite was the least effective, with an average 800% increase of effectiveness in cell absorption. •EDTA worked very well with an average 1900% of increase in bioavailability rate. •Cilantro was the most effective chelator with an average 5000% increase of cell absorption. We are happy to say that we have succeeded in being able to “Arrest Arsenic”.

Special Categories Selected by Student:

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Fruit seeds that are not planted or eaten are discarded and we wished to find a way to use them. We wanted to find out whether seeds could be used as plant fertilizer. We chose papaya seeds because they are rich in many of the nutrients found in plant fertilizer. We hypothesized that adding crushed papaya seeds to a plant's soil would help that plant grow faster and make it healthier. We decided to use Ficus Benjamina plants for our experiment because they are fast-growing and can be grown indoors in the winter. As a positive control, we added commercial plant fertilizer to the soil, and as a negative control we didn't add anything to the soil. We did all three conditions in triplicate, having 9 plants in total. Crushed papaya seeds and fertilizer were added to their respective plants on day 1. Plants were watered every three days thereafter. Plant height was measured and recorded initially and every three days. Our positive control plants that received commercial fertilizer lost leaves and we removed them. Our plants receiving crushed papaya seeds as fertilizer grew 2.4 centimeters more than the negative control plants with no fertilizer. On average, the plants that were given papaya seeds grew 4.65 cm while the fertilizer plants only had an average growth of 0.27 cm. Our hypothesis is supported as our data suggest that papaya seeds would be a good plant fertilizer.

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Title:

Student Name(s):

Fair Category

Abstract:

We all know that plants need sunlight to grow, but have you ever wondered whether the color of the light affected a plant's growth in any way? The hypothesis was that the light bulb that was red would make the peas grow tall because the light bulbs used emitted red wavelengths and the red coloring would enhance the effectiveness of the light bulb. Red wavelengths cause plants to grow tall and stringy and with the enhanced effect the peas would grow tall. I exposed yellow peas to different colored incandescent light bulbs for twenty hours a day. The peas were watered equally every two days. I recorded their final height after ten days and kept a record of their height for every two days. My hypothesis was proved correct because the group of peas grown in the red light grew the tallest on average. The peas grew at a certain rate, but their height sort of doubled every two days. I concluded that the color of the light is in fact important to the growth of peas. This experiment is limited to only yellow peas and incandescent light bulbs. To improve it a variety of plants could be used.

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

I love to read all types of books and I wondered if the genre I read affects my heart rate. I tested if the content of an article affected the reader's heart rate. I used a funny passage and a scary passage. The passages were about the same length. Subjects rested for 30-60 seconds, as a baseline heart rate, then they read the two passages. Half of the subjects read the scary passage first and half read the funny passage first. This was to make sure that I was testing the reaction to different readings, not how used to reading the subjects got. I measured their heart rates in 10 second intervals throughout the experiment using a Nellcor OxiMax N-65 pulse oximeter. Baseline heart rate was lowest of all conditions tested. My original project was the comparison of the reading genres. The heart rate in the funny passage compared to the scary passage only differed by 0.1 beats per minute. Then I wondered if reading in general affected heart rate. It did. When I compared the first reading to the second reading, the heart rate was one full beat per minute higher in the first reading. Overall I found there was a bigger difference between resting heart rate and the first article read, than there was between the two genres and resting heart rate. This may mean that the more used to reading you get, the less it might affect your heart rate, especially if it is exciting reading.

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Student Name(s):

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Word Count

Abstract:

This past summer, I began raising six chickens at home and since September, I've collected their eggs every morning. This simple task of collecting eggs made me wonder if anything can pass through an uncracked eggshell. I began to wonder how I could prove it. I established a baseline of data by weighing the collected eggs every day. In one test, I hard boiled the eggs and compared their weight to the freshly laid eggs. In another test, I dyed the eggs. In both tests, my goal was to prove that something could pass through an eggshell. Either water through hard boiling or dye through the dye process. When I hard boiled the eggs and re-weighed them nothing seemed to change. I did this four days in a row. I then moved on to dyeing the eggs. Once the dyed eggs dried, I cracked them to see if any of the dye got through the eggshell. Nothing did. Initially, none of the data led me to believe something could pass through an eggshell. I was stumped with these results and carefully reviewed my findings. What I found was that after hard boiling, the eggs weight declined very slightly. This sent me back to hard boil an egg. While watching it, I noticed a stream of air bubbles leaving the egg. When I started this experiment, I thought the evidence would be clear. Instead, it came down to tiny air bubbles that proved to me that eggshells are porous.

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Student Name(s):

Fair Category

Abstract:

I did this project to see if well water is as safe a source of drinking water as municipal water, in the town of Bethel, CT. I went to 5 different houses, 1 with municipal water, and 4 with well water, and took water samples from each of the bathroom faucets. I then took those samples to a lab. There, I tested each sample for traces of Coliform, and Escherichia (E.coli) bacteria. I poured media into each sample, and let it dissolve. Then I sealed them in Quanti Trays. I then put them in an incubator overnight. I recorded my data. There was no evidence of E.coli or coliform bacteria in either the well water samples or the municipal water sample. I found out that the well water is as safe a source of drinking water as the municipal water.

Word Count

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Student Name(s):

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Word Count

Abstract:

Air pollutants caused by industry and transportation have long been blamed for acid rain and the destruction of marine ecosystems. Fish are in danger of water acidification due to acid rain. Trout begin to die when the pH of their environment reaches 6, tadpoles, and mayflies die when the pH is at 5.5, and all fish die at a pH of 4.2. But what about the plants? Sphagnum moss thrives in acidic water, but it chokes out the other organisms because it doesn't allow sunlight to penetrate the water. However other plants and algae are damaged by acidic water. Spirogyra, common marine algae found in freshwater demonstrates damage at a cellular level when the water reaches a pH of 4. At a pH of 4, the chloroplasts, which give the Spirogyra the pretty spiral pattern, begin to breakdown and the spiral loosens. At a pH level of 2 the chloroplasts have totally fallen apart demonstrated by the lack of a spiral. Marine algae, like Spirogyra, are a good way to test the health of aquatic ecosystems in area with high acid rain levels.

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Proj. Title:

Student Name(s):

Fair Category

Abstract:

My experiment was to see which method of removing bacteria works the best – vinegar, UV light, or hydrogen peroxide. I did this experiment because I wanted to see which household item cleaned a bacteria filled area the best. To do this experiment, I first swabbed the bacteria-filled surface for the control. Then, I cleaned different parts of the surface with each household item and swabbed each part to measure the amount of bacteria still present. My results were that all three household products cleaned the bacteria off the surface, but the surface I used did not have much bacteria on it to begin with, so I was not able to compare the cleaning power of each of the household items. (I was limited to 4 swabs due to the involvement of a scientist from Danbury Hospital.)

Word Count

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Num

Title: What is the relationship between dissolved oxygen and coliform in the Pequonnock River?

Student Name(s): H. Jung

Fair Category

Abstract:

Fecal coliform bacteria are normally present in the digestive tract, but are rare in unpolluted waters which don't contain sewage or fecal contamination. Colder water temperatures hold more dissolved oxygen. The purpose of my experiment was to test the water quality of the Pequonnock River during the winter at two sites: Beardsley Park in Bridgeport and Old Mine Park in Trumbull. My hypothesis was the dissolved oxygen levels will be higher in winter and coliform bacteria tests will be negative. My tests included pH level, phosphate, nitrate, dissolved oxygen, coliform, bio-chemical oxygen demand {B.O.D}, and turbidity. I purchased a "Low Cost Water Monitoring Kit." At the river, I measured the water temperature, air temperature, and turbidity. I collected a sample of river water in a container and tested it using test tubes, Testabs, protective sleeves, aluminum foil, goggles, and plastic gloves. Most of my tests were immediate; the coliform bacteria took 48 hours. The B.O.D took five days. My results showed that coliform were positive in every test. Dissolved oxygen was low at 4ppm each time for three months, regardless of the water temperature. The water temperature ranged from 0°C to 8 °C. Also, phosphate ranged from 1ppm to 4ppm. Although it's winter, the coliform tests were positive and dissolved oxygen was consistently low. Maybe flocks of birds defecating and people walking their dogs, are the source. The other reason for the high coliform bacteria levels may come from storms that overwhelmed home owners' septic systems in Monroe and Trumbull.

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Student Name(s):

Fair Category

Word Count

Abstract:

My purpose to doing this project is that I wanted to know if grocery store items are sanitary and healthy for people to handle or eat without washing. I thought the packaging of items will have a lot of bacteria. To figure this out, I decide to test different items at my local grocery store. My dad drove me to the grocery store and I decided to swab an apple, a Nyquil cold and flu bottle, a lemon lime Gatorade bottle, and a Light and Fit yogurt container. I then sent the swabs to a lab where the scientist let them incubate for forty-eight hours. The gala apple, NyQuil cold and flu bottle, and Light and Fit yogurt container all had no growth at the end of forty-eight hours; the Gatorade bottle had rare (meaning not much) staphylococcus and bacillus. In conclusion, The Gatorade bottle was the only thing with bacteria that grew. My hypothesis was supported but not in the ways that I thought because three out of four items did not have bacteria. if i were to do the project again, I would research popular items to buy and test some more, different items.

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Proj. Title:

Student Name(s):

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Word Count

Abstract:

In my static project I am making an electroscope to measure how different fabrics, in this case cotton and polyester, react to static electricity. Also I have this ballon experiment to show how long the static charges last in each fabric. I will do three trials for each of my fabrics in both of my experiments. While doing this project I will record data down and then make my two data tables showing my final results. In my data collected I can see that polyester holds more static electricity then cotton does. Polyester's static charges also lasts longer in average room temperature but not when it is really cold. Cotton's static charges last longer than polyester's when it's cold. After looking at my results I realized that my hypothesis of polyester having more electrons and more static cling did come true. I can prove that because my electroscope ball bounces one inch further and more rapidly when I did it with polyester than it did with cotton. In my ballon experiment when the temperatures where warm polyester did stick on to me longer than it did with cotton. But then as the temperatures got colder cotton seemed to stick on longer than polyester. This changed my results a lot. Polyester still has more electrons than cotton but, cotton sticks on longer compared to polyester in the cold.

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Student Name(s):

Fair Category

Abstract:

Kylie Schlottman Pain Relieving Faster?! February 24, 2013 Science Fair Abstract The experiment I conducted was to figure out which drink will dissolve an Ibuprofen pill the fastest because a family member of mine is currently suffering with arthritis and needs a way to find fast relief that is not too expensive. I tested four drinks with different pH and acidic levels, to figure out if the two levels mattered in how fast the pill would dissolve. I thought that the black coffee would dissolve the pill the fastest because it has the highest pH and acidic levels, and black coffee had the second highest pH level. I went with the drink that had the highest acidic level and not the highest pH level because Ibuprofen is designed to dissolve in the stomach, which is made up of mostly acid. In this experiment I had to drop a pill in the cup with one of the drinks in it, write observations, and keep track of how long it took the pill to dissolve using a stopwatch. The black coffee dissolved so quickly in the cup, that it was very difficult to make observations. My hypothesis was correct! The black coffee dissolved the pill the fastest. In my experiment I found out that the more acid that is in a drink, the faster it dissolves Ibuprofen pills. Even though the three trials were all different, they were still all less than all other trials preformed by the other drinks.

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Student Name(s):

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Word Count

Abstract:

Taste Buds: Are You a Supertaster? The purpose of this experiment was to find out if having more taste buds would make food taste better. The hypothesis was that is people have more taste buds that they would be able to taste foods better. For the experiment, you put some blue dye onto a cotton swab. Then place the blue dye onto the participants tongue. They then rinsed their mouth out with water and a reinforcement was placed onto their tongue within the area of the blue dye. Next count the papillae within the area of the reinforcement. They were then counted and photographed. The second part of the experiment was to have the test subjects taste a mixture of sweet-n-low and water. After completing this experiment, there were more average tasters then supertasters or non-tasters. If there are thirty plus papillae within the area of the reinforcement, then you are a supertaster. If you had sixteen through twenty-nine papillae you are an average taster. If you have zero through fifteen papillae, you are a non-taster. After tasting the sweet-n-low mixture, more supertasters would taste bitter more then anything else. The average tasters tasted mostly bitter to sweet, and the non-tasters tasted mostly sweet. This experiment helps show us that being a supertaster isn't as great as it would seem. They are more likely to be sensitive to bitter foods or flavors then a non-taster or an average taster.

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Fair Category

Abstract:

The basis of this project is the strength of basic short-term human memories. The information involved were different tests containing audio and visual information. There was a lot of trial and error in putting the procedure in literal terms. The visual and audio tests had to have identical variables. The time period (to study pictures) was determined by the running of the visual test, came out to about a minute. The rest period (right after receiving the information) was chosen for thirty seconds. I wrote a script describing to the person the procedure, to eliminate how the test is administered. The tests were all given in the same location. For audio, I used a pre-recorded timed list of each word said one by one. I simply played the tape aloud. The visual tests had a wide range of reaction and memorization techniques shown by the testee. Some would say the word of the picture aloud, some would look at the pictures slowly, some would rapidly look. In these findings, I conclude the initial response that a person has when asked to memorize pictures in a short period is to analyze the information as much as possible, by doing things such as saying the objects back to themselves, or slowly viewing them. For audio, I noticed similar results, some recited the words back to themselves, and their facial expressions looked like they were really concentrating. Overall, right away, in collecting the audio data, I could tell that is was not as successful, and that visual information was overall perceived better. An extension could be using graphic pictures and real pictures, or words and sounds.

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Word Count

Abstract:

Natural curiosity led me to wonder if people connected the way they name objects with how the object looks. I designed a simple experiment in which I used 9 test subjects, divided into in 3 age groups. Each person was shown the same 2 images and was asked the same question. "Which figure would you call a 'bouba' and which figure would you call a 'ki ki'?" I recorded each response into a data table. Each person was only questioned once. My hypothesis stated that people do connect the way they name objects with how those objects look, and I anticipated that everyone's answer would be the same. The results supported by hypothesis. Each person I questioned, no matter what age, gave me the same result. In addition, after the testing, I questioned person #9 as to why they selected their response and they stated that it was because "bubba" sounds round and "ki ki" sounds pointy. My conclusion is based on a very limited study. I can state that people do connect the way they name an object with how that object looks, however, this study should have been expanded to include more test subjects and additional images in order to allow for a more definitive conclusion.

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Abstract:

There is a worldwide problem regarding water pollution. Metals from industry, pesticides, and fertilizers from farming can leech into the water supply. Organisms living in the water can be sensitive to pollutants and may be utilized as an early warning of contaminated water. Diatoms are present in both fresh and salt water. Both bodies are subject to pollution from industry, farming and other human activities. Measuring the levels bioluminescence of diatoms can help scientists determine the pollution level of bodies of water due to copper, zinc, fertilizers and pesticides. The diatoms were exposed to five times the EPA acceptable levels of these pollutants and luminescence was measured using a rating scale of 1 – 5. The effect of these pollutants was evident within 60 minutes of introduction with continuing affects at the 120 - minute period. All the pollutant caused death in the diatoms demonstrated by lack of luminescence. However, the diatoms in the fertilizer behaved in the same manner as those of the control. This demonstrated that the fertilizer was not as toxic even at the high levels. This was due probably to the slow release of the main component, which was nitrogen. The bioluminescence of diatoms is a feasible alternate method to determine if a body of water is polluted with certain toxins.

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Abstract:

I investigated what would happen to algae and microorganisms if I added Roundup. I decided to do this because of the environmental impact it would make if this product killed algae and/or microorganisms. The food chain would be compromised, because if you take out one link of a food chain, it breaks apart. My hypotheses was that the Roundup would have a harmful affect on the microorganisms. I put four cups into an area with heat lamps, which were turned off at night. I recorded how many microorganisms were in the four drops I put under the microscope to represent each cup. The results of my testing were the following: The first cup, which had no Roundup put into it, had a high, steady number of organisms. The second cup, one which had one drop of Roundup put in every day, had a low and fluctuating population. The third cup, which had one drop of Roundup put in every week, had a moderate population of microorganisms. The fourth cup, which only had one drop of Roundup put in, had the lowest population. This may be attributed to the low concentration in that cup. I conclude that the Roundup had, according to my research, a negative effect on the organisms. Possible future investigations of this could be testing if other herbicides would have the same effect.

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Abstract:

With the ever occurring pollution in our world, I wondered if heat pollution is killing the aquatic plants in our ecosystem. My hypothesis is if the water temperature is above or below 21 degrees Celsius then the aquatic plants will suffer and also become damaged because the water would end up being either too hot or too cold and the plants might suffocate, burn, wither, or attain root damage. Three different temperatures of water (38 degrees Celsius, 21 degrees Celsius, and 4 degrees Celsius) were each in their own container along with the same amount of aquarium gravel. A Water Primrose aquatic plant was planted in each container. Once a day, every day, the water was replaced with fresh water of the same temperature and the growth and characteristics were observed and recorded. The experiment was continued over a period of 10 days. The Water Primrose in the 38 degree Celsius water grew a total of 0.9 centimeters. In the 21 degree Celsius water the Water Primrose grew 0.3 centimeters. The 4 degree Celsius water held a water Primrose that had grown a total of 1.6 centimeters. Due to the data above, it was concluded that the colder water helped the Water Primrose grow. This experiment has to do with our lives because heat pollution is changing the temperature of water in our ecosystems and this new heated water is killing our aquatic plants.

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Fair Category

Abstract:

Past studies have shown that physical activity decreases anxiety levels and improves short-term memory. In the current study, female rats were housed 4 per cage, in cages with either running wheels or no running wheels. The running wheels provide access to physical activity. It was hypothesized that rats with access to physical activity will have decreased anxiety levels and improved short-term memory. After one week of this housing (with or without running wheels), rats were tested for anxiety using the Elevated Plus Maze. If the rat makes more visits to the closed arms that means it is more anxious. The number of visits to the open and closed arms was recorded. The rats then were 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 3 minutes. When 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. Memory was defined as the percentage of time spent with the new object during the Time2 period. It is concluded that the rats with access to physical activity had decreased anxiety and improved short-term memory. Therefore, the hypothesis was supported.

Word Count

Special Categories Selected by Student:

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- 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. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Daily semiconductor and phosphate fertilizer industries produce a lot of fluoride as wastage. The EPA has kept a standard that the safe fluoride level released into the environment should not be above 4 ppm. The point of my project was to test if I could use eggshell to remove fluoride from water. My hypothesis was that the eggshell would effectively remove fluoride, because eggshell is made of calcium carbonate and fluoride can react with calcium to form calcium fluoride (insoluble in water). My independent variable was the time fluoride and eggshell was incubated together and the dependent variable was the amount of fluoride left in water. I simply constructed a procedure in which I smash 1 gram of eggshell and add 100 ppm of sodium fluoride solution to it and let it incubate. I measured the amount of fluoride left with fluoride test strips. I was astonished to find out that the eggshell did not remove fluoride. Then I tried adding vinegar to eggshell before incubating with fluoride solution, which reduced the amount of fluoride from 100 ppm to 10 ppm. Hence my conclusion was, incubating eggshell treated with vinegar and fluoride water reduced the amount of fluoride in water. I think one application of my project could be that this fluoride removing technique could be a cheap way to remove fluoride from the wastage that industries release. The baking industry throws eggshells as waste and these could be used to remove the fluoride instead of going into the landfills.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

An experiment was conducted to determine whether natural or synthetic sponges are more absorbent. A natural sponge and a synthetic sponge of the same size were given an equal amount of time to absorb water as a control. The independent variable was the types of sponges used. The dependent variable was the amount of water absorbed by each sponge. The water absorbed from each sponge was collected in the graduated cylinder and recorded. After conducting the experiment, the null hypothesis has been accepted. The natural and synthetic sponges absorbed about the same amount of water. The natural sponge absorbed from 209 to 217 milliliters and the synthetic sponge absorbed from 205 to 217 milliliters. This showed that there was no significant difference in the amount of water the sponges absorbed.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
2020

Student Name(s):

Fair Category

Word Count

Abstract:

The health of certain organisms has been used to detect the health of ecosystems. Frogs are a good example of this. When a frog's ecosystem changes, most of the time because of human activities, these changes can be seen in the little frog. For example, polluted water can lead to birth defects in frogs like extra legs. Sometimes a population may entirely disappear from the ecosystem if conditions are severe enough. Diatoms, producers in marine ecosystems, can be a good indicator of warming ocean temperatures because they are so sensitive to temperature changes. Measuring the bioluminescence of diatoms can tell us about the overall health of not only the diatoms, but the marine ecosystem as well. High luminescence equals good health, low-level luminescence equals stressful conditions or even impending death. My experiment demonstrated that increasing water temperature in increments of one degree Celsius stresses the diatoms and eventually leads to death. These microscopic organisms can be used as an early warning system to rising ocean temperatures due to global warming.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Burning fossil fuels causes harmful pollution and is an unreliable source of energy. Biomass is an organic material such as wood, sugar cane or rice that is burned and used for fuel. Biomass is renewable and can be used more than once. I hypothesized that corn will have the most biomass because it's mostly used as a fuel for energy. I tested my hypothesis to see which type of grass produces the most biomass. For this experiment, three different types of grass, wheat, corn, and oat, were planted in pots containing thirty seeds each. Every day, for ten days, the heights of each seedling were observed. Next, I removed the plants from their pots and calculated their "fresh weight." After the fresh weight was recorded, I found the dry weight. The percent change between these values was found using the formula: fresh weight minus dry weight, divide this value by the fresh weight and multiply the quotient by one hundred. Since three trials were conducted, I found the average percent change. During the ten testing days, corn grew the quickest, and wheat and oat grew at a slower rate. After finding the average percent change, wheat had the largest change, which meant it contained the most biomass. This experiment shows, corn though used commonly is not as efficient. Throughout this experiment I learned the importance of using biomass to keep our planet green, and that wheat produces the most efficient source of energy to do so.

Word Count

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CSEF Official Abstract and Certification

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Student Name(s):

Fair Category

Word Count

Abstract:

This science experiment was asking if a tsunami could be simulated by dropping a bag of aquarium gravel down an inclined slope into a tank of water. The first accepted hypothesis is if the small bag of aquarium gravel is released into a tank of water, then it will generate a smaller wave than when the large aquarium gravel is released. The second one is if the large bag of aquarium gravel is released into a tank of water, then it will generate a larger wave than when the small aquarium gravel is released simulating a tsunami. There was an independent, dependant, and controlled variable. The independent variable was the height of the aquarium gravel being dropped, which was 12 inches above the surface of the tank, and the 37ins, x 6ins x 7ins plexiglass tank. The dependant variable was the simulation of Tsunami-like waves. The controlled variable was the amount of water in the tank. There were 6 trials for each size bag of gravel. During each trial, the bag of gravel was dropped down an inclined slope into a tank of water. In conclusion, the first 2 hypotheses were proven true. The large gravel simulated a large splash leaving less water in the tank. The small gravel made a smaller splash leaving more water in the tank.

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CSEF Official Abstract and Certification

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Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

The purpose of my project is to find out at what level does banana peels biodegrade fastest. I wanted to find this out because so many materials that could be composted, gets thrown away. North America is running out of space to store trash and we need to find a way to get rid of a lot of the trash on this Earth. Composting is an easy way to save the Earth by reducing the amount of garbage you throw out. It is also very easy to make composting a routine in your daily day. My hypothesis was if I put the banana peels at the bottom of my compost bin, then they will biodegrade the fastest. I did my experiment by putting banana peels at different levels of my compost bin. Then, I observed the banana peels until they decomposed. At the end of my project, I found out that the middle is the best place to store fruits that you want to biodegrade fastest. The middle banana peels biodegraded after only 6 weeks of being in the compost pile. I believe that my project will help change people's mind about composting and make them give it a try!

Word Count

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Student Name(s):

Fair Category

Word Count

Abstract:

My science fair project is "Investigations of Catalase enzyme in Hydrogen Peroxide." The experiment will be trying to find out in which hydrogen peroxide temperatures will the hydrogen peroxide split into two different elements. This will help biologist because it will find out which temperature will the enzyme help accelerate hydrogen peroxide become a harmless oxygen and water solution. It will be known when the hydrogen peroxide has an anabolic reaction when the shredded potato wrapped in filter paper will reach the surface. As the temperature of the hydrogen peroxide increases, the anabolic reaction will increase. With the hydrogen peroxide at a temperature of 15°C, the reaction time of the shredded potato to reach the surface took 5 seconds. At a temperature of 30°C, the reaction time took 6 seconds, however, the reaction time of the potato in 45°C hydrogen peroxide, it took 18 seconds. The answer was that as the temperature increases, the reaction time also increases. This supported my hypothesis because the catalyst, the hydrogen peroxide, was heated up each time by 5°C each time. As the temperature of the hydrogen peroxide heated up, the reaction of the potato was greater than the last. The 40°C hydrogen peroxide took 9 seconds. The next time the hydrogen peroxide was heated up to 45°C, the reaction time was 18 seconds. There were a few exceptions such as the 15°C hydrogen peroxide.

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CSEF Official Abstract and Certification

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Student Name(s):

Fair Category

Word Count

Abstract:

The hypothesis I am testing is that lentils grown hydroponically will not do as well as the ones grown in compost, potting soil, and water/fertilizer mix. The reason I am testing this is that I am curious about the science of growing things hydroponically. I did this through 3 weeks of studying lentils. I sprouted over 30 lentils in a bowl surrounded with moist paper towels for one week. I then planted 4 lentils with each of the 4 variables, or 4 in compost, 4 in potting soil, 4 in water, and 4 in water/fertilizer mix. I studied them for 2 weeks, before doing a final measurement. The results were that the plants with the highest stem those grown in compost, and hydroponic lentils had the shortest. In conclusion in the future I might continue the trial until they started actually producing lentils, so I could monitor the amount of lentils produced by each plant. This experiment shows how to grow lentils most productively, and therefore with a quicker harvest so lentils can be grown productively anywhere that needs them. This is of course just a small handful of ways they could be grown and I would like to continue testing more variables in the future.

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CSEF Official Abstract and Certification

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Student Name(s):

Fair Category

Word Count

Abstract:

This experiment studied ideal temperatures for tempering and re-hardening chocolate. The microwave method was used to temper chocolate. Hershey kisses were microwaved to 115 120 F and was lowered to 86-88 F by adding un-melted Hershey kisses. This reintroduced melted to stable coco-butter and chocolate crystals. Melted chocolate was spread on wax paper and refrigerated. For the high and low temperature variables, 135-140F and 106-108 were used, respectively. For low temperature, 95-100F and 66-68F to cool was used. When the high temperature sample was used, the chocolate burned once you passed 122 F. At low temperature, chocolate dried up when cooling. When using ideal chocolate making temperature, 115-120 F and 86-88 F to cool, chocolate had a hard snap and a shiny finish. My hypothesis stated that if I change the temperature from the ideal, chocolate will not have the same characteristics as new chocolate was supported. Temperature noticeably affected the outcome of the chocolate. The outcome of high temperature on chocolate was that it became mushy, fingerprinted, and dull. This explained why the chocolate temperature became too high, burning coco-butter and crystals vital to chocolate structure. Low temperature caused chocolate to dry up when cooling. This explained that the chocolate temperature was too low and did not melt all the coco-butter. When melting chocolate at low temperature, large chocolate crystals form; giving a soft, crumbly chocolate that melts easily. Tempering chocolate involves ideal temperatures to get a glossy finish, remain hard at room temperature and still taste great!

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Several unmanned missions to Mars have been made such as Mars Pathfinder, Viking, Mars Global Surveyor and the Phoenix Mars Lander. But there are plenty of challenges involved before humans can establish a permanent colony there. One challenge mentioned is turning the carbon dioxide rich air of Mars into oxygen, kind of what plants do. It would certainly help if Earth plants could grow in Martian soil because missions going there would not be weighed down with Earth soil. Martian soil has been analyzed and it contains sand, basalt (volcanic rock, like what's found at Hawaii and Connecticut Trapp rock) and perchlorate. Three terrariums were made using these ingredients and 3 different plants were used, two flowering plants and a green foliage plant. All managed to absorb introduced carbon dioxide and produce oxygen as a waste product. However, the violet plant did it more efficiently than the primrose and foliage plant. By the seventh day of the experiment, oxygen levels showed a decline in all the plants' health. They were dying. As a result, the experiment demonstrates that it does not currently appear to be a feasible solution to grow plants in Martian soil with the hope the plants can absorb the atmospheric carbon dioxide and produce oxygen as a byproduct to support life within an enclosed environment.

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Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Abstract:

Abstract – Hypothesis: Frozen rice milk will melt faster than the frozen orange soda, or frozen apple juice. Using a half cup measuring cup, I measured equal quantities of liquid in each styrofoam cup. I then simultaneously put each of the liquids in the freezer. The next day I simultaneously took the liquids out of the freezer and placed them on a table. Each hour I measured how many teaspoons each liquid had melted using a measuring cup. I continuously repeated this method for seven intervals or seven hours. My results show that the frozen beverages orange soda and apple juice had been finished melting at the sixth hour interval or the sixth hour. The frozen beverage rice milk had been finished melting at the seventh hour interval or the seventh hour. My results disagree and are not consistent with my hypothesis. In the hypothesis I stated that the frozen beverage rice milk would melt faster than the two other frozen beverages orange soda and apple juice. After extensive testing I am able to conclude that rice milk melts at a slower rate when compared with the brands of orange soda and apple juice that I chose for this experiment. The rice milk was clearly the last frozen liquid to melt.

Word Count

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Student Name(s):

Fair Category

Abstract:

My project is to test and see if how long you let the flowers press will affect the strength of the perfume. A lot of companies use artificial scents because they are cheaper, faster, and last longer than real flowers. My project won't help anyone because people aren't really concerned with whether or not their perfume is real or artificial. My hypothesis is that if I let the flower petals press for three days as opposed to one and two days then the perfume will have the strongest scent. My hypothesis was both wrong and right. It ended up varying by flower. After one day four out of five said that the lilies and chrysanthemums had the strongest scent. After two days one person said that the lilies and chrysanthemums had the strongest scent. After three days everyone agreed that the freesia had the strongest scent.

Word Count

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Fair Category

Abstract:

In the Effect of Age on Optical Illusion Recognition experiment, it was found that adults are quicker than children at identifying ambiguous optical illusions. Therefore, age does impact a person's ability to see ambiguous optical illusions; in this case, the older and more experienced the person was, the quicker their time. During the lab, six different illusions were shown to children and adults, and their times were recorded for each. The average time it took for an adult to identify an illusion was 1.13 minutes, and for a child, the average time was 1.44 minutes. This was the result for a small group of people—20—but in order to make the results more reliable, the amount of people tested would have to be expanded.

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Num

Proj.
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Title:

Student Name(s):

Fair Category

Abstract:

Abstract In this experiment the question being tested was, "what is the Effect of Organic fertilizer in Improving Plant Growth?" The hypothesis in this experiment was that using manure will increase the growth rate of plants. After several weeks of performing this experiment it has been proven that that using manure increases the growth rate of plants. The plant with manure grew about an inch every day after it sprouted. The first week there was no significant outcome in the growth rate of the plant, however after the first week that it sprouted it reached seven inches whereas the other plants had not sprouted yet. To perform this experiment I took four pots and filled them with two cups of soil, and placed a Lima bean seed in each pot. Then I labeled the pots compost, manure, compost and manure, and liquid fertilizer. Afterwards I prepared one liter of water. The first plant will be watered every day and mixed with manure. The second plant will be watered water every day and mixed with compost. The third plant will be watered every day and will be mixed with compost and manure. The fourth plant will be watered every day and will be mixed with liquid fertilizer. Then I observed the plants for a few months and recorded the data. The purpose of the experiment was to find out what makes plants die and if the soil plays an important part in the life span of a plant.

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Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment is to see if a concentration of alcohol or caffeine would affect the rate of the Daphnia's heart beat per minute. I also wanted to see how much of an impact we had to aquatic animals due to littering. I had 2 hypotheses, 1 was that adding 1 drop of ethanol alcohol to the Daphnia would increase the heart beat by at least 20 beats more than the average heart rate. My second hypothesis was that the caffeine would increase the Daphnia's heart rate by 40-50 beats more than the average heart rate. I used a pipette and sucked up the Daphnia's and placed it on the microscope. Then I took the heart beats down per 15 seconds and timed it by 4 to get 60 seconds. I took the heart beats for adding one drop of caffeine, one drop of alcohol and the regular heart beat. I did see an increase in both the average beats for alcohol and caffeine compared to the normal heart beat. I also saw that during the placement of the one drop of alcohol or caffeine the Daphnia were calmer than just taking their normal heart beat. I do accept my hypothesis because the heart rate of the Daphnia did increase compared to the average heart rate of the Daphnia.

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Num

Proj. Title:

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Fair Category

Word Count

Abstract:

The objective of my project was to create a successful, natural, healthy way to kill unwanted insects. My invention quickly eliminates bugs with a no hassle clean up, and is 100 percent non-toxic and natural. It is completely unique and effective. The problem being addressed in my invention is how ants and insects live in common people's households, eating food, destroying property, and simply annoying the people living with ant infestations. In addition, all of the pesticides available today are either toxic, or non-toxic but made from chemicals and/or is unnatural. My alternative to common household pesticides provides an environmentally friendly, non-toxic, and a natural solution. The creation contains Diatomaceous Earth, which is a natural soil that is proven to kill all insects, yet harmless to humans and animals. My invention combines DE, Baby Powder, sugar, and water in the appropriate concentration to maintain effectiveness while making it household friendly for personal enjoyment. It solves common pest problems such as household ants, bed bugs, spiders, and other insects found at home by eliminating them within 30 minutes-while also attracting the insects and tricking them into thinking that they are consuming a sugary treat. On top of all of this, it is children and pet safe!

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
2502

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this investigation is to verify whether fast food French fries mold slower than homemade and frozen fries. This subject interests me because I saw a similar experiment done in the movie "Super Size Me", showing that McDonalds fries didn't grow mold after an extended period of time. My hypothesis states that if we watch the growth of mold on French fries from different fast food chains, then McDonald's fries will grow the least mold over time as shown in the movie. As a result of this investigation I hope to achieve a better understanding of the differences between homemade and processed foods specifically the effect of food additives and preservatives. French fries purchased from Friendly's, McDonalds, Burger King and Wendy's were placed in airtight bags and left at room temperature. Control fries were prepared from a frozen package and from fresh potatoes. All bags were monitored and the time of appearance of mold was documented. The experiment was repeated twice, with the first trial lasting 8 weeks and the second trial 3 weeks. Visible mold was seen on home made fries after 10-14 days. Frozen fries and Friendly's fries molded in both trials, while Wendy's and Burger King fries had mold in one trial. McDonald fries did not have any visible mold growth in either trial, even after 8 weeks. The published list of ingredients suggests that McDonald's fries contain TBHQ (Tertiary Butylhydroquinone), a unique phenol-type preservative that does not appear in any of the other samples.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

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Num

Proj. Num Title:

Student Name(s):

Fair Category

Word Count

Abstract:

My purpose was to find nutrients and pollutants causing negative conditions, like hypoxia, in two local rivers (West and Mill), leading to Long Island Sound. I predicted that run-off from phosphates and nitrates (as fertilizers) would be a possible problem. After testing probable nutrients and pollutants from collected river samples, I simulated a "river," adding known PO₄ and NO₃ levels (to determine algae growth rates) and I tested for Coliform/Bacteria levels in each of my samples. My experiment showed the following: West River • Low levels of oxygen and carbon dioxide (hypoxic) • High levels of phosphate and medium amounts of nitrate (yields algae) • Extremely high levels of coliform/bacteria Mill River • Very low levels of oxygen and carbon dioxide (hypoxic) • Low levels of phosphate and very high levels of nitrate (yields algae) • Medium levels of coliform/bacteria Simulated "River" • High amounts of phosphate or nitrate solutions, grew algae in five days • Combinations of phosphate and nitrate solutions caused the most algae (twenty percent). My tests proved that local rivers have excessive phosphates and nitrates causing algae blooms to quickly occur plus excessive bacteria. I hope everyone will learn to "Rescue the Rivers."

Special Categories Selected by Student:

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Fair Category

Abstract:

Purpose: High Acidity levels can be caused by acid rain runoff pollution and carbon emissions. It is a very big danger to Marine wildlife. Affects such as reducing an organism's ability to form a protective shell, making eggs and larvae not develop properly, and even death can be a result of high acidity levels. That is why I tested if bio-luminescent algae could be used as an indicator of these high acidity levels. **Procedure:** I changed the pH levels in the test tubes of bio-luminescent algae to different intervals; which were, unchanged, -.2, and -.4. The test tubes were placed in a room so that they all got the same amount of light every day, for 12 hours. Every night they were physically agitated using a device I designed and I recorded the length they remained luminescent. I then recorded this data daily for the duration of the experiment. **Data:** The data shows that the algae's ability to remain illuminated was affected by the acidity. The data shows that with a .2 reduction in pH, the luminescent duration was 30% less than the unchanged algae. With a .4 reduction in pH, the luminescent duration was 58% less than the unchanged group. **Conclusion:** I found that bio-luminescent algae were significantly less able to luminesce in high acidic waters than they do in their normal waters. This leads me to believe that they have the potential of being used as an indicator of high acidity.

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:
2506

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment is to compare treated and untreated well water in various locations in Connecticut and the effect of the water on the growth of rye grass. This is based on the parameters of the water, including coliform bacteria, e Coli Bacteria, chlorine, copper, iron, manganese, chloride, hardness, sodium, sulfates, nitrates, nitrites, color, odor, pH, and turbidity. It is predicted that the rye grass growing in soil watered by the untreated water will grow taller within the testing time than the rye grass growing in soil watered by the treated water. Also, when certain parameters are within a specific range the grass growing with this sample will grow taller. Begin this experiment by collecting water samples from a well, before it was treated and after. Test the water on the parameters listed earlier using the following instruments; pH meter, turbidimeter, incubator, Ion Chromatography, Inductively Coupled Plasma Spectrophotometer, and color comparison tubes. Plant grass seeds in six mason jars labeled Untreated Trial 1, Untreated Trial 2, Untreated Trial 3, Treated Trial 1, Treated Trial 2, and Treated Trial 3. Water according to the labels and record the height and progress of each plant over the 14 day testing period. Repeat the steps for the second well. It was concluded that parts of the hypothesis were correct. The grass was not affected by whether the water had been treated or not, therefore it must have been affected by specific parameters.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Acid rain is a growing concern as the condition of the environment worsens. It is caused by a chemical reaction, beginning when compounds such as sulfur dioxides and nitrogen oxides are released in the air. The objective of this experiment was to determine how drastic the effects of varying pH levels in soil are on the growth of Wisconsin Fast Plant seeds. A total of fifty seeds were planted into three separate environments. The acidic environment was created by pouring vinegar into the soil of three separate pots. The opposite pH environment, alkaline, was created by mixing baking soda with water and pouring the solution into the soil of the next three pots. Three control trials were also conducted, in which the pH of the soil was kept around a neutral level. My hypothesis was that the control group with neutral soil would grow the tallest. The acid and base groups didn't sprout throughout the course of eight days. The control group, on the other hand, sprouted four days after they were planted, growing at least a centimeter each day. After eight days, the tallest control plant was 6.2 centimeters in height. The results of this experiment show that pH levels have an impact on the growth of seeds, supporting my initial hypothesis. The data also shows the damage acid rain can cause to the growth of plants we need to keep our environment healthy and stable.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This project investigated whether the bending angle of the knee joint affects the amount of strain put on the patellar tendon. The hypothesis created for the project is that if strain is put on the patellar tendon, then the size of the bending angle will be inversely proportional to the amount of strain on the tendon, because more force is required to support the amount of body weight, therefore causing more strain on the patellar tendon. In order to test this I created a model of a knee. To test the problem I set the model to a 90 degree angle. I then measure the length of the spring, "quadiceps muscle", and subtracted the springs resting length. This gave me the amount of force required to support the angle because a tendon transmit's the force which the muscle exerts. I then repeated this process with a 70 degree angle and a 110 degree angle. The average force required to support a 90 degree angle is 3.37 N, 5 N needed to support a 70 degree angle, 2.63 N to support a 110 degree angle. Therefore my hypothesis was correct. I concluded that squatting, can lead to knee pains. This project relates to my life because I had a lot of knee pains. I now know that I was straining my patellar tendon by squatting while playing softball. Lastly, there could also be some human error. The human errors could be building the model incorrectly, and misreading the ruler.

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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 find out whether a worm's diet affects its reproduction rate or the soil it enriches. Four pots of worms each containing fifty worms were kept in my house for six weeks while feeding each container one of three different diets. The three diets consisted of: dead leaves; coffee grounds; and fruit peels. The worm containers were all watered the same amount once a week. The fourth container of worms was my control, so it was only watered. In the beginning of the experiment, I tested the soil nutrients in each pot, specifically nitrogen, phosphorus, pH, and potassium. After six weeks I again tested the soil for nutrients and counted the amount of worms per container to see if they reproduced. There were minor changes in the nutrients and rate of worm reproduction per container. The independent variables that affected the worms the most were the coffee grounds and fruit peels. The number of worms in the container fed with coffee grounds lowered down to forty eight worms and number of worms in the container fed with fruit peels raised to fifty six worms. The nutrients in these two containers were also affected the most. The concentrations of nutrients increased in the fruit peels container and decreased in the coffee grounds container. The dead leaves stayed at the same amount of worms and concentration of nutrients as in the beginning along with the control.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Num

Student Name(s):

Fair Category

Word Count

Abstract:

Energy drinks are a trend in caffeinated beverages and many teens and preteens are drinking them for an “energy boost.” Because of the effects of caffeine on the heart, drinking energy drinks could be a dangerous habit to preteens and teens. The purpose of this experiment was to determine if consuming energy drinks containing caffeine would raise a person’s heart rate and blood pressure. My hypothesis was that the energy drink containing the highest amount of caffeine would increase a person’s heart rate and blood pressure the highest. I used 4 different energy drinks containing caffeine in my experiment. My blood pressure and heart rate were recorded prior to consuming an energy drink daily. After consuming a serving of the specified energy drink, I waited 15 minutes. My heart rate and blood pressure were recorded. I calculated the blood pressure and heart rate change. The change is the difference between the blood pressure and heart rate prior to consuming a caffeinated energy drink & the blood pressure and heart rate after consuming one serving of caffeinated energy drink. The process was repeated on separate days until all 4 energy drinks were consumed. After consuming each beverage, my blood pressure and heart rate did rise. The energy drink containing the most caffeine did raise my blood pressure and heart rate the highest. My data supports my hypothesis therefore should be accepted.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Each year in Southern California, large fire spread from the forests to houses causing millions of dollars of damage. Often the fire is carried to the houses by the homeowner's choice of landscaping. By choosing trees that burn at a slower rate than others, homeowners may be able to reduce their losses. That is why i compared evergreen and deciduous trees in this study, so homeowners will know which trees they should put in their landscaping.

Word Count

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CSEF Official Abstract and Certification

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Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

My variable is the bottle with hot water because it produced fog, which is a change in action. Also the ice on top of both bottles started to melt which made the fog start to decrease in bottle with hot water only. My control was the bottle with cold water because there was no action at all in or out of the bottle. Also the structure of both bottles did not change either.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

Many Americans experience fatal ulcer development and gastric bleeding that is linked to Non-Steroidal Anti-Inflammatory Drug (NSAID) use. The objective of the tests in this study was to construct stomach environment models to determine how readily available OTC painkillers may cause gastric ulcers and other complications. The gastric environment was designed using cow intestine, pepsin, and dilute hydrochloric acid to simulate human gastrointestinal conditions. In doing so, precise dosages of Aleve, Advil, and Tylenol were added to each setup, including a control. It was hypothesized that the breakdown of the NSAID's will create visible damage to the intestinal lining in the model stomach environments. Upon trial completion, both Advil and Aleve showed significant deterioration of the intestinal lining, while Aleve indicated slightly more emphasized reduction. It became apparent that NSAID's are harmful to sensitive gastrointestinal lining. As expected, the tissue exposed to Tylenol did not demonstrate any visible damage. Results of this study support current research, as scientists have found that NSAID's, while inhibiting the production of COX-2, an enzyme that causes pain, also inhibits the production of COX-1, an enzyme protecting digestive lining. Furthermore, many people are oblivious to the dangers of these medications, as they are convenient and readily available. They also can be used to mask pain, rather than address a potentially serious medical problem. Therefore, people must become aware of the seriousness of the risks associated with NSAID's in order to prevent gastric damage and ulcer development in the first place.

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 this experiment was to find the optimum angle of a solar panel throughout the whole day. This project was inspired by the continuous power outages occurring in northeast America due to recent multiple major storms. The problem was, "How does the angle of a solar panel affect its solar energy output?" Five solar panels were placed outside, each with a different angle, during a mostly sunny day, with snow on the ground and temperatures slightly below 40 degrees. The five angles I chose to measure were 90° east, 90° west, 45° east, 45° west and 180° facing towards the sky. The outputs of the panels were measured every two hours between 10am to 4pm. When the solar panel angle was such that the Sun rays would be perpendicular, on average it produced 25% more output power. This proves that, the angle closest to the perpendicular angle of the Sun produced the most energy. The angle of the panel does really matter and make a difference in the amount of energy produced. As a result, if a sunflower technology was developed where a light sensor could track the Sun and the panel could follow the Sun as the earth rotates, in such a way that Sun rays would come almost perpendicular to the solar panel, than it will produce the maximum output all day. The sunflower technology would be producing much more power than fixed in place solar panels and can help produce more clean green energy.

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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:

Purpose: To determine the type and degree of competition between sister species by measuring relative growth in and out of each other's presence. **Materials/Methods:** Two species of dinoflagellate were grown under identical conditions according to protocol established in two prior studies; species were primed, then combined on one arm to share econiche as well as grown separately on control arm. Growth measurements measured subjectively as bioluminescence, objectively by cell counting. **Results:** Thirty-three of 36 algal colonies grew from baseline with overall growth reaching strong significance ($p < 0.001$). Also, each species individually grew significantly from baseline (growth range=5.8%-19.1%) with *P. fusiformis* significantly outcompeting *P. noctiluca* ($p < 0.001$) as measured by relative growth rate across all conditions. However, no competitive interaction between species was observed as measured by mutual inhibition/stimulation in each other's presence vs. a control of growth in isolation ($p = 0.23$). Finally, all growth study-wide was measured by both bioluminescence (surrogate endpoint) and cell counting (direct), with bioluminescence achieving a positive predictive value of 70%. **Conclusion:** Results show that a) both *P. fusiformis* and *P. noctiluca* dinoflagellates grow well whether in each other's presence or not, b) *P. fusiformis* grew significantly faster than *P. noctiluca* in all contexts, but that c) this significantly different growth is not significantly affected by the presence or absence of competing sister species despite study powering (80%) sufficient to establish strong significances. Future study should add a third, closely-related, toxin-releasing dinoflagellate to see if this yields any interactive competition.

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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: The Phytoremediation Efficacy of Elodea Canadensis, Lemna Minor, and Brassica Juncea in Copper Sulfate Contaminated Water

Student Name(s): M. Robertson

Fair Category

Word Count

Abstract:

Thirteen highly contaminated areas of my town are on the Department of Environmental Protection's National Priorities List—Superfund sites. Most are former industrial sites where toxic wastes were disposed of by dumping them into nearby land or water. Cleaning these areas of industrial waste by ex-situ methods like dig and dump is difficult and costly.

Phytoremediation is an in-situ remediation method which uses plants to remove or neutralize contaminants in polluted soil or water. Some plants, known as hyperaccumulators, can remove extraordinary amounts of contamination from water and soil. I tested the ability of three different hyperaccumulators, Elodea canadensis, Lemna minor, and Brassica juncea, to see how much copper they would be able to remove from water contaminated with chelated copper sulfate at a concentration of 3parts-per-million. The Elodea canadensis lives under water, the Lemna minor floats on top of water, and the Brassica juncea is a land plant which I grew hydroponically, watering constantly with the contaminated water. I tested the copper concentration of the test waters each day for twenty-five days. I found that Brassica juncea was a highly effective hyperaccumulator of copper, removing 96% of the copper sulfate from the water in its test jar. Because the Brassica juncea remediated the copper-contaminated water best, I believe it may also be effective at remediating other, more harmful, toxic substances and heavy metals, such as arsenic, lead, or mercury, from water or soil. This knowledge could help to form a plan for cleaning up my town's other toxic sites.

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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:
2519

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment is to study the effect of various types of non-ionizing radiation on French Breakfast radishes (FBR). The hypothesis proposes that both FBR seeds and plants exposed to greater duration of radiation will exhibit the greatest impediment to seed/plant germination and growth. Three types of non-ionizing radiation are employed (IMW = inside microwave, OMW = outside microwave, CP = cell phone). Both seedlings and fully grown plants are analyzed for germination and growth. One time exposure to radiation was measured at 0s through 3". Cumulative exposure was measured at 0s through 30s. In Part 1, seedlings were exposed to all types of radiation and placed in hydroponic media. Part 2: the same irradiated seedlings were planted and grown in soil. Part 3: fully grown plants were exposed to one time IMW. Part 4: five fully grown plants were subjected to cumulative daily IMW. Part 5: hydroponic seeds were exposed to 90s, 120s, and 150s of IMW. Observations: 1. The type or duration of non-ionizing radiation has no effect on either seed/plant germination/growth unless IMW duration = 3". 2. The point of seedling death occurs between 150s and 180s IMW. 3. Plant growth velocity dramatically diminishes with one time IMW at 10s. Plant death occurs at 30s. 4. Seedlings, hence, appeared to resist the effects of IMW better than plants. 5. Cumulative daily IMW has a direct negative effect on plant growth. All irradiated plants showed diminished growth velocity and those with greater than 2s daily exposure showed eventual demise. 6. An unplanned observation (at 45 days) revealed demise of some plants grown with CP and OMW irradiated seedlings. If the unplanned observation is valid, then rising morbidity (Autism, cancer) unexplained by other environmental factors must be suspect to be related to the increasing daily use of devices emitting non-ionizing radiation.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

I studied the effects of oil spills on sea plants. I did this because I had never seen how oil affected sea vegetation, I had only seen how it affected marine animals and the body of water in which the spill occurred. My hypothesis for the project was that both the seaweed and the sponges would show significant changes in the experiment. I believed that the sponges pores and the seaweeds roots would absorb the oil and thus damaging the plant. When I conducted the experiment, I had placed three seaweed plants in a container filled with sand and water. I did the same for the sponges. I then poured diesel fuel into the containers. I watched the plants over the course of a month and wrote of observations and took pictures in my science fair notebook. During this time, I observed that the seaweed had shown the most changes during the first few days. The sponges, in contrast, showed a more gradual change. The changes showed less and less as the days went by for both of the sea plants. I saw that the seaweed showed a more visible change than the sponge. The seaweed had gotten darker each day and the pores sponges seemed to get bigger. After a while both plants stopped changing. The plants had probably died by then. The diesel fuel obviously had a big impact on the sea plant environment. It had affected the plants and their habitats as well.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The Colors of Ozone Abstract I picked this experiment because I want to keep our earth safe and undamaged from pollution. In my experiment I wanted to find out which places were emitting the most pollution into our breathing air and environment. I tested ozone because it is very harmful to our lungs but trucks and factories let these chemicals into our air. I also found it interesting that ozone is the layer surrounding our earth, that is keeping us alive, but it causes illness and damage as well. For my project I used potassium iodide and cornstarch to make a testing strip that would show which location had the most amount of ozone. My hypothesis was that the highway would have the most ozone because in the last 40 years there has been an increase in drivers. My thought was that the more cars, the more pollution and ozone. My hypothesis was proven wrong by the fact that the hospital strips looked worse than the highway strips. My conclusion also ended in another question. When I got to the strips at the residential testing spot, one stake had fallen over and touched the ground. What I found was that the strip on the ground was completely colored and worse than any of the other strips. My next conclusion and question would be about ozone landing and settling into our soil as well as causing harm in the air.

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Proj. Title:

Student Name(s):

Fair Category

Abstract:

My project is about how roots grow when the direction of gravity changes. When farmers plant their crops, they might wonder why the roots of their plants are curled when they uproot them. This is what my project is about. I planted radish seeds in compact disc (cd) cases to see how they would grow when the direction of gravity changes. I rotated these "seed sandwiches" ninety (90) degrees each day and arranged them in various ways to see the different changes in direction. Each "seed sandwich" responded in their own ways, which would be the measurements they had at the end of each trial.

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Student Name(s):

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Abstract:

For my science fair project, Does the Color of Light Effect Plant Growth, I first wrote my hypothesis. In my hypothesis I stated that I believe that the plant under the green light will grow the most after one week. My results agree with my hypothesis. During the time that the plants were under the lights I researched the different colored lights and type of plant I was growing. After a full week of testing my project ended. I greatly enjoyed doing this experiment and was glad that I learned how to increase the growth of plants!

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The objective of this science experiment was to determine if coliform bacteria in contaminated water could be killed using various home decontamination methods. Coliform bacteria is a harmful bacteria found in the intestines of warm-blooded animals. Depending on the surroundings of the source of your water, contamination of coliform bacteria is a possibility. The three household decontamination methods used included boiling, adding chlorine, and using heat and pressure from a pressure cooker. Before being able to test which method/methods would kill the coliform bacteria a culture was grown persisting of thirty grams of feline feces and three liters of room temperature water, which went into a milk container. After three days of the culture sitting out in a room temperature environment, it was transferred into another milk container using a cheesecloth and a funnel to remove excess feces. Then, tests were run by using a coliform test kit to confirm the existence of coliform bacteria inside the water. The results from the coliform test kit indicated verification of coliform bacteria and the three methods were then applied at separate times to try to kill the bacteria. This experiment consisted of various tests involving a sample from each method of decontamination, which were followed by observations made over a twenty-four hour period. In conclusion, the three decontamination methods killed the coliform bacteria and this was proven by the use of the coliform test kit. All three methods proved themselves to be powerful enough to kill the coliform bacteria.

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Fair Category

Word Count

Abstract:

My experiment, "The Antioxidant Mystery" was performed to see which type of nutrient (Vitamin A, Vitamin C, or Vitamin E) is most effective for protecting cells against free radicals. I started by taking 15 Petri dishes and dividing them into 5 groups of three. Then I either put Vitamin A, Vitamin C, or Vitamin E inside of these dishes as a source of antioxidants, or I added water as a control. Also I added Hydrogen Peroxide, H₂O₂, to the dishes as the source of free radicals. Then, I either placed 25 Radish seeds or 15 bean seeds in the dishes. Depending on the type of seed, I waited either 4 or 6 days for the seeds to germinate. I had originally hypothesized that Vitamin E would protect the seeds best from the free radicals. Scientists have done studies that prove the Vitamin E in the human body is what helps to protect against free radical damage. I soon found out that Vitamin E isn't actually all that I thought it to be. In conclusion, I discovered that Vitamin A is actually better for protecting against free radicals. The results of the radish seeds trials show the average percent of seeds germinated for Vitamin A was 80%. Compared to the other averages, it is the best. In fact, for Vitamin E, the radish seeds average amount of seeds germinated for each trial was only 48%. I was really surprised to see the end result. Wow, these antioxidants' really are a mystery.

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:

"Fertilizer: Phenomenal or Fatal" was to investigate the question "How does the level of nitrogen fertilizer (Miracle Gro) in water affect the growth of leaf lettuce plants by measuring plant height, leaf width, and color?" My hypothesis is: "If leaf lettuce plants are fed an optimal level of nitrogen, then they will have higher growth rates than control plants and plants fed nitrogen levels higher than optimal amounts." To start, I germinated 100 leaf lettuce seeds in each of four separate trays for 10 days by feeding tap water until they reached a height of about 70 millimeters. Next, each tray was fed a food source with variable levels of nitrogen for the 14 day experiment period. The first tray was used as a control and was fed normal tap water. The second tray was fed an optimal level of nitrogen. The third and fourth trays were fed at a rate four and eight times the optimal level. The overall results of this experiment proved that the recommended amount of nitrogen resulted in growth rates of more than three times the growth rate of the control tray. Additionally, trays three and four that were fed nitrogen levels of four and eight times the recommended amount of nitrogen, which resulted in plant deterioration, and eventually died. In conclusion, my hypothesis was not rejected because nitrogen is a primary nutrient for plant life, but too much nitrogen is harmful to plants, and too little does not allow them to grow as well.

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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:

In order to understand how deoxyribonucleic acid (DNA) works, molecular biologists extract DNA from the nucleus of cells of living things. The purpose of my experiment was to measure the effect of chlorine on the extractable of bananas, strawberries and kiwis. I chose to test these three fruits for specific reasons. Strawberries are octoploids, meaning they have eight copies of DNA in their genome, kiwis contain numerous proteases (enzymes that break down proteins allowing for easy DNA extraction), and bananas because humans share 50% of their DNA with bananas. The steps of DNA extraction are the disruption of the protected cell membrane, the release of the DNA, and the precipitation of the DNA out of the solution. The fruit is equally placed into five controlled solutions; (1)distilled water, (2)1/1000 chlorine dilution, (3) 1/100 chlorine dilution, (4)1/10 chlorine dilution, and (5)100% chlorine solution. After fruit is absorbed for ten minutes and drained, it is chopped and placed into a chilled buffer solution of salt, water and detergent. These three household items work together to cause cells to burst open, thereby releasing the DNA. Fruit is then strained and alcohol is added, causing the DNA to separate from the solution. DNA is then extracted and measured. The fruit absorbed in higher concentrations of chlorine resulted in less amounts of DNA. The results proved similar for all three fruits. The findings of my experiment thereby concluded that chlorine can destroy some, but not all, DNA in bananas, strawberries and kiwis.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

The purpose of my projects was to test wheter or not plants are more sensitive to touch rather than humans are. My project will most likely appeal an inform gardeners to be more cautious towards growing their plants and remind them to always be cautious when growing their plants. It will give them the knowledge that although plants aren't walking, alive, and talking they are also sensitive just like humans. In my experiment the first thing that I did was grow the flowers that I used which consisted of Morning Glory Plants, Royal Sweet Pea Mix, and Old Spice Sweet Pea Mix. After they grew, I placed a 12 inch pencil in each of the 8 pots that held my flowers next to a tendril and timed how long it will take the tendril to curl around the pencil. In the end I came to a conclusion that plants posses more sensitivw outer surfaces rather than humans.

Word Count

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Fair Category

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This project was formulated when construction plans were announced on a 30 inch pipe connecting a salt marsh to a bay near my home. The plan was to enlarge the opening to a 6 by 4 culvert. This construction was to limit the growth of Phragmites, an invasive species overtaking the marsh. Town officials thought that salt content in the soil would increase; therefore killing the Phragmites' and as a result improve the habitat for wildlife. I wanted to determine if the culvert really changed the salt content in the marsh. I predicted that if I measured water salinity in the bay and in various places along the river, at high tide, before and after construction, then I would find that the new culvert did increase the salinity of marsh water. To test my theory, I kayaked down the river before construction started, and marked 7 places along the way. At high tide I gathered a sample of the water at each spot. Later I measured the water sample temperature and specific gravity. Once the new culvert was completed, I recorded the information again. Finally, I converted the numbers to salinity levels. The results showed that salinity levels did increase after construction. The greatest difference in salinity was at the farthest sample, which showed high salinity bay water did make its way up the river. I concluded that the construction made a difference, but more time would be needed to determine the affect on Phragmites.

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The Reasoning: The purpose of this experiment is to test how high the phosphate levels are in my local water bodies. Question: What is the level of phosphates in our local bodies of water? Hypothesis: My hypothesis is that the level of phosphates will be higher than they are supposed to be, because of the many ways that phosphates can collect in bodies of water. Procedure: 1. I went to 4 local bodies of water in my area: the brook that runs behind my house, Mekauer Park's pond, Bennett Park's pond, and Taunton Lake. 2. I went to all four bodies of water and collected 3 samples from each. 3. I took all the samples home and followed the directions of a phosphate testing kit (the testing kit I used is the 'API Phosphate Test Kit). 4. I took the results of each sample and recorded them and then compared them using the color chart, provided by the testing kit. Results: My results were as follows: The brook had 0.25 ppm for all 3 trials. Meckauer Park's pond had 0.25 ppm for all 3 trials. Bennet Park's Pond had 0 ppm, 0.25 ppm, and 0 ppm. Taunton Lake had 0 ppm all 3 trials. Conclusion: The conclusion to my experiment is that my hypothesis was incorrect. My hypothesis stated that the level of phosphate would be high in my local surrounding bodies of water, whereas my results came to back to the two lightest colors on the chart.

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CSEF Official Abstract and Certification

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Proj.
Num

Proj.
Num

Title: A Comparative Study of the Effects of Organic vs. Chemical Fertilizers on Lubricus terrestris

Student Name(s): V. Bennet

Fair Category

Word Count

Abstract:

Through this project the effects of organic and chemical fertilizers on Lubricus terrestris were determined. I chose this project because in the spring and summer months my family uses chemical fertilizer on our lawn and flower beds. A few days after applying the fertilizer I observed dead earthworms on top of the soil. Through research I found that earthworms are a very important contributor to soil environments. They are responsible for creating fertile soil as well as for aerating the soil. Was the fertilizer causing the death of the earthworms and would organic fertilizer have the same effect? An experiment was designed and conducted to find the answer to my question. Earthworms were purchased, weighed, measured, and observed for response to a stimulus before being placed in containers of equal size. Earthworm bedding and food were added to the containers. The manipulated variable was the addition of organic and chemical fertilizer dissolved in solution one time per week over the four week test period. At the end of the test period the earthworms were again weighed, measured, and observed. At the conclusion of the experiment none of the earthworms exposed to chemical fertilizer survived while there were some alive in the organic container. The earthworms in the control container showed evidence of reproducing during the test period.

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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 purpose was to naturally inhibit weed growth using possible hardy allelotrophic grasses. Chemicals that inhibit weeds contaminate the soil and eventually “run off” to rivers. I planted grass and weed combinations using different types of soil, recording growth heights and rates of each. I wanted to determine which grasses could inhibit the weed growth. I also tested the nutrient levels of my soils and my grasses, to see if weeds had a negative effect on the grasses. Grass/Weed Growth Effect: •Kentucky Bluegrass, Tall Fescue, Perennial Ryegrass, and Sun & Shade Mix were able to inhibit clover and creeper from growing. •Overgrown Fescue and Perennial Ryegrass were effective inhibitors on all weeds. •Weeds: Wildgrass and Wild-Wheat were more challenging to inhibit and sometimes took over the grass, especially in sand/silt soil. Soil/Plant Nutrient Effect: •Growth was in large closed containers using loam potting soil so no contaminants. •Sand-Silt had very high levels of phosphates while loam soils had medium to high levels of nitrates; this may cause lower Oxygen levels (hypoxic danger <3ppm), causing the grasses and weeds to die within days. •Other nutrient tests on soils and plants did not have significant results. I have found an ally with allelotrophy. Several common hardy grasses, planted in loam, will help the “War on Weeds.”

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

In my project, I tested twelve people on easy Thai words, using the memory devices audio, visual, and keyword. I was trying to find out the effect of the memory technique you use on the amount of definitions you actually memorize. I made up my own keywords and made flash cards to show the word, and tested them after showing the definition, speaking the definition, or explaining the keyword to them. The audio had the most right answers, and then visual and keyword, in that order. These results were the complete opposite of what I originally thought, keywords was what I thought as most useful. This could be because of many of the people I tested used their own keywords for both the audio and the visual.

Word Count

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Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This experiment's purpose was to test iron's effect on two dinoflagellates in estuarine water. Specifically, two dinoflagellates were co-cultured in media with experimentally-varied iron enrichments, and survival and growth of both species were determined and compared. It was predicted that as iron increased, populations of both dinoflagellates would increase. The dinoflagellates were inoculated into media with different amounts of iron (0Fe, Fe/100, F/2), and cell counts were taken over 28 days. Samples were taken on day 4, 15, 24, and 28. The dinoflagellates were counted using a compound microscope and the data were analyzed using Multifactor ANOVA (StatGraphics Statistics Software). In the flasks with the 0Fe (no iron enrichment), Akashiwo Sanguinea stopped growing before day 24, while Prorocentrum minimum continued to grow. In the flask with Fe/100, (low iron enrichment), Akashiwo sanguinea growth was slowed and restricted to 250 cells/mL on day 24, while Prorocentrum minimum continued to grow past day 28 with the highest cell density of 3,800 cells/mL. In the flasks with F/2 iron (higher iron enrichment), both Akashiwo sanguinea and Prorocentrum minimum continued to grow to reach populations of 800 cells/mL and 4,783 cells/mL, respectively. The hypothesis was proven right for Akashiwo sanguinea; as iron increased, the population increased. In contrast, Prorocentrum minimum grew equally as well in low iron as in high, making this species a better competitor under iron-deficient conditions. This topic is significant because dinoflagellates, as important components of phytoplankton communities, can absorb carbon dioxide and release oxygen which may slow global warming.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Current ornithology research has included genetic drift quantification of bird subspecies, as well as genetic correlation between subspecies. Connections have been made across several bird subspecies. For this project, birdsong was tested to see if it could reliably predict a correlation between subspecies. In order to see if birdsong could correctly relate two subspecies based on geographic distance, the most common sign of differentiating genetic code, thirteen sound recordings spanning seven distinct subspecies of Pygmy Wren-Babbler (*Pnoepyga pusilla*) were analyzed as spectrographs and were sorted based on several features of each recording, including the frequency of each note, the number of notes, and the time between notes. Then, each of these features were measured against the distance separating the Pygmy Wren-Babbler subspecies (*annamensis*, *everetti*, *harterti*, *lepida*, *pusilla*, *rufa*, and *timorensis*). It was found that the variable with the largest correlation to geographic location was the average frequency of each sound recording, with a correlation coefficient of 0.6623. Possible extensions of this research project could include verifying this correlation with other bird subspecies, or using this correlation to quantify the genetic drift of bird subspecies.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

The objective of this project was to test the effect caffeine, in various forms, has on the growth of bean plants. To test this, water each plant with a different form of caffeine (a pill dissolved in water, coffee, tea, mountain dew, red bull, and coca-cola) each day. We also used a control, so we could see how the caffeine directly affected the growth. The results showed that using simply caffeine, tea, or coffee helped plant growth, but using too sugary or too caffeinated drinks killed the plants.

Word Count

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Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title: TACE Inhibitors As Non-Biological Drugs For Treating
Rheumatoid Arthritis

Student Name(s): A. Agarwal

Fair Category

Abstract:

The etiology of Rheumatoid Arthritis is unknown. However, increased amounts of TNF- α (Tumor necrosis factor-alpha) in the joints of RA patients led to the belief that it is an autoimmune disorder. An RA patient's body mistakenly assumes that bone and cartilage are foreign substances and attacks them by releasing cytokines and chemokines. These chemicals cause irreversible joint destruction, intense pain, progressive disability, and significant morbidity. Currently available anti-RA medications help only 50% of the patients and that too, only partially. I aimed to design orally available, non-biological anti-RA medications. I designed inhibitors of TNF- α converting enzyme (TACE), an enzyme responsible for converting inactive precursor of TNF- α into the active TNF- α . If appropriate drugs are designed then they will bind strongly with TACE, because drugs will optimally occupy the catalytic site of TACE. Next, pep:MMs:MIMIC was used and non-biological TACE inhibitors were designed by using TIMP-3 as template in the 3D structure of TACE bound with TIMP-3 (another protein). Subsequently, Schrodinger Suite of Software was used for calculating MMGBSA binding energy (dG) and top ranking twenty inhibitors were selected by the calculated dG. I found that calculated dG of top twenty TACE inhibitors was in the range of -77.89 to -106.25 kcal/mol. This result suggested significant reduction of TNF- α by these inhibitors. My project was successful in designing non-biological TACE inhibitors. Synthesis and testing of these inhibitors will potentially identify more effective RA medications possessing fewer side effects and that will help greater than 50% of patients for a longer period.

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:
2539

Student Name(s):

Fair Category

Abstract:

This project was designed to determine the LC50 rate of organic and standard detergents on blue mussels. Last year, as part of science class, I studied blue mussels and the estuarine system. During further research, I discovered that many animals in the ecosystem are poisoned every year by increasing amounts of laundry detergents entering freshwater systems through sewers. I have seen numerous advertisements for detergents that claim to be “safe,” and “eco-friendly”. These claims and the research conducted helped form a hypothesis to be tested. I wanted to know if “green” detergents really are safer than standard chemical detergents on mussels. Several concentrations of green and standard detergents were tested in this experiment. These concentrations included 0% (control), 6%, 15%, 60%, and 100%. Two blue mussels were placed in each of nine containers. Factors such as size and type of container, type and amount of water, temperature, and light were controlled. Observations were made of the mussels at regular intervals noting their condition. The first results occurred at hour fifteen disproving my hypothesis. The 6% green concentration killed the first mussel. The 6% standard did not kill any mussels during the course of the test. Many other similar tests have reported green detergents as being safer than standard detergents for marine organisms. The next steps would be to retest the experiment to see if the results stay the same and to test other brands.

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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Proj.
Num

Proj. Title:
Num

Student Name(s):

Fair Category

Word Count

Abstract:

Abstract: The purpose of this project was to determine the effects of different chemicals on skin. Since human skin was not available, flower petals were used as the surrogate tissue. Six different chemicals were tested on flower petals that represented skin. Each petal was dipped in the chemical and put it in a bag and over a nine day period. The chemicals tested were vitamin E, moisturizer, water, air, olive oil, and bleach. Water and air were the two controls. My hypothesis was that vitamin E would work the best, followed by moisturizer, olive oil, water, air and then bleach. However, the observations at the end of the period indicated Vitamin E, olive oil, water, air, moisturizer, and then bleach. My hypothesis was mostly correct; except for the moisturizer which was ranked surprisingly second to last.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

WHICH ECOSYSTEM HAS THE MOST LIFE Julian Driebeek
I did my project because I wanted to figure out which ecosystem in my yard had the most plants and animals. To find this out I counted all of the small invertebrates as well as the plants easily visible in four different square meter plots of land. I also moved a motion activated camera to the plot I observed and left it there for 24 hours. The amount of smaller animals stayed the same all day while many larger animals such as deer and opossums only appear at night and obviously are not in the same place all day, so I used the camera to record them. I predicted that if I counted the amount of animals in a wetland, grassland, deciduous forest, and coniferous forest, during the fall then the deciduous forest would have the most animals. I also predicted that if I counted the amount of plants in a square meter of four ecosystems then the grassland would have the most plants - not counting grass. I found that the deciduous forest had the largest average total of animals at 18 per day and the grassland had the most plants with an average total of 11 non-grass plants per day. It is important to know how many animals and plants live in just one square meter of the surface to know how much of an impact we have by doing simple things like stepping off a trail or picking flowers.

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Glioblastoma multiforme (GBM) carries an extremely poor prognosis. Current surgical resection methods result in low gross total resection rates, which lead to increased recurrence rates and reduced overall patient survival time. 5-Aminolevulinic acid (5-ALA) induced Fluorescence-Guided Resection (FGR) is currently viewed in Europe as a novel approach to surgical resection of GBM, although 5-ALA has yet to gain FDA approval in the United States. Although patients who undergo 5-ALA induced FGR are administered 5-ALA 2-4 hours prior to surgery, there is no definitive standard for the exact timing of preoperative administration of 5-ALA to ensure peak Protoporphyrin IX (PpIX) fluorescence during surgery. In our study, we incubated human U-87MG GBM cells with various concentrations of 5-ALA for 72 hours and measured PpIX fluorescence values at 8-hour intervals. Our data indicate that an initial significant increase in PpIX fluorescence does not occur until 48 hours after incubation and that PpIX fluorescence continues to increase at 72 hours after incubation, suggesting that a 2-4 hour window of preoperative 5-ALA administration is insufficient. Our results also suggest a range of 5-ALA concentrations that are both non-cytotoxic and result in significant PpIX fluorescence over time.

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Title:

Student Name(s):

Fair Category

Abstract:

Ocean acidification is an occurrence that is becoming more rampant. It is a phenomenon that can have drastic effects on the marine ecosystem, especially on shellfish. Carbon dioxide released by microbes in the ocean lowers the pH value of the ocean water, which limits the amount of carbonate ions that oyster larvae have to build their shells, causing stunted growth and death. The purpose of the experiment was to study the effects of ocean acidification on oyster larvae, particularly on the species *Crassostrea virginica*. Three buffers (sodium carbonate, calcium hydroxide, and sodium hydroxide) were used to buffer seawater to a pH of 8.0, a range ideal for oyster growth. The control was seawater at a pH of 7.6. Each buffer was made in triplicate for precision. Oysters are spawned and allowed to live in their perspective buffer or control for two weeks and samples were taken every other day when the water and food had to be changed. The oyster larvae mortality and measurements were recorded with each sampling and data was consolidated to determine whether a certain buffer(s) can be used to suppress larval mortality due to ocean acidification. At the end of the experiment, all three buffers used did not show abnormal mortality or stunted growth. These results signified that the three buffers could be used to correct the problem of ocean acidification. This project is a subset of a larger project being done.

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Fair Category

Abstract:

Protein Aggregation, particularly the formation of Amyloid Fibrils, is a poorly understood topic. Here, using protein aggregation software, as well as previous research, we identified the Aspartic Acid residue at the 126 position in CRABP as a potential gatekeeper regarding the formation of Amyloid Fibrils. We mutated the Aspartic Acid into a Glycine, a relatively inert amino acid. If the Aspartic Acid was a gatekeeper, the mutation to a simple, nonpolar, and unreactive amino acid like Glycine would remove the effect of the gatekeeper, and the mutated protein would have a higher aggregation propensity. We found that the mutated protein had a larger aggregation propensity than the Wild Type protein, suggesting that the D126 residue is an important gatekeeper. I would like to give many thanks to Lila Gierasch, Abhay Thakur, Colin Tinknell, and everyone else that helped me at the Gierasch Lab at UMass Amherst.

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:
3005

Student Name(s):

Fair Category

Word Count

Abstract:

Trigeminal Neuralgia (TN) is a debilitating neuropathic disorder characterized by severe episodic facial pain originating from the trigeminal nerve (V). Cyberknife Radiosurgery (CR) is a new image-guided robotic radiosurgical system that delivers high doses of radiation to a 6mm segment of the trigeminal nerve. The purpose of this project is to determine the effectiveness of CR on the treatment of TN. It is hypothesized that CR is highly effective in relieving pain with low incidences of facial numbness. Between October 2008 and April 2012, 39 patients with TN were treated with CR at Yale New Haven Hospital Saint Raphael Campus. All 39 patients with severe debilitating facial pain were treated with a maximal single dose of 60-70 Gray and evaluated after therapy. A retrospective review of the medical records was performed to determine the presence or absence of pain and facial numbness. Of the 39 patients treated with CR, 92% (36) (92%, 95% Confidence Interval (0.79130, 0.98385)) experienced pain relief with 46% (18) experiencing complete pain relief. 8% (3) experienced no pain relief. Most patients continued to experience pain relief between 13-17 months after treatments. Eight patients (20%) experienced mild residual facial numbness in the post-therapy setting. Median follow up period was 14 months. In conclusion, CR is highly effective in relieving pain in patients with TN. High rates of pain relief (92%) were obtained with this new non-invasive robotic radiosurgical system. Research will be continued to increase patient number and obtain objective long term follow up.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

As runoffs continued to pollute our ponds, lakes, and rivers, and destroy the ecosystems they contained, research revealed that phosphates as well as nitrates may be the cause of algal blooms which in turn deplete the oxygen supply of a body of water, resulting in an overall destruction of ecosystems. As a result the US banned the production of many household products, such as detergents that contained phosphates. Many people now claim that their laundry and dish detergent products are not as effective without phosphates, which is why I decided to test how the amount of phosphates in dish and laundry detergents affects the amount of algae grown. First, 1 $\frac{3}{4}$ cups of water was added to each of 15 small containers. Then a tablespoon of dish detergent containing phosphates was added to each of 3 of the 15 containers. This was repeated with the phosphate-free dish detergent, phosphate-free laundry detergent, and laundry detergent containing phosphates, leaving three containers with just water to be the control. After a week, there was a clear difference between the amount of algae grown in the laundry detergent with phosphates and the laundry detergent without phosphates. The difference was less clear between the dish detergent containing phosphates and the dish detergent without phosphates. The control group had grown a surprising amount of algae, even more than the detergent containing no phosphates. In conclusion, the addition of phosphates does in fact cause an increased amount of algae to grow across a range of different products.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Past in vivo studies have investigated the higher rates of embryonic implantation, pregnancy, and live birth and significantly higher amounts of macrophages and dendritic cells, levels of proinflammatory cytokines, and expression of TNF- α following the development of an endometrial biopsy-induced inflammatory reaction. To better understand this phenomenon, an in vitro model was created by wounding ECC1 (Endometrial epithelial-like cells) and HESC (human endometrial stromal cells) to mimic the biopsy and treating these cells with TNF- α , as well as treating monocytes with TNF- α conditioned media. The similar data shown from past in vivo and this in vitro experiment validates the suitability of this model as a research tool. The HESCs had the capacity to heal over 46 hours, but the ECC1 wounding experiment must be reassessed with fully healed cells. The increase of cytokines and chemokines in both treatment models implies that both help create a more receptive uterus. The expression of CD11c by TNF- α HESC treated immune cells could indicate that TNF- α helps monocytes differentiate into dendritic cells in the stroma. Further studies should focus on the role of TNF- α on this environment, the education of monocytes with additional treatment groups, and gene quantification of the cells through qPCR.

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CSEF Official Abstract and Certification

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Research has shown that high fructose corn syrup negatively affects learning and memory, and that blueberries help prevent memory loss. This experiment further explored these effects. In the experiments, the water of four groups of rats was manipulated. The control group received plain water, the second had a 5% high fructose solution, the third a 1% blueberry extract solution, and the fourth a combination of 5% high fructose solution and 1% blueberry extract. I also wanted to know if the affects were reversible. I hypothesized that after learning to alternate arms on a T-Maze, the high fructose group would take longer to complete it and would choose the wrong arm more frequently than the control group, blueberry group, and the combination group. In addition, the blueberry group would complete the maze quicker and more accurately than the other groups. An analysis of variance revealed significant differences in duration ($F(3,96)=13.6, p<.05$) and accuracy ($F(3,96)=3.7, p<.05$) between groups. When conducting planned comparisons between specific groups, there were significant differences in both duration and accuracy between High Fructose and Control, and between High Fructose and High Fructose plus Blueberry, but not between Control and Blueberry, or between Blueberry and High Fructose plus Blueberry. In summary, the rats ingesting high fructose corn syrup took a longer time to complete the maze and made more errors. This was not a genetic change: adding blueberry extract to the high fructose water reversed this effect. Blueberry alone did not increase speed or accuracy relative to plain water.

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Modern sustainable aquaculture methods are not environmentally and economically feasible; as a result, environmentally detrimental practices are favored. The sustainable concepts of integrated multitrophic aquaculture (IMTA) and ebb and flow (EF) aquaponic practices are combined in this experiment in order to fulfill the sustainable potential of aquaculture. In order to test the function of IMTA and EF aquaponics, the filtration potential of the hydroponic element and the nutrient supply ability of aquaculture systems were tested. Daily water quality testing and constant plant monitoring were performed upon a fully stocked EF hydroponic system filled with aquacultural effluent water. This system is compared to a control where EF techniques are not used and plants are grown in a foam platform, floating in an aquaculture rearing tank. EF aquaponic methods were found superior as 100% of germinations flowered fully where in the float-aquaponic system only 17% survived, as plants are properly aerated through EF. Nutrient uptake in the EF system reached peaks of 100% in nitrite, and 44% in nitrate absorption. This data indicates that not only could the untreated aquacultural effluent support a fully stocked hydroponic system as all plants grew and blossomed, but that the plants had the ability to reduce previously lethal nitrogen compound levels to sub-lethal levels for finfish culture. This experimentation affirmed the benefit of IMTA and EF aquaponics and led to the original design of a prototypical recirculating EF aquaponic system. The combination of IMTA and ebb and flow aquaponics is effective, showing sustainable aquaculture is possible.

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CSEF Official Abstract and Certification

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Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

To understand the complex and impressive power of ant communication, it is essential to study the operational principles of pheromones as one of the chief instruments of said communication. This experiment sought to pursue a possible correlation between the concentration of a pheromone and the duration of a reacting ant population. To do this, 5 specimen samples of *Pogonomyrmex barbatus* were placed in isolated enclosures and exposed to varying concentrations of the alarm pheromone Formic Acid. The alarm response time of these specimens was recorded from the time of the first specimen responding to the time of the last specimen returning to a "base" state as defined by prior observation of the specimens. The observations of this experimentation yielded very little consistency between specimen samples exposed to equal pheromone concentration. And thus, massive discrepancies exist in alarm response duration, and no clear correlation could be established, at least within the limited testing span of this experimentation. It can be proposed that there are other variables at play with ant reaction times, beyond the concentration of the pheromone stimuli.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3014

Student Name(s):

Fair Category

Word Count

Abstract:

Regulated intramembrane proteolysis is an important mechanism to control cell metabolism, differentiation and development in many organisms, from bacteria to humans. The enzymes responsible for this reaction are embedded within the membrane, which is puzzling because the membrane is hydrophobic, yet a proteolytic reaction requires water. Crystal structures of the rhomboid family of intramembrane proteases showed the membrane bilayer is constricted around the protein. In this research project, WinCoot, a graphics program, was used to study the atomic structure of the rhomboid protease GlpG, and to determine where the boundaries of the membrane bilayer fall, based on the hydrophilic and hydrophobic properties of amino acids located near the boundaries. Then, the program TableCurve 3-D was used to generate an approximate 3D model of the membrane bilayer. Results showed the bilayer around the protease had deviated from the ideal shape: the boundaries were no longer parallel to each other, and the membrane surface has irregular bumps. These unexpected features are potentially important for the mechanisms of intramembrane proteases.

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CSEF Official Abstract and Certification

Fair Category

Proj.
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Proj.
Num

Title: CAN PHYSARUM POLYCEPHALUM AGREE WITH THE EMERGENCY EXIT ROUTES OF GLASTONBURY HIGH

Student Name(s): D. Aranibar

Fair Category

Abstract:

Although slime molds such as the Physarum polycephalum are simply unicellular multinucleate organisms, their trait of externalized spatial memory to scavenge for food has made them a unique protist. Physarum polycephalum has been proven to find the ideal route from point A to point B in a maze. Emergency exit routes are essential for the safety of a school; this study was conducted to determine whether the plasmodium would copy the emergency evacuations routes for Glastonbury High School, testing their optimality. Point A (the starting point on the map) will be room B106, this will be marked by oats. The oats are food for the slime mold, therefore more oats will be placed at point B and point C (the main exit and the zone C exit). The effects of the plasmodium's scavenging method would first fill up the "hallways" (holes) of an 8" by 11" plastic map of the first floor of the school. Then the slime mold will retract and create a visible path of the optimal route to the nearest food supply. The process of the protist will be monitored at all times by a video camera. To analyze, the path made by the slime mold will be compared to the regulated emergency exit routes provided by the high school. A time lapse video of the plasmodium's process will be constructed from the video footage, this will provide the most accurate representation of its scavenging process. Results and conclusions are pending.

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:

Magic Salt is placed on roads to de-ice them and are said to be safe on vehicles, but there was never a mention of our environment. The chemicals sodium chloride and magnesium chloride are chemicals that are used in the Magic Salt. It is hypothesized that the grass on the side of the roads is possibly getting residual salt from the trucks. The focus of this was to see if the chemicals sodium chloride and magnesium chloride were harmful to plants, specifically grass. The research was completed using four trays of grass each sprayed with a different solution. One tray sprayed with sodium chloride, one with of magnesium chloride, one with sodium chloride and magnesium chloride combined, and one with distilled water. Each of the salts was added to water to make the 4 different solutions stated above. All except distilled water were 2% solutions and 20mL of each would be sprayed on the trays every day. This showed which chemical had a harsher effect on the grass rather than another. Results showed that the tray with the most prominent "death" was the sodium and magnesium chloride combination. This is important for towns to know that the chemicals that they are putting on the road are affecting the environment in a negative environment. Towns are worried about the vehicles being affected, but aren't realizing that the environment is being damaged, when it can be prevented by using safer chemicals.

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Student Name(s):

Fair Category

Word Count

Abstract:

In this experiment, one was testing the effects of various substances on the heart rate of the aquatic crustacean *Daphnia magna*. Although *D. Magna* are extremely small, and can therefore only be viewed under a microscope, they prove to be quite useful in pharmacological studies because they are completely transparent. Under a microscope, one can literally see their tiny heart beating. In order to measure their heart rate, one had to simply count the number of heart beats in 10 seconds, and then multiply the measured value by 6 to get the total beats per minute, BPM. *Daphnia* serve as an excellent model for human heart activity. Four substances were tested in the experiment, ethanol (C₂H₅OH), potassium chloride (KCl), Advil (C₁₃H₁₈O₂), and as a control, pure distilled water (H₂O). All substances other than the water were prepared or diluted as 1% solutions, and 30 trials were conducted for each of the four substances. To measure the heart rate of the *D. Magna*, one had to use a laboratory pipet to randomly remove a single *Daphnia* from their original container and place it onto a petri dish. When testing substances other than water, one also had to remove any water surrounding the *D. Magna*, then add a drop of concentrated solution before placing the dish under the microscope. Once data was gathered, it became easy to see how each of the three substances changed the heart rate of a daphnia. While the control experienced a heart rate between 172-192 BPM, the KCl proved to be a cardiac stimulant, raising the heart rate as high as 222 BPM. The ethanol served as a depressant for the daphnia, driving the heart rate to a range of 102-138 BPM. Finally, the concentrated Advil also served as a depressant, bringing down the heart rate to values between 132-162 BPM.

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Num

Title: The Investigation of Agar Quality Extracted from Gracilaria tikvahiae Applied to Biotechnology Industry Needs

Student Name(s): C. Heffern

Fair Category

Abstract:

Agar is a water soluble gel polysaccharide extracted from the cell walls of red seaweeds which is used as a culture medium for microorganisms, and more commonly as a food additive. The quality of agar extracted from the red seaweed Gracilaria tikvahiae grown under various conditions has limited research; therefore data obtained through this project can be applied in biotechnology labs where specific characteristics are required. The agar was extracted and compared between two growing conditions, G. tikvahiae grown indoors under sodium halide lights with a 12 hour L/D photoperiod and G. tikvahiae grown outdoors under natural conditions. The agar was extracted using a novel acetic acid technique to standardize all samples for testing. After the agar was extracted it was freeze dried and analyzed for agar yield per seaweed mass. The indoor samples demonstrated a higher agar yield/seaweed mass averaging 50.8% while the outdoor samples demonstrated a lower percent agar yield/seaweed mass averaging 25.2%. To determine gel characteristics the agar was reconstituted from a powder to a gel using a 1:20 g/ml agar to water ratio with an average temperature of 214°C. To determine melting point the agar was put into a water bath and the temperature was recorded when the gel denatured. The indoor samples showed a higher melting point averaging 49°C while the outdoor samples averaged 38°C. Gel strength data resulted with the indoor samples averaging 33g/cm² and outdoor samples 12g/cm². The data shows that the indoor agar provides the biotechnology industry a more versatile application range.

Word Count

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Title:

Student Name(s):

Fair Category

Abstract:

The early ecological changes that cause the splitting of bacterial species are often unknown. Therefore, we aim to study the most recently divergent, ecologically distinct populations of bacteria (“ecotypes”) to better understand the mechanisms of bacterial evolution. To this end, we analyzed bacteria previously sampled from a salt gradient in Death Valley, CA and demarcated them into putative ecotypes using sequence data from *gyrA*. The computer program we used was Ecotype Simulation. We sought to determine if salinity was the ecological parameter that caused the putative ecotypes to diverge. To do so, we tested the uppermost salinity tolerance of the ecotypes by growing several strains from each ecotype along an artificial, agar-based salinity gradient. We found that the putative ecotypes studied were not distinct in their salinity tolerance. There are two possible explanations for this result. One, that either there is a different, unknown factor that caused their divergence, or two, that the putative ecotypes found by Ecotype Simulation are not the correct putative ecotypes.

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Student Name(s):

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Word Count

Abstract:

In a time of growing concern surrounding environmental impact, and with a growing coastal population, being able to better understand our impact is of vital importance. This study aimed to examine the relative importance of human derived sounds in stressing our fragile coastal ecosystems. It was expected that higher frequency sounds, like SONAR, would produce more stress as it has been well documented in higher level marine mammals (Miller et.al. 2000). A striking gap in this literature exists, however, if we try to look at the effects on lower trophic levels that live in primarily coastal habitats more frequently traveled by humans. Examining stress resulting from high and low frequencies sounds on coastal marine invertebrates it was determined that both can have negative impacts, but higher frequency sounds produced a significantly greater impact on coastal crabs ($p < 0.05$). The importance of this study extends beyond the scope of just being able to understand our impacts on crabs. Coastal Zone Managers frequently are tasked with deciding how to manage our impact on these zones. If we can continue to increase not just our knowledge of human impacts, but which impacts are more important in relation to others, we can better arm these managers to make environmental decisions aimed at preserving our natural habitat for the long term. This will have lasting environmental, economical, and social significance.

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Student Name(s):

Fair Category

Word Count

Abstract:

Recent tragic events, including terrorist attacks and school shootings, underscore the importance of understanding the physiology of anger and developing methods to detect and reduce anger. The goal of this study was to identify physiological measures that can distinguish anger from other emotions. In work performed in collaboration with a team of laboratory researchers, analyses were performed for biometric measures, including pupillary dilatation, pulse, skin conductance response (SCR), electrocardiogram interbeat interval, abdominal respirations and motor activity. These were performed in thirty-two adults while they imagined personal experiences in which they felt angry, disgusted, sad, fearful and happy, and while they viewed scenes or heard sounds that evoke these emotions. Findings demonstrated that angry experiences were distinguished from other emotional experiences by higher SCR levels. SCR responses were also elevated when subjects viewed or heard angry stimuli, but were higher during imagining angry experiences, suggesting subjects did imagine angry experiences and that imagining personal angry experiences is more evocative than viewing less personal stimuli. A trend towards differences in interbeat interval recovery suggests further exploration of electrocardiograms may be promising. Finally, subjects' ratings of how angry they felt did not match SCR increases, suggesting they were not aware of their responses. These findings are an important step in understanding anger, identifying methods to detect it, and developing methods to prevent tragic events precipitated by anger.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title: "Good To The Last Beat..."

Student Name(s): M. Bandyopadhyay

Fair Category

Abstract:

Irregular heart rate can lead to cardiac problems such as Syncope, Arrhythmia, Ischemia or even Cardiac arrest. Humans are exposed to a wide variety of chemicals on a daily basis from beverages to medications, all of which in theory can affect heart function by altering the rate of signal transmission in the cardiac muscle cells. This experiment examines the effect of different types of chemicals on heart rate using Daphnia as an experimental model. Daphnia have transparent carapace, and this allows observation of its heart under the microscope. Daphnia were exposed to each particular chemical, placed under a compound microscope and their heart beat measured for one minute. The chemicals tested are as follows: Sprite™, Coke™, Red Bull™, vodka, Delsym Cough Suppressant™, and Children's Liquid Allergy Relief (CVS®). Pond water, the natural environment of Daphnia, was used as the control. When exposed to Delsym, a cough medication, the average heart rate of the Daphnia was 249 beats per minute, while the use of vodka resulted in an average heart rate of 153 beats per minute. Unlike in humans, caffeinated drinks acted as depressants for Daphnia, an effect previously reported by another group as well. This observation, was further supported by our observation that prolonged exposure of Daphnia to caffeine resulted in death of the organisms. Overall, the data shows that certain chemicals such as vodka and Delsym noticeably affect heart rate and therefore it seems reasonable to hypothesize that excess consumption of these chemicals may result in heart problems.

Word Count

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CSEF Official Abstract and Certification

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Student Name(s):

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Word Count

Abstract:

Natural antibiotics can play a vital role in our daily lives because they are capable of killing various pathogens with minor side effects than pharmaceutical antibiotics. The purpose of this experiment was to test which natural antibiotic between garlic, and onion would be most effective in fighting against E. Coli bacteria. The 2.5%, 5%, and 10% concentrations were made each for garlic and onion, including milk as a control. Then, these different concentrations of garlic and onion were added to the petri dishes, and the growth of bacteria was recorded after 48 hours of incubation. The number of colonies of bacteria was measured using a graph paper to determine the average growth of bacteria in each petri dish. The analysis of the data showed that as the concentration of the garlic and onion increased, the bacterial growth decreased. In contrast to onion, garlic inhibited the bacterial growth more than onion even with the same concentrations. Furthermore, onion had less bacterial growth than the control, demonstrating that it is an effective natural antibiotic against bacteria. Overall, the data supported the hypothesis, and garlic is verified to be exceptional antibiotic than onion. Garlic can be used as a paste for open wounds and other diseases. Further research continues to discover new properties of garlic. The research of garlic continues in the future about its effect on cancer because of the allyl sulfur compounds in garlic, which damage the cancerous cells due to its vulnerability to the stressors generated by cancerous cell division.

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Fair Category

Abstract:

Asthma is a chronic disease involving inflammation of the airways, characterized by variable airflow blockage. Previous studies conducted at the Yale Center For Asthma and Airway Disease suggest that chitinase-like-proteins may play a role in environmental factors leading to asthma. In this study, both asthmatics and non-asthmatics were evaluated concerning their asthma symptoms and severities, yielding a number out of 25 which reflects their asthma. Three dust samples were then taken from their houses, and were tested for chitinase activity through an assay developed through last year's research project. The two findings were analyzed through linear regression. The data from this study shows that there is a moderately strong positive correlation between chitinase enzyme activity and asthma symptom scores on the asthma ACT test. Statistics show that approximately 61% of the variance in chitinase activities can be explained by asthma, according to linear regression. These results lead to two conclusions. The first is that asthma symptoms and severity are highly correlated with chitinase activity. Though correlation does not necessarily indicate causation, it is seen that a high chitinase enzyme activity is directly linked to asthma.

Word Count

Special Categories Selected by Student:

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- 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:
3026

Student Name(s):

Fair Category

Word Count

Abstract:

Despite a 97% DNA sequence similarity between humans and chimps, humans have significantly more genomic disorders. My hypothesis is that clues to these genomic disorders can be found in the regions of the genomes that are diverged between these two species. The term “Genomic disorder” is typically used to describe gain or loss of a specific genomic location. Previous studies have shown that these locations are often adjacent to ‘DNA repeat sequences’ that are capable of forming atypical DNA structures. These structures can be in the form of cruciforms, hairpins, quadraplexes, loops etc. and can in turn facilitate complex genomic rearrangements leading to gain/loss of genomic segments. These rearrangements result in genomic aberration or abnormalities. In this research I identified a set of ‘unique DNA repeat sequences’ that facilitate the formation of atypical DNA structures. These ‘unique DNA repeats’ have specific positioning characteristics, i.e. clustering of direct repeats, inverted repeats or palindromic repeats that are essential for rearrangement events and are likely to be “abnormality/disease precursors”. Limited subsets of these DNA locations were examined in depth for this research [CHR 1,3,15 and 22]. Unexpectedly, the aforementioned ‘unique DNA repeat sequences’ not only show significant divergence between the human and chimp genome, but also distinctive clustering effect for the former making them more susceptible to rearrangements than the latter. A remarkable correlation was also observed between the location of these unique sequences, evolutionary divergences and breakpoints of several cataloged genomic disorders (e.g. Autism, mental retardation, congenital disorders). Consequently, the evolutionary pathway that gifted humans with such amazing cognitive abilities may be the root cause of several neurological disorders including Autism.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3027

Student Name(s):

Fair Category

Abstract:

The cell shape of any bacterium is essential to its function. Recent studies have shown that deletion of a group of peptidoglycan-synthetic enzymes called Penicillin Binding Proteins (PBPs) leads to a unique, "branching" morphology in E. coli, causing rod shaped cells to bifurcate into "Y"-shapes. The mechanisms governing the morphogenesis of these mutants, especially the role of the essential cell division protein, FtsZ, are not well understood. This study aimed to probe the morphogenesis of branching mutants, and also investigate how the process of chromosome segregation is affected. Through site-directed mutagenesis of 90 FtsZ surface amino acid residues, we isolated the 96th amino acid as the single FtsZ residue responsible for cell branching. Comparisons with branching in PBP deletion strains, and immunofluorescence microscopy of FtsZ and MreB in the FtsZ mutants, allowed us to propose a novel model pointing to the morphology being a result of the interaction of this residue with Low-Molecular-Weight PBPs to position the cytokinetic FtsZ Ring. Additionally, visualization of chromosome localization in the branching mutants through DAPI staining revealed an even pattern of segregation into both branch arms. Thus, we also proposed a model for chromosome segregation in these mutants. Ongoing and future experiments will involve mutant "rescue" experiments and more specific chromosome localization methods. Understanding the questions posed in this study and future work will provide key insight into the fundamental processes responsible for how bacterial cells control cell shape, as well as into chromosomal dynamics. Such work is promising for applications such as antibiotic drug development.

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:

The aim of this experiment was to test the effects of commercial and “home-made” insecticides on grass growth and appearance. The hypothesis was that certain insecticides will have a negative effect on the grass because of their chemical composition. The controls were water and Roundup. The insecticides tested were Sevin Liquid Concentrate, Apicide, Spectracide Commercial Wasp and Hornet Killer, WD-40, and distilled white vinegar. Each was tested on three containers of 7 cm tall grass; grass growth was measured over three weeks. Qualitative factors, including color and texture, were also observed. Grass treated with Sevin grew at about the same rate as grass treated with water. Grass treated with Apicide grew at a slightly faster rate than that treated with water. Remarkably, grass treated with Spectracide wilted slightly in the first week, did not grow nor wilt in the second week, and grew only slightly in the third week. Grass treated with WD-40 wilted, but at a slower rate than the grass treated with Roundup. Grass treated with vinegar wilted at about the same rate as that treated with Roundup. “Home-made” insecticides are worse for grass than commercial insecticides. The vinegar probably made grass die because of its acidity, and the petroleum base oil in WD-40 was probably the reason for grass death. Spectracide had a stunting effect on the grass, possibly because of its similarity to the oily WD-40. Apicide and Sevin did not have an adverse effect on grass, so perhaps Apicide and Sevin just had neutral components.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Current research concludes that cancer's mode of growth is via hijacking inflammation, a natural process through which injured tissues heal themselves. Most cancers exhibit mutations which cause them to actively release inflammation chemicals, making the immune system treat the cancers as damaged tissue in need of repair. Polyunsaturated fatty acids (PUFAs) have an effect on this process. Factors like Omega-6 that are pro-inflammatory can potentially incite cancerous growths. Factors like Omega-3 that are anti-inflammatory can potentially slow cancer's growth, and some research suggests that Omega-3 can actually induce apoptosis. I am testing breast cancer with the above two fatty acids to determine if heavier concentrations of the two chemicals can affect breast cancer growth rates. To do so, I split the breast cancer into three groups. One will be tested with Omega-3, one with Omega-6 and one was a control. I used media supplemented with 1% by volume of Omega-3, and though not enough time has passed to gather quantitative data, increased amounts of debris in the treated petri dish and significantly fewer cells suggests the Omega-3 is slowing the cancer's growth and causing apoptosis. Therefore, the concentration of Omega-3 in the media will be lowered to 0.1% to more closely simulate levels of Omega-3 in the body. The concentration of Omega-6 in the Omega-6 group will be 0.1% as well. Cells will be counted using a hemocytometer approximately every three days. This will be done for three weeks after which results will be tallied and conclusions drawn.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This project is determining whether the type of water affects bull shark behavior. It is seeing if there is a correlation between the type of water (fresh versus salt) and attacks from bull shark (*Carcharhinus leucas*) are fatal. A chi-square test for independence was performed on data was collected from a variety of different locations all over the world. The p-value was greater than 0.05, thus the null hypothesis could not be rejected and there is no correlation between the type of water in which the attack had occurred and whether or not there was a fatality. Therefore there is little to no correlation between whether or not the type of water affects bull shark behavior.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Abstract The purpose of my experiment was to find out which energy drink erodes the most calcium carbonate, also known as chalk. The teeth in our mouth are made up of calcium carbonate and so is chalk, so by soaking chalk in energy drinks I would find out the damage energy drinks cause to our teeth. My Hypothesis was that Rockstar Energy would erode the most chalk because it contains citric acid and citric acid removes the enamel from our teeth. To start my experiment I bought three energy drinks that are popular; Amp, Monster, and Rockstar Energy. I took 240 ml of each energy drink and poured it into beakers. This amount was chosen because it's the serving size for each energy drink. Each energy drink contained two trails. Then, I placed 1 chalk stick in each trial. Next, I labeled the beakers and covered of the beaker with plastic wrap to create an anaerobic environment. I tested each trial for seven days. In my results, I found out that my hypothesis was correct. The energy drink Amp eroded away 16% of the chalk, Monster eroded away 24-25% of the chalk, and Rockstar Energy eroded away 46-50% of the chalk. From this experiment I conclude that the citric acid in energy drinks erodes away calcium carbonate (chalk) within seven days. However, each energy drink has different effects on the eroded chalk and the chalk sticks. From this experiment I have learned that energy drinks are not good for our teeth.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3032

Student Name(s):

Fair Category

Word Count

Abstract:

Recent studies have indicated that the cisplatin-paclitaxel drug combination treatment is more effective than the commonly used carboplatin-paclitaxel treatment in combating ovarian cancer, but studies have also shown severe side effects resulting from the cisplatin treatment. There is a clinical need for a drug treatment that is both as effective as the cisplatin treatment, but has less severe side effects. The purpose of this study is to find such a drug treatment. The role of p53 in assisting ovarian cancer cells survive during chemotherapeutic drug treatment was investigated to fulfill this purpose. The chemotherapeutic drugs, cisplatin (Cis) and veliparib (PARP), were used in conjunction with the p53 inhibitor pifithrin-alpha (PFT). Clonogenic assay layouts were implemented to test the combinations. Using epithelial ovarian cancer cells with wild-type p53, the effectiveness of each drug alone in eliminating cancer cells was first tested (controls). Then, various combinations were tested. The double combinations of Cis+PFT and PARP+PFT required a high concentration of Cis to eliminate a high proportion of cancer cells. The synergistic triple drug combination of Cis+ PARP+PFT had the lowest effective dose of Cis. All combinations outperformed the single drug controls. P53 may have an apoptotic or a non-apoptotic role, depending on the nature of the cytotoxic stress. The triple drug treatment potentially possesses higher effectiveness and less severe side effects than the cisplatin-paclitaxel treatment. In vivo experimentation will be conducted to further assess the effectiveness of the triple combination. Carboplatin-paclitaxel and cisplatin-paclitaxel will also be included in future studies for comparison.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

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Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this investigation was to observe the effect of bovine serum albumin (BSA) on the quality and visibility of DNA bands after cleavage of Lambda Phage DNA with PstI, EcoRI, and HindIII restriction enzymes. It was hypothesized that the addition of increased amounts of BSA during the digestion of Lambda Phage DNA with PstI, EcoRI, and HindIII restriction enzymes would enhance the quality and visibility of the DNA bands after agarose gel electrophoresis. To establish a control run, 4 ul of Lambda Phage DNA, 5 ul of restriction buffer, and 1 ul of one restriction enzyme were added to four micro-test tubes. Tube one had an extra ul of restriction buffer added in place of a restriction enzyme for a control within the run. After the digestion protocol, loading dye was added to 10 ul of a DNA standard, and 10ul of each of the five tubes were pipetted into individual wells and run at 100V for 30 minutes. The gel was stained and rinsed until a light stain remained and DNA banding was visible. Process was repeated with the addition of varying amounts of BSA. Gels were dried and analyzed. At the conclusion of the experiment, the original hypothesis was not supported as the banding in the gels containing the BSA was not significantly enhanced in quality or visibility. The qualitative nature of the analysis may have impacted the results. Future studies may include analysis of results with finely tuned banding analysis software.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The Effect of Change in Training Method on Vertical Jump Height
Throughout the experiment, subjects will experience one of three different training regiments in order to evaluate which training method will increase vertical jump height most effectively. The three training methods are plyometric training, weight training, and complex training. Subjects will be assigned a number and will be recognized as a number during data collection and analysis. After the experiment, the subjects will randomly be assigned new numbers. Therefore, no one will know which number is which subject and this will maintain the confidentiality of each participant. Next, subjects will randomly be assigned a letter, A, B, or C, which is representative of which training method they will perform. For instance, A may represent plyometric training, B may represent weight training, and C may represent complex training. Before collecting data, each subject must complete background information on data chart. Before starting the experiment, the initial vertical jump height of the subjects will be tested and recorded. Then, after x amount of training sessions, the vertical jump height will be tested and recorded again. This data will then show the difference of initial and final vertical jump height of each subject. At this point, the effects of different training methods on vertical jump height will be known.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3036

Student Name(s):

Fair Category

Word Count

Abstract:

Upper arm prostheses are difficult to design. Upper arm prosthetists have endeavored to replace one of the most important tools of the human body, the hand. Artificial hands must be able to replicate simple functionality, such as torque, lift, and grasp. In recent years, different models of prosthetic hands have been developed. Prosthetists have argued over which prosthetic hand design is best. Three hands, the “Hosmer Hook,” “iLimb,” and “Stark Hand,” provided by the Yale University Grab Lab, were tested on six grasping abilities detailed in a study performed by Dr. Cutkosky at Stanford. Because the three tested hands couldn’t be used for further testing (due to patents), the researcher constructed a model hand: the “Addy Arm” (dedicated to mentor Dr. Nii Addy at Yale). Today’s prosthetic limbs are body operated. The researcher tested whether brain could draw enough voltage to power the Addy Arm. Electrical voltage required by the Addy Arm were compared with electroencephalography (EEG) recording of human hands. EEGs record the ionic current flows within the neurons via from electrodes. These EEG voltage fluctuations were recorded when human participants perform the same six grasping abilities (Cutkosky, Stanford). The Addy arm also performed these six grasping techniques, and the EEG machine recorded voltage fluctuations. Voltage fluctuations were compared to the voltages required by human hands. It was concluded that the human brain produced enough voltage to power the Addy Arm. The researcher began designing a device to control the Addy Arm via the brain.

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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 headwaters of Toll Gate Brook on Briggs Hill Road in Sherman, Connecticut feed into a pond. If a bentonite clay filtration system is used to filter the pond water, then the water will lack many of the pollutants and metals originally present because of the detoxifying and absorptive properties of bentonite. The purpose of this filtration system is to study the effectiveness of bentonite clay in purifying water. For the experiment, pond water was retrieved. 250 mL of pond water was poured into one vial. Then, 1/2 cup of bentonite clay powder was mixed with the remaining water. The mixture was left undisturbed for 12 hours. The clay, now hopefully containing metals and other impurities, precipitated out and collected at the bottom. 250 mL of this water was poured into a 5 micron filter with a hydrophobic exterior. The filtered water was put into another vial. The vials were tested at HydroTechnologies. They underwent optical emissions spectroscopy, a process in which nitrates, calcium, and magnesium were tested for by measuring wavelengths of emissions, which correspond to the particular wavelengths of the substances being tested. Ultimately, the filter had little effect on the levels of nitrates in the water. However, the bentonite sample decreased the levels of calcium and magnesium by 79.9% and 66.6% of the original concentrations, respectively. The bentonite filter was effective in supporting the hypothesis for absorbing calcium and magnesium. Further testing is necessary to determine how effective bentonite is at absorbing other substances within water.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: THE PRESENCE AND MAGNITUDE OF
MELANOMACROPHAGES IN THE LIVERS OF SHARKS

Student Name(s): D. Kehoe

Fair Category

Abstract:

As a top predator in the marine ecosystem, the shark biomagnifies and bioaccumulates a representation of the toxins found in its ecosystem. The melanomacrophages cells (MMC) have recently been considered reliable bioindicators of exposure to environmental toxins in fish. However, research on the implication of the presence of MMC in sharks is rudimentary. In this study, tissue samples of the liver, kidney, and gonads were taken from various adult sharks that had been caught in a local fishing tournament. For the portion of the study discussed in this paper, the liver cells of the sharks were used. Permanently mounted on glass slides, these liver tissues were examined under a microscope and analyzed using imaging software in order to find the area of each MMC found. The data will be statistically analyzed and then compared to data taken from years past. The results of this study will add to the archive of data monitoring the dynamics of bioindicators from the past fifteen years, relating to the health of the Western Atlantic Ocean. Results are pending.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3039

Student Name(s):

Fair Category

Word Count

Abstract:

Patients undergoing abdominal surgery often experience complications such as peritoneal adhesions and inflammation of the surrounding tissue. Occurrence of intra-abdominal adhesions ranges from 67 to 93% for general procedures, but increases up to 97% after gynecologic pelvic opening operations. Current methods of treatment are impractical for both patients and health care providers. This research investigates the application of a polyelectrolytic layer-by-layer assembled thin film that can be applied internally (post-operatively), to prevent adhesions and inflammation through the systematic dissolution of the film and incorporated medication over time. Initial experiments used the cationic polyelectrolyte poly (styrene sulfonate) and the anionic poly(allylamine) to create a film that remained on the underlying substrate. Degree of dissolution of the polymer matrix was analytically characterized via ATR-FTIR Spectroscopy, using the spectral fingerprint region from 650-1800 cm⁻¹. In addition, periodic SEM analysis of dissolution time-points verified that the entire polymer film dissolves into an aqueous medium in 48 hours. Cortisporin, an anti-inflammatory and anti-bacterial drug, was blended with poly(sodium 4-styrene sulfonate) at 2 mg/ml, prior to thin film assembly. The timely release of drug into an aqueous medium, and simultaneous dissolution of film, was modeled via FTIR. A new, substrate free film was created by assembling a poly(acrylic acid)/poly(4-vinylpyridiniummethanecarboxylate) sacrificial layer soluble in a 1M NaCl solution. Each experiment demonstrated that the films were capable of dissolution in an abdominal cavity like environment. Excess Cortisporin on the surface layer of the film enhances initial elution, where 36% of the drug was released into an aqueous medium in one hour. Following hour 1, drug eluted at 8.6% per hr, until all medication was released in 36 hours.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Num Title:

Student Name(s):

Fair Category

Abstract:

Multiple sclerosis (MS) is an autoimmune neurological disorder characterized by the demyelination of the neurons. A variety of genetic factors increase susceptibility. The major histocompatibility complex (MHC) region is a set of genes that codes for tissue compatibility. Previous studies have found that the human leukocyte antigen (HLA), the human version of the MHC, has specific alleles, such as the DRB1*1501 gene, that may increase susceptibility for autoimmune disorders, such as MS. The purpose of this analysis was to identify specific single nucleotide polymorphisms (SNPs) found in MS patients as opposed to healthy individuals that may lead to increased susceptibility to MS. After analyzing 475,806 SNPs in 7,018 individuals using the genomic data analysis tool PLINK (developed by MIT and Harvard), the data analysis found 203 SNPs with a statistically significant difference between allelic frequencies in cases and controls, resulting in a p-value less than 1×10^{-7} . These SNPs were all located on chromosome 6, where the MHC is located.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3041

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this project is to determine the effect of TAM receptors on the innate immune response to the Lyme disease spirochete, *Borrelia burgdorferi* (Bb). In in vivo studies, the TAM receptors (Tyro3, Axl, and Mer) have been found to have an inhibiting effect on inflammatory cytokine cascades, mostly affecting macrophages and dendritic cells (DCs). Studies show that lack of TAM receptors causes a decrease in the expression of suppressor of cytokine signaling (SOCS) cytokines. Thus, TAM receptors act as a controlling agent of the immune system. The project will explore whether TAM receptors dampen the innate immune response to Bb. It was hypothesized that TAM receptors will have an inhibiting effect on the innate immune response to Bb. The independent variables are the presence of TAM receptors Axl and Mer. The dependent variable is the level of socs mRNA expression. DCs and macrophages were stimulated with live Bb, Bb lysate, or poly:IC. The RNA of the cells was isolated and the mRNA levels of socs1 and socs3 measured by RT-PCR analysis. Results indicate that mouse macrophages and dendritic cells upregulate expression of socs1 and socs3 after stimulation. The absence of TAM receptors Axl and Mer resulted in impaired socs1 and socs3 expression. While both socs1 and socs3 are upregulated, socs3 expression may peak earlier than socs1 expression. Further exploration of this pathway will bring new understanding to the mechanism in which our bodies govern the innate immune system and inflammation.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3042

Student Name(s):

Fair Category

Word Count

Abstract:

Sanitation is essential to protecting our homes, schools, and workplaces against illness. However, many household and cleaning products often include harmful chemicals that cause health problems. Over the centuries, honey has shown its amazing antibacterial and antimicrobial properties. Experiments were conducted to explore which honey out of the five that were chosen- buckwheat, clover, bamboo, orange blossom, and wildflower- would exhibit the best antibacterial properties. The honey with the best antibacterial properties was then used to make a homemade cleaner that would be compared to another homemade cleaner made from tea tree oil. My hypothesis put forth that the honey with the best antibacterial properties would be the one that is the darkest in color- bamboo or buckwheat- because studies have found that dark-colored honeys tend to have better antioxidants than light-colored honeys. Six agar plates were inoculated by the bacteria, E.coli, and separated into four quadrants. Filtered paper disks were soaked in each of the honeys and the controls-water and propanol. The disks were placed in each quadrant according to their label and then incubated for 20 hours. The bamboo honey's average kill zone was 0.40 cm, whereas the rest of the honeys' kill zone ranged from 0.13 cm to 0.36 cm. My hypothesis was supported because the bamboo honey's kill zone was the largest. The tea tree oil and honey-based cleaners were tested against one another using bacteria from a bathroom sink. Clearly, the most effective homemade cleaner was the one made from bamboo honey.

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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 purpose of this experiment was to see which type of cone cell, green, blue, or red, in the human retina would fatigue the fastest. In order to complete this experiment a test subject was asked to stare at a green triangle for ten seconds. Afterward they glanced up at a whiteboard and the time it took for the afterimage to disappear was recorded. The size, color, and shape of the afterimage were also recorded. This was repeated again, but ten seconds was increased to twenty seconds. The time was increased by an interval of ten seconds each time until it reached fifty seconds. The entire procedure was repeated again using a blue triangle and then a red triangle. This was done with ten test subjects. The afterimage was used to indirectly determine the fatigue rate for each cone cell. The time it took for it to disappear was the fatigue rate. The blue cone cells fatigued the fastest with an overall average of 8.12s. The green cone cells' fatigue rate had an overall average of 8.93s. The blue cone cells could have fatigued faster, because the sky and ocean are a larger amount of blue that people see everyday than vegetation, which stimulates green cone cells. Lastly, the red cone cells had an overall average of 10.87s. It was expected that its average would be greatest, because red cone cells are not stimulated as often as the green or blue cone cells, because red is not seen as often.

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:
3044

Student Name(s):

Fair Category

Word Count

Abstract:

The function of telomeres (non-coding, protective DNA at the ends of chromosomes), has been widely studied in animal cells, but to only a limited extent in plants. Telomeric proteins help regulate the function of telomerase, which is responsible for extending the lengths of telomeres. Previous research has suggested that telomere length in maize may be influenced by genetic mutations. This experiment looked for differences between the telomere lengths of six different maize mutants and those of their wild-types. It was hypothesized that maize with Les6, Les12, and Zb8 mutations would have shorter telomeres than their wild-types because the mutants age faster, and that the maize with Sdw1, Na1, and Bv1 mutations would have longer telomeres than their wild-types because the mutants age slower. Tissue samples of maize leaves with mutations of Les6, Les12, Zb8, Sdw1, Na1, and Bv1, as well as their wild-types, were obtained. DNA was extracted from each sample and analyzed using a Southern blot to determine telomere lengths. As expected, Les6 and Les12 mutants have shorter telomeres than their wild-types and Na1 mutants have longer telomeres than theirs. However, the results for Zb8 and Bv1 mutants were opposite from the expectations. This data suggest that some of these genetic mutations in maize affect telomeric proteins. Greater knowledge of telomeric proteins may lead to finding a cure for cancer. Disabling telomeric proteins in cancer cells holds the potential of preventing cell immortality, so further research into variation of telomere length in plants and factors affecting length is needed.

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.
Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Macrophage migration inhibitory factor (MIF) is a cytokine with many functions in the regulation of inflammation. MIF recruits white blood cells to sites of inflammation and supports their survival. In addition, it interacts with Toll-like Receptor proteins, particularly TLR4, which is recognized by lipopolysaccharide. However, MIF has also been shown to inhibit the activity of the p53 tumor suppressor gene and loss of MIF function worsens the tumor phenotypes seen in p53-knockout mice. Based on its interaction with p53, we hypothesized that MIF may have a role in the response to DNA damage. We studied this by employing MIF-knockout mouse embryonic fibroblasts (MEFs). Unsynchronized MIF-knockout MEFs did not show a difference in growth rate as compared to wild-type MEFs. However, MIF- knockout cells showed increased sensitivity to ionizing radiation compared to wild-type cells. In addition, the induction of total and ser18-phosphorylated p53 after the induction of DNA double-strand breaks by ionizing radiation were defective in the MIF-knockout, compared to the wild-type MEFs. In contrast, MIF-knockout MEFs did not show increased sensitivity to hydroxyurea, which inhibits DNA replication forks by depleting nucleotide levels within the cell. Finally, our initial studies of the G2/M cell cycle checkpoint suggest abnormal checkpoint engagement. These findings suggest that MIF functions in the response to DNA damage, and that MIF may connect DNA damage response and inflammatory signaling pathways.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Finding and Analyzing Motifs Uniquely Expressed Upstream in *A. thaliana*: Intron-Mediated Enhancement Candidates

Student Name(s): M. Adler

Fair Category

Abstract:

The desire to manipulate the expression of favorable and unfavorable traits has led researchers to search for patterns in genetic sequences that enhance gene expression. In the 1990s, introns were found to be capable of enhancing gene expression in a phenomenon known as intron-mediated enhancement (IME). Studies have focused on finding specific motifs in introns that may be responsible for IME as well as using these motifs to create formulas that evaluate the capability that any intron has of enhancing gene expression. However, these studies have focused little attention on the capability of sequences in the 5' UTR to enhance gene expression. This investigation analyzes *Arabidopsis thaliana* for motifs in introns and 5' UTRs and finds the density of these motifs upstream and downstream of the transcription start site. Specific locations on genes that are motif-rich are found and plotted. These motif-rich locations were generally found in the 5' UTR and in introns within the first 1000 nucleotides of genes, which indicates that IME is a possibility. Future research should focus on the conservation of these motifs across different variants of *A. thaliana* and different species.

Word Count

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title: Investigation Into Synthetic Disc Designs And Resultant Failure Modes

Student Name(s): M. Seger

Fair Category

Word Count

Abstract:

Degenerative Disc Disease affects many people causing severe pain, which could potentially lead to surgery for artificial disc implantation. If these discs are crucial to functionality based on a human's anatomical composition, how durable are they until they fail? Using different force variables, how much pressure can a spinal disc withstand before it degenerates? In order to conduct this experiment, I had to create a model to test this idea. I made a model disc found in a human spine with few steps. I filled a water balloon and casted it between silicon caulk until it cured. Once the model was secured, I was able to place this model between to planks of wood that acts as two endplate that sandwich the disc. I will then apply different angles of pressure to each model until the water releases from the balloon. This determines the maximum amount of weight a disc can withstand based off of that weight variable. I observed that based on the angle of the force applied, the water was released from the nucleus of the model with different pressures. Since the spine doesn't move in just one single direction, I treated the independent variable as the specific angle or orientation the weight was applied on an "end plate" onto the actual disc. This experiment was very interactive with a good concept. I hope to indulge myself in neuro-orthopedics further and compose an artificial disc that has organic qualities so it acts more like a real spinal disc.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Over 3 million Americans are suffering from the debilitating, rheumatoid arthritis (RA). Current medications provide partial relief, for about 50% of patients, for about 5 years, and are associated with serious side effects, such as cancer. Therefore, rheumatoid arthritis is a significant, unmet medical need. The goal of this study was to create a novel treatment option for RA patients. An early step in the RA pathogenesis is accumulation of LTB₄ which leads to neutrophil influx, cytokine release and joint destruction. Leukotriene A₄-hydrolase (LTA₄H) catalyzes the last committed step in the biosynthesis of LTB₄, hydrolysis of LTA₄ into LTB₄. LTA₄H deficient mice were healthy and rheumatoid arthritis free. LTA₄H inhibition was also safe in humans suffering from atherosclerosis. I used Computer Aided Drug Design(CADD) to design novel LTA₄H inhibitors and estimate their potency. I designed a novel LTA₄H inhibitor by combining structural features of the known LTA₄H ligands, resveratrol and bestatin. Binding energies of LTA₄H with the designed inhibitor, resveratrol and bestatin were calculated to be -144.27, -55.05 and -53.99 kcal/mol, respectively. These binding energies indicate that the function of LTA₄H will be potently inhibited by the designed LTA₄H inhibitor and stop LTB₄ release early in the pathogenesis of RA.

Word Count

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Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3049

Student Name(s):

Fair Category

Word Count

Abstract:

Lionfish are known today as one of the most dangerous invasive species to invade the Atlantic East Coast and Caribbean Region. Their spread and growth in density is causing a significant impact to the current state of many marine ecosystems, especially that at Mahahual, a small reef off the coast of the Quintanna Roo State in Mexico. Lionfish studies are critically important and understanding their contributions to the state of the food webs in this region. Using 3D food web imaging software and the Ecopath V.6 model to simulate the reef conclusions can be made as to the current impact of lionfish on the fragile food web of the reef. Local data provided via the CINVESTAV database was used in a quantitative measurement of the lionfish impact through the various models. Findings thus far through the two models show an important correlation between decreased levels of strongly interacting species of the same trophic level and that of lower trophic levels. To fully grasp the gravity of this invasions models such as this are needed. The aim being to grasp the consequences of of biodiversity loss on ecosystem functioning.

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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:
3050

Student Name(s):

Fair Category

Word Count

Abstract:

Approximately three million individuals stutter in America. This study compares two articles describing results of stuttering treatment. To validate the data between the two studies used in research, they were compared resulting in a correlation of 0.731. The result was a good correlation between the articles, Long-Term Results of an Intensive Treatment Program for Adults and Adolescents Who Stutter 1994 (E. Boberg, D. Kully) and the Results of an Intensive Stuttering Therapy Program 1993 (M. Langevin, E. Boberg). These tests were used as a basis for general population of treatment in stuttering individuals. The study then analyzed data sets for (S-24) attitude towards stuttering, (PSI) self-perceptions, and (SESAS) self-confidence in, Results of an Intensive Stuttering Therapy Program 1993. This research compared patient self-evaluations to %SS to find possible correlation between S-24, PSI, SESAS, and success of treatment. It was found that S-24 and %SS correlated 0.622 (Pre) and 0.187 (Post). Correlation between PSI and %SS was 0.286 (Pre), 0.355 (Post). SESAS correlation with %SS had been found to be 0.137 (Pre), -0.304 (Post). This showed there was no significant correlation. This study contradicts previous results of Overall Assessment of Speaker's Experience of Stuttering (OASES) (J.S. Yaruss, R.W. Quesal). This article proposed an instrument for measuring impact of stuttering by assessing aspects in an individual's disorder. Due to little correlation between the above-mentioned parameters and success, self-assessments are unreliable. An assessment given to client's on feelings towards stuttering to judge if treatment success is therefore unnecessary.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Mental rotation tasks involve identifying objects presented from different angles. Previous research has used abstract shapes as stimuli and found that greater degrees of rotation produce lower accuracy and longer reaction times; people actually rotate the mental image until they find a match. After extensive literature search, no previous study was found to have examined whether these principles hold for human faces. The purpose of the research study is identifying whether the mental rotation of naturalistic human faces followed the same principles of the mental rotation of three-dimensional. The independent variable was the angle the target face was in, and the dependent variable the reaction time of participants and their accuracy in identifying the target face. Human faces were generated using the FaceGen program. For each target face, two foils were created, each 30% randomized. Beneath each target, sets of 3 faces (including the target) were presented in 7 orientations (full-face and 30, 60, & 90 degrees rotated, left or right). Participants (N=21) were instructed to identify the match in each of 350 computer generated trials as quickly as possible. Findings were consistent with other mental rotation tasks: the greater the degree of rotation, the lower the accuracy and the slower the reaction time. The only exception was for profile pictures, where accuracy was random.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title: Sustainable Enhancement of Plant Growth & Disease Reduction
Using Biochar Soil Additives

Student Name(s): Z. Gushe

Fair Category

Word Count

Abstract:

Sustainable plant growth agents that reduce the effects of disease, while being ecologically friendly, are desirable. Biochar, a solid charcoal-like material that forms by the pyrolysis of biomass, is attractive as a soil additive. It sequesters biomass carbon that would otherwise naturally degrade to greenhouse gases. This research provides experimental evidence that supports Biochar as a soil additive to improve soil function, while producing a net-negative CO₂ emission. The soil fertility & disease prevention characteristics of Biochar for tomato & eggplants were investigated. Best Energies (BE) & CT Charcoal (CC) biochars were separately added to the soil of healthy tomato & eggplant seedling specimens at 15g/kg soil (LO) & 30 g/kg (HI) soil concentrations. To mimic disease conditions, a portion of both eggplant & tomato spec. were inoculated (inc.) with *Verticillium dahliae*/*Fusarium oxysporum* respectively. Biochar's ability to enhance plant growth & remediate plant disease was evaluated for healthy & inc. spec. for 1 month, using periodic growth measurements & final biomass. Healthy spec. with HI conc. of CC grew up to 21% larger for eggplants, & 38.6% larger for tomato plants. HI conc. of BE provided less growth enhancement, with 8% & 16.7% improvement for eggplant & tomato, respectively. For inc. eggplant spec., addition of either Biochar offered little/no improvement in the growth condition, but for inc. tomato spec. with HI conc. Biochar soil additive were as much as 21.9% larger than normal healthy spec., providing direct evidence for disease suppression. Headspace & liquid-phase GC analysis of the Biochars reveal that both contain C₁-C₆ hydrocarbons & BE contains 2.68-23.68 ppm of over 16 PAH's that adversely affects its growth enhancement ability. Increased plant growth enhancement is realized with CC that is free of PAH's.

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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 exact mechanisms of intraorganismic communication of fungi and single-celled organisms remains unknown. This study aims to determine if electrical signals, in the form of propagating action potentials, play a role in communication within the single-celled plasmodial slime mold *Physarum polycephalum*. Without any organs, the slime mold can exhibit seemingly intelligent behavior, including finding the quickest path through a maze. The mechanisms behind this behavior could begin to be explained by determining whether there is electrical communication within the mold. Electrodes connected to a 16-channel amplifier were placed in cultures of the slime mold and the set-up was placed in a faraday cage to block external electrical activity. Action potential-like activity was found in all tests. When a stimulus was applied, in the form of an oatflake, the channels reading the majority of the potentials changed. Based on the results, it is likely that *P. polycephalum* uses action potentials to regulate contractions of its hyphae and that the potentials are responsive to some stimuli. Further study, however, is required to determine if the action potential-like activity is propagating across the slime mold.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3055

Student Name(s):

Fair Category

Word Count

Abstract:

The reason I wanted to conduct this experiment is because I wanted to find out if there is actual proof that paranormal activity exists. In order to do this, I needed to test some theories about when spirits are present. The two theories that I tested were the effect of paranormal activity on temperature, and its effect on electro-magnetic frequency (EMF). Due to prior research, I discovered that if the temperature was to drop within an area without any environmental causes, it might be sign of paranormal activity. If the EMF rating was to rise without any environmental causes, then it also may be a sign of paranormal activity. First, I chose my living room as a testing area and made sure the room temperature was at 70 degrees. The reason why I chose 70 degrees was because it would be easier to find a drop in temperature. Next, I placed a motion detector within the room. This way, if there was a spirit moving within the testing area, I could easily know. If there was, I would use my digital camera and take a few snap shots within the specific area. If I did find spirits appearing as orbs or something similar, I would then use my infrared thermometer to record the temperature. I would also use my Gauss Meter to record the EMF rating. I followed this procedure for five days, which included the controlled experiment, and was able to find evidence of paranormal activity by capturing pictures of orbs, noting drops in temperature, and finding a rise within the EMF ratings.

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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:

Xantusia vigilis is a species of lizard concentrated in southern California east of the Sierras and San Gabriel Mountains into Baja, California. It is a specimen that dwells primarily in desert areas. Due to this, its build is flat and long with a body length ranging from 1½ to 2¾ inches. Likewise, its tail is roughly the same length. The Principal Investigator of this study originally came across the left denarys of an extinct lizard that appeared to have been the predecessor of Xantusia vigilis. However upon closer inspection, it was noticed that the specimen had several distinct differences to the modern day version. This caused speculation over whether the specimen was an ancestor of the modern day Xantusia vigilis. The research objective was to determine if the specimen found is within the specie vigilis. This was determined by taking a series of twenty eight measurements of the left denarys of thirty specimens of Xantusia vigilis. Then using multivariate statistics, it was determined if the denarys of the extinct lizard was consistent with the specie vigilis. The morphometric statistical analyses showed that the fossils were in fact a part of a new species of Xantusiid. The fossilized denarys were found to be physically larger than vigilis. However, it was proportionately the same. This indicates vigilis was a product of natural selection and the fossilized denarys were a part of a stem Xantusiid. The fossilized specimen was named Xantusia neomexicana.

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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 my experiment was to test the affect of caffeine on different types of bacteria. Caffeine is considered to be a drug by the FDA and yet it is a common ingredient in over the counter medicines and more than 30% of people exceed 300mg a day. To test the effect, I used enterobacter aerogenes and ecoli as my bacteria and caffeine pills and red bull as my source of caffeine. My control was the bacteria with no caffeine and I also tested distilled water with bacteria. I found that caffeine does have antibacterial effects, but I do not know at what concentration because I was not able to fully dissolve my caffeine pills. In the future, I plan to run this experiment again, next time using many different types of bacteria and find a source of caffeine that will give me an exact concentration.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title: Solvent Extraction of Hydrocarbons and Hydrocarbon Derivatives
from *Lythrum salicaria* Seed Capsules

Student Name(s): A. Ma

Fair Category

Word Count

Abstract:

Invasive plants have the potential to be a cheaper source of biological compounds than traditional plants such as corn and sugarcane. If useful chemicals are discovered within invasive plants, the chemicals can provide an incentive for invasive plant remediation. Discovery of such compounds in *Lythrum salicaria* (Purple loosestrife) would be highly desirable as this plant is widely available and highly problematic. *Lythrum salicaria* is established throughout the continent, and annual control costs and forage losses in the United States amount to approximately \$50 million. The objective of this research is to obtain industrially applicable chemicals from *Lythrum salicaria* seed capsules using hexane solvent extraction. An energy-free process (Method 1) and an energy consuming process with grinding pretreatment and sonication during extraction (Method 2) were tested. The extract solutions were analyzed via GC-MS, and spectral data was compared with the NIST database for compound identification. The two extraction processes yielded hydrocarbons and hydrocarbon derivatives with significantly different chemical profiles. The extracted compounds in Method 1 had a carbon chain length range of C7-C29; Method 2 had a carbon chain length range of C13-C40. Due to the wide range of carbon chain lengths, different components of the extract could be used as a surrogate or additive for a variety of different fuels including gasoline, jet fuel, diesel, and kerosene. In Method 1, higher n-alkanes of carbon chain length 27 and 29 were detected. Higher n-alkanes of carbon chain length 17, 20, 28, and 40 were detected in Method 2. Such compounds could be applied as inexpensive and effective phase change materials (PCM's) for thermal energy storage. Oleamide, a potential hypnotic, was also obtained in both extraction methods. Extracted chemicals can be combusted collectively as a single biofuel mixture or separated for individual

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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:
3059

Student Name(s):

Fair Category

Word Count

Abstract:

A current problem in cancer drug delivery is that many drugs degrade and become invasive. One possible solution is to create a micro-particle drug carrier that is nontoxic and biodegradable. The purpose of this experiment is to create alginate micro-particles with optimum shape, stability and uniformity. If parameters including alginate and calcium chloride concentration, agitation, voltage, and flow rate were tested, then voltage will most affect micro-particle shape. Low viscosity alginate was mixed with deionized water and brilliant blue dye to create the micro-particle. Calcium chloride was mixed with water to form 50 mL homogeneous solution with varying concentrations and put in an encapsulator dish. A syringe with 5 mL of alginate solution was attached to a rubber tube connected to the micro-particle encapsulator. Multiple parameters were tested and the resulting micro-particle diameters were recorded. Results showed that increased alginate concentration produced denser, more stable particles; increased calcium concentration fluctuated the diameter size of particles; increased agitation produced amorphous particles; and increased voltage and flow rate produced smaller particles. Further experimentation was done where alginate particles were created with a target size by adjusting all the parameters. The different target diameters were 100 um, 150 um, 450 um, and 500 um. The creation of the hydrogel particles have a wide range of applications. The particles can be used to form a simple and efficient method for drug delivery and controlled release for biomolecules like proteins, vaccines, enzymes, and hormones.

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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:
3060

Student Name(s):

Fair Category

Abstract:

This experiment supported the hypothesis that tryptophan can be extracted from egg whites using an aqueous biphasic solution. Tryptophan is an important amino acid that is used when making serotonin, a neurotransmitter. It is found in many foods, such as chicken, milk, and eggs. As the most non-polar of the aromatic amino acids, it is extremely difficult to extract. Earlier extraction methods have used VOCs, volatile organic compounds. An aqueous biphasic solution (or ABS,) is much less environmentally harmful. In this experiment, egg whites were first dissolved in water. Trypsin and chymotrypsin from a bovine pancreas were added to denature the proteins. The samples were filtered, and a solution of K₃PO₄, [C₆min]Cl, and H₂O was added. This broke apart the hydrophobic and hydrophilic parts of the tryptophan, the benzyl group and the carboxyl group. This hydrophobic ionic liquid (IL,) also helped in creating an ABS. When water was added to the samples in drop-wise additions, this phase was formed so that the tryptophan was extracted and found at the interphase of the two layers. The top layer, which contained the highest concentration of tryptophan, was tested for absorbance at 290 nm using a UV/VIS spectrometer, as tryptophan absorbs light at 290 nm. A control was conducted, which tested the extraction of tryptophan from solution in water. A “double control” was also conducted, which included only the IL in a solution of water. The qualitative numeric results supported the hypothesis that tryptophan can be extracted from egg whites using an ABS.

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

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:

This project was designed to see the effect of different lighting situations on mushroom coral, Rhodactis sp. and the symbiotic relationship it has with zooxanthellae, known as algae. The specimen were split into three test groups, all under different levels of light, measured in Photosynthetic Photon Flux Density (PPFD). 300, 600 (control), and 900 PPFD were used. Each week, the coral's zooxanthellae content was counted on medium power (40X magnification) power. After 10 weeks of repetition for each group, the data was compiled, and it showed that the standard lighting (600 PPFD) was the most successful environment for the relationship to thrive.

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:
3062

Student Name(s):

Fair Category

Word Count

Abstract:

Listeria monocytogenes (Lm) is a bacterium that causes listeriosis. Infection with Listeria is generally through ingestion of contaminated food and has a high mortality rate. Previous work has suggested that cytotoxic CD8 T cells are responsible for protection against Lm infection. However, in a mouse model of oral Lm infection, we identified a population of protective $\gamma\delta$ T cells in the intestinal mucosal tissues. $\gamma\delta$ T cells are an enigmatic lymphocyte population whose ability to recognize foreign antigens has been difficult to study. Since the precise mechanism of $\gamma\delta$ T cell activation has remained elusive, this study investigated the antigen presenting cells (APCs) in the mesenteric lymph node (mLN) that are responsible for activating $\gamma\delta$ T cells following oral Lm infection. Using confocal microscopy, we showed that APCs known to harbor Lm, such as dendritic cells (DCs, CD11c+), inflammatory monocytes (Gr1+ Ly6G-), and granulocytes (Ly6G+), can interact with $\gamma\delta$ T cells within the mLNs following oral Lm challenge infection. Moreover, using purified APCs to stimulate Lm-induced $\gamma\delta$ T cells in vitro, we found that DCs induced higher levels of interleukin-17A (IL-17A) and interferon-gamma (IFN- γ) expression on Lm-induced $\gamma\delta$ T cells when compared to inflammatory monocytes and granulocytes. Thus, the results of these studies indicated that while multiple cell types appear to interact with $\gamma\delta$ T cells, DCs are primarily responsible for initiating the $\gamma\delta$ T cell response following oral Lm infection.

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:

The process of wound healing can be divided into the inflammatory phase, the proliferative phase, and the remodeling phase. Prolonged length of the initial phase increases the likelihood of infection, however recent studies have pointed to the healing properties of the Fibroblast Growth Factor 10 (FGF-10) and Chondroitin Sulfate (CS) as a means to accelerate wound healing. FGF-10 is produced naturally and is dispatched to a wound site, where chondroitin sulfate acts to stabilize and improve its function. *Candida albicans* (CA) are fungal pathogens that are causal agents of infection in humans. CA infections have become a major health concern. The rate of infection for those with weakened immune systems has increased, where more than 15% of those individuals have superficial infections of the skin or mucous membranes. Current treatments for Candidiasis are limited to the use of orally administered antimycotics that include Flucanazole (FLUC), however adverse drug reactions are of concern. This research focuses on creating an alternate path for the delivery of FLUC directly to the wound site, with simultaneous delivery of CS to promote FGF-10 function. An innovative wound dressing was created that included effective concentrations of FLUC and CS. A novel elution methodology was devised to measure time-release of these wound-healing agents into an aqueous medium. A fluorescently tagged analog of CS, Chondroitin Sulfate-Rhodamine, was used to facilitate luminescent detection of the FGF-10 promoter. Results indicate that the maximum rate of FLUC and CS elution from the wound dressing occurs in the first hour of application (127 $\mu\text{g/hr}$ & 0.62 mg/hr, respectively), where more than 60% of each active ingredient is time-released during a time that is most critical in the wound healing process. The remaining FLUC & CS-R are delivered after 10 hours, after which time the dressing should be replaced.

Word Count

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
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Proj.
Num

Title: An Analysis of Hemocyanin Content of Atlantic Horseshoe Crabs (Limulus polyphemus) Prior to Hemolymph Extraction In Order To

Student Name(s): I. Mansour

Fair Category

Abstract:

The mortality percentage of Atlantic Horseshoe Crabs, *Limulus polyphemus* (HSCs), collected for *Limulus* Amebocyte Lysate (LAL) production is approximately 15%. Standard individual hemolymph extraction for LAL production is 30% of individual total hemolymph volume. This study investigates HSC vivacity after standard hemolymph extraction as a function of initial hemocyanin concentrations (HC) to reduce mortality by developing a candidacy protocol. Two groups of HSCs were established; experimental, which experienced standard hemolymph extraction, and control, which did not. Baseline hemolymph samples were collected from all HSCs. Subsequently, experimental HSCs experienced standard hemolymph extraction. Samples were collected again from control HSCs 15 minutes after the initial bleeding, and from experimental HSCs 15 minutes after large-volume extraction. 3 days after the initial bleeding, samples were collected from all HSCs. Samples were centrifuged immediately after collection in 4 degree Celsius containment tubes, diluted in 1M Tris-HCL pH 7.5, and analyzed with a UV/VIS spectrophotometer. From the experimental group; the differences between initial HC and HC 3 days after 30% hemolymph extraction are: 14.58273 mg/mL, 20.34532 mg/mL, 22.14173 mg/mL, 19.33022 mg/mL, 10.62878 mg/mL, and 14.09424 mg/mL respectively. The model $HR = 1.0797HI - 22.172 (\pm 5 \text{ mg/mL})$ illustrates how initial hemocyanin concentration (HI) can be used to predict hemocyanin concentration 3 days after 30% hemolymph extraction (HR), indicating organism health. The absence of mortalities indicates that HSCs with an initial hemocyanin concentration of 37.76 mg/mL or higher are expected to survive the extraction process. This novel candidacy assay will reduce HSC mortalities due to LAL production, preserving the species as a sustainable

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3066

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this study is to determine the relationships between Alzheimer's disease CSF biomarkers and PET in a cohort of cognitively normal middle-aged and elderly individuals. Data was analyzed from 42 subjects. This data included CSF levels of amyloid-beta 42 (A β 42), total tau, and tau phosphorylated at threonine 181, as well as PIB and FDG-PET. It was determined that levels of CSF A β 42 had an inverse correlation with PIB-PET. PIB-PET had a positive relationship with the ratios of CSF tau/A β 42 and CSF p-tau181/A β 42. Abnormal t-tau corresponded with increased PIB uptake in the MTL, and decreased FDG in the hippocampus and amygdala. This study offers insight into the earliest stages of the progression of AD, and the role these biomarkers play in healthy aging.

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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 well understood how bacteria develop resistance to antibiotics, however how they react to biocides is less studied. Biocides, like antibiotics aim to kill bacteria but are less specific. They usually employ general mechanisms to destroy cell walls. It seems possible that bacteria exposed to biocides at low concentrations can develop resistance to biocides. In this experiment bacteria were exposed to various low concentrations of biocides. Surviving bacteria were re-cultured and re-exposed. The results show a trend of E. coli surviving at increasingly higher concentrations of biocides. However, more detailed experiments need to be performed to confirm these conclusions. This research applies to the lives of many people because the disinfectants being used are found in the typical household. If bacteria do develop resistance, it could lead to the evolution of new resistant strains of bacteria, new infections, and the need to develop new disinfectants.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Small robots have many useful applications ranging from emergency scenarios to espionage, since they are quite capable of entering small spaces equipped with sensors and remain relatively undetected. Harnessing the natural biology of an insect could provide an alternative to designing small robots. The purpose of this research is to develop a controlling circuit that can be mounted onto a live *Blaberus discoidalis*. The neurosensory system in a cockroach consists of two major inputs: The antennae at the front of the insect provide tactile feedback on the presence of obstacles and/or predators, while the cerci at the rear are extremely sensitive to any motion and will induce a flight response. By stimulating the antennae, the insect assumes an obstacle to exist and moves to evade it. This stimulation of the antenna was used to electrically induce the insect to turn via the controller. The controller used an Arduino Pro Micro and was initially prototyped and programmed outside of its application environment to ensure circuit functionality. The program was written in the Arduino programming language, a variant of C++ specific to the Arduino family of circuit boards. The completed circuit was fitted to the live insect, and stimulation of the antennae successfully effected the desired direction of movement. A 55 Hz pulse to the left antenna resulted in a right turn, and to the right antenna in a left turn. When the pulse was applied for 5.00 seconds, an approximate 80-900 turn was completed.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

The world's coral reef ecosystems represent areas of impressive diversity and yet are in danger due to many environmental factors, including collecting by the marine aquarium trade. Aquaculture represents a possible way to alleviate this pressure. It has been suggested that low electrical currents may speed growth in coral. This experiment was designed to test the influence of electric current on the growth rate of *Leptosiris*, a stony coral, selected due to its quick growth. Two connected aquaria were used, each with a steel strip running through them and multiple coral specimens of similar size. One set of corals was placed in the tank and on the strip with current running through it; the other had similar corals, on and off the strip, but no current running through it. Photographs were taken and ImageJ was used to measure the area of each individual coral to assess growth.

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:

Stress is a prevailing health concern for society, especially among adolescents. This project questions whether or not stress in teenagers has increased over the past decades and searches for stressors. Adolescents who use excessive amounts of technology will suffer higher stress levels because the time spent on technology could be used to reduce other stressors and create a well-balanced lifestyle. To test this hypothesis, surveys were distributed to teenagers ages 14-18 and adults 45 and over. The survey asked participants to record how much time in hours they spent on certain daily activities, such as sleeping and on technology, and how much stress they felt they experienced during each activity, 1 being the lowest amount experienced and 10 being the highest. Adults were asked to respond to the questions using their time as adolescents as reference. In addition, a discussion group was held to gather qualitative observations. After analysis, school-work proved to be the most stressful activity, in both past and present generations. Overall, adolescents today are more stressed about daily activities than those from the past. However, teenagers today spend much less time on schoolwork and other activities in comparison to past generations. Adolescents today also spend a greater amount of time on technology than past generations have. The hypothesis is proven because time spent on technology is detracting from time spent on homework and other stressors, therefore inducing stress due to poor time management. If time spent on technology is reduced, stress will most likely decrease.

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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

Word Count

Abstract:

The Emerald Ash Borer (EAB) is an invasive species of beetle that kills ash trees by burrowing under the bark. EAB have been found in 16 different states including CT, causing billions of dollars in damage and severe ecological problems. Currently, the only method of control is to use environmentally dangerous chemical insecticides. In order to find a more environmentally sound control strategy, entomopathogenic fungal spores and nematodes were used in an approach targeting both adult and larval EAB. Adult EAB were exposed to increasing concentrations of fungal spores, and mortality was measured after 8 days. In addition, infested ash logs were treated with entomopathogenic nematodes. Although unable to show effectiveness with nematodes, treatment with fungal spores showed a dose dependent decrease in survival of adult EAB compared to an insecticide used as a positive control. These results demonstrate a promising biological control method that is safe for the environment.

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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

Word Count

Abstract:

Many houses each year are flooded. These floods containing nasty materials can damage your floor. Hardie Backer makes a cement board that claims to be mildew resistant. If this is true it could save thousands of homeowners the hassle of replacing their floorboards after a flood. WonderBoard is a competing brand. And of course there is the option of applying a Spray or sealer to your floorboards before hand. I examined which option is most cost effective when picking your floorboard in a flood prone area. I collected 27 gallons of water and mud from the Connecticut River after it flooded and placed it in a 54-gallon container. I then placed in it 12 boards, each different. I used the two cement boards as well as a control, which was the plywood. There were 4 of each of these boards, one with no applicants, one sprayed with mold control, one sealed with mold resistant primer, and one with both applied. I then placed them and inch under the water for 24 hours, I then let some of the water drain out so that the water sat an inch below the floorboards. I observed the floorboards for six days. On the sixth day I then washed with bleach. I found that the only thing that after being washed, all the mud came off and there was no mold visible. Based on these results I know that paying the extra money for the Hardie Backer and the applicators is not worth it.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Temporal lobe epilepsy and neuronal heterotopia in Brodmann area 20: A quantitative analysis

Student Name(s): J. Joo

Fair Category

Abstract:

Neuronal heterotopia is commonly found among patients suffering from temporal lobe epilepsy, and is believed to be a source of epileptic seizures. However, previous research has obtained conflicting findings on the significance of these heterotopic cells. In an attempt to better establish the correlation between neuronal heterotopia and epilepsy, a quantitative study of Cajal-Retzius cells in the molecular layer and heterotopic neurons in the subcortical white matter of Brodmann area 20 was performed. Our study aimed to improve upon previous research by establishing definite, statistical significance with the largest number of cases studied to date (71 epilepsy, 31 control), as well as investigating novel relationships in a specific region of the temporal lobe (Brodmann area 20). Neuronal densities were recorded from epileptic and nonepileptic brains, after which the data were subjected to statistical tests. Our results confirmed the presence of a statistically significant difference ($p < .0001$) between neuronal densities of epileptic cases and controls, as well as limited relationships in other factors such as age and gender. Because of these abnormally high neuronal counts among epileptics, it is evident that heterotopic neurons may play an important role in epileptogenesis. This project therefore provides vital insight into the origin of epileptic seizures and establishes a path to the development of drugs or surgical procedures that may potentially reduce the prevalence of epilepsy through the treatment of neuronal heterotopia.

Word Count

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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. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of my project was to see how effectively different hand sanitizers killed the bacteria staphylococcus epidermidis. This was done by making agar plates in petri dishes, and then administering the bacteria into each of the plates using a steril transformation technique. I administered the bacteria for twenty-one plates. One plate was used for a control: water, one to just grow the bacteria, and three plates were used for each hand sanitizer which were Germ-X, Purell, Smart and Silky sanitizer, TopCare foaming hand sanitizer, and a scented hand sanitizer from PocketBac. Each petri dish was cut into quadrants, and a disc soaked from each sanitizer was placed into each of the quadrants. I wasn't able to collect much data only in the first trial the bacteria produced well enough. Also, only Topcare, a liquid hand sanitizer, produced any numeric data, by killing bacteria approximately 1 cm around the disc. The rest of the hand sanitizers had no effect on the bacteria, which I think was because they are in plasma form; and unable to spread around the disc. Also, in the next two trials, the bacteria didn't grow at all, or grew a lot and turned yellow which were signs of contamination. In conclusion, my experiment found that Topcare is effective at killing staphylococcus epidermidis, but there was no other data found.

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: Soluble Adenylyl Cyclase (sAC) Suppresses Cancer Development
by Enforcing Contact Inhibition

Student Name(s): F. Buck

Fair Category

Word Count

Abstract:

Malignant cancer cells have four properties distinguishing them from normal cells. Cancer cells: (1) are immortalized, (2) usually, grow at a faster rate than normal cells, (3) are not contact inhibited, and (4) can metastasize. Soluble Adenylyl Cyclase (sAC) is one of nature's CO₂ sensors and sAC antibodies are used to diagnose melanomas. My research seeks to determine whether sAC is involved in cancer development and if so, what its specific role is. Several methods, such as charting cell growth, staining cells with Trypan Blue and growing cells in semi-solid agarose, were used to study the growth properties of different fibroblast cell lines obtained from wild-type mice with sAC and knockout mice missing sAC. Fibroblasts normally grow as adherent cells and stop growing when a monolayer of cells becomes confluent. My research demonstrates that sAC knockout cells and wild-type cells initially grow at the same growth rate. However, when sAC knockout cells reach confluence, they do not stop growing but rather begin clustering on top of one another to form 'plaques'. Over time, these three-dimensional cell colonies will develop into big visible tumors, and thus into cancer. This is contrary to the wild-type cells, which, upon reaching contact, stop growing. The results of this research demonstrate that sAC knockout cells lack contact inhibition, a crucial aspect of cancer development. Contact inhibited cells cannot form tumors or metastasize. My data indicates that soluble Adenylyl Cyclase (sAC) suppresses tumor formation by enforcing cell contact inhibition.

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:
3077

Student Name(s):

Fair Category

Word Count

Abstract:

Warfarin and clopidogrel are widely prescribed anticoagulant and antiplatelet agents, respectively, which have been intensely studied in the field of cardiovascular pharmacogenomics due to known variability in patient responses. Although genes and variants have been previously implicated in both warfarin (e.g., CYP2C9 and VKORC1) and clopidogrel (e.g., CYP2C19) response variability, a significant amount of the variability is still unexplained. To identify additional genes and variants associated with warfarin and/or clopidogrel response, six candidate variants previously implicated in either warfarin or clopidogrel response in specific patient populations are being genotyped across diverse multiethnic patients from the New York metropolitan area. Specifically, two variants in the calumenin (CALU) gene and the cytochrome P450-2C (CYP2C) region were genotyped in 178 compliant multiethnic patients treated with warfarin, and six variants in the platelet endothelial aggregation receptor 1 (PEAR1), ATP-binding cassette, sub-family B (ABCB1), and carboxylesterase 1 (CES1) genes were genotyped in 465 multiethnic acute coronary syndrome patients treated with clopidogrel, all at the Mount Sinai Medical Center. Genotyping is being accomplished by commercially available TaqMan® assays and novel PCR-restriction fragment length polymorphism (PCR-RFLP) assays, and association with relevant phenotypes by multivariable regression analyses. Selected DNA samples were also confirmed by Sanger sequencing. Given that these candidate variants have only been previously studied in largely homogenous patient populations, results from this ongoing study will help guide the implementation of appropriate pharmacogenetic variants into cardiovascular practice for more effective care in the general population.

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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

Abstract:

This engineering experiment is inspired to help facilitate the use of RC remote controls. It challenges the idea of a standard, two-handed held, remote control by allowing it to be maneuvered with a simple touch of fingers with a single hand. This is an advancement to allow children, as well as adults, with disabilities like Hemiplegia, muscular dystrophy, and an arm amputation as well as give well capable people, children and adults, the facilitation of controlling an RC more freely. This Design allows the user to maneuver it with comfort due to the placement of each piece of the Remote control. Also, due to it's rechargeable property the owner will not have to go through the struggle of constant changing of batteries. This design only requires a simple motion of fingers to operate (thumb, index, middle, and ring finger).

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Proj. Title:

Proj. Num

Student Name(s):

Fair Category

Abstract:

In this experiment the effect of nitrates in fertilizer was tested to see its affects on dissolved oxygen levels and algae growth in water. To do this particular experiment, which lasted a time span of 4 weeks, 8 containers had to be filled with equal amounts of water and algae. There was also 4 different groups (two containers per group), which had their own amounts of fertilizer in each. The control group had no fertilizer added; group A had 0.5 grams added, group B had 1.0 grams added, and finally group C had 1.5 grams added. All 8 containers were then put in a room with constant temperature and with a constant light source. Twice a week, the levels of dissolved oxygen and nitrogen would be measured using a dissolved oxygen probe and nitrogen probe. After taking those measurements, the algae would then be looked at under a microscope in order to examine of the field count. To take the field count measurements, drops of liquid from each container would be put on separate slides and the green algae would be counted individually under the microscope. All measurements collected at the end would help to find the trend that dissolved oxygen and nitrogen increased in every container and so did algae growth. The final results of the experiment allowed any researcher to see that fertilizer runoff can be a tremendous issue, especially after large rains because it can get into the local water systems and affect any wildlife within it.

Word Count

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CSEF Official Abstract and Certification

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Proj.
Num

Proj.
Num

Title: A Novel Design for the Integration of a Microbial Desalination Cell in a Microbial Fuel Cell for the Production of Energy and

Student Name(s): A. Ahmed

Fair Category

Abstract:

The search for renewable energy has been driven by the diminishing supply of fossil fuels. On-going research is required to determine cost-effective sources of energy. More recently, microbial fuel cells have become a viable option. A MFC apparatus can generate an electrical current from microorganisms. Nine microbial fuel cells were constructed with a novel design in order to test the effectiveness of 3 different sized electrodes: 5cm², 6cm², and 7 cm². A salt-water solution was placed in the cathodic chamber, leaving the anode with mud, the source of microorganisms. Between the two chambers was a third chamber with another salt-water solution; on either side were anodic and cathodic-exchange membranes. Three different amounts of salts were placed in the middle chamber: 10 g, 20 g, and 30 g. The goal was to integrate a microbial desalination cell in a microbial fuel cell to produce energy. Although the amount of water desalinated was negligible (continued modifications will be employed); the highest output of voltage – slightly over 330 millivolts was produced from the cell with the largest electrodes. The experiment demonstrated that the larger the surface area, the higher the voltage. These cells had an average voltage of 243 mV while the cells with medium-sized electrodes had an average of 153 mV and the smallest electrodes with 161 mV. Ultimately, this experiment confirmed the ability for microbial fuel cells to be implemented on a larger scale.

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.
Num

Title:

Student Name(s):

Fair Category

Abstract:

Currently, products featuring lemon balm extract, such as teas, skin products, lip balms, salves, and essential oils, are widely available. While these products are often labeled as organic, this does not mean that they lack potentially hazardous side effects. Tannic acid (C₇₆H₅₂O₄₆) is naturally found in lemon balm and many other plants in small doses; it was deemed safe by the FDA when taken normally, but studies have shown it destroys the liver and kidney and causes anemia when ingested in high doses, in addition to increasing the risk of throat and nose cancers. This study aimed to discern whether or not lemon balm absorbs excess tannins from the soil by bi-weekly watering a test group with a solution of 10 mL tannic acid and 90 mL deionized water and then comparing the concentration of tannic acid in this group to that of a control group watered equally frequently with deionized water; results showed the concentration in contaminated plants to be 150 mg/L, while that of uncontaminated plants watered averaged 107 mg/L. This shows lemon balm plants are capable of absorbing excess tannic acid; this is a potential problem if tannin-producing rotten leaves decompose on the soil where lemon balm is grown. Preventing the contamination of lemon balm plants with tannic acid must become a priority for commercial farmers to decrease the risk of side effects associated with the products derived from this source; this also means further studies should investigate the potential of tannin absorption in other commonly-used herbs.

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CSEF Official Abstract and Certification

Fair Category

Proj.
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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Xanthan gum (XG) helps to control the drawbacks of rice starch when used as a food thickener. However, sugar also has negative effects when added to rice starch. Therefore, the main objective of this study was to investigate the effect of the presence of XG on rice starch and sugar mixtures on gelatinization time, viscosity, and texture. Initial testing determined the optimal amount of rice starch as 15g for gelatinization into 400 mL of water. Three trials of 15g of rice starch with 5g of sucrose were then gelatinized, and gelatinization time was recorded. After thirty minutes in a controlled temperature, the substance was put through a viscosity test which recorded the time it took to move through a hole in a cup. Finally, a sensory assessment determined the textural properties. This same process was followed for the experimental group, but 3g, 5g, and 7g of XG were added with the rice starch and sugar. In total, 3 trials of each sample ensured accuracy. The original mixture took an average of 19.62min to gelatinize, 2.05min on the viscosity test, and had a smooth, gel-like texture. The 3g, 5g, and 7g XG mixtures took an average of 15.82min, 12.88min, and 11.45min to gelatinize, respectively. The viscosity times for the three were 2.78min, 3.60min, and 4.20min, also respectively. The textures for 3g and 5g XG were lumpy and gel-like, and for the 7g XG, gritty and paste-like. The addition of xanthan gum appeared to shorten gelatinization time, increase viscosity, but deteriorate texture.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The reason why I did this experiment was to see if spring water would be better to grow bean plants than tap water would. My hypothesis was "If I water 3 bean plants with spring water and 3 bean plants with tap water then the plants I watered with spring water would be bigger because there is no fluoride in spring water". When preparing my project I had 6 cups, 3 for testing spring water and 3 for testing tap water. Each cup had soil and one kidney bean. The kidney bean was put into the soil about a half inch deep and covered with soil. Each cup had a marking on it the three spring water cups had SW1 SW2 SW3 and the three tap water cups had TW1 TW2 TW3. I watered the 3 cups with 10ml of spring water a day and in the other three cups 10 ml of tap water a day. On day 14 I noticed that there was only one spring water plant that had sprouted when all three of the tap water plants had sprouted. I concluded that my hypothesis was wrong, even though tap water has fluoride in it, it was still a better advocate for the growth rate of bean plants than spring water, and my data collected proves that.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Megakaryoblastic Leukemia Factor-1 (MKL1) is a necessary protein in megakaryocytes; its nuclear localization is critical for the cells' maturation. MKL1, with its cofactor Serum Response Factor (SRF), begins a signaling cascade necessary for an increase of ploidy and the transcription of a myriad of proteins. CCG-1423(RhoA inhibitor) has been shown in muscle cells to inhibit nuclear localization and increase glucose uptake. The main purpose of this experiment was to observe how CCG-1423 effects MKL1 in megakaryocytes. In the lab I concentrated on MKL1 localization, protein concentration, and gene expression in HEL cells (Human Erythroleukemia Cell Line) treated with 12-0-tetradecanoyl-phorbol-13-acetate (TPA). It was found that MKL1 does inhibit nuclear localization of MKL1 this beiNg the reason for the immaturation of cells described in previous papers. This experiment not only provides insight of the importance of rhoA polymerization in megakaryocytes but provides a novel positive control that could be used to compare the inhibition of nuclear localization of MKL1 in OTT-MKL1(fusion protein attributed with causing Acute Megakaryoblastic Leukemia) megakaryocytes, as well as a new information on how CCG-1423 works. Future studies will explore MKL1 localization in OTT-MKL1 megakaryocytes using CCG-1423 as a positive control for rhoA inhibition and MKL1 nuclear localization.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3086

Student Name(s):

Fair Category

Word Count

Abstract:

Our goal was to determine how a climate change-induced temperature rise of 4°C over the next 100 years may affect the composition of ecological communities occurring along an elevational or latitudinal temperature gradient. To this end, we developed a general temperature-dependent community model with consumptive and non-consumptive interactions among multiple species within three different trophic levels representing plant, herbivore, and predator species. We incorporated temperature-dependence for many species- and trophic-level parameters including interaction strengths, handling time, and reproductive fitness, the values of which were determined by surveys of empirical data. Once the model is fully operational, we will vary initial conditions based on ecosystem type (freshwater, marine, terrestrial) to determine differences in potential responses to climate change. At the same time, we will also try to determine how the size of a community (whether it is "species-rich" or "species-poor") will affect its response. Specifically, we will use the model to assess the effects of rising temperatures and trophic vs. non-trophic interactions on the number of species extinctions, changes in community diversity, and formation of no-analog communities.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Num

Student Name(s):

Fair Category

Word Count

Abstract:

In “What do we remember more: color or shape?” the purpose is to determine if our brain has a preference of one over the other when it comes to memory. Humans use color and shape relationships for memory. The V4 area of our brain’s Visual Cortex perceives both colors and shapes. Toddlers associate brightly colored blocks of distinctive shapes or colors to letters and numbers while learning. Patients with memory loss are often presented with objects that may trigger some response due to its color or shape. However, most studies study the effect of color and shape together on memory rather than dealing with each separately. Depending on which property (color or shape) the brain remembers more, we can find more effective ways to capitalize on the power of our memories. To study this impact in a quantifiable way, a series of tests are designed and conducted on a diverse group of participants while taking care to test the memory against each property independently. Each participant is shown commonly recognized colors and shapes and then asked questions to test their memory. The population sample is diverse in age, gender or race. The results are tabulated to see if either color or shape has a bigger impact. The data can help advance learning and retention through use of the colors and shapes.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: EFFECT OF SHORT-TERM CIGARETTE SMOKE EXPOSURE
ON FOOD CONSUMPTION IN GRYLLUS ASSIMILLIS.

Student Name(s): A. Galinsky

Fair Category

Abstract:

It is a common assumption that cigarette smoke, nicotine intake, stunts ones appetite. Many use smoking tobacco as a way to curve their appetite in order to lose weight or decrease their diet. In a study done at the University of Melbourne it was shown that mice subjected to cigarette smoke ate a significantly less amount food compared to mice that were not subject to smoke. Because nicotine is absorbed through the lung function in mammals and crickets form of ventilation is similar to mammalian lung function testing this idea on crickets may serve to be useful. Using similar procedures as the study conducted by Chen at the University of Melbourne, two groups of 25 crickets (*Gryllus assimillis*) were given ample food and water for three days to assimilate to the new environment. The next four days the “smoking group” was subjected to one Marlboro Red™ each day. The “non-smoking” group was given ample food and water again with no smoke exposer. Food was massed daily. An unpaired t-test was used to analyze the significance of the data. Data collection is still pending.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Targeted cancer treatment involves the inhibition of pathways like the Phosphoinositide 3-kinase (PI3K) and Mitogen-activated protein kinase (MAPK) pathway-responsible for growth and reproduction, respectively. This study will explore the effect of the inhibition of one of these pathways on colon and kidney cancer. It is hypothesized that the inhibition of an activated pathway results in the least proliferation. In order to test this hypothesis, the initial ATP count of the CAKI1 and HT29 cells was compared to the ATP of cells post introduction of a MEK inhibitor. When inhibiting the growth of the cells by 50%, a value important in determining the efficacy of drugs, the inhibitor concentration was shown to be 5.012×10^{-9} molar in HT29 cells and less active in the CAKI1 cells with a flat curve, inhibition not reaching 100% even at $1 \mu\text{M}$ concentration. Furthermore, a Western Blot was used to quantify the phosphorylation of ERK protein, a substrate of MEK enzyme. MEK inhibitor does in fact reduce the MAPK phosphorylation in HT29 cells, which have an overactive MAPK pathway. However, in CAKI1 cells, a cancer with a wild-type mutation, meaning that the MAPK pathway is not overactive, the MEK inhibitor was not very effective. Future work includes testing of a PI3K inhibitor and also a combination of the two inhibitors in order to determine the optimal amount.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Num

Student Name(s):

Fair Category

Word Count

Abstract:

Many people, young and old, deal with acne and can never find the source or the best way to get rid of the haunting blemishes. Most people don't know that bacteria are the main cause of acne and there are certain environmental situations, in which a person experiences, that may onset their acne formation. In this experiment, the bacterium, Staphylococcus Epidermidis, was placed under different conditions and sources to test to see if they contribute, prevent, or stall the acne growth. This experiment was conducted by growing the bacteria then placing it under different situational and environmental situations, such as hot and cold temperatures and oily and non-oily substances. Then once the bacteria has been left under the condition for approximately 4 days then the growth of the bacteria is measured by ruler in mm and compared to day one. Observations made once comparing data were that many common outside sources do not directly affect acne growth in either a negative or positive way. As conclusion from the data, some colonies of bacteria grew and some did not, while others began to destroy the bacteria. This was an interesting experiment because it has great real world application. It tells people certain products to use in order to lower the risk of acne or help people find ways to prevent the formation of acne.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

With so many concerned about the overwhelming feelings of stress that people face on a day to day basis, this study was conducted to measure the correlation between stress and gender, specifically on teenagers. Based on current research, it was hypothesized that if the relationship between gender and stress was determined, then girls would be more stressed than boys because boys do not show their feelings as often as girls. Anonymous surveys were given to 77 consenting students, asking the following questions: (1) What is your gender? (2) How stressed are you on a scale of 1-5 (5 = stressed) (3) If you are stressed, why? (4) If you are stressed, how do you cope with it? It was determined that gender is a weak predictor of stress level, given a correlation coefficient of 0.16 (boys were given a value of 1 and girls a 2). Boys were found to be on average less stressed than girls with an average of 3.15 (out of 5) compared to girls at 3.54. Further studies should be conducted with a more diverse population beyond magnet students in 10th and 11th grade, and these should be compared to stress levels in adults and youngsters. Ideally the age where stress level spikes could be determined and programs could be put in place to reduce stress. While gender wasn't found to be a great predictor of stress as hypothesized, a larger population should be studied.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3093

Student Name(s):

Fair Category

Word Count

Abstract:

Current archaeological research has focused on the process of state formation, using Iklaina as a diagnostic tool for understanding the incorporation of other peripheral regional centers into large Mycenaean states. As such, it can also be used as a prime example in the study of Mycenaean ethnogenesis and the expansion of a Mycenaean ethnic core zone. The current understanding of Mycenaean ethnicity (the conscientious inclusion of an individual in a Mycenaean identity) is rooted in an elite culture— what is known about the ethnicity is derived from ethnic markers (including pottery styles, architecture, and fresco subjects) identified at palatial centers such as the Palace of Nestor. The extent to which these markers penetrated the regional centers, and the period during which this occurred, must be identified in order to understand the incorporation of Iklaina into an ethnic core zone which eventually covered most of Greece. This project involved careful analysis of the presence of various ethnic markers (as recorded by the IKAP excavation) and continued excavation and recovery of additional markers. It presents a holistic examination of the relevant finds from Iklaina, in pertinence to the issue of ethnicity, deriving evidence from all elements of the excavation including material, architectural, botanical, faunal, and other remains, with particular emphasis put on the changes in ceramic presence on the hill top.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Research in genetics can be enhanced with a model organism in which there is potential for future experiments. Therefore the focus of my experiment was to determine if the Tardigrade would make a good candidate for this model organism. To see if they would be easy to obtain and sustain, I took samples of moss outside of my school and developed a method for isolating tardigrade from the moss. Then I counted the average number of Tardigrade you could isolate in 30 minutes using my developed method, in order to show the time required to start a culture. I then compared the survival of a certain species of Tardigrade and flower Beetle when subjected to UV light to see their behavior in experimentation. I found that it couldn't be easier to finding them and start a culture. Tardigrades can be found at a decent rate and at practically no cost, making them a no hassle organism for experiments. The results for the second experiment however surprised me. Although the species of Tardigrade that was used in my experiment was very resistant to oxygen depletion, they had trouble surviving UV radiation and high temperatures. I concluded that Tardigrades are a good model for genetics studies because of their known extreme traits, and of the availability of information about them, for instance their genome that will be released soon. They would be a great organism to experiment with in the future, however the differences between species should be considered closely.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Parkinson's Disease (PD) is a disorder of the brain in which there is a lack of dopamine produced. The brain then cannot properly send out signals to the muscles, affecting motor functions in the body. A surgical treatment called Deep Brain Stimulation (DBS) has recently arose in popularity for PD. The two possible stimulation sites are the Subthalamic Nucleus (STN) and the Globus Pallidus interna (GPi). The purpose of this project was to determine which stimulation site (STN or GPi) for DBS is better for producing a more effective result in treating symptoms of Parkinson's Disease. It was hypothesized that the GPi and STN DBS will significantly differ in the efficacy in treating the PD symptoms. To conduct this study, publications were first selected through PubMed, a large medical database. Publications were chosen through four relevant MeSH terms. Data was extracted from these studies, and lastly a meta-analysis was performed using the Comprehensive Meta-Analysis software. Results showed that there was a minimal difference between the two stimulation sites. It only slightly favored the STN (Fixed Effects Model SDM: $-4.15E-02$, $p=0.62$) and the 95% confidence interval was between -0.22734 and 0.137216 (Fixed Effects Model), which is very close to the zero mark. These results imply that the stimulation site chosen for DBS is not particularly important, given that both have very similar outcomes. The major limitation for the study, though, was definitely the lack of publications since only four articles fit the requirements.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

This project was conducted to determine if children's eating habits are heavily influenced by social media and several nourishment stereotypes. In order to test this, I used the power of suggestion to influence their overall decision on two sugary drinks that appeared different, but were actually the identical in composition. To collect the data, I surveyed each child drinking the solutions and had them rate the taste on a scale of 1-10. I clearly informed them that one drink was made from fruit, while the other was made from green vegetables. I found that 37% of students surveyed liked the fruit drink better, while 42% liked the green drink better. The remaining 21% believed that the drinks tasted the same. Therefore, 79% of students supported my hypothesis that because of the appearance of each drink, they would rate each differently. Students most likely logically deduced that either the drinks cannot taste the same, or their answers were predetermined before they even drank the juice based off their knowledge. This process was extremely interesting to research, for it relates to almost any child in the modern age. I would like to conduct an extension of this project in the near future, surveying more people in general, and different age groups to see where the "judgmental" trend ends.

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 order to test the damage caused to liver cells through the constant over exposure of ethanol, or the alcohol humans ingest, 5gram liver samples were exposed to 15mL of 80proof vodka for a period of 9 days to 1 hour. Catalase, an enzyme found in liver cells that breaks down hydrogen peroxide, was used as a measure of liver function. Catalase breaks down hydrogen peroxide into oxygen and water and the percent of oxygen is what was measured. The liver samples were put into an oxygen sensor bottle that had 10mL of hydrogen peroxide (H₂O₂) and the catalase reaction was monitored for 2min (120sec) period. The data found was unusual. The hypothesis stated that as the amount of time increased the amount of oxygen production would decrease. The results showed the complete opposite effect. All the liver samples that were tested had an oxygen percentage greater than the control and this has yet to be explained. Although catalase activity has a direct relationship with ethanol (it increases as more ethanol is ingested) this still does not explain why catalase produced more oxygen. This makes even less sense when the cause of liver damage from the body's over exposure to ethanol is lack of oxygen to cells causing their death. The experiment concluded that you cannot use catalase as a direct measure of liver cell function when exposed to ethanol due to the direct relationship of catalase activity and ethanol ingestion.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3099

Student Name(s):

Fair Category

Word Count

Abstract:

Soil-borne pathogens affect the health of crops as well as the health of consumers. This study looks at the earthworm *Lumbricus terrestris* (*L. terrestris*) bioturbation of several different biochars as a chemical-free means to improve soil health, sequester carbon, and suppress pathogenic fungus and bacteria. *Fusarium oxysporum* (*F. oxysporum*), which causes vascular wilt, and *Escherichia coli* (*E. coli*) which can be transmitted to humans through crops, were investigated. *L. terrestris* bioturbation of 7 different biochars into topsoil resulted in $\geq 80\%$ integration of one natural and 2 man-made biochars. These three biochars were then fully integrated into topsoil by *L. terrestris*. Assays of the composted soils included *E. coli* K-12 –W1485 (diluted with PBS, incubated, and periodically sampled and counted), active carbon (using KMnO_4 and Spectrophotometer), CO_2 efflux (using soda lime), adsorption, and pH. A portion of each of the composted soils was amended with 1 g per liter of *F. oxysporum* f. sp. *lycopersici* Race 1 (FRC0-111); tomato plants were cultivated in the infected and non-infected soils, then assessed for weight, vascular discoloration, and root health. Plants grown in infected soils with the composted man-made biochar weighed 20-60% more than plants grown in other infected composted soils, and 80-90% of those grown in infected uncomposted soils, comparing favorably to plants grown in uninfected soils of the same type. Plants grown in the infected soils composted with all types of biochar showed a decrease in disease up to 100%. These experiments indicate that (i) *L. terrestris* bioturbation of man-made biochar is particularly effective in decreasing disease from *F. oxysporum*, (ii) all types of composted biochar improve general soil health and reduce CO_2 efflux (composted natural biochar up to 29%), and (iii) man-made biochar contained growth of *E. coli* while natural biochar encouraged its growth.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3501

Student Name(s):

Fair Category

Abstract:

Caffeine has been previously shown to have an anti-bacterial effect (Ramanaviciene et al., 2003). Hand sanitizer, containing 70% ethanol, is a widely used disinfectant, killing 99.9% of germs it comes in contact with. We wanted to test whether smaller concentrations of caffeine can be used as a disinfectant. We grew E.coli strain AAAA overnight in liquid LB media. We then spread the bacteria on nutrient agar plates and placed small filter discs that were soaked in our different concentrations of caffeine solutions as well as our control solutions. We used 70% propanol as our positive control and water as our negative control. We also tested coffee, caffeinated soda and decaffeinated soda. Everything was carried out in triplicate. The plates were placed overnight in a home-made incubator, and kill zones observed and measured the next morning. Results showed that caffeine was more effective at inhibiting bacterial growth at both 25% and 50% concentrations than 70% propanol, exhibiting kill zones of larger diameter. At a caffeine concentration of 5%, a clear kill zone could not be measured, but fewer colonies grew around that disc. It would be interesting to work out the minimum caffeine concentration that would be effective as an antibacterial in a spray solution for use as a household disinfectant. We believe that using an effective concentration of a caffeine solution would help not only clean surfaces but also eliminate the toxicity factor. We also believe that such a product would be cheaper, more effective, and very simple to manufacture.

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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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

For our science project, we tried to evaluate how the ways in which cows are fed and treated and how that affects their digestion in our stomachs. We added amylase to factory beef and organic beef, and then timed how long it took for starch to be digested by adding Benedict's reagent. The factory beef took 10 minutes to digest the starch while the organic took 7 minutes. We have concluded that organic beef is naturally healthier than factory beef. There were less additives and preservatives in the factory beef, and the factory beef leaves you feeling full longer. The treatment of the cows has adverse affects, and the unnatural diet of the cow negatively impacts how long it takes for the starch to be digested.

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Proj. Title:

Student Name(s):

Fair Category

Abstract:

Hypothesis: If bananas and grapes are in the freezer for an extended period of time, then it will take more time for the banana to rot once removed. We've noticed that fruits rot at different rates. This led us to question if we put the fruit in the freezer prior to it sitting on the counter, will it rot at different rate. We placed various bananas and grapes in the freezer for four different periods of time before removing and placing them on the counter. Daily pictures were taken and observations made to determine which rotted fastest. Ultimately, we did find a trend in how long it was in the freezer and how fast it rotted. The bananas and grapes that were in the freezer longest, showed the worst rot, however took longer to rot once out of the freezer.

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CSEF Official Abstract and Certification

Fair Category

Proj.
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Proj. Title:

Student Name(s):

Fair Category

Abstract:

Many overlook the unnatural shelf life and durability of makeup and other products used everyday. Companies achieve the everlasting effect of products with parabens, harmful preservatives that are linked to many side effects, such as breast cancer and premature aging. The purpose of our experiment was to test the preservative qualities of mugwort, a plant native to Asia and Europe, to create a substitute for parabens found in seemingly innocuous products. We used distilled mugwort and employed different materials to create our end product, a sunblock cream with mugwort as a preservative. To test the preservative properties of distilled mugwort, we observed the antibacterial test for non-woven fabric mugwort preservative at the Korea Far Infrared Association. Mugwort eliminated more than 99.9 percent of four bacteria tested: Staphylococcus aureus, Klebsiella pneumoniae, Escherichia coli, and Pseudomonas aeruginosa (Korea Far Infrared Association, 2012). In order to test the preservative properties of the cream itself, we incubated a cream with mugwort and one without for 48 hours; both creams did not show any bacterial growth visible to the naked eye. However, we recorded the pH changes in the creams (with the results at the end documented by our mentor) over a two-month period which showed that mugwort possesses antibacterial properties. The cream with mugwort maintained a constant pH value, while the one without showed a continuing decrease in its pH level. Our research overall supported our hypothesis that mugwort is a viable option for a natural preservative.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In this project we found a new method by mimicking the nature as plants producing their energy through the chlorophyll molecules. One ITO glass conductive side comes on top and cleaned with ethanol. Then the glass is taped from four sides (pomegranate) and (chlorophyll). 6g of Tio2 powder is dissolving in Acetic Acid Solution. This Paste of Tio2 spread on the surface of ITO glass which allows a thin layer of Tio2 on the center of the ITO glass. The glass is dried and taken into high temperature furnace for annealing. The temperature of the furnace is set to 450 Celsius, After 30 minutes the glasses is taken out. This makes sure the Tio2 stick to the surface. 10g of spinach leaves is grinded; 20ml of Acetone is added. Solution is transferred into a funnel and 30ml of n-Hexane is added. The chlorophyll is extracted into hexane phase. The glasses are soaked into the solutions of Pomegranate and Chlorophyll. The hexane contains chlorophyll to dry overnight. The next day Ethanol dissolves the chlorophyll but not the Tio2 film. Another ITO coated glass on the conductive side carbon is coated. This is done by a pencil to catalyze the reaction; the ITO glasses are joined together by clips. Both conductive sides come face to face and there is a small opening from both sides. 2 drops of Iodine electrolyte is added. As a result we achieved 75% more energy from the chlorophyll dye sensitized solar cell than anthocyanin solar cell.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3507

Student Name(s):

Fair Category

Abstract:

The purpose of this experiment was to synthesize a high-performance, biomaterial with an amino-acid ratio similar to that of spider silk. It was hypothesized that using a specific mixing ratio, correlated with specific heat conditions, cross-linking between proximate chains of amino acids would occur producing a biodegradable, biomaterial of both strength and toughness. The known amino acid ratio of *Nephila clavipes*'s major apullate silk was used as a standard and product content included a mixture of serine, leucine, valine, glutamine, glycine, alanine, arginine, and tyrosine powders. The amino-acid samples were massed in accordance with a published ratio, and combined with a pre-heated mixture of distilled water, gum Arabic, and glycerol. After further heating, the product mixture was poured into flexible, polystyrene dishes coated with mineral oil, and allowed to dry. In order to optimize strength, toughness, and biodegradability of the created biomaterial without compromising the amino-acid ratio, several trials were conducted using varying amounts of water, gum Arabic, and glycerol. Dried product was tested for strength, toughness, and rate of degradation. The hypothesis was supported in that a biomaterial was created, though not supported in that cross-linking of the amino acids could not be confirmed. Additionally, the created biomaterial was not strong, nor tough as compared to published tensile strength of *Nephila clavipes*'s major apullate silk, but it demonstrated rapid biodegradation in water and garden soil. Further experiments may include investigating biodegradation of the biomaterial by microbes as well as a practical application of the biomaterial as a shipping material.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

In our experiment we are looking to implement three natural treatments on mouse mammary cancer cells to observe and record any adverse effects in cell proliferation. The three natural remedies we wish to use all have active ingredients that we hope to utilize in our experiment. The three active ingredients include Capsaicin, Taxol, and Biochanin A. Using these active ingredients we hope to find a decrease in cell growth or even apparent cell death. To test our hypothesis, we subjected *Mus musculus* epithelial cells that have mammary carcinoma with and without the active ingredients. Based on various papers by other scientists, we measured appropriate concentrations to test. We also have a positive control with the drug Tamoxifen which is known and expected to induce cell apoptosis. In the experiment, Tamoxifen, Capsaicin, and Taxol have displayed a decrease in cell proliferation and in fact an increase in cell death while Biochanin A will require a further analysis in the next few days. We have a camera to observe and record the cells in their conditions. Using such tools we will count and record quantitative information of the induced apoptosis in the cell cultures. We will also utilize Western Blot to identify for a desired, specific protein within the cells.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
3509

Student Name(s):

Fair Category

Abstract:

Beta-lactam antibiotics are a broad class of antibiotics which are being used for many bacterial infections. Overuse of these drugs is leading to resistance among the bacteria towards these drugs. 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 inhibitor for Class C β -lactamase from Enterobacter cloacae P99. Compounds from NCI diversity set III were virtually screened with Class C β -lactamase from Enterobacter cloacae using AutoDock® and PyRx® to determine if the compounds could inhibit Beta lactamase enzymes. A chromogenic cephalosporin CENTA, which can be readily hydrolyzed by β -lactamase was used as a substrate in the enzyme kinetics. A total of 250 molecules were screened. Ninety one were found to have good binding energies. These binding energies were ranging from -7.0 K.Cal/Mol to -9.1 K.cal/Mol.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Studies have shown that grasshoppers in the presence of spiders or under thermal stress move from areas of nitrogen rich plants to areas of carbohydrate rich plants, thus increasing the amount of carbohydrates in their diet. Stress on the grasshoppers causes an increased metabolic rate. What is unclear is whether the grasshoppers are shifting location to avoid their spider predators, seeking cooler environments, or different diet requirements to sustain their heightened metabolic rate. The problem that was investigated was: do grasshoppers under stress eat more carbohydrates? It is hypothesized that if the grasshoppers are put under stress, they will eat more carbohydrates. Grasshoppers in terraria were given powdered choices of carbohydrate-rich food and protein-rich food. In two separate parts of the experiment, half of the grasshoppers were put in the presence of a stressor, either heat or the predator. The other half of the grasshoppers were not in the presence of a stressor, serving as the control. The overall intake of carbohydrates did not change in the presence of either stressor. The results support the conclusion that the shift of grasshoppers to nitrogen plant-rich areas is due to the grasshoppers' necessity to avoid the predator or be in a cooler environment, rather than craving carbohydrates. Each factor on its own was not strong enough to elicit a significant response in the overall dietary pattern, even though there was some variability due to spider size. Future research should look at the patterns between spider size and warming as joint stressors.

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Fair Category

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Num

Proj.
Num

Title: Green Crabs affect on the Native Crab Species in the Long Island Sound

Student Name(s): J. Krim, A. Speranza

Fair Category

Abstract:

The European green crab or *Carcinus Maenas*, is a non-native species to the Long Island Sound area. It was first introduced into this environment during the late 1800's. If the green crabs start to out compete the native crabs, either by biological or behavioral advantages, then the native crab populations will start to decline. Crab traps were used in the Poquonock River in each of the basins. Seins were used to cross-reference the silver side population and the green crab populations. A behavior study was also conducted between the four types of crabs in an A-frame. It was found that the green crab population and the silverside population are closely related. Green crabs are also more aggressive than other crabs found in the A-frame. If these trends continue then the other crab populations will decline and this will negatively affect the ecosystem.

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Student Name(s):

Fair Category

Word Count

Abstract:

This study attempted to determine the effect of different types of drinks on the length of a musical note could be held. While there is little research in the field, many singers refer to home remedies that increase their abilities to hold notes. It was hypothesized that if a singer were given water, orange juice, green tea, and chocolate milk and asked to sing middle C after each, then they would be able to hold the note longer after drinking green tea because of the soothing antioxidants and slow release of caffeine. Consenting participants were asked to warm up vocally for 5 minutes and were given 2 ounces of orange juice. The length of time each participant held the middle C note was recorded and repeated for each drink. This procedure was repeated for three days, rotating through the drinks to minimize error. It was concluded that water was the most effective drink with an average note length of 22.75 s, compared to 15.78 s (orange juice), 18.53 s (green tea), and 16.45 s (chocolate milk). While green tea is said to have positive effects on the throat, participants noted that it seemed to make their throats dry and lips pucker. Water, on the other hand, appeared to clear the throat of any mucus and previous drinks, allowing for a longer note. Further studies should be completed with a larger sample size and various notes with an attempt to control other variables.

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Student Name(s):

Fair Category

Abstract:

Today humans are exposed to the highest level of metals known in history. This is due to their industrial use, the unrestricted burning of coal, natural gas and petroleum, and incineration of waste materials worldwide. Toxic metals are now everywhere and affect everyone, and everything on earth. Examples of health effects are nausea, lung irritation, rashes, vomiting, dizziness, cancer, liver and kidney damage, disorders of the nervous system, damage to the immune system, birth defects and even death. Currently, water purification is done by either the use of chlorine, which is itself a contaminant or with a polymer membrane that uses pores, much like that of fruit peels, to filter out the ions. Fruit peels can be a inexpensive, environmentally friendly alternative to cleaning contaminated water by industrial waste. Fruit peels contain nitrogen, sulfur, and carboxylic acids, which bind with positively charged heavy metals often leached into water from mining and industrial runoff. Because many methods of removing metals from the water are expensive and toxic, this may be a more natural method of cleaning drinking water. We carried out our experiment by measuring the conductivity of various metals polluted within water with conductivity probes (zinc, copper, iron). We also tested the conductivity after we used the fruit peels as filters in order to see if the fruit peel is actually an effective filter for the metals in the water. Our results indicated that fruit peels changed the conductivity to resemble the safety parameters outlined by the Environmental Protection Agency.

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Yara Hosney and Ewelina Zambrzycka May 4, 2012 Abstract: As we all know Vitamin C, scientifically known as ascorbic acid, is an essential factor of human growth and development. Usually orange juice containers say that there is 100% of vitamin C in the orange juice. Therefore many people prefer to drink orange juice as their daily source instead of taking the pill because it is a great source of vitamin C, and it is "good for you". In our experiment we wanted to investigate if the concentration of vitamin C in orange juice stays the same until expiration date. Our hypothesis is: If we test the concentration of vitamin C in orange juice then the concentration will decrease over a period of time. This is because when the orange juice is exposed to oxygen the concentration of vitamin C in orange juice might be affected. The independent variable in this experiment is the days over which the orange juice container is open. The dependent variable of this experiment is the concentration of vitamin C in orange juice (mg/ml). The controlled variables are amount of orange juice (20ml), amount of vitamin C solution (20ml), concentration of iodine solution (1:10), concentration of vitamin c solution (250mg/1000ml), starch (1g/200ml) and environmental conditions. To test our hypothesis we did the titration process, using iodine as the titration solution. We added iodine to orange juice with starch and to vitamin C solution with starch separately until it changed color. The change of color was the outcome of redox reaction, where electrons are transferred from donor to acceptor. Then we calculated the change in iodine in the buret and we did the calculations to figure out the concentration of vitamin C in orange juice. We did the same procedure for 11 days on Wednesdays and Fridays. From our data we could see that the amount of iodine needed for the titration process to be completed decreased as days went on. On the first day the concentration of vitamin C was .52mg/ml

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Fair Category

Abstract:

Nowadays, everybody loves a good cupcake, but baking them could take a long time, and many people don't have the patience for it. We wanted to know if you could achieve satisfactory results by varying the time and temperature in baking cupcakes. We used a standard store bought cake mix and followed the directions written on the box, and then baked the cupcakes at proportionally varied times and temperatures. When we took the cupcakes out of the oven, we evaluated them on the five senses. It turns out that it is possible to bake cupcakes at a higher temperature for a shorter amount of time without burning them or drying them up, which is good news for an impatient person. Temperatures lower than 300 degrees Fahrenheit yielded undercooked and raw cupcakes that were inedible. Improving on the experiment would consist of adding different flavors, and experimenting in different types of ovens. We might also change the relationship between the recommended time and temperature and the ones that we experimented on.

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Word Count

Abstract:

Our science project tested if the pH has an affect on the voltage rate produced by a fruit or vegetable. To conduct this experiment, we placed a zinc screw in one end of the fruit or vegetable and in the other end of the fruit or vegetable we placed a copper penny (we used one made before 1982 because before this date the pennies were made of real copper). We then connected the voltmeter to the fruit or vegetable and measured the voltage rate. Next, we cut each fruit or vegetable in half and tested the pH with pH paper. After letting the pH paper sit for a minute we then compared the colored paper to the pH chart. We predicted that the lemon would produce the highest voltage rate because it has a high level of citric acid. Our hypothesis supported our results because the lemon produced the highest voltage rate. However, we did discover that the pH did not affect the voltage rate in the fruits and vegetables. We know this because the lemon and the melon had very diverse pHs and still had similar voltage rates. The lemon had a pH of 2 and the melon had a pH of 7. But still the voltage rates were still extremely close since the lemon produced 0.997 volts and the melon produced 0.977 volts. Therefore this proves that the pH does not have an affect on the fruits or vegetables.

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Fair Category

Word Count

Abstract:

This experiment tested the use of solar energy to determine if it is a viable method for disinfecting water for purposes of drinking and sanitation. As water is a limited resource that is required for survival of our species, it is critical that there is awareness of the magnitude of this crisis and new methods be explored to help solve this problem. To test the viability of using solar energy to disinfect water for drinking, water samples were collected in sterile containers from two different water sources, the Saugatuck River in Danbury and the Housatonic River in Wingdale, New York. Boiled water samples were used as the standard and compared against the untreated water, a 12-hour SODIS and 48-hour SODIS sample. The SODIS samples were placed in sterilized PET bottles, polyethylene terephthalate, and the tryptic soy agar plates were kept undisturbed in a microwave and observed at 24,48,72, and 96 hours. Bacteria growth was counted and documented. The untreated water samples had too many bacteria to count (TMTC) and needed to be retested diluting them in sterile water. As expected, the 48 hour samples had significantly less bacteria than the untreated or 12-hour SODIS samples. Each sample was tested three times to ensure the validity of the results. Ideally, everyone could have access to clean drinking water, but using UV rays or solar energy proves to be an efficient and cost effective disinfection method for disasters, third world nations and maybe someday for all of us!

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Student Name(s):

Fair Category

Word Count

Abstract:

According to a study done at Harvard University, students within the United States are falling behind in mathematics ranking only 32nd in the world. The need to find new, innovative methods of teaching is critical and urgent for the schools and students within our country. This project examined if a social robot has the ability to teach a mathematical concept as well as a certified, human math teacher. It is hypothesized that if a social robot is able to teach a mathematical concept, then students will grasp just as much material as if taught by a human teacher. To test this hypothesis, we programmed the advanced humanoid robot, NAO, to teach the concept of how to multiply simple fractions. Two groups of third graders, who had not yet learned this concept, were taught the concept by either the robot or the certified human math teacher following the same script. Afterwards, both groups were given the same quiz on the concept learned and then surveyed on comfort level towards their new teacher. The data indicates that both groups were comfortable being taught by either the robot or the human. The students taught by the human teacher had an average quiz score of 57.14% while the group taught by the robot averaged 81.18%. Our data showed that a social robot does have the ability to teach a mathematical concept as well as a certified human teacher and could potentially become a math tutor or teaching assistant in the future.

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Title:

Student Name(s):

Fair Category

Abstract:

This project was tested to see what type of sugar/sweetener made the largest rock candy. It was hypothesized that Domino Pure Cane Sugar would make the biggest rock candy. 5 different sugars/sweeteners have been tested. Water had been boiled which 2 cups of sugar was poured into, and later, was placed into a glass jar. Each different type of sugar had been repeated in the process. Next, yarn that had been rolled in each different type of sugar was hung and placed into the water matching its sweetener. These were observed for 7 days. As it was observed throughout the week, nothing has really changed in all but 1 of the sugar/sweeteners. It was concluded that Sweet N' Low had the longest, widest, and heaviest rock candy.

Word Count

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Fair Category

Abstract:

In our Science Fair Project, we performed a task of figuring out which out of four frames was able to perform best and hold up the most weight. We were able to build four frames, each frame structured differently. We researched the meaning of weight and mass, as well as previous earthquake-proof buildings. Weight is the quantity of mass or heaviness of an object, however mass is the amount of matter in an object. Weight is a very important contribution to our project. To perform this experiment, we used plywood, acting as a base and for the frames, and a block of thick wood, acting as a support system for a pulley. Each frame was differently structured. The first frame was built with no supports. The second frame was built with a board across the middle. The third frame was built as an "X" form, two boards meeting at the middle. The fourth and final frame was built with small pieces of wood at each corner at a forty-five degree angle. We attached each frame to the plywood base with nuts and bolts. We also filled a one gallon jug with sand and mixed rocks to help with the simulation of the weight of an earth quake. After the building procedure, we tested 3 different weights (15, 14, 13 lbs.), giving us three completely different results. In conclusion we found that the corners frame with held most weight, and as a result was our strongest frame.

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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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Proj. Num

Student Name(s):

Fair Category

Word Count

Abstract:

In everyday life, many heavy lifting jobs require the use of cars, or other automobiles. However, as well as the efficiency of carrying items, another question to ask is how will speed be affected by certain amounts of weight. Such questions are so important to ask, such as how much you'll have to pay for gas if you are going faster or slower. In real life, questions like these could save thousands of dollars. Our hypothesis is the more weight a vehicle carries, the longer it will take to get to a certain distance. In order to test our hypothesis, we've designed an experiment involving a small car going across a distance of one meter while carrying given amounts of weights. We'll repeat the same process more times, with more weight (100 grams more each time). Our data collected is a graph of time versus speed from the tests. For 0 grams, the car finished in 6 seconds, for 100 grams it finished in 10 seconds, for 200 grams it took 18 seconds, and for 300 grams, 30 seconds. In conclusion, we can see that it takes a car with more weight longer to travel a meter. After examining the graph, it seems that the more weight that is placed upon the cars, the slower it went. We can now see that our initial hypothesis was correct.

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CSEF Official Abstract and Certification

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Num

Proj. Title:

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Student Name(s):

Fair Category

Abstract:

All three of the scientists in this project live near bodies of water. We had studied the weather in 6th grade, and were aware from the news of problems in the environment from pollution and its impact on the earth and water. Therefore, we wanted to see how acidic the precipitation is near our home, and whether it had an immediate impact on the nearby bodies of water. Based on our research, to study acid rain and its impact, scientists study elements such as (1) pH of the precipitation, and (2) pH of the bodies of water, to try to see if the pH of the precipitation affects the pH of the water. They also study what the impact is of the acidic elements of the rain, including sulfur dioxide and nitrogen oxide. We decided to replicate these kinds of experiments. In four bodies of water and three different precipitation locations, we collected precipitation and samples of the bodies of water after the precipitation. We ended up unusual collections, including Superstorm Sandy, Nor'easter Athena, and a variety of regular rain and snow falls. We hypothesized that (1) the precipitation would be acidic, and that (2) the acidity of the precipitation would make the bodies of water more acidic at a measurable level. However our experiment did not prove any element of our hypothesis correct. The precipitation was not mainly acidic, and there was no correlation between the pH of the precipitation and the pH of the bodies of water.

Word Count

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Proj. Title:

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Student Name(s):

Fair Category

Word Count

Abstract:

This science project looked into the depth of inertia and torque. Torque is a component of force multiplied by the distance from the axis to the outermost edge of the paper roll. We tested how mass affects inertia of an object, and in this case, of paper clips. Three paper rolls of different masses were hung on the dowel of a holding fixture to be tested to see if their mass affected how much torque was needed to overcome rotational inertia. The mass and the diameter of the paper roll also affected to what extent the rotational inertia was overcome. Three trials were conducted that tested how the component of force, in torque, applied to the paper roll was affected by the mass of the rolls. Friction was also a factor which determined how much the paper roll would unwind, due to the pulling from the paper clips, which acted as the torque in the situation. Overall, the lighter paper roll required a lesser load to unroll the paper. Roll C, which proved to be the lightest roll, was 50 grams, required the least amount of paper clips to move the roll. The largest roll, weighing at 125 grams, required a much larger amount of torque than the smallest roll. Moreover, a small amount of inertia can be overcome by a small amount of torque.

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Within the past few years, Connecticut has been hit by several storms that have resulted in prolonged electrical outages. During these outages, simple tasks, such as charging phones or essential medical devices become impossible. Homes should have an inexpensive and easy way to generate electricity and charge devices during power outages. A Thermoelectric generator (TEG) is a device that converts thermal energy into electricity. The larger the temperature differences between the two sides of the TEG, the higher the voltage that can be generated. A series of experiments were conducted in this project to evaluate various methods to heat a TEG and generate enough voltage to charge electronic devices. The experiments focused on using key resources that are readily available during a power outage, such as: solar energy, a fireplace, grill, and steam, to heat the TEG. The other side of the TEG was maintained at low temperature by using snow or ice. Two methods were used to concentrate the solar energy: a Fresnel lens and a parabolic mirror, which was prepared from a satellite dish with a reflective paint. Several modifications to apparatus were employed. The maximum voltages measured, in descending order, using the fireplace, grill, steam, Fresnel lens, and parabolic mirror, were 5.0V 2.95V, 2.12V, 1.3V, and 0.4V respectively. The maximum current reached was 0.6A. The snow was found to outperform the ice. The TEG successfully charged an mp3 player and a cellular phone using a USB cable. Powering essential devices via a TEG and common heat sources around the house proved feasible.

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Proj. Title:

Student Name(s):

Fair Category

Abstract:

A major cause of acne is the colonization of infection of clogged pores with bacteria. So in our science fair project, we will be testing different types of acne medications/ cleansers to determine their effectiveness at killing bacteria, which was e coli and staphylococcus Aureus. This will show were acne comes from and how you treat it.

Word Count

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Proj. Title:

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Student Name(s):

Fair Category

Word Count

Abstract:

Our project is testing how does liquid affect the trajectory of light. So far the liquid that has the highest density has affected the light the most. We have tested olive oil, water and soap. Soap, being the highest density affected the water by 350 degrees. The water affected it by 13 degrees the olive oil affected it by 4 degrees and the cranberry juice affected it by 17 degrees. The procedure we followed was that first we found the control by shining a laser through a clear glass cup. Then we poured the first liquid in and collected the data. We did the same with all of the other liquids until we had all of the needed pieces for the experiment. Our hypothesis was that the liquid with the highest density would affect the light's path the most. In conclusion we found out that the hypothesis was correct. The soap affected it the most and it had the highest density.

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CSEF Official Abstract and Certification

Fair Category

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Num

Proj. Title:
4014

Student Name(s):

Fair Category

Word Count

Abstract:

Our goal was to create a non-toxic, natural fire retardant that slows burning as good or even better than the chemical fire retardants now used. Using fabrics commonly chosen for children's clothing, we included cotton, polyester, nylon, and felt in primary colors plus black and white. All fabric samples were the same size. After research, we tested possible natural fire retardants: chitosan (chitin) soak, kaolin clay soak, and brominated vegetable oil in Gatorade for flame retardant effectiveness. Each was coated with up to thirty layers of the retardant. Results and correlations follow:

- Chitin solution didn't affect the fabrics. They ignited within 1-5 seconds, and burned in 10-20 seconds, similar to the chemical.
- Kaolin clay was our best solution. Treated felt and polyester ignited in 50-110 seconds, and didn't burn but melted!
- Cotton and nylon ignited in 5-15 seconds, and burned in 20 seconds (similar to the untreated).
- Brominated vegetable oil found in Gatorade didn't work as well as hoped. Felt and polyester ignited in about 150 seconds (positive), but burned in about 250 seconds (negative). Cotton and nylon worked similar to clay (ignited in 5-15 seconds and burned in 20.)
- The color of fabrics didn't alter the outcome.
- Adding more "coatings" of retardants significantly increased ignition time.

Our natural fire retardants have proved to be a safer and better choice than the chemical ones. We think we have found a way to "Chain the Flame."

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CSEF Official Abstract and Certification

Fair Category

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Student Name(s):

Fair Category

Word Count

Abstract:

Abstract The purpose of our lab was to find a way to produce electricity using household items. We chose to do this lab because of the many natural disasters that have hit the Connecticut area in the past years. We learned that with a few common household items such as coins, salt and white vinegar you could produce a simple battery to provide you with small amounts of electricity. To start off our experiment we combined vinegar (electrolyte) and salt (ions). We then placed small squares of paper towels in the salt-vinegar solution. Next we started building our batteries. We made four batteries by stacking repetitive patterns of penny, wet paper towel pieces, nickel and wet paper towel pieces. Each battery had a different amount of coins. To record the amount of electricity produced, we used a digital multi-meter. We measured the electricity in volts. In our lab, we determined the more coins there are in a simple battery, the more voltage would be produced. In the battery with 1 penny and 1 nickel the amount of voltage produced was 0.215 volts. The battery with 2 pennies and 2 nickels produced 0.218 volts. The battery that produced the second most amount of voltage had 3 pennies and 3 nickels. That battery produced 0.225 volts. The battery that produced the most voltage had 4 of each type of coin, it produced 0.275 volts. In conclusion, this lab demonstrated that simple batteries with a larger amount of coins produce more electricity.

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Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment is to see which type of bridge is the strongest out of three types of bridges: the arch bridge, suspension bridge or the Warren Truss Bridge. We believed that the suspension bridge would be able to hold the most weight. This is because the cord on the suspension bridge helps support it better by transferring the load weight into the tension in the cord. We constructed the arch bridge, the suspension bridge, and the Warren Truss Bridge. Next we tested them by seeing which one could hold the most weight. We rested the bridges on two elevated supports, which were two tables with a small space between them. A loading block was placed on top of the bridge and a bucket was suspended below using an eye-bolt and an S hook. The bucket was then filled up with weights until the bridge broke. The arch bridge held the least amount of weight breaking at 41lbs. The Warren Truss Bridge held the most amount of weight breaking at 100lbs. The suspension bridge broke at 53lbs. In conclusion the Warren Truss Bridge held approximately 50 more pounds of weight than the suspension bridge proving our hypothesis incorrect. We think that the Warren Truss Bridge held the most amount of weight because it is made up of equilateral triangles which spreads the weight of the load evenly making the bridge more supportive. Modern suspension bridges are made of much stronger materials than our model making them some of the strongest bridges in the world.

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Student Name(s):

Fair Category

Word Count

Abstract:

Dry Ice Hero's Engine Abstract Our experiment is an example of Newton's Third Law of Motion; "Every action has an equal and opposite reaction force." We decided to create a simply constructed hero's engine for our experiment. We wanted to find out how the design of a hero's engine affects its spinning speed. We did this by changing the amount of holes in five identical hero's engines. We accepted our hypothesis, which had predicted that too few or too many holes would produce slower speeds because the equal and opposite reaction forces wouldn't be sufficient enough to spin the can quickly. The speed of the engine with two holes was ten spins per minute (154%) slower than the engine with six holes. So we conclude that having two holes in our hero's engine is not enough. On the other hand, there was a 13% decrease between the average spinning speed of the can with twenty-two holes and the one with forty-two holes, so our results confirm that too many holes in the engine decreases its efficiency as well. Our results show that the most efficient hero's engine should have between twenty-two and thirty-eight holes. Related topics that could be researched next are: the rate at which dry ice evaporates and the evolution of the hero's engine's design. Overall, although there were some opportunities for error in our experiment, we feel that our data was valid and successfully highlighted the most efficient design (of those we tested) of the hero's engine.

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Proj. Title:

Student Name(s):

Fair Category

Abstract:

We have discovered that throughout the years technology is expanding. More and more people have cell phones and are using them while driving. Although laws have been put in place and people have been warned that it is dangerous, people these days just don't seem to care. We wanted to create an experiment that would show through the results that you are distracted while talking on the phone and that it is dangerous to do so while driving. We tested this through a series of trials using six different test subjects. During the trials we had the test subject hold out his or her dominant hand while sitting down. We explained to them that they would have to try and catch a yard stick when the tester yelled "now." Then we had an assistant call the subject from a separate room to get them engaged in conversation. Once they seemed engaged, the tester yelled "now," dropped the yard stick and waited for the subject to catch it. After this the tester measured from the bottom of the yard stick to where the subject's last finger was on the yard stick. This was how we measured their reaction time during each trial. We repeated these trials using, hands-on mode on the cell phone, hands-free mode on the cell phone, texting on the cell phone, and just concentrating on the test. We tested each trial three times and averaged the results together to get the final number. In the end the trial just concentrating on the test measured the fastest reaction time and we proved our hypothesis.

Word Count

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Proj. Title:

Student Name(s):

Fair Category

Abstract:

This science experiment is about trying to change the flavor of popcorn by letting the popcorn kernels sit in a various liquid for a certain period of time. Our hypothesis was supported. We soaked each set of popcorn kernels in grape juice, apple juice, ginger ale, and pineapple juice. We had no difficulties while performing this experiment.

Word Count

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Student Name(s):

Fair Category

Word Count

Abstract:

People grab a coffee before work everyday. Then they may head onto their long drive or ride to their job. If they want to have a hot coffee the whole drive, they need a cup that will prevent heat loss. The purpose of this experiment was to find the cup that is best to prevent heat loss. To test this, we choose six different types of cups which were glass, paper, plastic, styrofoam, ceramic and tin. We placed styrofoam tops on top of the cups to prevent heat loss from the top. We placed thermometers in a small hole in the styrofoam tops to measure the temperature of the water. We heated water to 50 degrees celsius and then placed the water in the different types of cups. We waited 15 minutes and then measured the heat loss. The styrofoam cup has the least amount of heat loss every time. On the other hand, the tin cup had the most amount of heat loss. After this research, we realized that people can save money by buying less coffee. If you save one cup of coffee a day, you could save around \$540 a year. It would also be better for your health. If people use styrofoam cups, it could help their financial problems and health problems.

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Proj. Title:

Student Name(s):

Fair Category

Abstract:

My project is you try to play call of duty in different positions and record the scores. I chose this topic because I enjoy playing video games. We play call of duty modern warfare 3 survival until death. We do this for each position. The most effective method was sitting with almost three times the score than any other.

Word Count

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Word Count

Abstract:

This project is about how we can make a building that can take the power of the earthquake and stay up while a machine turns the waves into energy. This machine will first be visualize then research to see if materials will work then make a model (It can be a working model but due to funs it doesn't). The machine will have a ball in it which will move, when the earthquake comes, hitting the sensors which that will active an air pump turning a tiny windmill that uses the same technique as the big ones on the fields. This will keep power on in the house and can be use as backup power. So like a min generator but instead of gas it works on vibration. This can also be put in cars so the use of oil would be less. The buildings they use these years have different structure so it can keep an amount of weight up. But it's not use to keep vibration from shaking the atoms on the building causing them to become weaker. They should have a main pole in the building that all the other poles are connect to and all the vibration will be taken by the main pole so the other will be safe. Buildings are usually to keep you warm and safe, but they're not. Once those atoms are beat the building comes down. Most people build house with less stronger items because earthquake don't happen that often and it's a lot of money. But they do come, what you going to do. All ways be prepared.

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Word Count

Abstract:

The goal of this project was to fix a faulty weather program at the TMSC weather station. The problem was that the other program, Easyweather, missed important data and didn't update it's data quickly enough. The program also ran very poorly on older computers. The idea of this project was to replace Easyweather by engineering a new program that fit small weather stations' needs and ran smoothly on older computers. The most critical materials were a working computer, a programing language, and a USB weather console. The hard part of the materials was deciding on a specific programing language. The language had to fit the required needs and be beginner friendly. The program that was used was Python. Python was used because it fit all the required needs and is well known as a user friendly program that "bridges the gap between C++, Java and other major programing languages." After deciding on a programing language, a GUI applet was required. GUI stands for graphical user interface. The three applets found, and tested were Tkinter, EasyGUI, and Kivy. Tkinter was already installed in Python but it was not beginner friendly and did not have some of the features needed for this project. EasyGUI was easy to install and extremely easy to use. The problem was that the program was too simple and could not accomplish the required tasks. Kivy was very hard to install but it had all of the required needs and was simple too use. Kivy was the best.

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Word Count

Abstract:

Solar panels are very expensive. A normal house kit can cost from \$8,000-\$10,000! Thus, when people buy them they need to make sure that the solar panels are mounted to work at their peak efficiency. For this to be possible, the solar panels are programmed to follow the direct path of sunlight of the sun. This experiment was done to test the best angle to mount a solar panel so that it produces the most energy. In this experiment we mounted solar cells on wooden blocks that we cut at different angles. The angles at which the solar cells were mounted were the independent variable. The volts, watts, and amps that were produced were the dependent variables because the higher the readings were, the more efficient the angle was. Our hypothesis was that if the solar cell was mounted at 45 degrees, it would be the most efficient because it is halfway between 0 and 90 degrees. Also, when we observed the roofs of houses, the solar panels look as if they are mounted at 45 degrees. Our control kept the light source directly overhead in all the trials. The experimental results showed that 0 degrees was actually the best angle, since the most surface area was covered when the sun (light source) was directly overhead. At 0 degrees, 0.6 volts, 0.1 amps, and 0.06 watts were produced. At 45 degrees though, 0.4 volts, 0.05 amps, and 0.02 watts were produced. This data proved that our hypothesis was incorrect.

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Fair Category

Abstract:

The purpose of our experiment was to show that motion of magnets inside circuits create electrical current, and review possible applications in everyday life. Our hypothesis was that if a certain type of magnet is moving inside an electrical circuit then it creates an electrical current. Our procedure enabled us to visualize magnetic field lines, check the creation of current in conducting tubes due to the movements of magnets. We extended the experiment to the measurement of the direction and intensity of current created inside a coil due to the motion of a magnet, assess the impact of the magnet speed through the coil on the current intensity. Finally we built a small electrical generator using the outcomes of the previous procedures. Our procedures allowed us to practically demonstrate that a moving magnet inside a conducting circuit generates a current that we materialized with a small lamp or with a galvanometer. We learned that the direction of the magnet through the circuit, the magnet polarity or the magnet's speed relate to the direction and intensity of the current created. In conclusion, after many trials and procedures, we are able to verify our hypothesis that magnets moving inside a circuit create an electrical current. This experiment also helped us understand technical principles used in applications that affect our everyday lives such as electric car alternators, power generators used in dams or also brakes in roller coasters or subway trains.

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Fair Category

Abstract:

Our project is about how chemicals combine together to form a color reaction. We separated the crucial chemicals into two mixtures, the timing mixture and trigger mixture. The timing mixture consists of 4.3 grams of potassium iodate, distilled water and 2 grams of starch soluble into (test tube A) along with 1.2 grams of sodium metabisulfite. The trigger mixture consists of 4 grams of concentrated sulfuric acid, and 10 mL of ethanol. After we mixed the two combinations together, we saw that they changed colors. We concluded that our hypothesis was accepted, the combinations of the chemicals forced the reaction of the jet black/ ink appearance.

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:

Ryan Caldwell and Tyson Richards Abstract We are investigating the initial drop required for a glass marble to complete a loop-the-loop of a fixed sized. We are investigating this because it is crucial for us to know how kinetic energy interferes with objects and leads it to completing a loop-the-loop. The hypothesis we developed and studied was if we want to find the initial dropped required for a marble to complete a loop-the-loop. Then we will set the pipe insulation to a fixed size for the loop and test the marble on the track, because it will determine what the minimum height for the starting point would be. In order to conduct this experiment, we started by cutting the pipes to create a track. Next, we bent the pipe to create a loop-the-loop. Then we ran a glass marble down the track. Finally, we recorded the data we gathered from this experiment. Six experiments were conducted in order to receive our conclusion. The height of the starting point ranged from 2ft. 5in. to 3ft. The result of our test was that the minimum height required is 2ft. 10 ½ in. We realized that if it's too high or too low, then it wouldn't complete the loop-the-loop. Our hypothesis was correct. The procedure we stated in the hypothesis actually got us the results we needed and wanted. We also realize that height is significant for something to complete a loop-the-loop.

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Proj. Title:

Student Name(s):

Fair Category

Abstract:

The purpose of our project was to discover the affects of air particles on air quality in various locations. After choosing four specific locations (front porch, backyard, parking lot, science classroom), we completed an experiment involving three trials to collect our scientific data. This data would help us determine which site had the cleanest air quality. We also utilized three different variables (control variable, independent variable, and dependent variable). We placed Vaseline on the center of milk carton squares which were placed at the four specific locations to capture any air particles present. The data was collected and recorded after a period of five days. During our experiment, we hoped to prove the air in the science classroom was the cleanest to support our hypothesis. As we examined our results, we discovered many pollutants were present in the air we breathe. This was most evident in the results collected from the parking lot. Due to chemical pollutants given off by cars, trucks and machinery in our area, the particles collected at this location had the highest results. The other outdoor locations collected fewer but significant amounts of particles on the squares. It was evident, after three trials, the air in the science classroom yielded significantly less air particles on the squares thus supporting our hypothesis. We concluded one reason was because the school air is controlled therefore less affected by outdoor pollutants and environmental factors like at the other locations. We were pleased to find our results supported our hypothesis.

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CSEF Official Abstract and Certification

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Our goal was to determine the effectiveness of different plastic storage bags/containers in preventing food spoilage. We tested different forms of plastic (as polyethylene) used in different brands of baggies/ containers. Experiments conducted included permeability, moisture loss, nutrient loss, and antioxidant loss. •The common Polyethylene (as Saran) was ineffective with high permeability, high nutrition loss, and very high spoilage levels (within 24 hrs.) •Polyvinyl Chloride (Ziploc bags) kept foods freshest- with the least permeability and least nutrition loss. •Polypropylene (as Ziploc or Pack n' Snack) had a high permeability allowing oxygen and moisture to spoil food quickly. •Nutrition loss (35- 50%) was greatest with Polyethylene (PETE+ LDPE). The other forms of plastic prevented spoilage for a maximum 48 hours. •Fenugreek (paper storage) lost moisture but preserved some nutrient content. To prevent food spoilage chose plastic products wisely; some of the thinner wraps and baggies had very high permeability, with moisture trapped in containers adding to nutrient loss and food spoilage. Know how to keep food fresh and shop sensibly to avoid a "Plastic Peril".

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Word Count

Abstract:

Due to recent increase of hurricanes near Connecticut, my partner and I wanted to design an experiment that could weaken hurricanes. Since hurricanes intensify when in warmer water, our objective became to find a way to cool down water while factoring in the salinity of ocean water. Thus, our project tries find out how the salinity of ice affects how much it lowers the temperature of boiling water. We figured this out by taking 200g samples of ice with different salinity levels, placing them in 400g bodies of boiling water, and measuring the temperature of the solution when the ice melted. Our initial hypothesis was that the saltier the ice, the more it would cool down the boiling water. Since salt lowers the melting point of ice, the saltier ices would become liquid at a much colder temperature than pure ice. In addition to this, water's specific heat is two times that of ice. Therefore, since the saltier ices would become liquid before the pure ice, we assumed it would absorb more energy from the boiling water. However, our experiment proved otherwise. In the end, the more salt added to the ice, the less it cooled down boiling water. We realized that this was because salt water could not fully freeze into ice; therefore the pure ice had a greater latent heat of fusion than the salt ice. In conclusion, we realized that the best way to cool down water would be to simultaneously extract salt while adding pure ice.

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CSEF Official Abstract and Certification

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Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Abstract:

Our project's purpose was to see whether a homemade hydrogen fuel cell or a rechargeable battery would power the variables longer. During our experiment, the rechargeable battery was able to power all of our variables, but the fuel cell was unable to power any of our variables. Just because our fuel cell didn't power anything, it doesn't mean that this project was useless. This is because, now anyone who looks upon our project may be able to perfect it, thus bringing us one step closer to achieving this hydrogen powered resource. Our conclusion was that our hypothesis was correct because the hydrogen fuel cell couldn't power anything, and the rechargeable battery powered the variables for a longer time. The hydrogen fuel cell was unable to power any of our variables because there wasn't enough amperage. We learned that you need both amperage and voltage to complete a successful fuel cell. For our procedure, we filled a glass with water, stirred in a spoonful of salt, and taped a Popsicle stick to the top. We taped a battery clip to the stick; we used the wires from a different battery clip by twisting them to the wires on the stick. We twisted platinum coated nickel wire around a nail and twisted it where the two battery clip wires meet. Then we clipped the ends of the alligator clips of the jumper cables to the wires. We clipped the free ends of the jumper cables to our variables.

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

Abstract:

A popular topic in golf is which golf ball is the best for me to use. A lot of people will say the most expensive or the one with the most layers of material. For our experiment we chose to show you the best golf ball at the cheapest price. We did this using a trebuchet, a machine that we made to accurately launch the golf balls with consistency. For our experiment we used 5 different types of golf balls including golf balls from these brands: Titliest, Callaway, Precept, Taylor Made and Top Flite. We tested our experiment at Wolcott field. We launched each of the five golf balls four times and recorded the measured distance travelled. We found that the Callaway golf ball had the greatest average flight distance (241 feet). We compared the measured distance to the calculated distance based on the projectile motion equation. We found the Callaway to be 32% of theoretical distance. This is less than 100 % due to friction, wind and launch angle. We conclude that the best golf ball is the Callaway based on the maximum average distance and the mid range price.

Word Count

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CSEF Official Abstract and Certification

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Student Name(s):

Fair Category

Word Count

Abstract:

When using natural dyes, it's said that using mordants will improve the color, and the dye will stay in longer. We wanted to know if mordants should be used when using natural dyes. If we add a natural dye and a mordant to a fabric, then the mordant will make the dye stay in longer and improve the color of the fabric, because mordants have chemical links that fix the dye to a substrate by combining with the dye pigment. For our experiment, we used five white fabrics; wool, cotton, denim, linen, and polyester. We used dried blueberries as our natural dye, and one mordant; alum. We began by collecting dye from blueberries by soaking them in water. We then cut the fabrics in half, one half for the alum fabrics, and the other without. We dyed the non-alum fabrics in the dye, then added alum, and dyed the rest. Three days later, we took results on the fabrics, and washed each group of fabrics separately. In three days, we took results, and repeated the washing process. After five washes, we took final results. Through our five trials, we noticed that the fabric's color continually faded. After we dyed the fabrics, they were all a purplish color. By the last wash, the denim was a light purple (alum), and a light blue (non-alum), linen was a light blue for both, polyester was white for both, cotton was blue (alum) and a light blue (non-alum), and wool was white for both. We showed that mordants should be used when dyeing fabrics with natural dyes.

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CSEF Official Abstract and Certification

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Student Name(s):

Fair Category

Word Count

Abstract:

Have you ever wondered what would be the best weight for an object to be launched from a trebuchet? Well that's what has been tested! The original purpose of the experiment was to test if weight had an effect on the distance that the objects traveled. The hypothesis proposed that the heavier the object is the farther it will go. Using a trebuchet that was built from scratch, three different objects were launched with the following weights; 4.6 grams (glass marble), 2.1 grams (clay marble), and 0.8 grams (plastic marble). During the experimental process it was determined that weight did not have a significant effect on the distance that the object traveled. It was determined that the middle weight (clay) marble was the most consistent and had the furthest average distance traveled. The conclusion has been made that if a marble was going to be fired, the best material for it to be made of is clay- not because of its weight, but rather because of its well gripped surface material. The surface of the clay marble was rough and easily grasped, therefore increasing the friction between the object and the trebuchet, compared to the smooth and slippery surface of the plastic and glass marbles. The plastic and glass marbles were not nearly as consistent (fired successfully) as the clay marble, because they kept slipping out of the Trebuchet. Therefore if this experiment was re-run all the marbles would have the same surface material, but different weights.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment was to test how heat treatment affects the hardness and amount of energy that it takes to break a steel sample. Our hypothesis was, "If steel is heat treated at different temperatures, then the hardness and resulting impact energies will be different because when steel is quenched after being heated, it will break the easiest. When it is heated for another hour at 149° C (300° F), it will become a bit harder. This is also true for 316° C (600° F) and when we heat it to 482° C (900° F), it will be the strongest. Therefore when it is the strongest it will take more energy to break." We tested 12 samples in the Materials Lab at CCSU. All were heated to 843° C (1550° F) in a High Temperature Heat Treatment Furnace, then quenched in a bucket of water. Nine samples were reheated in a Laboratory Heat Treatment Furnace; three each to the different reheat temperatures, and three were left alone (control). We then tested their hardness and measured how many Joules it took to break them using the impact hammer. The average hardness for the controls was 37.4 HRC (Hardness Rockwell C-scale), 45.6 HRC for 149° C, 39.2 HRC for 316° C, and 29.6 HRC for 482° C. It took an average of 3.1 J to break the control samples, 4.5 J to break the samples heated to 149° C, 6.7 J to break the samples heated to 316° C, and 60.1 J to break the samples heated to 482° C. This data supports the fact that the higher the temperature that a sample is heated to, the harder it is and the more energy it takes to break it.

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CSEF Official Abstract and Certification

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

We are experimenting to find which type of toe pads provides the most comfort to a dancer en pointe. Dancers experience pain while in pointe shoes, so it is important for them to own a good pair of toe pads to use. We are trying to figure out which toe pads are the best. We are testing to see how long a dancer can stay on pointe while wearing the different toe pads. We will record the duration of time that the dancer can stand on pointe. The toe pads that the dancer can stand on for the longest amount of time will be the best. We believe that the toe pads where the gel spots surround the big toe on the foot will be the best and most effective. The big toe is where the most amount of pressure goes when a dancer is on pointe, so if the gel spot is positioned on the big toe, it will provide the most comfort for the dancer. It is very likely that this type of toe pad will be the best. Gel spots provide relief for dancers, because they are made of gel and they are flexible. The toe pads with the gel spots surrounding the big toe will most likely be the best for the dancer to stand on when using pointe shoes. They provide relief, because most of the pressure goes to the big toe. That is why they will probably be the most effective for the dancer.

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CSEF Official Abstract and Certification

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Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Abstract: This experiment was conducted to determine if color effects light refraction. Light refraction is the angle at which a light beam bends when going through two or more substances. The refraction of light was measured by shining a laser through Jell-o. A red laser beam was shined through four different colors of Jell-o. Then, the angle at which the light bended was measured using a protractor. The average angle of light being shined through all four Jell-os were different. The light beam that was shined through the yellow Jell-o had the greatest bend, the clear had the second greatest bend, the red had the third greatest bend, and the laser beam did not shine through the blue Jell-o making the information unavailable. Based on the results of this experiment, light refraction varies greatly between colors.

Word Count

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Word Count

Abstract:

Living in the twenty-first century, we have seen a large range of natural disasters, including earthquakes and tsunamis. Concluding that the tsunami barriers used today have proved relatively ineffective, our experiment was to design and test different barriers in a controlled tsunami tank, with a scale of 4 meters per 3 centimeters. Two different types of beaches were used. One beach, with a steep slope, was that of an island (i.e. Hawaii, Japan, etc.). The other beach tested was without as steep of an incline, representing continental shorelines. Designs behind the barriers were based on the structure of a tsunami. They are constantly pulsing forward with energy; that movement was what needed to be broken up. The barriers tested were a sea wall, troughs, and a wedge. Each cement barrier was constructed by hand. The molds used were also hand-made. Based on research, the hypothesis was that the barrier that made the wave take the longest to reach the beach was the most effective one. In a wave "tank", or plastic bin, a miniature beach was set up at one end. The wave was generated by submerging a lid in the water and lifting up. The wave created traveled at a life-sized scale of an average of 150 kilometer per hour wave. Using a controlled wave, it was discovered that a wedge provided the most protection for sloped beaches, and a seawall best protected the level beach.

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Student Name(s):

Fair Category

Abstract:

Buoyancy is the upward force of a fluid on an object placed in it. As an effect of this objects float. Density says how heavy something is in relation to its volume. In our experiment we are measuring buoyancy of different boats by measuring the amount of water our boats displace. To test this experiment we built three boats with different volumes and densities. We constructed all of the boats with a constant mass by using the same amount of poplar wood. We had gathered two bowls one bigger that the other. We filled the small bowl to the brim with water and place it in the bigger bowl which was empty. The next step was to place the first boat into the small bowl. We measured how much water the boat displaced wrote down the results and refilled the bowl. We followed the same procedure for the next two boats. The boat with smallest density (boat 1) displaced the least water and after two tests it averaged 63ml of water. The second boat (boat 2) displaced an average of 73ml between two tests. Boat three had the biggest density and displaced 82ml on average. Therefore the boats with smaller densities are the most buoyant and have a smaller chance of sinking. If we were to do this project again we would either use a different amount of boats or a different type of wood.

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Student Name(s):

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Word Count

Abstract:

The purpose of this project was to experiment with the eco-friendly, innovative system called Maglev. Essentially, we wanted to see how it works and possibly alter and find a way to improve the design. By using our knowledge of friction, the Laws of Magnetism, and aerodynamics, we did so. The hypothesis for this segment was, "If we altered the design of our original Maglev train (control) by using lighter-weight materials, then the design would be more efficient because there would be less friction between the train and the guide-rails; thus, the train would gain velocity." We built a concept model to simulate the way a real Maglev train would function. Once it was all set up, we did four experimental series for velocity, acceleration, force, and work. We determined that the lighter "trains" made from materials which caused less friction were faster and more efficient than those that were heavier and made from materials that cause more friction. We saw that on average, a train made from cardboard was 2% more efficient than a train made from wood, and a train with added weight is 0.65% less efficient than a train with no added weight. This project is important when it comes to real life application because currently there are only two commercial Maglev trains operating in the world, and neither of them are in the U.S. Through our research and testing, we hope to take a step towards changing that.

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Fair Category

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Our project was designed to test how mass affects centripetal force. We started our process with research on centripetal force in general. In our research, we discovered that mass does indeed affect centripetal force. We decided to test this by measuring how marbles of different mass travel through Jello when a centripetal force is applied. At first, we obtained three marbles of different masses, one heavy, one light, and one, our control, in between. We then got two different colors of Jello, and poured nine cups half full with red Jello. Next, we placed the three control marbles in the center of three of the cups. After that, we filled the rest of those cups with orange Jello. We then had Charlie swing the cups around his head for twenty revolutions. Afterwards, we carefully removed the Jello from the cups and measured how far the marbles had moved. We repeated this for the lighter and heavier marbles. We examined our results, and learned that the more mass an object has, the further it traveled, and the more it was affected by centripetal force. This proves our hypothesis was correct. Afterwards, we compared our results with those of other experiments, and found that their results were the similar to ours. This helps us know that our results are valid. This experiment has many real world applications, because it is a very broad topic. For instance, when you are riding in a car or a roller coaster, turning involves centripetal force.

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Fair Category

Abstract:

We asked the question “Does the weight of a marble affect the speed of the drop down a tube?” If we drop different sized marbles down the same length tube every time and timed it each time, then the largest weighted marble will go down the track the fastest, because it has the most amount of gravitational pull. We started off by taping the Styrofoam tubes together. We then got the smallest marble and rolled it down the track and recorded the time. We repeated this two times for each marble. We then kept doing this until we got to the biggest marble and rolled it down the track three times. When we did this we saw that the marble went down the track at slightly, but not the same time. They were about a second to less than a second apart. We concluded from our data that the largest sized marble went down the track the fastest, therefore our hypothesis was correct. It was because that the marble had the most gravitational pull on the ground. That is why none of the other marbles went down and had the least amount of time over all of the other marbles.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
4047

Student Name(s):

Fair Category

Abstract:

This experiment was conducted to find a way to best prevent topsoil erosion on sloped areas. In the experiment, grass, gravel, floral netting, and a drainage system were tested to see if they could prevent topsoil from eroding. Each of the pans was landscaped to simulate a landscaping method, the pans were set on an angled board, and water was poured at the top of the slope. Then, the runoff was collected at the bottom in a cup. Later, the water was strained using a coffee filter, and the topsoil that had eroded was weighed. The results were very interesting, but not as consistent as predicted. This may be due to some possible errors throughout the experiment. Overall, the experiment was successful and yielded positive results.

Word Count

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this project was to investigate the use of alternative energy to power a model car and determine if different color filters affect a solar cell's conversion of light energy to electrical energy. After examining how gear ratios affect the speed of the car, a solar powered model car was constructed to collect data using different lighting conditions (sunlight/artificial) and different filters (red, purple, yellow, green and no filter). The first car constructed was tested using sunlight only. It would not perform consistently under artificial lighting. Multiple trials were run during sunny days and cloudy days. The time it took the car to travel a given distance was measured and recorded. Additional trials were done with different color filters while measuring time to travel a pre-measured distance. A second car was constructed with a solar panel that could be used indoors or out. The tests run during part 1 of the experiment were repeated with artificial light and sunlight. Total distance traveled was divided into smaller intervals and the time was measured for each interval to determine if the car's speed varied within a trial. The car's speed was the slowest with the red filter and the fastest with no filter. The speed changed since different colors of visible light have different wavelengths and different amounts of energy. Red has the larger wavelength and the lower frequency and energy. Distance of the indoor light source from the solar cell and light bulb wattage also affected the car's speed.

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:
5002

Student Name(s):

Fair Category

Word Count

Abstract:

I made a model tsunami to study the effect of water depth and varying sea floors on tsunami wave velocity. Sea floor contours can influence the tsunami wave. Natural features like reefs and bays can dissipate a tsunami's energy. When a tsunami wave hits shallow water as it nears land, the wave velocity and length increase due to the energy of the wave's relation to the length and the square of the wave height. If tsunami waves can be made slower and shorter by varying the water depth and sea floor at the coastline, mimicking natural sea floor features, then it can follow that the disastrous effects of the tsunami could also be lowered. I created a mock sea using a long storage bin filled with varying levels of water (2-6 cm) and 2 types of sea floors: smooth & sandy and rough & rocky. I dropped a wood block ten times each into the bin under the varying conditions to make a wave and measured the time in seconds it took for the wave to travel from one end of the tank to the other. I also recorded the height of the wave as it hit the end of the tank. The results show the deeper the water the lower the wave height, and the more varied the seafloor the slower the wave speed, which makes me believe a more uneven, unlevel rocky seafloor and deeper water at the coastline can lead to smaller tsunamis.

Special Categories Selected by Student:

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Proj. Num

Student Name(s):

Fair Category

Word Count

Abstract:

A hovercraft is an amphibious vehicle that is supported by a cushion of slightly pressurized air. Although often seen as high-tech, and even a bizarre mode of transportation, hovercrafts are actually quite simple. My hovercraft was constructed out of a cd, balloons, and a sports pop-top cap (not nearly as exciting as a real one). When inflated, the hovercraft would slide on the floor until the ballon completely ran out of air. I used three different sized balloons and ran three different trials. I used a small,medium,and large balloon. The small balloon was not nearly capable of powering my hovercraft. The medium balloon had almost enough air to power the hovercraft, but not quite. The large balloon had enough air to power the hovercraft. After I gathered my results, I concluded that the more air you have the hovercraft use, the better the hovercraft will be powered. A hovercraft has a cushion or "skirt" on the bottom. In order to hover around, there needs to be enough air produced to push the hovercraft up. The more air that is produced, the higher the hovercraft will hover. That is why hovercrafts have fans attached to the rear of them. The fans are used to push the hovercraft forward and backward. They are also used to keep the hovercraft hovering.

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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:

The purpose of this experiment was to create a bioplastic film that could be used to make compostable shopping bags. Phase 1 used six different starches, glycerin, corn syrup, water, and vinegar, to create and cure over 100 formulas. Samples were evaluated for tensile strength using a self-designed, homemade tensile strength device. The samples were sent to a commercial tensile strength tester for comparison data. Bioplastic samples from each type of starch were tested for their ability to biodegrade in Phase 2. Samples were subjected to burial, composting worms, water, and photo-degradation. Samples were weighed before and after testing to measure degradation. The best bioplastic sample is determined by strength, flexibility, durability, and degrading potential. 100% of the formulas without glycerin resulted in samples that were too brittle to test. Other formulas were too thick to produce a bag or took too long to cure. Corn starch films averaged the highest tensile strength at 23.69 kg/cm², and accounted for 50% of the top 20 strongest bioplastic films. Arrow Root produced the most even, flexible films; accounted for 25% of the top 20 strongest samples, and yielded the strongest overall bioplastic measuring 87.06 kg/cm². Bioplastic samples were also ranked by the ability to biodegrade. Xanthan Gum samples degraded completely in water within 24 hours and within 2 weeks using soil and photo-degradation. In conclusion, it's possible to make an inexpensive bioplastic film that's both strong and biodegradable for making plastic bags. Using bioplastic bags would reduce the amount of fossil fuels used to produce bags and decrease waste in landfills.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Proj. Num

Student Name(s):

Fair Category

Abstract:

I did a modern version of the experiment conducted by Jacques Charles to discover the relationship between volume and the temperature of a gas. I used a syringe, thermometer, wooden block with two holes for holding the syringe and thermometer, chopsticks, rubber bands, cooking pot, water, and ice as the materials for my experiment. With the syringe held in the water that was in the cooking pot, I added different temperatures using ice and heat from the stove to see what happens to the volume in the syringe when you change the temperature. From all three trials of this experiment I learned that my hypothesis was true, the volume increases as the temperature increases and vice versa.

Word Count

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CSEF Official Abstract and Certification

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Num

Proj. Title:
Num

Student Name(s):

Fair Category

Word Count

Abstract:

Max Landolina The Science Fair Project's title was "How Can Water Help Win A War?" The experiment was conducted in the year 2012 and the construction of the board happened in the year 2013. The reason that the project was chosen was because there are people in the family that went into the army and navy. There's also a lot of engineering in this project, too. The hypothesis was basically that a large wave will greater effect an aircraft carrier's stability because of the more mass and force that it has, and that a wave would greater effect an aircraft carrier's stability by hitting it's bow, than if a wave with that same size hit the stern. The stability of the aircraft carrier was tested. Placing it in the bathtub, and then dropping different weights that created a small, medium, and large wave tested this. While applying slight pressure to the boat, the ruler that came vertically up from the boat held a marker that recorded (on the graph paper) how many centimeters of range the line changed. In the end, the first hypothesis was not rejected, but the second was not. This is because the large wave affected the ship's stability the most, but the boat's stability was greater affected when the wave hit the stern, rather than the bow.

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CSEF Official Abstract and Certification

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Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Abstract "Bernoulli Effect: The Magic Ball" This report is about the Laminar flows, air-velocity and pressure, how they are related and how things are affected by them. This is known as the Bernoulli affect. This presentation also includes two live demonstrations that explain the equations and principles of Bernoulli. The first demonstration will show that in laminar flow keeping air velocity around a sphere constant will keep the sphere centered in the flow stream because the pressure is equal on all sides. The second demonstration will show the changing the velocity of the airflow between two objects will lower the pressure between them making them come together.

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:

Less than 0.1% of the world's energy comes from solar panels. The use of solar panels has elevated by about 20% each year over the past 15 years due to rapidly falling prices. Unfortunately, less than 20% of the sunlight that actually arrives at the solar panel is converted into electricity. Peak sunlight levels, 1000 Watts of sunlight per square meter, is when solar panels produce the greatest amount of electricity. However, the true value of energy generated depends on the actual amount of sunlight that reaches the ground, called insolation. If the angle at which solar panels are installed is adjusted, they will become more useful to the world due to their new and improved efficiency. The experiment was conducted in a high sun environment zone and the angle of the solar panels was measured with a protractor. The outcome of the produced energy was determined by a voltmeter. When the solar panels were angled perpendicular to the sun, they demonstrated the greatest power output. Future work could involve creating motorized solar panels that orient themselves perpendicularly to the sun's rays.

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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 experiment was to build and program a robot that would solve the Rubik's cube and to learn about the algorithms. Research was done to locate solver algorithms and building directions. Two algorithms were examined. Some problems were encountered and resolved during the building process. After construction was completed, an NQC algorithm was installed on the NXT brick. Then the completed system was tested. After many trials and adjustments the robot would solve the cube. Next, testing began to learn about the algorithms. The robot was used to collect data to understand how the algorithms work to solve the cube. The cube was scrambled and the robot was used to identify the number of moves to solve it. The test was repeated with the same scrambled cube for 24 possible orientations. Multiple trials of this test were run to determine if the orientation of the cube would affect the solution the robot computes. The cube was scrambled with different numbers of rotations. After scrambling, the number of moves needed to solve the cube was compared to the number of rotations to scramble it. Testing was also performed to measure the average number of moves to solve the cube. Initially, the cube would fall during the solving process. When trials were completed, the data indicated that that the amount of moves computed by the robot to solve the cube was affected by the orientation of the cube. The average number of moves to solve each cube was 47.

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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:

Recently, my family purchased a farm in Ohio. Last year, my brother and I purchased 50 baby chicks for our chicken coop and the first time we put them in the chicken coop, none survived the night. After additional work on the chicken coop, we realized that a good way to keep the chicken coop safe was to electrify the perimeter of the coop. Unfortunately, the coop can not be electrified because the electricity to the building was cut. Instead, we decided that we should try to electrify the chicken coop using wind power, a renewable resource. As a starting point, I decided to see if I could generate enough electricity using a wind turbine to charge walkway lights. I started by researching a few different types of wind turbines and decided on a vertical axis wind turbine (VAWT) rather than a horizontal axis wind turbine. I tested two different types of motors that did not generate enough electricity at the wind speeds in our area and then changed to a three phase wind turbine. The three phase wind turbine was able to generate enough electricity to charge a AA battery. Since this design was to power walkway lights, I needed to have a way for the light to not go on during the day. On this part of the project, I needed additional help from my father who built me a 'black box' which uses of a light sensor to detect light. If the sun is not shining, the sensor detects the lack of sunlight and turns on the walkway light but keeps the walkway lights off in the daylight. Using this VAWT, I worked on the efficiency of charging the battery by modifying the fin designs using three different fins, increasing the number of magnets and using different substances to reduce the friction in the shaft of the vertical axis. I tested the different configurations using a fan and a voltmeter to test to see which configuration generated the highest. Most consistent amount of electricity. I found that the circular plate with attached fins, two set of round magnets and liquid lubricant

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
5014

Student Name(s):

Fair Category

Word Count

Abstract:

The experiment was conducted to determine which type of light bulb was most efficient: incandescent, compact fluorescent, or LED. The efficiency was determined by comparing the light output from the different light bulbs. A photometer was used to measure the relative intensities. The photometer was positioned between two light sources and moved back and forth until the two wax blocks inside the photometer were equally illuminated. The distance from the wax block to the control light source was measured. This measurement and the inverse square law were used to calculate the relative intensity. The efficiency of each bulb was calculated by dividing the relative intensity by the bulb wattage. The incandescent bulb was least efficient because more of the electricity it used went into producing heat. Based on the results of this experiment, the 60 watt LED bulb was the most efficient. The 60 watt LED was more efficient at converting energy into light because less energy was lost as heat.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The refrigerator is an everyday item we use. Have you really thought about how it works? If you took an educated guess you would probably say, cold air is put in an insulated box to keep product cold, right? Well, you're sadly mistaken. Really heat is being taken out of the insulated box and the product. I am proving the transformation of heat in a refrigerator by running a test showing the temperature before the basic refrigerator is turned on and the temperature before I shut it off. A simplified explanation of the basic refrigerator is heat is absorbed from the insulated space through the refrigerant, in the Evaporator. Then the refrigerant releases its heat in the Condenser. Intern the Condenser fan motor blows the heat off the Condenser. When I started my test I looked at the Evaporator and Condenser temperature. (They were both at room temperature.) Then I let it run for 10 min and I came back. The Evaporator's temperature was -24 degrees Fahrenheit and the Condenser was 88 degrees Fahrenheit. My test proves my Hypothesis is correct. The refrigerator takes heat out of the product and insulated space it's in. It is shown through the Evaporator's temperature dropping and the Condenser temperature rising.

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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 consume coffee, tea, and cola (soda) on a daily basis. These drinks have a staining impact on human teeth. I wanted to determine what beverage stains teeth the most and does brushing with a teeth whitener help mitigate the impact of the staining. In order to test this hypothesis I hollowed out 6 eggs and prepared containers with coffee, tea, and soda. I used eggs to simulate teeth since both eggs and teeth are made from a calcium base. Eggs contain calcium carbonate and the enamel of teeth contains calcium phosphate. I submerged the eggs in their respective containers for ten minutes every day over a 15 day period. Two eggs were allocated for each drink. One of each egg was replaced into the egg container and the second egg was brushed with a toothpaste that contained a whitener. I tracked the results on a daily basis. My results show that tea had the highest amount of staining followed by soda and then coffee. The results were the same for brushing the eggs with the whitener. Tea contains tannins which gives tea its color. Tannins add color and flavor for tea. It is also found in red wine. Based on my research tea had the strongest staining but soda is the worst daily drink overall for teeth because of the high sugar content and artificial chemicals. This project is a small sample based over a 15 day period. As people age, their teeth are exposed to these staining drinks over many years. The enamel on teeth weakens over time and becomes more porous. This aging process exposes the teeth to a higher impact from staining from these daily drinks. People should use caution when they choose their daily drink if they are concerned with staining their teeth.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
5017

Student Name(s):

Fair Category

Word Count

Abstract:

The exploration of how to effectively use organic matter to create viable biofuels is necessary as our energy needs continue to increase. I wished to test the use of orange peels as a biofuel. Briquettes with different proportions of orange peels to sawdust were tested. I hypothesized that the briquettes containing higher proportions of orange peel would make the better biofuel. Orange peels were collected, dried, ground up and mixed with sawdust. The mixtures were pressed together in a homemade briquette press and the briquettes were then oven dried. A moisture test was done to ensure the briquettes were completely dry. The briquettes were tested by lighting them, placing them under a pot of water for 10 minutes and recording the water's temperature. The orange/sawdust briquettes successfully heated the water. The briquettes with the highest proportion of orange peel resulted in the highest water temperature, reaching 100F.

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

My grandmother had some damage to her flat roof from snow building up on it during winter storms so the objective of this experiment is to find out what roof is best for a New England home. Is a flat roof or a pitched roof better? For my experiment I built two houses, one with a flat roof and one with a pitched. I added one cup of snow on each of the roofs every five minutes for a thirty five minute time period. I measured the snow build up on top of the houses and the inside height of the roofs. I started to see that the snow was building up on the flat roof more than the pitch roof. The flat roof began to cave in from the weight and the pitched roof did not move. The snow on the pitched roof melted faster and started to slip off. The snow on the flat roof stayed longer. The results from my study show that pitched roofs are better for a New England home than the flat roof. The snow on the flat roof melted slowly, if we were to have another snow storm all the snow would not be gone. The new snow would add more weight making the roof unsafe and possibly cave in. This experiment can help people choose the best roof when building or purchasing a New England home. This experiment should start a new study on how to build a stronger flat roof.

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

I was interested in investigating the properties of soap bubbles, particularly surface tension, and how changing those using glycerin would affect how long the bubbles lasted because the surface tension would be lowered. Glycerin is a popular tool in experiments, so I thought it would be a good tool. I conducted the experiment by using a plain solution and using a bubble fan to produce a bubble and timing how long it lasted. Then I did the same thing adding 1/4 teaspoon of glycerin and with one teaspoon of glycerin. I repeated this seven times. Then I analysed my data. The solution with 1 teaspoon of glycerin lasted the longest, on average. My hypothesis was correct. Lowering the surface tension did affect it positively. In conclusion, I learned that glycerin is a good additive to bubble solution to make the bubbles more durable. Also I learned how much surface tension affects the bubble, and it can make the difference between whether it will last at all or not. I think that in doing this experiment I could have used a room with a higher ceiling. I think that the experiment turned out well and I am happy with my results.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Comparative Study of Three Renewable Energy Sources: Solar Power, Wind Power and Hydroelectric Power

Student Name(s): E. Guerrero

Fair Category

Abstract:

The purpose of this experiment was to construct three renewable energy devices and determine which device would be the most energy efficient. I set out to prove that the hydroelectric turbine would be the most energy efficient device compared to the wind turbine and solar panel. The solar panel was constructed using a CD case, copper and cuprous oxide plates and salt water. The vertical axis wind turbine was constructed with four plastic turbine blades attached to a homemade generator constructed with magnets and copper wires. The hydroelectric turbine was constructed using a plastic bottle, a spinning wheel and the homemade generator. Each device was tested following their individual protocol. The energy output was measured with a voltmeter and the energy efficiency of each device was calculated. Upon completion of the experiment, it was determined that the solar panel was the most energy efficient (0.132%) renewable energy device compared to the hydroelectric turbine (0.0128%) and wind turbine (0.0037%). Although my hypothesis was not supported by the results of my experiment, I believe that the solar panel design was superior to the two turbine designs due to its basic design. Therefore, reconstructing the hydroelectric and wind turbines by reducing friction would most likely increase their energy outputs. The results of this experiment may be useful to engineers around the world. Solar power, wind power and hydroelectric power are effective renewable energy sources that can save our environment for future generations.

Word Count

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Everyday, millions of cars release heat into the atmosphere contributing to global warming. The purpose of this experiment was to demonstrate how a Peltier cell can be used to generate electricity from heat that would otherwise be wasted out of a car's exhaust pipe. A Peltier cell is a module that generates electricity when there is a temperature difference between the two sides. I created an assembly using two Peltier cells that I attached to the car's exhaust system. The temperature difference between the hot exhaust system and the cold outside temperature produced various voltage readings when the car was driven on four different road conditions: in my neighborhood, on a state road, and at two different locations on the highway (level and uphill). My prediction was that the faster the car drives, the hotter the exhaust pipe becomes, hence the bigger the temperature difference and the higher the voltage. The results turned out to be very close to my prediction, with the exception that the lowest voltage was on the state road and not in the neighborhood test.

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Student Name(s):

Fair Category

Word Count

Abstract:

The objective of this experiment is to explore the possible differences in the salinity levels of bodies of water that flow into each other. I wanted to test the waters from various bodies of water that all share a connection to each other, to see if their levels of salt are the same or different. My research led to the hypothesis that the bodies of water I sampled would have varying levels of salinity. I collected water samples from different locations across Connecticut in which all the bodies of water flowed into each other at some point – a bay, a marina, a beach, an estuary, a river, and a cove. I weighed each water sample and recorded the results. I then evaporated the water from the samples, so that only the salt was present. Next, I calculated the amount of salt present in the waters and the salinity level of each. To do this, I weighed the salt left behind after the evaporation process. The weight of the salt itself was the amount of salt present. I then took that number (in grams) and divided by the amount of water originally present in each sample (in liters) to calculate the salinity of each sample. My experiment proved my hypothesis to be correct. Although the bodies of water from each sample location flowed into each other at some point, the salinity level in each sample of water was very different.

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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:

My research has shown that speed, size, and weight of an asteroid will affect the overall size, including diameter and depth, of a crater created on a simulated lunar surface. In my experiment, the asteroids were represented by two different spheres with variable weight and size. I hypothesized that speed, size and weight of an asteroid will affect the overall size and depth of a crater formed on the lunar surface. Data showed that the heavier asteroid with the smaller diameter made a deeper crater than the lighter asteroid with a larger diameter. I calculated the speed of both asteroids using the formula: Distance = Rate (Time) with distance being the height in which the asteroid was dropped and time being the number of seconds it took the asteroid to fall. Solving for Rate, I noticed that the heavier Asteroid with the smaller diameter traveled faster than the lighter Asteroid with the larger diameter when dropped at 3 feet. However, the lighter less heavier Asteroid traveled faster than the heavier Asteroid with a smaller diameter when dropped at 5 and 6 feet. In summary, my results showed speed, size, and weight of an asteroid did affect the size of a crater made on a simulated Lunar surface. My data indicated the heavier asteroid had the greatest affect on the creation of a crater on the simulated lunar surface. This would indicate that speed, size, and weight of an asteroid would have the greatest affect on the Lunar surface.

Special Categories Selected by Student:

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Num

Proj. Title:

Proj. Num

Student Name(s):

Fair Category

Abstract:

H2O VS Gatorade Abstract In my research of H2O VS Gatorade, I found that water is composed of hydrogen and oxygen which helps you remove dangerous toxins, regulate body temperature metabolism working properly and body hydrated. Gatorade helps restore lost electrolytes which helps muscle function and keeps the body hydrated. In my procedure, I asked two basketball players on my team to help me test my research. Player 1 drank Gatorade and player 2 drank water. This experiment was to determine which drink hydrates the body best. I gathered data for 4 weeks using a scale of 1-10 (1 least thirsty and 10 more thirsty). I then took all the data results collected from the 4 weeks and came to my results for my conclusion. Player 1 who drank Gatorade was less thirsty than player 2, who drank water.

Word Count

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Proj. Title:

Proj. Num

Student Name(s):

Fair Category

Word Count

Abstract:

For my introduction I desired to test a light bulb and its filaments because I thought it would be interesting to learn about how energy travels through a light bulb. I decided that I would first create a light bulb, and then I was going to test three different filaments thicknesses to see which would keep the bulb burning the longest. I hypothesized that the thickest filament would burn the longest. I created a light bulb and used the 6 volt battery for an energy source. The result for my experiment was that the thickest filament allowed the light bulb to burn for twenty- five seconds but the filament barely glowed. The second filament allowed the light bulb to burn for forty-one seconds and the filament turned red. The thinnest filament turned an amber color and the light bulb burned for a minute and thirty seconds. If you ever went out and needed light you could use this experiment for my light bulb.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose behind this experiment was to establish if adding salt to distilled water increased the flow of electrical current. The expected outcome (hypothesis) was that if the amount of salt dissolved in water is increased, then the amount of electrical current that will flow through the salt water will also increase. The foundation for this project began with wrapping aluminum foil around two individual craft sticks and then attaching them to the positive and negative ends of a battery through wires. The two sticks were then placed in distilled water solutions. Test leads to a multi-meter were then attached to the battery and the voltage of the solutions was measured and recorded. The control for this experiment would be the non-salted distilled water. Several trials were done with increasing salinity to see if the electrical current would increase as well, proving the hypothesis true. The data from this experiment proved that the non-salted distilled water (control) held no electrical charge while the increasing salinity of the other trials showed that the greater the salt content of the water, the higher the electrical current. This experiment concluded that higher amount of salt in a solution increases the concentration of ions which enables a greater electrical charge, thus proving that the hypothesis was accurate.

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CSEF Official Abstract and Certification

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Num

Proj.
Num

Title: Impact of using ice-melting chemicals on the coastal waters surrounding the Mystic River Estuary, Beebe Cove and the Noank

Student Name(s): A. Garcia

Fair Category

Word Count

Abstract:

For my project, I studied the coastal waters in my neighborhood and any changes after a snowfall due to the chemicals used to melt the ice. Although, the amount of salt needed to melt the ice depends on the temperature in Connecticut, for every mile of highway lane, 215 lbs. of salt are used to melt the ice and snow. My hypothesis is that during the winter months, when salt is used to melt the ice and snow around the Mystic River, Beebe Cove and Noank, these bodies of water will have heavier salinity content. And this is important for all the negative things that these chemicals do to the fish and plants. I collected water samples from the Mystic River, Beebe Cove and the Noank public pier before it snows as a control. I then collected samples from each of these places every day after a snowfall. After collecting samples for 10 days, I used different tests to see if they can help me see any changes in the salinity of the water. The results from analyzing the samples using two drying methods let me observed that the salinity in the waters did increase after the snowfall. Comparing the results with an estimated number of miles or roads surrounding each of the three bodies of water, it was clear that there was more salt when there were more the roads around the waters it came from. My experiment confirms my hypothesis very well.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Imagine a world in which every vehicle around you is powered by a fuel cell and there is no more worrying about pollutants affecting the air. With my research we will be closer to having a vehicle that runs on a non-toxic and renewable substance that is easily contained, called hydrogen. The purpose of this experiment was to see if future designs of the Fuel Cell would have to be adjusted in order to accommodate a specific type of water that would provide an acceptable speed for highway and street use. For my research, I tested 2 different types of water to see how they affect the performance of the Fuel Cell. What I did was, put distilled water (bottled water) and tap water into the fuel cell to test how many yards it traveled in a minute. I did this test 3 times to make sure that the data was correct. To make sure that liquid from water A (distilled water) was completely removed from the Fuel Cell, I flushed the it out by replacing it with water B (tap water) three times. I predicted the distilled water would work better due to its purity. My hypothesis was correct in that the distilled water did work better, but the data was very close; concluding that distilled water is best, but tap water is also a viable secondary option.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Piezoelectricity is the creation of vibration when an object is under pressure, such as quartz in electric watches. In order to explore this phenomenon I am doing a crystal radio project. I first thought about this project when I was reading a science book on smart materials. Researching different kinds of smart materials I became interested in piezoelectricity. Searching for projects on piezoelectricity I came across a crystal radio project that I liked. My question was, "How does a crystal radio work?" In making it, we had to create an inductor by hand winding a coil over a container. At regular intervals we made a loop to create a tap to attach the antenna to, and added a germanium diode to one end. We put an alligator clip on 100 feet of wire to create an antenna, and made a ground wire by attaching another alligator clip to one end of the inductor and connecting it to an earth ground. Moving the antenna to different loops I got different radio stations. I was able to pick up on 2 football games in good quality, a jazz station in low quality, 2 rock stations in good quality, and a weather station in low quality. I can apply what this project has taught me by helping someone fix their radio.

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Fair Category

Proj.
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Proj. Title:

Student Name(s):

Fair Category

Abstract:

Abstract: This project is an Idea Generator. It is a program that helps you come up with a science fair or invention convention project. It searches the Internet for your question or keyword and comes back with the search results list from your keyword or question. The websites it will be using are Google, Bing, and Ask. The results will come up in a sorted page from minimum to maximum. That will tell you if it has been used often or if it was used rarely.

Word Count

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Student Name(s):

Fair Category

Word Count

Abstract:

The goal of this project is to determine the fastest method of cooling a can of soda with materials readily at hand? Based on the tests I performed I found the ice-water bath (combination of water and ice) is the fastest way to cool a soda. I placed three cans of room-temperature soda in each of the following cooling devices: freezer compartment, refrigerator, ice-only bath and ice-water bath. I measured the starting temperatures of the sodas then continued measuring the soda temperatures at fifteen minute intervals for two hours. I charted the average temperature of the soda over elapsed time for each environment. Although the other three methods eventually cooled the soda down to 40 degrees, none of them did so as quickly as the ice-water bath. My hypothesis was that the ice-water bath is the fastest way to cool a soda. My results support my hypothesis. I think the tests I did went smoothly and I had fun doing the experiment. I must admit I've always thought putting warm cans of soda in an ice-water bath was the quickest way to get them cool I wasn't exactly sure. Now I'm sure and I won't forget at my next family picnic.

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This project shows how to maximize the power of a gauss rifle. The rifle consisted of four neodymium magnets taped two inches apart on two wooden dowels. Each magnet had two steel balls attached on the opposite side from the starting point which is three inches from the first magnet. An extra steel ball is rolled slowly from the starting point to the first magnet to create a domino effect. Then, I measured and recorded the distance the last ball traveled from the last magnet. I predicted that if the spacing between the magnets is too close, the steel balls will not have enough time to accelerate to gain a lot of energy. I also believed that the last steel ball will not travel very far if the magnets are too far apart. After the first trial, I repeated the experiment four times by re-taping all four magnets with three, four, five, and six inches apart. I observed the result and it showed that three inches between each magnet produced the greatest distance. This showed that my hypothesis was right. The conclusion from my experiment is that to maximize the power of a gauss rifle, the spacing between the magnets could not be too close or too far apart.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title: "Burning" Calories-How much chemical energy is in different types of food?
Proj. Num

Student Name(s): M. Jarboe

Fair Category

Abstract:

The purpose of this project was to see how much chemical energy is in different types of food. The question was, "How much chemical energy is in different types of food?" Originally six foods were going to be burned and my hypothesis was that the peanut would have the highest amount. This experiment would happen by taking two different sized cans and cutting the top and bottom out of one (to make a cylinder) and the top out of the other (to fill with $\frac{3}{4}$ cups of distilled water. The food would be impaled into a needle which would be impaled into a cork and lit on fire and the cylinder would be placed around the flaming food. The can with water would rest, with a pencil through it, on top of the flame and the difference in temperature times the mass of water would tell the amount of chemical energy in the food. The controlled variable is the water in small can, the dependent variable is the chemical energy in each piece of food, and the independent variable is the food being burned in the calorimeter. After the experiment it was shown that the potato chip burned the highest amount with an average of 4,675 cal. Second was the peanut with an average of 3,116.6 cal. And last was the Cracker Jack, with an average of 366.6 cal. After the experiment was concluded, the hypothesis of the peanuts having the highest amount of chemical energy was rejected.

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 conducted an experiment to determine how differences in temperature affect magnetism. My hypothesis stated that if differences in temperature affect magnetism, then the coldest temperature will provide the highest level of magnetism. Magnets can be used in medical technology such as magnetic resonance imaging, or MRI, that can look far into the human body without touching it. I learned that the magnet used in MRI machines must be kept extremely cold so I wanted to test if a magnet's temperature affected its performance. During my experiment, the same magnet was placed in a 0°F freezer, a 37°F refrigerator, room temperature, a 150°F oven, and a 300°F oven. It was then placed in a bowl of BBs and lifted out. I gathered data by counting the number of BBs that remained stuck to the magnet. My hypothesis was supported because the colder the temperature of the magnet, the more BBs it picked up. Differences in temperature do affect magnetism. At the coldest temperature, the magnet picked up an average of 200% more BBs than at the warmest temperature. There was an inverse relationship between temperature and magnetic attraction. From my research, I learned that as a magnet is heated, the motion of the particles speeds up and becomes more random, resulting in less magnetism. On the other hand, cooling a magnet slows the particles leading to stronger magnetism. Identifying the best possible temperature for magnetism can help ensure that medical testing devices, such as MRI machines, perform at optimal levels.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Let's face it. None of us can go forward in our daily lives without electricity. Even though we all use it, most of us don't know where we get it from. That's the purpose of my project. To educate others on how electricity is made. To build this generator I used multiple pieces of wood, three hundred and eighty feet of copper wire, multiple screws, twenty four couplings, two pieces of acrylic, two light bulbs, and multiple washers. Before I wired the light bulbs to the generator I tested the voltage with a multimeter. I found that the faster I would crank the more voltage I got. Later when everything was wired and when I cranked the generator I found that the more voltage there was flowing to the light bulbs the brighter the light bulbs were lit. How the generator works is quite interesting, when the wheel with the magnets attached spins near the wire it moves electrons to the light bulbs thus lighting up the light bulbs.

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Proj. Title:
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Student Name(s):

Fair Category

Abstract:

The purpose of conducting this experiment is to see what level of psi will conduct the most energy and electricity. I changed the amount of wind power to see that what wind level would make the light bulb turn on. My hypothesis is that the 120 psi will make the most energy because it is the highest wind power. Using a compressor as a simulated wind source I tested three wind powers to see which one would create the most energy. Also to see which wind power would light a mini light bulb. The 120 psi made the blades go the fastest. In turn the blades went so fast that they looked like they were bending a little. The results came out being so that the 120 psi was the wind level that made the most energy. Although the electricity created did not come out to be enough so it would turn on the light bulb. The 120 psi did not create the enough energy so, using further research to figure out why this happened I found out that the light bulb needed about nine volts to turn on. Since the 120 psi made 1 volt at the most it would need to make 9 times more of the amount conducted. Through the experiment conducted the hypothesis was proven correct because the 120 psi did in fact make the most energy. In contrast it was also proven incorrect since the light bulb could not be turned on.

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Title:

Student Name(s):

Fair Category

Abstract:

The Purpose of the experiment is to find out if different masses of an Alka-Seltzer tablet will release more carbon dioxide. It was predicted that 3.2 grams of an Alka-Seltzer tablet would release the most carbon dioxide. First all safety precautions must be taken and materials needed at the beginning of the experiment must be set up. For each crushed amount of the tablet , pour the powder into the water. Record the carbon dioxide level after every 10 seconds for about 70 seconds. The data collected showed that only 3.2 grams of the tablet released any carbon dioxide at all. It was predicted that 3.2 grams of the Alka-Seltzer tablet would release the most carbon dioxide. The data showed that while 3.2 grams of the tablet release a lot of carbon dioxide, the other lesser amounts released none. It is concluded that changing the mass of an Alka-Seltzer tablet does affect how much carbon dioxide is released. This experiment could be made better if more amounts closer together were added.

Word Count

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Word Count

Abstract:

The purpose of this test is to observe the rate in which the strength of magnetism relative to the amount of coils affects the rate of induction. My hypothesis was: if more layers of coil are added onto an electromagnet, then there will be a constant rate in the escalation of the strength of magnetism. The more coil, the greater amount of electrons that are induced into the core of the electromagnet. In this test, I recorded how the amount of coils on the core affects the amount of magnetism exerted by the core in terms of layers of coil. Each layer has approximately 30 coils. The wire had 8 strands of copper. The screwdriver, which was the core, had a 2.5 mm thickness. And I used 1.5 volts of electricity (one AA battery). I tested the amount of magnetism by seeing how many more micro screws the electromagnet would pick up whenever a layer of coils was added. The results proved my hypothesis to be accurate. Whenever I added a layer, the magnetism's rate increased in terms of 2.3... micro screws. It only picked up two more screw every time a layer was added. My experimentation does not stop here. I would like to go further and explore different metal cores as well as adding more volts of electricity. It is concluded that magnetism has a constant rate of escalation when a certain amount of coils are added.

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Student Name(s):

Fair Category

Abstract:

This experiment will demonstrate the potential and kinetic energy of a rubber band when it is stretched. In this project a rubber band will be stretched at different lengths, measured, and then recorded. The data will show the distance the rubber band reached, therefore showing the energy in rubber bands. Understanding potential and kinetic energy is important to a person's everyday life. For example walking, running, and driving involve potential and kinetic energy

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Abstract:

"The Heat Is On!" is an experiment that was conducted to help people in third world countries such as Uganda, Bangladesh and Ghana; the people in these countries cook on smoky, open fires and breathe the dirty air the fires produce. I chose this as my project when I learned about women and children who cook on these dangerous open fires, which can cause chronic obstructive pulmonary disease and other deadly diseases. My goal was to build 5 inexpensive stoves that are useful, simple in construction, burn a small amount of fuel quickly, and not visually smoky. I had also hoped to construct a design of my own, which I called the "Chimineia". During my experiment I built 5 stoves and tested each one 3 times for efficiency and visual smokiness. I collected sticks and twigs from my backyard for fuel, just as women and children would have in third world countries. My stoves were built out of recycled or easily available materials, and each stove was then used to bring 500ml of water to a boil. By measuring the average amount of time and fuel it took to bring the water to boil, I compared the stoves to each other for efficiency. My conclusion was that the 5 Can Rocket Stove did the overall best, because it boiled water quickly with very little fuel used. The other stoves either took too long or used up too much fuel.

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Word Count

Abstract:

The purpose of this experiment is to see if the temperature of Luminol affects how bright it glows. It was predicted that the warmer temperature would make the Luminol brighter. There will be 3, 80 mL cups of room temperature water, 3, 80 mL cups of refrigerated water and 3, 80 mL cups of micro-waved water. In 3 different, plastic cups 0.2 g of Luminol, 0.2 g of Perborate and 0.1 g of Copper Sulfate crystals will be in each cup. Then, pour one cup of water into one plastic cup and so on for the 3 plastic cups. Next, stir the water and chemicals together. Dim the lights and wait twenty seconds to take a picture on an f-stop of 8. Continue this procedure for the remaining six plastic cups. The data showed that the hypothesis was right, the micro-waved/warm water fluoresced the most. According to the graph made to determine the data, the average of the micro-waved water was a 2.67, following close behind was the room temperature water with an average of 2.0. The refrigerated water, unfortunately, showed a 0 as the average because it never luminesced. In conclusion, Luminol would work it's best in warm places. A way that this experiment could have been improved is by having a completely dark space to take the pictures for more accurate results.

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Fair Category

Abstract:

My project is called, "Bridges: Can They Take the Weight?" I choose this topic for many reasons. When I found it online, I thought it would be fun to build different bridge models. I also thought it would be interesting to learn about types of bridges, and also challenging to build them out of Popsicle sticks. The question was, "Which type of bridge supports the most weight, the beam, arch, or truss bridges?" After doing lots of research I created a hypothesis; I think the arch bridge supports the most weight because of the curved arch and abutments, which can supports a lot of weight. Next, I had to conduct the experiment. First, I had to get the materials I needed. I had to buy about 500 Popsicle sticks to build the bridges, and I had to get Styrofoam to make the arch. Next I had to carve the Styrofoam into an arch shape. After that I had to make the other bridges by gluing the Popsicle sticks with hot glue. Now I was ready to test them by using weights, and I finally acquired my conclusion and results. My hypothesis was correct. The arch bridge supported an amazing 64 kg., while the beam held 2 kg. and the truss 4 kg. I learned that the arch bridge supports the most weight because of the weight-bearing force carried outward along the curve to the abutments.

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:

Have you ever wondered what's in your water? The purpose of my project is to test the acidity and alkalinity in four types of water, bottled water, tap water, sea water, and rain water. My prediction was that the sea water would contain the most acid. I started my experiment by dipping the litmus paper in each of the four water samples. Next, I compared the litmus paper to the PH scale and determined if the sample was acidic or alkaline. My results were; the sea water contained the least amount of acid and the rain water contained the most acid. The main reason that the rain water contained the most acid is air pollution. Humans create an abundance of toxic gases that contaminate the clouds and the rain in them, therefore producing acid rain. In conclusion, my hypothesis was proven wrong and I have learned a lot about how to keep our air clean.

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Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Corrosion of Different Metals Abstract by Ryan Gorneault During my research, I discovered that through history, there have been many bridge accidents due to corrosion. An example is the Mianus River Bridge disaster in 1983 in Greenwich CT. I was interested in why these accidents occurred and became curious about what metals corrode the fastest. At the start of my Science Fair Project, I bought different types of metal wire, copper, aluminum, steel, zinc coated steel and stainless steel. I used 10 plastic cups, 5 bamboo skewers cut in half, and sticky notes. I also used measuring cups for the water, a pen for labeling, and Salt without Iodine to make salt water. The first five cups, I added 8 ounces of distilled water in each cup. For the last five cups, I created a salt-water solution with 20 ounces of distilled water and 2.5 tablespoons of salt. I mixed it up completely and then put 8 ounces in each of the last cups. Then I wrapped the wires around the skewers, placed the skewer on top of the cup, and let half of the wire hang in the water. Each type of wire was placed in the two types of water solutions. I started my experiment at 2:10 PM on December 27, 2012 and ended on January 5, 2013. I made a daily observation for all 10 days and recorded my observations. In conclusion, I have discovered that the stainless steel corroded the least and steel corroded the most.

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Proj. Title:

Student Name(s):

Fair Category

Abstract:

My problem was what kinds of buildings can withstand an earthquake of different speeds. I guessed that the building developed by scientists and engineers could withstand an earthquake of different speeds. To test, I made a shake table using four PVC pipes & elbows, two dowels, a wooden board, nuts & bolts, and rubber bands. I then made a building out of Legos. Then I tested the building and three different speeds after. I tested the first building I took it apart and created the building based on a design by scientists and engineers. I tested that building then made a model of my own design with the same pieces. I then tested. I averaged results after testing. After averaging I found that my hypothesis was right.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title: Automating A Simple Electromagnetic Generator to Power A
Device By Switching AC Current To DC Current

Student Name(s): K. Rahman

Fair Category

Word Count

Abstract:

Today's society is dependent on cell phone devices which have become a necessity. Recently massive storms have knocked out power for weeks at a time leaving people unable to charge their cell phones. Resources available such as generators are expensive, inefficient, and emit harmful, flammable gases. This experiment was developed to generate electricity through the power of magnets. I engineered a simple electromagnetic generator model to see how I could modify the design to generate more electrical output. Electricity is generated from the magnetic field produced by spinning magnets enclosed in a cardboard box. The magnetic field pulls electrons and creates a stream of electricity. The cardboard box insulates the electricity created by the magnetic field so it only flows into the copper wire. My hypothesis was to build a model that was able to support enough wires and magnets to charge a cell phone - 6 volts. To achieve this I had to test different materials for the insulator, orientation of the magnets, and automate the input power. Although my model produced less than 6 volts, I supported my hypothesis that by adding more wire and magnets more electricity would be produced. Through 15 different test models, I discovered that plexiglass was the material with the scientific properties to allow the electrons to flow to the copper wire and was sturdy enough to support the amount of copper wire, and magnets. As a result of this project I was able to create approximately 3 volts of electric power.

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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:

People in the United States need to be more concerned about how they use energy. Many scientists think that global warming was created because we burn too much coal, oil and natural gas (nonrenewable energy). Renewable energy sources do not give off harmful chemicals and can be replaced easily. This project looked at one type of renewable energy: wind energy. I used the Kidwind advanced wind kit and four different blade materials (plastic, wood, aluminum and cardboard). These materials were my independent variable. I wanted to see if the material affected the amount of voltage produced (dependent variable) by the Kidwind wind turbine. I made sure the angle I turned the blades, the blade shape, blade length and the distance the blades were from the fan were the same for each type of material (controlled variables). After the first set of tests, the data showed that the aluminum created the most electricity. This did not support my hypothesis because I thought the plastic would be the best. Since the mass of each blade material was not the same, I plan on using one type of material and test if different lengths affect the amount of voltage produced.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

What surface area to weight ratio is will give a kite the best lift? This project uses a NASA kite modeling program to develop a kite design that flies. Kites with several surface area to weight ratios were then be built to see how a simplified L/D equation compares with the actual kite efficiency equation. The kite efficiency equation (L/D) is not easily used to design kites since the coefficients of lift and drag must be determined experimentally with wind tunnels for a given kite design. Kites that were designed with the NASA program were successfully built and flown. The simplified L/D equation similarly predicted kite designs that flew. Although the simplified equation predicted kite designs that flew, it needs to be further tested to see how it can be used to design kites.

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:

The problem investigated was to discover what color light is most visible through fog. To find that out, fog was needed to be created. I mixed half a jar of water and 2 teaspoons of milk in the jar. When stirred around, it created a foggy mixture, just like a liquid fog. I took some colored cellophane wrap and covered the end of a flashlight so it could make a colorful light. The primary and secondary colors (red, orange, yellow, green, blue, and purple) are the best to use because they are the most common colors. Shining the cellophane-covered flashlight through the fog made a dim, but colored light come out the other side. Next, it was measured by the light meter to find the intensity of light for each color. Since yellow is the brightest color out of the primary and secondary colors, my hypothesis stated that it would have to most amount of foot-candles. My hypothesis was disproved because orange had the greatest intensity of light in my results at 6.9 foot-candles, while yellow only had 3.7 foot-candles. Yellow was the fourth brightest light after purple, which had 5.5 foot-candles and green, which had 4.0 foot-candles. This experiment is very informational to people that work in dark places and need to use a darker light than an LED or a white light.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Heat is form of kinetic energy that is created when any type of work is done, heat is always moving. Atomic movement generates heat. The more the atoms move the hotter they will get, and this is called Thermal Energy. Thermal energy is not the same as heat. Heat is made by the transfer of different temperatures between to objects, and thermal energy is made when the atoms move to create heat. When the atoms of an object vibrate more, they move farther apart making the whole object bigger. This reaction is called expansion. When heat is taken away from an object the atoms get smaller, and this is called contraction. A calorie (cal) is a unit of energy or heat. A unit of a calorie is 4.2 joules. Joules is a small amount unit of heat energy. The Massachusetts Department of Environmental Protection study shows that Americans spill 180 million gallons of used oil per year, the vast majority ending up in waterways. Motor oil that is used has many toxic and dangerous substances, including polycyclic aromatic hydrocarbons, which studies show can cause cancer. Adding, small pieces of metal from engine erosion, such as lead, zinc and arsenic, make their way into lubricants, further helping the polluting probability of used motor oil.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In my project I wanted to test a sequence of machines to determine if they can make a job easier. I made the following machines and tests: 1. a fulcrum and lever to lift something heavier than myself. 2. a One Pulley and a Two Pulley – Block and Tackle Design to compare lifting a full water bottle 3. my “Rube Goldberg” Machine, with a marble as force weight, an incline plane, lever and a pivot fulcrum to lift a water bottle. 4. a marble, lever and fulcrum to lift a water bottle. First I used the lever and fulcrum to lift my dad. I was able to lift more than twice my weight using this simple machine. But I was not able to lift him just by myself. Second I wanted to see if a One Pulley or a Two Pulley system was easier to use. The Two Pulley design needed less force for lifting. Third I wanted to see if a marble could lift the water bottle using speed to increase force. The pivot fulcrum design only lifted a partially full water bottle when positioned correctly. The speed did not give enough force to lift a full water bottle. Fourth I used a longer lever, a triangular fulcrum and a marble to lift a full water bottle. The test was successful. The Two Pulley Design with rope was easier to use, took less space and lifted the water bottle higher than the other machines.

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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:
Num

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of my experiment was to find out which orange juice has the most vitamin C. This benefits people of all ages. Knowing which type of orange juice will give you the most vitamin C during the cold and flu season is very crucial. Vitamin C boosts your immune system and keeps colds away. My hypothesis was that I thought fresh squeezed orange juice will have the highest amount of vitamin C. This hypothesis was investigated and proven in my experiment. My independent variable was the type of orange juice. My dependent variable was the vitamin C. My problem question was "When I Change the Type of Orange Juice, What Happens to the Amount of Vitamin C?" To titrate my orange juice, I made an iodine titration solution. This was used to solve how much vitamin C was in 20 mL of orange juice. In my results, I figured out that fresh squeezed orange juice had the most vitamin C. On average, the amount of vitamin C in 20 mL of fresh squeezed orange juice was 10.67 mL. In the regular not from concentrate orange juice, on average, the amount of vitamin C in the orange juice was 3.33 mL. Lastly, the frozen from concentrate orange juice has 6.67 mL of vitamin C in it. I met my objective to find which orange juice had the most vitamin C.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

My mother has always had migraine headaches, and so she wants a pain reliever that works quickly. There are many different over the counter pain relievers that relieve migraine symptoms, but not all people get relief from the same medication. In addition, most pain relievers have both a more expensive name brand and an economical generic form. Is there a difference? I compared three different types of name brand pain relievers with their generic equivalent. These were Bayer and aspirin, Advil and ibuprofen, and Aleve and naproxen sodium. My mentor made a simulated stomach acid/enzyme mixture and I measured the time it took for each pill to disintegrate at body temperature. I repeated each trial three times. My hypothesis is that name brand pain relievers will disintegrate faster than their generics. I was also interested in the price difference to see if it was worth buying the more expensive pain reliever, so I verified prices at three different stores. In every case the name brand pain relievers disintegrated faster than the generic brand, but were more expensive. Using my averaged data, Bayer was 40% faster and 58.5% more expensive. Advil was 83% faster and 32.5 % more expensive. Aleve was 20% faster and 34.8% more expensive. These results could help people decide when a name brand pain reliever is worth the extra cost. If I were to continue my research, I would repeat the experiment more times, so my results would be more accurate. I would also test other name brand and generic equivalents.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In this project I studied how weight distribution on the body of a rocket affected how far the rocket flew. I studied this by building a pressurized rocket launcher and a paper rocket body with a movable clay weight. I used the same rocket for each of the experiments and the same amount of clay. For each position of the clay weight I launched the rocket multiple times, measured the distance flown, and averaged the results. I hypothesized that the rocket would fly the farthest when the weight was in the middle because it would not be top-heavy or bottom-heavy. I found that my hypothesis was incorrect; it flew the farthest when the weight was in the front. When I redo the experiment I will probably do it indoors so there is no wind factor, and I will also probably do more tests because I found there was a lot of variation between tests.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
5502

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this project was to see which renewable energy source would produce the most power because fuel wasn't available during Hurricane Sandy. The Earth's surface is made up of 98% water so making hydrogen from water would be a great, clean source of fuel. If I test solar, wind, and hydrogen power, I think hydrogen will produce the most energy. The independent variable is the type of energy source, dependent variable is the watts produced, and controlled variables are the time and location. I assembled the wind turbine and electrolyzer (hydrogen generator). I filled the two water containers and the electrolyzer with distilled water and connected them. For the first test I put the solar panel by itself, connected the wind turbine to power the hydrogen generator and put them outside. I checked the volts and amps every 5 minutes for 30 minutes on the solar panel with a multimeter. Then I brought them inside, hooked up a fuel cell to the electrolyzer and tested every 5 minutes for 30 minutes. I recorded the results and did it all over again with the wind turbine by itself and the solar panel connected to the hydrogen generator. I repeated all the steps 3 times and analyzed my data using Ohm's Law. The average power produced for all three trials was wind 0.00202, solar 0.15, wind/hydrogen 0.0000033, and solar/hydrogen 0.38 watts. I came to the conclusion that Solar/Hydrogen makes the most power out of all 4 energy sources.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Abstract:

This project was designed to determine if copper, aluminum, stainless steel, brass, silver, and tin have antimicrobial properties. The project began because flu season was beginning. Many people are trying to prevent illnesses such as the flu, colds and strep throat. These illnesses can be spread in many ways such as in the air, coming in contact with sick people, or touching objects that the virus and/or bacteria have landed on. Research conducted showed that microorganisms can live on a variety of materials and not on others. I wanted to find out if metals were able to prevent the growth of microorganisms and if so which ones were the best. In the experiment thin sheets of each metal were tested. Before swabbing each metal, I rubbed my hands on each sheet. My hands were also swabbed and the swab was swiped onto agar plates. The metals were left in room temperature for three hours. Then, each metal was swabbed using a sterile swab and swiped onto nutrient agar plates. The plates were incubated for 48 hours. Two controls were left untreated and incubated for the same amount of time. The presence and amount of growth on the agar plates was observed and photographed. Sterile techniques were used. All of the metals, except tin, prevented the growth of the microorganisms. As an extension of this experiment, a product will be designed and built using one of the metals to help prevent the spreading of microorganisms.

Word Count

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The title of my project is “Make It Glow”. The purpose of my experiment is to find out if glow sticks have different chemical reaction rates when put into different temperatures. The results of this experiment are useful because glow sticks are a great alternative for light from a candle or a lighter. This is because both candles and lighters use fire which can be very dangerous. Glow sticks are completely safe to use by both children and adults and they’re often used when camping. My results showed that glow sticks last longer in lower temperature. Campers can use this information to preserve their glow sticks. For this experiment, I tested glow sticks that were put into three different temperatures to see if it would affect the rate at which the chemical reaction within the glow stick took place. I put one glow stick in 53.6°C water, one in 20.8°C water, and one in 1.1°C water. From then I maintained the three different temperatures throughout the course of the trial. After all three trials, I averaged each glow sticks trial. The one that was put in to 53.6°C water averaged out to last 565 minutes, (9 hours and 24 minutes). The glow sticks that were put into 20.8°C water lasted for an average of 4,367 minutes, (72 hours and 42 minutes), and the glow sticks put into 1.1°C water lasted for an average of 7,396 minutes, (123 hours and 17 minutes). From this information, I came to a conclusion that putting glow sticks in colder temperatures will preserve them longer. After doing this experiment, I learned that if you put glow sticks in lower temperatures, they will last longer than if I was to put them in higher temperatures. I got to witness how much temperature really does affect the rate of chemical reactions. While looking at the glow sticks, I could see what was happening inside after the two capsules broke and the chemicals mixed creating that luminescent glow. You put meat inside the freezer to keep it from spoiling, but you don’t get to see what’s going on

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment is to see if there is a way to slow the oxidation reduction reactions in apples (low potassium) and bananas (high potassium) by treating the fruit with an acid, base, (or neither substance) and placing the fruits into different temperature controlled environments. It is predicted that the apple and banana slices' averages that are in a tightly sealed plastic bag (not treated with an acid or base) in both temperature settings will have the least reaction to oxidation reduction because potassium needs oxygen to form potassium oxide. In the procedure, place the apples or bananas slices into an acid, base, bag, or no substance at all. It is concluded that the hypothesis was partially correct because the apple and banana slices put in the bags did have the lowest average (for 3 out of the 4 trials). However there was another apple or banana slice that had the same average and was not placed in bags. In basic terms, this experiment has proven that most of the time to keep an apple or banana slices from reacting to oxidation reduction, you should keep it in a bag to limit the exposure to oxygen.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this project was to change the parameters of capillary action to make the water rise higher in a given amount of time. My variables were increased and decreased viscosity, temperature, pressure, and gap size. My hypothesis based on my research was that the smaller gap, water (not thinner or thicker viscosity), higher temperatures, and increased pressure would increase the effects of capillary action. I postulated this for pressure because as the pressure intensifies, the pressure being applied to the liquid in the dish will force the water into the capillary gap. I postulated this for the other variables by using the formula found in my research, which is;

$H = \frac{2\gamma \cos\theta}{\rho g d}$ I experimented my variables one controlled variable at a time keeping all others constant. The results of this experiment have been averaged, as each variable was tested three times. The result for increased air pressure; 208.3mm, and decreased pressure; 102mm. For increased temperature the result was 150.3mm, and decreased temperature; 103.3mm. For viscosity the result for increased viscosity was 18.3mm, and decreased viscosity; 87.7mm. Finally for gap size the results for the most increased gap size was 33.7mm, for the middle sized gap it was 70.7mm, and for the smallest gap the result was 113.7mm. The result for the constant was 113.7mm. I have discovered from my results that the height in which the liquid will rise increases as the gap between the glass gets smaller, temperature increases, and pressure increases. Also I discovered that viscosity is affected by the liquid media.

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Student Name(s):

Fair Category

Word Count

Abstract:

This experiment is about how the air pressure of the soccer ball affects the distance of the kick. It was discovered that the optimum FIFA approved air pressure was between 8.5 and 16.8. When tested it was discovered that 8.5 was the optimum air pressure. This was discovered by raising the leg of the kicking machine until the level on top of the leg was balanced and released. It was found that the high pressure performed the worst, medium slightly better, and the low pressure the best. In conclusion, the air pressure in the soccer ball, when decreased to 8.5 pounds per square inch, made the soccer ball perform optimally. The difference between the high quality soccer balls and low quality soccer balls were in fact in the air bladder and material.

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:

There is a great need for new sources of abundant, clean, energy on the Earth as many of our old fossil fuel sources are being depleted. Seventy percent of the earth's surface is oceans. These oceans contain salt water and would be a huge energy source if this salt water could be used to generate electrical energy. This Salt Water Energy project will show that energy can be generated using salt water fuel cells. It will then show that the efficiency of the engine would depend on the amount of salt in the water and it will also show that other chemicals added to the salt water fuel cell can affect its efficiency. In this project a salt water fuel cell was used to provide electricity to the engine of a model monster truck. The salt water fuel cell was filled with different concentrations of salt and water or different combination of chemicals, salts and water and the effect on the efficiency was determined. The result of the experiments proved the hypotheses that salt water can generate energy in a fuel cell, that the concentration of the salt in the water has an effect on the efficiency of the cell, and that additional salt or chemical combinations can impact its efficiency. These experiments met the objectives of the project and suggested additional ways that efficiency could be improved. Salt water fuels cells will become a great source of energy for cities and towns close to the oceans

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):

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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:

The construction for the Tacoma Bridge started on November 23, 1938 and was completed on July 1, 1940. this bridge collapsed just 4 months later on November 7, 1940. The Tacoma Bridge was a suspension bridge in washington that collapsed during a storm with 40 mph winds. I will be building a scale Tacoma Bridge and test it using 50, 75, 100 mph winds using the on and off, from the botom, and from the top method. I used an anemometer to measure wind speed. As a result I was able to discover that the most damage was useing the on and off and blown from the botom methed. I belive this was a cobination of both of these that distroied the Tacoma Bridge. I was able to meet the design criteria by doing it to scale.

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

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of my experiment was to expose the effect of surface texture on the adhesion of Duct Tape. I became intrigued in this relationship when I made the observation that while Duct Tape bonded well with some textures, it was unable to bond to others, resulting in lack of adhesion that represents a big problem for the consumer. This discovery begged the question that became my problem statement- Does the variation of a texture affect the amount of force used to remove Duct Tape from that surface? First, I selected a surface that could host a bond of medium strength with Duct Tape and could be easily manipulated to form different textures. I selected cardboard, as it met both requirements. I created the control texture, which I classified as smooth/dry and created four other textures- sticky, rough, dirty, and wet. Using a Newton Scale, I ripped pieces of Duct Tape off of the textured surfaces, recording the amount of force it took to break the bond between tape and texture. Each texture was tested thrice. The data obtained indicated there was a dramatic change in force required to break the bond between tape and a varying texture. There was a difference between force required with the smooth/dry texture and other textures. Therefore, I accepted my hypothesis, as it entailed what I concluded. Overall, I determined that texture does affect the adhesion of Duct Tape. In future tests, I would like to include both other tapes and other surfaces.

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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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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The title of my experiment is Homemade Ice Packs. My problem statement was how does the amount of concentration (nitrogen {fertilizer} and water) affect the temperature of the ice bag? People may be interested in this experiment because they will be able to make homemade ice packs that may be reusable, rather than buying ice packs that cannot be reused. In my experiment, I made 3 different ice packs, 2 trials each. For each trial, I weighed the amount of fertilizer I needed and measured the amount of water. The water went into the zip lock bag while the fertilizer went into a sandwich bag which then was placed in the water, in the zip lock bag. After waiting for 1 minute, I cut a small hole on the corner of the zip lock bag, and put the thermometer in it to measure the temperature. At the end of my experiment, I had concluded my hypothesis was accepted. My data shows that the temperature of the ice pack with 100 milliliters of water and 100 grams of fertilizer was averaged to 3.2°C more than the ice pack with 150 milliliters of water and 150 grams of fertilizer. An error that occurred during my experiment was mistaking the measurement of the ice pack that contained 100 milliliters of water and 100 grams of fertilizer. Another error that occurred was when the triple beam balance would occasionally get unbalanced because of the pressure that was put on the plate of it.

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Student Name(s):

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Word Count

Abstract:

Abstract Infection control has been developing since the Civil War. MRSA, a resistant bacterium is becoming more prevalent and dangerous. Athletes are at risk for developing MRSA. Covering wounds with bandages is required for many athletes. Which is the most adherent? In my hypothesis I stated that I thought the most expensive brand of bandage would adhere best to skin. Because the Band-Aid brand invented bandages, and they were the most expensive I anticipated they would be most effective. In this experiment I tested the adhesion of three different athletic bandages. Samples included the Band-Aid brand, Rite-Aid brand and CVS brand. I exposed each bandage to moisture in the form of tap water, chlorinated water and Long Island Sound water. I moistened a peach with at damp cloth, applied the bandage then re moistened the adhered bandage. I developed a scale to compare the adhesion and I monitored the samples over several days. I discovered the CVS was most affected by exposure to moisture and had the worst adhesion consistently. It was also the least expensive bandage. Next came the Band – Aid brand bandage. Finally, the Rite- Aid brand had the best adhesion. It stayed on longest with exposure to the different types of moisture consistently. The Rite Aid brand was in the middle in terms of cost. Wound coverage is important to reduce infection. Knowing the most expensive bandage is not always the best in terms of adherence can help one make purchases that save money and reduce infection.

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

I chose this topic because I was interested in how pitch produced from a wine glass can change just by increasing or decreasing the amount of water in the glass. The problem I tested was 'how does frequency change as fluid is added to the glass?' I tested five different amounts of water in the same glass, to be accurate, and I used a chromatic tuner, a device used to indicate frequency and pitch. To produce the sound, I rubbed the rim of the glass. The sound produced was also very loud, so it made it easy for the chromatic tuner to measure. My hypothesis was that the least amount of water in the glass would have a higher pitch, and the greatest amount of water would have a lower pitch. My reasoning was that with more space in the glass there would be a higher pitch. In the end, the results stated that the lesser the water in the glass, the higher the frequency, which proved my hypothesis correct. In my opinion, the project was correctly planned out. It was a compatible project with my interests, and I learned a lot from it. If I were to do something like this next time, I'd probably test multiple densities with the same quantity.

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Fair Category

Word Count

Abstract:

Advancements in humanoid robotics over the past years have improved their abilities to assist the elderly, the depressed, and the autistic. This research examined whether or not a robot can affect human emotions. It is hypothesized that if a robot tells the same story as a human, the audience of the robot will experience less emotion during the telling of the story. To test this hypothesis, an advanced humanoid robot, NAO, was programmed to read an inspirational, humorous short story that few, if any, people would be familiar with. The participants were split into three groups: one that read the story to themselves, another that listened to the story as told by a human storyteller, and a third that listened to the robot tell the story with its voice changed at various points during character transitions. All participants completed a likert scale survey rating the five following emotions experienced during the story: happiness, joy, amusement, interest, and inspiration. Data suggests that the robot evoked more positive emotions from participants than when another human read them the story or participants read it to themselves. The average scores for four out of the five measured emotions were higher with the robot than with the other two groups. The most notable difference was seen in the emotion of joy. These findings indicate that an advanced humanoid robot can evoke positive emotions from an audience. This research, and its results, suggest that humans requiring robotic assistance could experience positive emotions from these interactions.

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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:

The purpose of this research project is to develop and construct new systems of Inertial Propulsion are more effective than previous inertial propulsion prototypes. Inertial Propulsion generates thrust without the need for an outside force or net momentum exchange to produce linear motion. If produced in significant quantities, Inertial Propulsion could be a viable alternative to propel vehicles in environments with unreliable surroundings. My hypothesis is if a device can utilize more kinetic energy towards forward propulsion, then an effective inertial propulsion device would be created. I built three different prototypes to generate inertial propulsion: 1) Disk attached to electric motor with counter rotating weights; 2) Spinning disk attached to electric motor with one weight attached to rubberband (stores and releases kinetic energy); 3) Reciprocating motor with weights attached to spring. I tested each device in two experiments, one to determine amount of forward motion, the other to determine the vertical force or weight loss generated. Concept #1 produced insignificant forward or vertical force. Concept #2 produced a maximum of 100 grams of vertical force, reducing the weight from 280 to 180 grams. Concepts #3 provided strong forward and vertical motion. Overall, Concepts 2 and 3 were successful and the reciprocating motor showed the greatest force. The project proved my hypothesis that an effective inertial propulsion device could be created using more kinetic energy toward forward motion. Further improvements in efficiency of these inertial propulsion devices could make them more viable for propulsion in low friction environments.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Abstract:

The science fair project I conducted this year, tests if the amount of cocoa in a chocolate bar will affect how long it takes to melt. My hypothesis was if the percentage of cocoa in the chocolate is higher, then the chocolate will take more time to melt. I took three chocolate bars with different amounts of cocoa in them: 70%, 85%, and 90% cocoa bars. First, I cut up squares of chocolate and weighed them using a food scale so they would all be 0.8 ounces. Then, I poured two cups of water into a saucepan. Once the water came to a boil, I took a thermometer and made sure the water was 213°F. I placed one 0.8 ounce piece of chocolate in a metal bowl, which I then put into the boiling water. When the bowl and water touched, I started the timer. I repeated this system four times for each chocolate bar. When my experiment was finished, I analyzed my data. I had found that the averages for each chocolate bar were not what I expected. The 90% cocoa bar had the quickest melting time, the 85% cocoa bar had the slowest melting time, and the 70% cocoa bar's time was in between the other two sets of data. There may have been a few factors affecting my experiment that I could not control. In my research report, I go more into depth about what these factors may have been.

Word Count

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 vertebrate animals controlled substances

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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:

My project involves renewable energy sources such as wind, water, and solar power. The reason why I wanted use this idea for my science fair project was to show people the ways renewable energy can help can be able help us from global warming, earthquakes, and tsunamis. Also to show people that if they use this type of energy, we don't need to worry about running out of oil and live without power. And to show that solar power is not the only good renewable energy source in the world. There are other ways to use renewable energy that doesn't involve wind, water, and solar such as biomass energy. But it doesn't mean wind, water, and solar is no good. All types of renewable energy is good for us and the environment.

Word Count

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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:

The experiment I conducted was to test the Effect of Name Brand Detergent, Eco Friendly Detergent, and Value Brand Detergent on Grape Juice Stains. The most desirable and efficient detergent, to remove the grape juice from the cotton t-shirt was to be determined. The effectiveness of the different laundry detergents was tested by applying stain, adding water and detergent, and shaking a plastic container to simulate a washing machine. After the sheets were left soaking for 15 minutes they were quickly rinsed and left to dry. In the end, Valu Time laundry detergent was the most successful. Valu time laundry detergent, the value brand detergent, removed the stain totally. Tide detergent, the big brand detergent, removed half the stain. ECOS, the Eco friendly detergent, removed little to none of the stain. Different people may get different things out of this experiment. The big brand shopper's brand is not the most effective. The eco friendly shopper will be glad to know ECOS has all natural ingredients. Bu the Valu time laundry detergent is the cheapest and most cost effective, though none of its ingredients are natural.

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:

Gasoline prices have increased tremendously over the last few years. Due to this, many are looking to biofuels to find a cheaper, cleaner solution. There are many biofuels to choose from. Out of all the biofuels, which one is the most efficient? Ethanol should be the most efficient biofuel due to the fact that it's the world leading biofuel. I started my project by building a calorimeter and testing three different biofuels. However, I was testing data on heat, not efficiency. I then decided that a meta-analysis would be best to cover all of the bases of biofuels. I meta-analyzed each biofuel by combining results from different studies to identify the most efficient biofuel in a number of categories: efficiency, emissions, heat, etc. In my own experiment, I found that the wood generated the most heat out of the three biofuels I tested. However, the meta-analysis is pointing towards ethanol at the best biofuel. The meta-analysis is not complete, but my current results indicate that ethanol is the most efficient biofuel. This has potential application in the long run since the world's petroleum will eventually run out.

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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:
5521

Student Name(s):

Fair Category

Word Count

Abstract:

Digital bandwidth is a severe constraint in today's digitally connected world. I was dismayed whenever I used my Dads' iPhone because he cautioned me that I would exceed the data-limits of his plan. That got me thinking how video could be transmitted with low data throughput. Could mathematical expressions be used to represent an image and transmitted instead of sending the binary code of each pixel? The mathematical function could be transmitted with a fraction of the data compared to the bitmap information. The function can be interpreted to recreate the bitmap image at the destination. This would significantly reduce the amount of data needed to be transmitted. This approach is possible due to the advanced computational capability of today's CPU's found on smart-phones, computers, and digital televisions. The challenge, however, is to effectively convert a bitmap of a picture to a function based image via mathematical algorithms. In my research, I found that this approach is very difficult to implement for complex images with various shapes, textures, shades, colors, edges, and motion. Mathematical representation of surfaces could be generated via polygonal meshes, NURBS, and Bézier Surfaces. I experimented with using Cartesian and polar coordinate based mathematical algorithms, to generate images for 2D and 3D shapes (e.g. catenary, cycloid, cardioid, logarithmic curves). Moving image functions were also created (e.g. tractrix, "Witch of Agnesi"). I then compared the file size (in bits) of the graphics image (pixel data) to the file size of the corresponding equation. As expected, the former was greater by an order of magnitude than the latter. Advancement of this concept can lead to significant reduction in bandwidth required to transmit images.

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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

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In this investigation, three experiments were performed testing the efficiency of propellers, airfoils, and plane designs. The purpose of the Efficiency of Propellers test was to determine how changing the chord length of propellers would affect its efficiency. The efficiency of Airfoils test determined which airfoil design would generate the most lift and the least drag. For the Efficiency of Plane designs test, the objective was to determine which plane design yields the best flight characteristics. The Efficiency of Propellers test incorporated four propellers of varying chord lengths fastened to a motor. This motor was connected to a digital multimeter which measured the amount of volts that the propeller generated when the system was held in front of a fan. In the efficiency of airfoils test, airfoils were placed inside a wind tunnel. Lift was measured by attaching the airfoil to a kitchen scale, and drag was measured by attaching the airfoil to a spring scale. In the efficiency of plane designs test, three elastic band propelled aircrafts were flown. Flight characteristics such as distance, time airborne, and maximum height were recorded. This project concluded that wider propellers perform better at low fan speeds while thinner propellers perform better at high fan speeds. The thin under-camber design for airfoil #3 generated the most amount of lift and the least amount of drag. While data is still being collected for the Efficiency of plane designs test, it is hypothesized that the elliptical winged plane would yield the best flight characteristics.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

My project is about what the mechanics of an elevator are from the construction to the metal ropes to whats in the big mechanical box. I am explaining the different elevators and how safe they are supposed to be. Also i learn alot too, therefore, i can have a better outlook on how my project is.

Word Count

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Student Name(s):

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Word Count

Abstract:

For many years, scientists around the world have been searching for alternative energy sources to replace non-renewable resources, such as coal. There has been progress made in finding new ways to create power, such as using the sun, the ocean, and the wind to bring energy to our homes. Converting energy from ocean waves and tides into electricity is appealing since these energy sources seem to be never-ending and could be used as a long-term source of power. A tidal barrage is a man-made structure that can be used to harness the ocean's power by taking advantage of the rising and falling action of the tides caused by the moon's gravitational pull. The purpose of this project was to understand the trade-offs that engineers have to make while designing a tidal barrage. One of the factors that they must consider is how large, or tall, to make the barrage compared to how much energy can be extracted from the water. A simple experiment was set up to study the effect of head height, or water level, on the water flow rate, which is directly proportional to the amount of power produced. Before running the experiment, it was hypothesized that greater head would produce an increased flow rate. The test results confirmed the hypothesis.

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Student Name(s):

Fair Category

Word Count

Abstract:

Soundproofing is so important in many aspects of manufacturing and construction. The purpose of this experiment was to find the best soundproofing material. I tested nine different materials commonly used in those two industries. My hypothesis was that Homasote would be the best soundproofing material. After searching the web, I found a 300HZ sound frequency generator download. I placed speakers in the box. I took the sound level meter and held it at the center of the mouth of the box. I measured the intensity of the sound without any test material in the way, in order to create a control. I then recorded this value five times in the log book. I removed the sound meter from the mouth of the box, and placed one of the test materials on the edges of the box, closing in the speakers. The testing began by playing the 300 Hz sound and recording the decibel measurement, which was repeated five times for each material placed on top of the box. After testing nine materials five times each the results ranged from 1.6 decibels (lowest reduction) for foam insulation to 20 decibels (highest reduction) for Homasote. Homasote is the best because it is so tightly compact and doesn't let vibrations, sound waves, or air pass through it. My conclusion based on the experiment is that Homasote reduced the sound the most effectively. The next thing I want to find out is "Is there a better soundproofing material than Homasote?"

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Student Name(s):

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Word Count

Abstract:

My project is testing the strengths of different bridge designs of different complexities. I began by researching the three types of bridge designs I am using in this project. Next, I planned by making my blueprints, figuring out what materials I needed for this project, and figured out how long I should spend on each section of the project. Building was next by glueing all of the toothpicks together to make the bridges. Lastly, I put my bridges on two level surfaces, with an opening in the middle to hang a paint bucket for the weighing stage. I kept adding more and more objects in the paint can to see how much weight the bridge could hold before it broke. I recorded the objects weight, and the total amount of weight the bridge held before breaking in the end. Finally I concluded my project and found out that the Warren Truss Bridge held the most weight and was the sturdiest bridge design. I chose this project because in my science class we all built different toothpick bridges and broke them. I wanted to look a little closer by testing three designs to see which one held the most weight.

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Word Count

Abstract:

Newton's Law states that energy is consumed when moving objects are accelerating or decelerating therefore energy must be consumed with the slowing and stopping of cars at traffic lights. The purpose of this experiment is to devise a mechanism where cars and traffic lights communicate with the purpose of reducing slowing and stopping thus improving gas efficiency. If a car computer knows precisely when a traffic light will change then speed can be adjusted in a manner that would reduce slowing or stopping and therefore improve gas efficiency. Using a car's gas efficiency computer, gas mileage at various speeds was calculated. Gas mileage was also calculated by periodically slowing the car to various speeds as well as stopping. This was to simulate what occurs at traffic lights. A mathematical model was then created using this information. In the model a traffic light was simulated with different green/red timing cycles. Mathematically the car speed was adjusted based on a car computer knowing when the traffic light would change. The speed was adjusted to minimize slowing and stopping. The periodic slowing or stopping of the car resulted in decreased gas mileage. Slowing and stopping of a car correlated with decreased gas efficiency which was graphed. The mathematical model demonstrated slowing and stopping could be reduced and therefore improve gas mileage. If cars could communicate with traffic lights then slowing and stopping could be reduced and therefore gas mileage could be improved.

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:

I think that my experiment could help a lot of people because many teenagers listen to music with big headphones with their music blasting, this is a problem because in some cases when the music is louder their dB levels go up and if the decibel levels get too high it can make people's hearing can weaken and in some cases go deaf in the future. I thought if I could find a way to reduce the dB level of the sound I could help a large number of kids from getting hearing problems because if a dB level is too high or low it can become very harmful to their ears. My hypothesis is that the octagonal shape will increase the decibel level because the sound will be directed straight out and sound waves will be concentrated. The first step we I did was I got MDF (Medium Density Fiberboard) from my uncle and did a little carpentry work. I cut a square, octagon and a triangle box all with the same area so it wouldn't affect the experiment, then I put a speaker up to them and had it blasting at full sound. I put a decibel meter on the other side of the apparatus's and saw which had the best decibel sound for a human's ear. I have found out was that having an octagonal apparatus (headphone) is the best for human's ears because when I did my testing the octagonal apparatus was the best.

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Student Name(s):

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Word Count

Abstract:

The hypothesis of the project is that between low fat milk, powdered milk, and soy milk will contain the lowest amounts of lactose carbohydrates. Soy milk will be the lowest amounts of lactose. First, need to prepare all materials ready, and mark the name of milk on the beakers and the Erlenmeyer flasks. Pour low fat milk and soy milk (100ml) into the beakers and stirring the powdered milk. (13ml of powder milk add into 87ml of warm water) Heat three beakers until 55 ° and stirring them. Drop acetic acid into the liquid till they turn colorless. After that, get the mass of formed proteins out from each beaker. Add 4 grams of calcium carbohydrates into these clear liquid and stirring a few minutes. Heat these beakers again and stirring till they start boiling. The remaining proteins will be formed. Then, filter this milk and heat them till only 25ml left. Add 100ml ethanol into each Erlenmeyer flask. Allow it cool, and warm it again. After adding 4 grams of carbonates and filtering the liquid, there was something white and tiny floating, but there's no crystal formed. After two days I decided to take them out and let ethanol expose in the air and volatilize until lactose crystals formed. Fourteen days later, the lactose crystals were completed formed. I weighed them and got the weight of lactose crystals.

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Fair Category

Proj.
Num

Proj. Title:
Num

Student Name(s):

Fair Category

Abstract:

This project was designed to determine if different arm positions affect the distance a baseball travels. I have played baseball since I was five years old and have seen many baseball games. While watching the games, I observed that the speed of an underarm angle pitch is significantly slower than speeds of an over arm pitch. I researched the physics of baseball and found that there are many factors that determine the speed and distance a baseball will travel including arm angle. In designing the experiment, I wanted to use a human subject, but realized that there would be too many variables to control. Therefore, a machine was built to simulate a baseball delivery from the over arm and underarm angles. The machine allowed me to control the input force. The responding variable was the distance the ball traveled. Each arm position was tested five times with different input forces. Measurements of the distance the ball traveled was taken after each trial. Analyzing the data from the experiment showed that the ball thrown from the underarm angle traveled the farthest, disproving my hypothesis. During research, I found that there are many other factors or mechanics involved in throwing a baseball. The wind-up, legs foot and hip positions, grip on the ball, and height and weight of the pitcher all contribute to the distance and velocity of the pitch. Arm angle was the only factor tested in this experiment

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: AN INVESTIGATION OF HOW THE ENVIRONMENTALLY
HARMFUL LEVELS OF ALGAL BLOOM DUE TO

Student Name(s): A. KELLY

Fair Category

Abstract:

The project was designed to determine first, if organic fertilizers contribute less to the harmful effect of algal bloom vs. synthetic fertilizers in Connecticut's fresh and sea waters, and secondly, if the addition of barley straw, a natural, material safe for marine life, can diminish this problem. Five different fertilizers (organic and synthetic) were dissolved in Connecticut sea water. Two sets of samples and sea-water-only controls (with and without barley straw) were placed in daylight for ten days. pH readings were taken on all samples. The same procedure was followed with Connecticut fresh water. After ten days, algae organisms were counted. All fertilizers were shown to cause algal bloom. In 8/10 fertilizer/water solutions, much more algae grew vs. the water-only controls without fertilizer. Regarding the hypothesis, part one was proven incorrect because the average number of algae cells was higher in the organic fertilizer solutions vs. the synthetic fertilizer solutions (7.7 million vs. 1.94 million algae cells/ml., respectively, in fresh water; 8.35 million vs. 325,000 algae cells/ml., respectively, in sea water.) Part two of the hypothesis was proven correct because in 2/3 of paired (with/without barley straw) samples, much less algae grew with barley straw than without. Similar pH values (+/- 0.2) in 9/12 paired samples demonstrated the innocuous nature of the straw. Algal bloom is reducing oxygen levels crucial to the survival of marine species. Identifying inexpensive barley straw to reduce this threat safely is significant.

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:

My project was to find the best way to clean up oil. I did this experiment because I thought the United States need a solution for the oil spills. I also did this project in case I have an oil problem I will know what to do. When I first did this experiment I hypothesized that kitty litter would be the best way to clean up oil. I had my materials and I put them in 5 different containers with 4oz of oil. Every 2 minutes for 3 hours I observed my results. In the beginning i had to add some materials to some containers. In the middle of the process my results stayed the same. Towards the end I had to add some more materials. In conclusion kitty litter was the best way to clean up oil, along with a swifter pad and some paper towels. But kitty litter is safer for the environment because, the oil in the swifter pad and the paper towels should be ringed out somewhere; however the kitty litter can just be thrown out.

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Many internet downloads are increasing in size. As these files increase in size, so does the amount of time it takes to download these files. One way to increase the speed of these downloads is to compress them prior to uploading them to the Internet for downloading. The reason I chose this experiment is because I wanted to learn which file compression method is most compressing. My hypothesis was that the "zip" compression format would work best, because it is included in Microsoft Windows. In order to prove or disprove my hypothesis, I downloaded 7-Zip, a free file compression program. I then compressed a "JPEG" picture media file, an "m4a" audio media file, an "ipa" mobile application, a "shsh" iOS signature file, and an "exe" executable application file. Using 7-Zip, I compressed all of the files seven times, using a different form of compression each time. By calculating the percent of decrease and averaging the percent of decrease for each file for each compression method, I was able to determine the most compressing form of file compression. I proved my hypothesis incorrect. The most compressing method was the "xz" compression method. The second most compressing form of file compression was "7z," and the third most compressing form was the "bzip2" compression format. The "zip" compression method was the fourth most compressing compression method, and the "gzip" was the fifth most compressing compression method. Both the "tar" and "wim" compression methods were the sixth most compressing compression methods.

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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 build a mobile robot and investigate variables that affect robot mobility. This robot's task was to follow a line, identify a break in the line, return to the starting point, and display the measured distance to the break. Some of the variables investigated were line width, line color, shape of route traveled, motor power, motor control and turning using wheel rotations and directions. A robot was built with three wheels; two were motor powered. A light sensor was connected to detect and measure information about the line. Programs were written to perform line following with light sensor calibration for different colors and light conditions, investigate/control robot turning (swing turn and pivot turn), measure distance traveled with wheel rotation sensors, and display distance traveled. Programs were tested and modified until they worked as expected. Programs were used to collect data about the distance traveled and success of line following for each variable measured while keeping the other variables constant for multiple trials. Adjustments were made and retesting performed as required. Sounds and sensor status were displayed for program debugging. Smaller programs were put together to make a larger program to accomplish the complete task. The robot could follow different color lines, routes of different shapes, measure distance and identify a line break. Larger lines were not a challenge for the robot since the robot followed the edge. The thinnest line that could be followed was .7cm. Line following performance was better for lower power.

Word Count

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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:

Energy use continues to rise and negatively impact the earth. This trend increases climate change and the frequency of extreme weather events. Learning to conserve energy can lower utility bills and reduce the risks of environmental contamination from mining or drilling. Thus, it is essential for energy consumption to be reduced to result in a healthier environment. This research studied how the type of computer used would affect the energy consumption in watts. I hypothesized that if a laptop was used then less energy would be consumed as a result of its energy efficiency. The computer state, monitor state, peripheral device state, peak power, and steady- state power was recorded for 11 different major computer components on both a laptop and desktop computer. There were 3 trials for each type of PC. Through the laptop's trials the peak power ranged from 26.6 watts to 41.9 watts and its steady- state power from 12.35 watts to 46.6 watts. The desktop's trials showed a significant difference in energy use because its peak power ranged from 101.2 watts to 112.3 watts and its steady- state power from 69.8 watts to 103 watts. This data proves that a laptop uses less energy than a desktop because through the 11 different computer components tested, the laptop consumed less energy in watts. Using a laptop can help greatly in conserving energy and future studies will improve the energy efficiency of them even more.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Fair Category

Student Name(s):

Abstract:

Hot air always rises and it is possible to convert this rising hot air into a draft channeled into a chimney. The draft can be made to mechanically rotate the blades of a turbine. The turbine's mechanical energy derived from its rotation is used to convert it into electrical energy in the generator on the basis of Faraday's Laws. The efficiency of conversion is dependent on the design and size of the containment area and design of the generator. A system based on these principles was built to illustrate the value of this alternative method of power generation. It was predicted that the Solar Updraft Tower would generate electricity. A muffin fan was used to convert the kinetic energy into power/electricity. The outdoor temperature, containment temperature and humidity, wind speed at base of tower and the sun's irradiance were all measured. The following mathematical equation was used to calculate the power (watts) produced:

$$P=2/3 (\eta_t \eta_{coll})(g/(c_p T_o)(h A_{coll} G)$$

Where: η_t is the turbine efficiency and η_{coll} is the collector efficiency, A_{coll} is the collector area, c_p is the specific heat of air, T_o is the inlet air temperature, g the acceleration due to gravity, h the height of the tower, and G the solar constant. The system did produce electrical power and illustrated the strength of simple and elegant engineering models to prove valuable engineering concepts in cost effective ways. A large scale solar updraft power system with a gigantic tower and thirty two turbines is being built in Arizona.

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Fair Category

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The objective of this experiment was to find which ball can be thrown the highest: a tennis ball, a golf ball, a baseball, or a football. The hypothesis states that the baseball can be thrown the highest because of the baseball's size and weight. The size of the baseball makes it the easiest to throw and its weight allows it to overcome air resistance. This experiment took four days. Each day a different ball was thrown three times. The point that each ball was released and the point of its decline were timed. The same person threw each ball, each day, and at the same time of the day. This person also ate the same foods at the same times each of the four days. The height was calculated using the following equation: $H=4.9 \times (.5 \times t)^2$. The results showed the hypothesis to be correct. The baseball was thrown the highest. This experiment demonstrates how proper mass can overcome the effects of air resistance.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In the world of radio controlled vehicles, Traxxas advertises that its servos are “Waterproof”. Some hobbyists say that these servos are waterproof at any depth. Many say that the servos are “Water Resistant” because after a certain depth, the servo will get water inside itself and will not function. My experiment tested the validity of this theory. To conduct the experiment, I connected 4 double A batteries to a receiver. Next I filled a container with a solution to the top of the servo and continually turned the servo in alternating directions and did this for 1 minute. I repeated this with different depths of submersion (top of case, 5 inches and 10 inches), different servos (stock, waterproof and modified) and different water solutions (tap, dirty, salty). During the experiment, I found that the waterproof and modified servos could work at all depths and solutions tested. The stock servo was unable to last the full 1 minute for the salty water at the top of the case and at 10 inches. After further inspection, about half the servo was filled with the solution. In conclusion, the waterproof and modified servos had no water inside of them and performed flawlessly. However, the stock servo failed to work at the top of case and 10 inches of salty water, but once dry, it regained function. These servos can be used in applications such as remote controlled cars, robots and to rotate security cameras .

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
5543

Student Name(s):

Fair Category

Word Count

Abstract:

I chose to do this project because playing chess is one of my favorite hobbies, along with millions of other people. People are always trying to find better strategies to beat their opponents in chess games. In my project, I tested if mirroring every single move your opponent makes, in this case the Computer in an online chess game, is a good strategy. My hypothesis was that an inexperienced player would have about a 10% chance of winning a chess game when mirroring all the moves. I believed this was a reasonable hypothesis because there is a small chance of checkmating the computer. The materials that I used were my computer, my own hands, a ruler, a pencil, an eraser, and a notebook. I conducted my experiment by playing a total of twenty games. I played against the Computer in online chess games. The three possible outcomes in my experiment were as follows: the Computer checkmates me; I checkmate the Computer; or I run out of time, as I gave myself a fifteen minute time limit for each game. The results I got were different from my original hypothesis. The more chess games I played, the more I saw how impractical mirroring the opponent's moves is. The opponent, not just the Computer, can take many pieces in a matter of minutes, and the player cannot do anything to retaliate. Considering my research, the method of mirroring the opponent's moves in chess is impractical and should not be used.

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CSEF Official Abstract and Certification

Fair Category

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Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Word Count

Abstract:

What is a better source of energy, hydroelectric power or wind power? I believe that if I were to construct both water powered and wind powered turbine, then the hydroelectric turbine would produce a larger and more consistent flow of electricity. To build my turbine, I used parts from a model airplane, and various supplies from a local hardware store. I collected my data from both water and wind, then used the volumetric flow rate formula to proportionately change my results. My results showed that hydroelectric power is much more efficient. There were no breaks in the amount of energy produced, and it was overall higher. In conclusion, my hypothesis of if I were to construct both a water powered and wind powered turbine, then the hydroelectrically powered turbine would produce a larger and more consistent flow of electricity, was proven. After doing much research and constant work, I realized that in real world situations, tidal powered hydroelectric turbines are much more efficient than wind powered turbines; this is shown by the large differences in the test results, where the average difference was about four volts. If I were to do this experiment again, I would most likely use a more sensitive multi-meter to try and pick up a more accurate reading. Something that could have gone wrong, and it did go wrong, but I corrected it, was my incorrect use of the volumetric rate of flow formula. This caused my readings to be mathematically inaccurate. This can greatly influence our society today because we need alternate energy sources, and this experiment shows that tidal based, hydroelectric turbines are a great source of constant, renewable energy.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The efficiency of a hot water solar system is greatly affected by pump selection. Pumps are sized by determining the optimal flow rate needed for the application. How fast should fluid travel through a coil to achieve optimal heat transfer? The slower fluid flows in laminar flow, the more heat is transferred through conduction and convection. Since I can't get turbulent flow through this pump, the slower the speed, the more heat transfer I will get. I will pump fluid from an insulated container through a circular tubing coil and back. The coil will be heated by two 250 watt bulbs placed one half meter away. I will use 10 meters of tubing which is the same amount of tubing in one section of a solar hot water panel. I will use a 70 watt pump that can pump up to 10 liters per minute. I will calibrate the flow valve to determine the flow rate. Each test will start with the fluid at a specific temperature that will be the same for each test. Each of seven tests will run for 30 minutes, at the end of which I will measure net temperature change. As the rate of flow decreases, the amount of heat transfer rises. I conclude that the best rate for heat transfer is also the slowest. Because a slower flow rate requires less energy, it is also more efficient. Thus, a well-designed solar hot water system is best designed using a slow, efficient, pump system.

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Student Name(s):

Fair Category

Word Count

Abstract:

While doing this project, I mainly researched one thing, "Good Rube Goldberg projects?" I researched this because I knew who Rube Goldberg was and what he did, but not of what other students had done based on his work. I wanted to be able to figure out what type of materials other people used to connect my project. What I wanted to accomplish with my project was being able to touch one domino or button and let the project work and start the Gangnam style music video. And with a lot of research and thought, I was able to accomplish that. I used ramps, dominoes, marbles, a bucket, popsicle sticks, a Hot wheels car, and a motion activated candy dispenser to complete my project. I recorded every successful and not successful trial, and made a few changes to my procedure after finding better materials to use. But over all my project stayed the same throughout my experimenting. My project switched on the Gangnam Style video. To do this I knocked over one domino which knocked over a row of other dominoes, the last domino in the row hit a ball that rolled down a ramp and hit another row of dominoes. The last domino, in that row, hit the Hot Wheels car. The car went down another ramp into a tube and activated the candy dispenser full of marbles. The marbles rolled down a tube and into a bucket that what hanging by a rubberband. As the bucket got heavier, the attached pointer pressed the space bar of my computer and began the video.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The Particle Wave Duality is an experiment in the field of Quantum Physics. I emphasized the number of many mysteries in the field of classical math and physics derived from the field of Quantum Mechanics. My experiment is on whether or not the number of visible intersection points from a laser hitting against a screen after passing through two small vertical slits side by side will increase or decrease over certain different distances. I tackled my experiment using the harder and un-flawed method. In multiple flawed ways I have encountered, a diffraction grating is used such as material such as the minuscule grooves found in CDs. First, the number of intersections are within another set of intersections that scientists might refer to. Also, you never know the differences that occur at the Plank level of the protons and electrons. The area of Physics I am currently studying consists of multiple occurrences that cannot be explained. My project defines these occurrences and explains my theories that are about how we can use these mysterious occurrences to our advantage like using the Photo-Electric Effect to make an enhanced version of an energy sending machine to power the International Space Station as well as other machines in the future. My results in experiment have not yet existed in any of the books, websites, or any other media I have encountered. It also benefits the scientific community by adding a piece of vital information that cannot be found as easily as it should be.

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Word Count

Abstract:

My research project was the effect of temperature on bounce height. The research project was that if I put a tennis ball into a freezer and a hot plate oven will the bounce be effected compared to a room temperature ball. The purpose of the project was to determine if the tennis balls would differ in bounce height depending on the temperature environment the ball was in. The procedure in this experiment was to place 3 tennis balls into a freezer overnight for 2 days. Once they were removed then bounce them from a height of 60 inches. After that, place 3 tennis balls in a hot plate oven and wait until they reach a temperature of 92,110 and 115 degrees Celsius. My data was made up of four trials. The averages of all of the bounce heights were, room temperature the bounce height average was 27.25 inches. 92 degrees Celsius was an average of 35 inches, 110 degrees Celsius was an average of 35.5 inches and the temperature of 115 degrees Celsius was an average of 34.5 inches. Lastly when I put three tennis balls in the freezer, the bounce height was an average of 34.5 inches. I concluded that the 110 degrees Celsius ball bounced the highest. When a ball is heated, the rubber inside the ball is stretched out, causing it to bounce higher.

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:
5549

Student Name(s):

Fair Category

Word Count

Abstract:

Renewable, clean energy is vitally important the future of America. One promising source, wind power, is projected to rise to 20% of the total U.S. energy by 2030(1). Utilizing as much available wind as possible is an efficient, cost effective way to increase power generation. In this project, I have explored wind turbine blade designs to improve aerodynamic airflow that will drive the blades to spin faster, thus yielding more electrical output. A small turbine was assembled and connected to a multimeter to test voltage and amperage. Watts, percentage of watt change, wind speed, efficiency, RPM's, tip speed, and tip speed ratio were then calculated. Testing was done on control blades and compared to: extensions (6 designs), extensions and winglets(6 designs) and winglets (3 designs). Results showed the .5'' extension combined with .5'' winglet facing away from the tower had the best results, 9.17% increase in wattage, corresponding to an 8.93% efficiency increase. Overall, the six extension designs produced the greatest range, yet with some of the most favorable results: 4 designs were very favorable and 2 designs were less favorable than the control. Of the six winglets plus extension designs, 4 were unfavorable, while 2 were very favorable (among the top 2) as compared to the control. The winglet only group, with 3 designs, 1 was favorable while the other 2 were unfavorable when compared to control. This research has demonstrated that a gain in wattage and efficiency, is best achieved with the blades that were designed with both extensions and winglets. Theses designs are a viable way to increase wind turbine efficiency that will not harm the environment.

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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:

Student Name(s):

Fair Category

Word Count

Abstract:

The title of my experiment is "As The Wind Turns." In the experiment, my problem was "How does the incline of the blades on a wind turbine affect the efficiency of the wind turbine?" Wind turbine designers would be interested in my results, because they could optimize turbine blades based on the results. To test the problem, I twisted metal blades on a turbine to different angles and put them in front of a fan. Using a measuring wheel, I checked how many times it rotated over 30 seconds in order to check its efficiency. After conducting the experiment, I could conclude that 30° is the optimal angle for a wind turbine to have its blades at. The 5 inch blades at 30° rotated 213 times on average, while 45° rotated 171 times, and 60° rotated only 139 times. With 7 inch blades, the 30° blades rotated 122 times, the 45° blades rotated 48 times, and the 60° blades rotated the least, at 41 times. The pattern continued with the 10 inch blade, where 30° rotated 98 times, 45° rotated 38 times and then the minimum was 60°, with 15 rotations. The 30° blades rotated the most because at that angle they provided the right balance between blade surface area exposure and wind resistance, compared to the other two angles.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Power, A study of various airplane engines and the forces they generate

Student Name(s): E. Romo Kurek

Fair Category

Abstract:

This paper discusses two different types of airplane engines, turboprop and turbine. The purpose of this experiment was to compare these two types of engines by measuring the force they generate. My hypothesis was, if I test turboprop and turbine engines for force (which will be measured by how far they can push a sail car), then the turbine engine will produce more force because the blades are wider than the turboprop blades. To test this I built small-scale models of a turboprop and a turbine engine I taped them to the floor, and had them push a sail car. I then measured the distance the car traveled. I found that the turbine engine provided much more powerful pushing the sail car an average of 240 cm while the turboprop only pushed the sail car an average of 128 cm. This proved my hypothesis correct, which was that the turbine engine would provide more force. The increased force is a result of the wider blades, as well as, the focusing affect of the coffee can. These findings therefore show that the turbine engine is the better choice for planes that need speed or to carry heavy loads.

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 main goal of this project is to measure the surface tension of water by using paperclips and drops of water as a counter balance to disrupt the surface tension. Then using the equation $f=2sd$ (where f is the force in newton's, s is surface tension, and d is the length of the needle) to solve surface tension. The question is "how does the force used (exerted) by a needle pulled through the water affects the surface tension of the water?" The hypothesis is "if you place a needle in the water with enough wait then the surface tension of the water will be disrupted." The experiment was completed by creating a single beam balance where one end held the weights (paperclips/drops of water) and the other balanced the needle, which was sitting in a bowl of water. Each trial measured the amount of weight necessary to break the needle free of the waters surface tension. The controlled variable is the single beam balance and the needle. The independent variable is the detergent in the water and the weight of the single beam balance. The dependent variable is the surface tension of the water. The results are the following surface tension measurements in newtons: .000047 for paperclip weight, .000369 for drops of water, .000030 with detergent in the bowl with paperclips, .000337 for detergent in the bowl using drops of water. In conclusion the drops of water had the most surface tension and the detergent in the bowl using paperclips had the least amount.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The development of humanoid robots is on the rise, and the appearance of these advanced robots varies in ways that reflect our beliefs. The objective of this experiment was to determine if internalized gender biases are projected onto humanoid robots. It is hypothesized that if gender specific voices are used by a humanoid robot that is gender neutral in appearance, then its perceived occupational success will reflect traditional gender roles. To conduct this experiment, participants were separated into three groups. Group 1 watched a presentation given by the robot as it used a masculine voice. Group 2 watched the same presentation with a high, feminine voice, and Group 3 – the control – watched it with the robot’s gender-neutral voice. This division was repeated across two groups: middle school students and teachers. Each participant then had to fill out a survey about the robot’s potential uses, rating the robot’s possible success at each of 10 occupations on a scale of 1-5. The occupations listed on the survey were split between those consisting of 80% men and those consisting of 80% women based on the Rhode Island Census 2000 Special Employment Equal Opportunity (EEO) Tabulation. There was no correlation between the gender-specific voices and the perceived occupational success. However, the participants in Group 1 almost invariably rated the robot’s likelihood of success higher than Groups 2 and 3 at all occupations. The findings indicate that the human bias to think of men as successful at all occupations is projected even onto androgynous robots.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title: "I'm Melting!" The Wicked Witch of the West and Ice Agree
Global Warming is a problem

Student Name(s): A. Lewis

Fair Category

Word Count

Abstract:

Abstract Global Warming is a real phenomenon, which is impacting the environment, particularly the polar ice caps. I am interested in environmental science and today's environmental situation is in trouble, I believe. My experiments tested two potential contributing factors to melting ice and 5 barriers to potentially slow the melting process. I tested time it took for ice to melt in different amounts of water, in different temperature water and different barrier substances. The barriers were tested with a grow light in a dark environment where as the others were in ambient light. I ran a control with every experiment- ice melting in container with no water or covering. To make my experiments valid, I first tested and found that with more water the ice melts significantly faster. Cold water keeps ice in solid form longer and warmer water melts ice faster. Based on these conclusions, I tested various barrier substances (newspaper, foam, plastic, tin foil, and Mylar). As I suspected, Mylar worked best as a barrier. Mylar has superior reflective properties, therefore delaying the melting time. Another conclusion I found was that all substances did slow the melting process, if only by a little. Mylar could be put over the polar ice caps, ski slopes or outdoor ice rinks like an umbrella. It would be a temporary solution to slow the melting process until a more sustainable one could be found.

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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:
Proj. Num

Student Name(s):

Fair Category

Word Count

Abstract:

Worms and maggots are nature's trash disposal crews; they get rid of rotting material making soil fertile. I researched the environmental effects of the consumption of high fructose corn syrup (HFCS) versus sugar by invertebrates. My project consisted of the use of HFCS, water, and sugar. I used five clear containers and filled three containers with the same amount of soil and four worms each. I placed maggots in the remaining two containers with a slice of rotting apple. One apple was covered in HFCS and the other apple was completely natural. For my worm experiment, I combined 2 ounces, 1 to 1 ratios of each substance in separate containers. A control container with no substances was added. Containers two and three had HFCS and sugar respectively. The worms subjected to the HFCS were not active and on the verge of dying. The remaining worms subjected to sugar increased in size and weight and were very active in their containers. The control worms were less active, but did increase in size. The maggots in the container with the HFCS lived longer and on the fourth day produced more viable cocoons that will produce flies. In the container with no HFCS, the maggot's mortality rate was higher producing half the amount of cocoons two days sooner. I observed each experiment for a period of seven days. In conclusion, if high fructose corn syrup is not disposed of properly, worms will die and soil will cease to be fertilized.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Caparison of Absorption Rates of Natural VS Artificial Sugars and Effect of Antioxidant Spice Enhancers and Absorption Rates

Student Name(s): E. Katz

Fair Category

Word Count

Abstract:

Abstract My goal was to determine if there is a difference in bioavailability between natural and artificial sugars. By testing forms of natural and artificial sugars for absorption rate and sugar content, I found which forms of sugars were most quickly absorbed by or cells. I also found the effect of simulated stomach acid and spice enhancers on cell absorption. Results and correlations include: • Most artificial sugars are “Chemically Sweet”. • Some Artificial sugars actually have sugar content in them, including Nevella, Aspartame, and Equal. (50-80%) • Heated “enhancers” increase bioavailability. (40-60%) • Cinnamon greatly enhances bioavailability of natural and artificial sugars, especially when heated (50-90%). • Cloves increase absorption best in artificial sugars (average 200%) • The simulation of stomach acid (0.1M HCl) enhances bioavailability of natural and artificial sugars, assisting in digestion. (Average 30-60%) • Xylose and Sucrose (natural sugars) and Truvia, Sweet N low and Splenda (artificial sugars) have less sugar content. Both artificial and natural sugars are quickly absorbed and easily digested but artificial sugars have chemicals that may be harmful. My “Sweet Advice” can help several people including over-weight people and diabetics.

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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:

This experiment and science fair project is analyzing how the age of a house (or of the water pipes in the house) affects the lead level in the water. The purpose of this experiment was to recognize how age of a house can affect people's daily lives and health. In order to obtain this experiment, I shall use a lead testing kit called First Alert. The active ingredient that is in the lead testing kit or the Indicator Solution is Sulphide anions (S²⁻). When the Sulphide anions mix with water it forms a yellow, brown or black color. $2\text{Na}_2\text{S} + 2\text{H}_2\text{O} + \text{Pb}^{2+} \rightarrow \text{PbS} + 4\text{Na}^+ + 2\text{OH}^- + \text{H}_2\text{S}$ When sodium sulphide is combined with water and lead, it creates lead sulphide. The Bi-products in the reaction are hydrogen sulphide (H₂S) gas, sodium ions (Na⁺), and hydroxide ions (OH⁻) To preform this experiment, I shall gather the participants I need, buy the test tubes, and distribute them to the houses that would like to participate. I shall also notify the houses that would like to participate about the specifics of the water collection procedure. The participants will be notified to not use their kitchen sink faucet for five hours prior to the water sample collection (this may take place over night). The water samples will be collected in the test tubes that are supplied. Participants will be notified about the amount of water to collect and they will be allowed one week to gather the water sample. Water samples will be picked up from the houses after one week. The problem statement for this experiment is: does the age of a house affect the amount of lead in the water? The hypothesis for this experiment is: if the water in homes built before 1970 is tested, then there will be a larger amount of lead in the water compared to a newer home. The independent variable is: the age of a house and the dependent variable for this experiment is: the amount of lead in a house.

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. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

My Science Fair project, intended to help people effectively protect shoreline communities, is an experiment to test what material is best to use in sand bags so that water does not get through. In my experiment, I put three sand bags on top of each other and closed all of the leaks with plumber's putty, so the only variable was the material in the sand bags. I also kept the water at a constant height because that was another variable that affected the water flow. The results in my experiment were not what I expected. I thought that sand was going to do the best, but in the end, large gravel did the best. I think large gravel was better because it was a more dense material than sand. Dirt, the least dense, was the worst out of all of the materials which I had expected. Since I noticed that the level of the water affected the flow rate, I tested the sand bags at three heights of water (4, 6, and 8ins). The result did not support my hypothesis but did support other expectations. For example, dirt and small gravel proved to be very ineffective while large gravel and sand were very effective. As a result of my experiment, I would encourage shoreline property owners to use sand or large gravel in sand bags.

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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:

Have you ever come upon the problem of being baffled by what type of computer components, quantity and which ones are most important in causing the biggest change in Windows system speed? It is hypothesized that both CPU speed and RAM combined(3.6ghz 8gb RAM) will cause the biggest change in system speed. The following is a brief synopsis of the procedure used in this experiment. The computer is tested with a stopwatch. The stopwatch is started when the power button was pressed. It is stopped when the mouse appeared onscreen. The test is repeated 15 times. The computer was tested with 15 different CPU/RAM configurations. The different configurations are 3.4 ghz 4gb RAM, 3.6 ghz 4gb RAM, 3.6 ghz 4gb RAM and 3.6 ghz 8gb RAM. The results were surprising. The results contradicted the hypothesis previously stated instead the results favored the fact that 3.4 ghz with 4gb RAM made the greatest change. It also stated that 8gb RAM with 3.4 ghz is overloaded and slows down the computer.

Special Categories Selected by Student:

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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:

Glue is a widely used product by many people in many places. There are a variety of glues that serve different purposes. Some are used for small art activities, others for projects. Stronger glue products are used for construction and remodeling and promise a life-lasting "stick." I set out to see which glue product (glue sticks, liquid glue, rubber cement, crazy glue, or gorilla glue) had the strongest affect on a variety of materials (plastic, styrofoam, wood, paper, and card board.) All five forms of glues were tested using five different materials. My hypothesis was that gorilla glue would provide the strongest "stick" due to its high cost and marketing promise as being the toughest on the planet. Experiments revealed quite different results, however. The strongest glue product was the crazy glue - with the highest score of all experiments when gluing wood material. Gorilla glue, despite its promise, had scores close to the bottom of all. It is not good to go by only what the label promises - it could be a waste of money of the product as well.

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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:
5562

Student Name(s):

Fair Category

Word Count

Abstract:

Microbial fuel cells (MFCs) provide an ecologically friendly and cost-effective energy source. Different variables such as sugar, yogurt, yeast, and compost were tested as additives to MFCs to mimic the effect of organic waste from the food industry waste stream, on the performance and sustainability of MFC. Seven different MFCs were tested and compared. The energy production of each cell was measured once every twenty-four hours in millivolts/2.5 inch of anode. The compost soil (rich with organic material) provided the most efficient cell; it produced 737 mV at its peak, which translates to 182.9 V/m². As hypothesized, the addition of yogurt and sugar to MFCs demonstrated increase in the energy production of the cells, providing proof of concept for possible usage of food industry waste stream in combination with MFCs as an alternative energy source. A new concept, multiple-anode microbial fuel cell, was devised and tested. This concept consists of a stepwise buildup of the cell by adding soil and another anode on top of the cathode which inverts to a new anode with the last added cathode on top (repeated 3 times). The results indicated that all anodes were equally effective. This allows for applications in compost buildup and new compact MFC activated by consuming food industry waste stream. Multiple-anode MFC plants are compact and would take advantage of the high energy production equal to that of several separate MFCs, they could be built near food industry plants as energy source that treats their own waste stream.

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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 question was: how does a rooftop garden affect the temperature of a house? The goal was to test the effect of rooftop gardens and how effectively they insulated houses. The hypothesis was: if a rooftop garden is used, then the temperature of the house will remain within a five degree range from the starting temperature. Four box houses were constructed. Three boxes, with sod on the top, represented houses with rooftop gardens. One box, without sod, represented a regular house without a rooftop garden. Multiple temperatures were taken including a starting temperature, heated temperature (one hour under a heating lamp), first cooling temperature (15 minutes of cooling), and a second cooling temperature (15 more minutes of cooling). The external temperature was taken as well as the internal temperatures of the regular house and all three rooftop garden houses. Three trials were completed. Rooftop gardens significantly reduced the temperature of the inside of a house. In all of the rooftop garden houses, the interior temperature stayed below or, in some cases, the same as the regular house's internal temperature. It was found that rooftop gardens help to better insulate houses by keeping them at more consistent temperatures.

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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:

My project was about finding out which battery creates the best solenoid. A solenoid is a copper wire, wrapped around a hollow plastic tube, which has a current through it. This current then produces a magnetic field that can attract and repel objects in its magnetic field. Solenoids are used mostly in engineering, and are used on railways, doorbells, and car starters. In my experiment, I will be testing 3 batteries, AA,C, and D. There will be a nail on the end of a Newtons cradle, and the solenoid will be inside that. I then hook it up using the connectors, and connect it to the battery being tested. Put the ball back, and let it swing. The ball should be attracted to the solenoid. This explains the solenoid's magnetic field. For the AA batteries, there are battery holders. For the C and D batteries, I used a flashlight that was hollowed out. I then connected the ends of the wire to the positive and negative ends inside the flashlight. This powered the solenoid and made the test possible. The results were that the D battery produced much higher power in the magnetic field, because the ball was swinging for much longer. Also, 6 volts produced more energy that the C batteries. This is not likely to change the world, but now we know that the D battery can create the strongest magnetic field.

Special Categories Selected by Student:

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: An Investigation of a Novel TiO₂ Coating for Improved Surrounding Air Quality & Reduced Solar Cell Maintenance

Student Name(s): B. Hallisey

Fair Category

Word Count

Abstract:

Photocatalytic oxidation (PCO) has gained ground as an innovative technology to remove hazardous environmental airborne pollutants. Nano-sized TiO₂ particles have been shown to trap, absorb, and remove harmful airborne pollutants, in the presence of sunlight. The TiO₂ photocatalyst produces hydroxyl radicals and superoxides, which are responsible for oxidizing and reducing airborne contaminants into water soluble by-products. Given the mechanisms for PCO air purification, the application of TiO₂ thin films to solar cell glass is attractive both from an air-quality point of view, but also from cell-maintenance and overall function perspectives. In this investigation, a novel TiO₂ thin film was spray-coated onto a glass substrate, and the efficiency of photocatalytic oxidation of N₂O and CH₄, derived from cigarette second hand smoke, was determined. FTIR & UV-Vis Reflectance spectroscopies, as well as SEM analysis, were used to characterize contaminant remediation and window throughput performance. In 2L, a 1 in 2 of TiO₂-coated glass (0.50 μm film thickness) remediated 8.8 ml of CH₄, and 463 μg of N₂O. The TiO₂ coating oxidized/reduced these airborne contaminants to water soluble entities, that were visible as residue on the coated-glass surface. Simulated rainwater rinse (20 min) of the post-remediation TiO₂-coated glass restored the light transmission characteristics to the original, clean condition. 8% loss of light transmission due to redox action of the TiO₂ layer was fully restored, with no change in reflectance. This is compared to a 3% loss in transmission for normal glass in SHS, without self-cleaning properties. Results suggest that a TiO₂ coating would be ideal for use on the leading surface of a solar cell; the coating will provide meaningful remediation of airborne pollutants, and the glass surface will be self cleaning, resulting in reduced maintenance, and enhanced solar cell

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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:

Enantiomers are stereoisomers that are related as an object and its non superimposable mirror image. In organic chemistry, specifically stereochemistry, many molecules are what are referred to as chiral. Chiral means that the molecule has a mirror image, such as your hands are mirror images, but the mirror images are not the same. Chirality occurs in molecules with a carbon that has four groups attached to it. The separation of racemic mixtures can be difficult and can only be done with both extensive and expensive work on the molecules. In our research, we plan to devise methods of inexpensively purifying racemic ketones by adding a chiral amine made in the lab. The goal of the lab is to add a chiral amine to the racemic ketone to turn the molecules into diastereomeric imines thus making it easier to separate them using various crystallization methods. The project that will be conducted in the laboratory will consist of devising methods of separating enantiomers. If successful, the separation methods may be used in biological studies in creating pharmaceutical drugs or for medical purposes. As of now, work in the lab is ongoing and the results are expected to reach conclusion in the near future and should be successful.

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 main scope of my project was to create a new invention to harness the incredible power that waves generate. The purpose of this invention is to find a new method of self sustaining energy that can be used in many practical applications worldwide. To begin, I first researched already existing methods and inventions that harness wave power. I then discovered the flaws and impracticalities of all those methods and then tried to base my new concept on improving on all the previous ones. My invention, if created, will be shore/land based as opposed to the majority of other wave harnessing devices, which float. My new invention will be more practical as it will be easier to service as opposed to having to use a boat to access off-shore machines. This new invention will be like no other and horizontally reciprocate with the movement of waves. This perpetual motion will be turned into rotation with the usage of a rack-and-pinion gear system that will make the reciprocation into rotation which can be used to power anything from a household appliance to charging an electric vehicle. In result, this new concept will vastly improve the practicality, applications, and cost over any other wave energy harnessing device to this day. In the near future, this invention could be used to bring power to locations where power companies are not a reliable option or even self sustain an island.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

A method was used to determine the metals content in a variety of pet food samples, using inductively coupled plasma mass spectrometry (ICP-MS). A one gram sample was homogenized and digested with nitric acid and hydrochloric acid. The samples were brought to a final volume of 50mL with distilled water, and an aliquot was analyzed by ICP-MS for thirty-two different metals. Twenty different pet food samples were analyzed, 7 of wet variety and 13 of the dry variety. The samples ranged in price from \$0.38/lb to \$4.00/lb. Results ranged from none detected to over ten thousand ppm for some metals. All results were corrected for dry weight. No correlation was found between price and metal content, nor was there any obvious differences found between expensive and inexpensive pet food. However, wet pet food did appear to contain less hazardous metals than dry pet food in certain cases.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Utilization of sUAS for Deer Tick Population Management and Environmental Research

Student Name(s): P. Hansel

Fair Category

Abstract:

In recent years, regions in the Northeast have had a severe problem with parasitic black-legged ticks (*Ixodes scapularis*) as a vector for infectious disease in the Northeast. White-tailed deer (*Odocoileus virginianus*) are the main hosts of ticks, and deer populations are rising with the recent elimination of their natural predators. Thus, distribution of tick-borne infectious diseases has risen dramatically in Connecticut and neighboring states. An effective response to this issue has been held up by a lack of reliable deer population data. The goal of this engineering project has been to create and test a robust and inexpensive small unmanned aerial system (sUAS) utilizing camera equipment covering visible, near-infrared, and thermal spectra to identify deer and their habitat, as well as the density and relative health of plant life over a measured area. Using software, this data is processed and an orthogonal, 3-dimensional map of the area is created. Data regarding deer population density, location, and age can be used to drastically increase the effectiveness of tickicide applications and culls. This system also shows promise as a valuable tool for search-and-rescue, disaster recovery, and agricultural purposes.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6007

Student Name(s):

Fair Category

Word Count

Abstract:

Oil spills cause significant financial losses along with negative environmental impacts annually. Current oil spill cleanup procedures are limited in their efficiency. These limitations lend themselves to the pressing requisite for more rapid and effective methods of oil spill cleanup. To this effect, it is proposed that Coal Fly Ash (CFA) can be a sustainable, rapid and effective candidate. To capitalize on CFA's abundant availability, the CFA's surface must be modified to promote hydrophobic and oilphilic properties. Surface modification was achieved by binding the CFA with Sodium Oleate (SO). To determine efficacy, a low concentration ratio of SO:CFA of 0.004g/1g and a high concentration ratio of SO:CFA of 0.5g/1g were employed. The modified and unmodified (control) CFA was tested for oil absorbency and hydrophobic capabilities with and without the aid of absorbency pads. These pads simulate existing methods of oil-spill clean-up such as the pads that line oil booms. The modified CFA adsorbed on average, 4.24% more oil per gram than the unmodified CFA and demonstrated on average 49.96% less oil displacement by water. This indicated that modified CFA is about 50% more effective at absorbing and retaining oil. Through the process of infusing pads with modified CFA, the oilphilic capacities of the pads were ameliorated to absorb 14.74% more oil. Furthermore, the modified CFA infused pads demonstrated on average 89.64% less oil displacement by water than the un-infused pads. Further research would include developing a method to extract the oil adsorbed in the CFA so it can be applied towards a secondary purpose.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Hydroxyapatite Sol-gel Coatings on Titanium Substrates for Bioengineering Applications

Student Name(s): L. Glicklich

Fair Category

Abstract:

Bone injuries, failures, and infections often require implants of bioactive materials. Metallic implants, like titanium substrates, enhance bone formation and stability within the body. This investigation examines hydroxyapatite (HA) synthesis through sol gel processing on to titanium substrates for biomedical applications. This technique offers an advantageous control of coating composition with precursor solutions, minimal equipment requirements, and low temperature processing. The titanium substrates were spin coated with TiO₂ and HA sols and then sintered at various temperatures ranging from 500-700 degrees. Bioactivity was tested in a simulated body fluid in which the coated substrates were submerged for two weeks. Characterization included X-Ray Diffraction, optical microscopy, and Scanning Electron Microscopy (SEM), which analyzed structural content. The SEM electron microprobe was utilized to elucidate structural and chemical information. Lastly, the FTIR spectroscopy testing was used to study the coating chemical bonding properties. Future endeavors will utilize greater adhesion processing for improved robust coatings.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Automatic Detection and Classification of Alzheimer's Disease
From MRI Scans Using Principal Component Analysis and

Student Name(s): R. Mahmood

Fair Category

Abstract:

Early detection of Alzheimer's Disease (AD) is important so that preventative measures can be taken. Current techniques for detecting AD rely on cognitive impairment testing which unfortunately does not yield accurate diagnoses until the patient has progressed beyond a moderate AD. Recently computer aided analysis of MRI scans is drawing great interest so that AD can be diagnosed more accurately and in its early stages. In this project, we develop a new approach based on mathematical and image processing techniques for better classification of AD. The most popular current technique analyzes MRI scans using properties of diffeomorphism which generates a mapping from one MRI to another. Since MRIs are very high dimensional vector spaces, the existing technique reduces it to three dimensions and then clusters the images according to presence or lack of AD. However, reducing a high dimensional vector space to three dimensions compromises the information in the data and thus results in some loss of accuracy. We propose to reduce the high dimensional MRI image vector space to 150 dimensions using Principal Component Analysis. In order to categorize the reduced dimensions from PCA for progression of AD, we employ a multiclass neural network. The neural network is trained initially on 230 diagnosed MRIs obtained from OASIS MRI database. We then test our trained neural network on the entire set of 457 MRIs provided by OASIS dataset to confirm the accuracy of diagnosis by our system. Our results produce nearly 90% accuracy in AD diagnosis and classification.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Morphological Modeling of Taurine Function in Mice to Study
Oxidant Injury to Lung and Kidney Tissue

Student Name(s): J. Lee

Fair Category

Abstract:

The role of Taurine in biological processes and in general animal health remains unclear. Although this amino acid is present in the majority of animals, cats remain as one of the few known animals that do not self-synthesize Taurine. Lack of Taurine in a cat's diet, to overcome their innate deficiency, has coincided with blindness brought on by oxidative injury to the retina. Researchers speculate that Taurine deficiency may lead to oxidative injury to retina tissue, triggered by subsequent light sensitivity. Results from these studies, however, remain unclear. It has also been established that Taurine plays a large role in osmoregularity. To better understand the significance of Taurine, and it's medical implications, this study examines the oxidant injury of and osmoregularity aberration in lung and kidney cells of mice that were intentionally depleted of Taurine. Lung and kidney tissue samples were harvested from normal mice (control) , as well as Taurine knock-out (TKO) mice, where a portion of these TKO mice's parents were treated with 0.05% Taurine. All samples were solidified with EPON, and processed for Transmission Electron Microscopic (TEM) analysis of the lung and kidney tissue organelles and membranes. Kidney and lung tissue samples from TKO mice did prove to contain the most significant oxidant injury and damage caused by alteration in osmoregularity. These results may in turn shed light on the morphological modeling of Taurine function in biological processes and overall cell integrity.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6011

Student Name(s):

Fair Category

Word Count

Abstract:

The original idea was to experiment at RHAM High School and understand whether wind power was a feasible renewable energy source by measuring the wind over a period of time. This was too taxing for the allotted time and budget, which led to a change to understand the effects of blade orientation on a model wind turbine. This project determined the optimal number and angle of blades for a wind turbine. It was hypothesized that six blades angled at 8° would be the most effective at catching the wind create electricity through turning a generator. Using a leaf blower to apply constant wind with consistent force, the experiment measured the output of Volts from a wind turbine over one minute. I tested a turbine with two, three, and six blades each at 8°, 14°, and 21° angles. The results showed that two blades produced little electricity at any angle. The best trial for two blades was at 21°, 0.0128 Volts. The trials with three blades produced sub optimal amounts of electricity, the best at 21°, 0.6977 Volts. The turbine tested with six blades at any angle was the most productive in comparison to the two and three blade trials. However, the angle most effective with six blades was 14°, 2.5033 Volts. These results can be applied to the original idea by using them to understand what orientation of blades would be ideal for a small wind energy system at RHAM High School.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Num Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Is it possible to maximize the electrical voltage of a solar array in order to charge a re-chargeable battery to keep a robotic vehicle running? Robotic rovers are the next form of technology with people developing and making advancements in this field, i.e. Mars Rover and rescue rovers. The engineering project that I have designed is a solar rover. Different obstacles have been taken into account in order to make a fully functional solar rover. A solar panel was constructed from 9 volt solar cells and blocking diodes wired in a parallel circuit in order to sufficiently charge a 6 volt battery. Diodes were used to prevent lower/ less efficient solar cells from loading the electric circuit. A 6 volt voltage regulator was added at the end of the project to control the charging voltage to the battery. A program devised to maneuver the solar rover was created using Mindstorms NXT 2.0 programming language, along with three NXT motors and a color sensor. They were used to move the rover and identify which direction the sun was in relation to the rover using various color LEDs that were attached to some of the solar cells. After identifying all of the constraints and figuring out options towards overcoming them, a successful solar rover was built that would successfully find the sun and charge the solar rover's battery pack.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Prediction of cancer tissue-origin based on molecular sequencing evidence using a machine learning-based classifier algorithm

Student Name(s): J. Henck

Fair Category

Abstract:

With the availability of sequencing-based technologies, it's possible to characterize cancer tissue samples at the molecular level. Can genes identified as containing somatic mutations be used to reliably predict the tissue of origin of oncology samples? It's hypothesized that a machine learning algorithm can be trained to accurately predict the tissue of origin of an oncology sample based on the genes containing the somatic mutations. Using COSMIC database information, an algorithm was developed to read the data file, analyze the data using a machine learning classification algorithm, and provide a prediction of the cancer tissue. The analysis was performed in two phases. First, non-metastatic tumor information was analyzed with cross-validation techniques to establish predictive algorithm feasibility and accuracy. Second, metastatic cancer information was used to test the algorithm based on the training in the first phase. The predictive value generated from the algorithm was 67% for non-metastatic cancer and 44% for metastatic cancer which was significantly more accurate than if randomly predicted at 7%. The algorithm had high specificity with variable sensitivity demonstrating its ability to accurately discriminate between tissue samples but less so in its ability to identify the tissue samples. Overall, not only did this study demonstrate the ability of a computer algorithm to improve the accuracy of classifying oncology samples but also demonstrated that gene mutations can be used to classify cancer tissue origins.

Word Count

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6014

Student Name(s):

Fair Category

Word Count

Abstract:

Self-assembly of superparamagnetic Fe₃O₄ colloidal nanocrystal clusters (CNC's) has gained particular interest as of late. In this colloidal photonic crystalline lattice system, a photonic band gap is produced as a result of cooperative scattering of light from an ordered array of dielectric particles. The visible color that is reflected by these colloidal photonic crystals can be controlled via magnetic stimuli that is able to alter the refractive indices of the colloids or surrounding matrix. Improvement in the performance of the Fe₃O₄ CNC's in solution, and their integration into a flexible solid-state matrix, are highly desirable for both consumer & defense sectors. This research investigates the self-assembly of magnetically responsive Fe₃O₄ CNC's in alkanol, and later in PDMS, so that a flexible, tunable color changing skin can be fabricated. SiO₂-coated Fe₃O₄ CNC's were synthesized, and maintained in ethanol. Photonic crystal alignment of the 180 nm SiO₂-Fe₃O₄ CNC's with only 70-140 G magnetic field produced selective reflection of blue through red/orange colors of the visible spectrum (521-621 nm), caused by 80-130 nm surface-surface colloid spacing. The relative spectral intensity of reflected color remained constant from 621-570 nm, with marginal energy reduction at blue wavelengths. These represent a 30 nm increase in constant spectral intensity, and 21% increase in blue spectral intensity, relative to literature. Reduced (5X) magnetic field requirements, and increased consistency of reflected color, allow for the greater applicability of Fe₃O₄ CNC's in solution. The SiO₂-coated Fe₃O₄ CNC's were successfully embedded into a stable PDMS matrix, to form a magnetically tunable, flexible color changing skin. 70-140 G magnetic tuning of the 2 mm CNC-PDMS skin produced a 30 nm spectral shift between green & orange wavelengths, brought about by the self-assembly of 1.5-5 μm CNC aggregates in PDMS.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6015

Student Name(s):

Fair Category

Word Count

Abstract:

While multi-walled carbon nanotubes (MWNT) have many promising applications, their behavior in different solvents must be observed to understand their environmental consequences. The extent of MWNT aggregation will influence the interaction with their environment's microorganisms and therefore, the ultimate impact on ecosystems. Quantification of nanotube aggregation is accomplished by measuring the absorbance or transmittance of the nanotubes dispersed in various solvents using an ultraviolet-visible spectrophotometer. Solvents of increasing polarity, deionized water (DI), dimethyl sulfoxide (DMSO), and dimethyl formamide (DMF), were chosen in this study. Ionic strength is also known to influence MWNT aggregation. Therefore, MWNTs dispersed in 1M NaCl and CaCl₂ were also examined. Using absorbance and transmittance measurements allowed for optimal readings in each solvent and their inverse relationship makes the results comparable. The transmittance of DI water, NaCl solution, CaCl₂ solution, was measured, while the absorbance of DMSO and DMF was measured. For all, the MWNT solutions, same concentrations, were first bath sonication to ensure initially well dispersal, each solution was pipetted into cuvettes and absorbance measured at specific time intervals. The results were graphed as absorbance/transmittance over time, illustrating the rate at which the nanotubes aggregated and settled out of solution. It was found that as the polarity of the solvent increases, the rate settling decreases. These results support the conclusion that polarity and ionic concentration of the solvent influence the stability of MWNTs in solution. The more stable MWNTs are in solution, the more bioavailable, increasing their probability of interacting with the environmental biota and microorganisms.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: How Robot Facial Features Affect the Ability to Attend to and Recall Movement Patterns

Student Name(s): T. Meehan

Fair Category

Abstract:

There have been many studies exploring how the perceived emotion of seemingly plain symbols can affect our ability to concentrate and focus. Studies have also shown us that people are quick to assign emotions and facial expressions to otherwise neutral subjects such as robots. However, there have been few studies investigating how robot facial features affect one's ability to pay attention to the robot. Thus, in this research study, one's ability to attend to and recall previous actions made by a robot with various facial features is studied. Four face configurations were utilized: a neutral face, control (scrambled) face, positive face, and negative face. It is hypothesized that participants observing robots with positive expressions will recall the most information. Participants were asked to view and memorize a sequence of movements performed by a robot. The sequences were between four and ten moves long, and participants' recall accuracy was measured for each sequence length. Data collected from 155 participants showed that the neutral face produced the highest accuracy rate in responses, while the other three conditions produced much lower accuracy rates and were not significantly different from one another. This implies that the neutral face was just engaging enough to gain the participant's attention, while the other conditions were either too abstract or too distracting to lead to high memorization rates. These findings hold potential implications for psychologists interested in the relationship between emotional expression and attention, as well as robot designers or researchers interested in eliciting attention from robot users.

Word Count

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6017

Student Name(s):

Fair Category

Abstract:

There are many hazardous situations that can be harmful and even fatal to humans exposed. A robot with similar force to weight ratio of a human arm could alleviate these dangerous environments. Artificial muscle configurations will need to be constructed in order to attain this proper force to weight ratio. A building design and configuration of six pneumatic McKibben muscles was used to attain the desired ratio. To evaluate the configuration a testing method was developed to quantify the force to weight ratio and durability, which involved a simulated forearm and force gauge. Considerations towards cost effectiveness were considered in the choice of materials, construction, and simplicity. This is initial work in hoping to further investigate the issues of sensing and control and extending to the forearm.

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

Abstract:

The experiment was performed to see whether or not the damage of a building, or in this case model house, during an earthquake changes if the soil was wet or dry. My hypothesis stated that wet soil would cause more damage because of the factor liquefaction could take place. The results that I obtained through this experiment was that the amount of time it took to destroy a building with no soil was less with dry soil than it was with wet soil.

Word Count

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6019

Student Name(s):

Fair Category

Word Count

Abstract:

The problem investigated in this study was the efficient and economic generation of electricity. The objective of this project was to design and create an electromagnetic perpetual motion machine that would generate and possibly store electricity. This was not accomplished due to both the first and second laws of thermodynamics holding true. That said, after several trials with various designs, magnet strengths, sizes, and layouts, as well as bearing and mount choice, a decision was made to create two variations of the most efficient model and compare duration of rotation. The testable model used two polyurethane skateboard wheels containing ceramic ball bearings. Forty holes were drilled in a "V" formation around the circumference of the surface edge of the first wheel and 1/2" neodymium cylinder magnets inserted in the holes. This created a single V. A second variation of the wheel was created by arranging the neodymium magnets in two smaller Vs around the circumference of the surface edge; the double V. A third wheel with two ferric bar magnets was used to initiate rotation of the first wheel. Both variations were tested by recording duration of rotation with varying strengths of the initial spin, with and without applying the bar-magnet wheel, and with "pumping" the bar magnet wheel. At the conclusion of the experiment, the original objective was not accomplished, but the results suggest a medium spin accompanied with "pumping" the bar magnet optimizes duration of rotation. Future studies attempting to disprove the laws of thermodynamics may be futile.

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CSEF Official Abstract and Certification

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Commercially available photovoltaic panels harness only solar radiation, have only a 5 to 10 percent conversion rate, and have poor power density. This project explores the feasibility of developing a prototype hybrid solar panel that enhances the power density by capturing both the radiation energy and the thermal energy of the sun. It utilizes the traditional photovoltaic cells to capture the sun's radiation energy in combination with thermoelectric devices that capture the sun's thermal energy. The hybrid solar panel also employs an innovative water cooling system that creates the temperature differences necessary to optimize the electric generation from the thermoelectric device as well as cool the photovoltaic cells to optimize its performance. At 40 degrees Celsius delta temperature, the power generated by the hybrid solar panel was 32 watts. This corresponds to a power density of .13 Watts/sq. in. compared to .067 Watts/sq. in. for just a photovoltaic panel, thereby doubling the power density. As the temperature difference increases, the improvement in power density increases as a second order polynomial comparing well with the mathematical model. This project clearly shows that the hybrid solar panel is a viable source of renewable and sustainable power.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Geomagnetic storms are storms that are produced by the sun and occur in the upper atmosphere. It causes disarray in the magnetosphere and plays a major role in space weather. These storms vary in power and can be as severe as causing blackouts in major cities or it can be as minor as interrupting GPS signals. GPS, or global positioning system is a network of satellite navigation that provide locations to many people. Since GPS systems involve with satellites that means that they are very vulnerable to these geomagnetic storm. These systems need these satellites to give correct data in order to give people correct directions and most importantly location. Currently, I am using two different brand named GPS receivers and with one of them, I am measuring the same location with the GPS simulator on and off. When it is on, that means that there is no signal and it bases its location without using the satellite signals. The other one, I am measuring my location to make sure that the other GPS is working correctly. So far, I have done this every day for two weeks and each day I would check the Kp index on an official space website and see if there were any geomagnetic storms that occurred and would have an effect on the signals. Currently, my data is showing that there is a correlation between my GPS signals and the effects of geomagnetic storms.

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. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Does the shape of a hot air balloon affect how high it can fly? Does the volume of a hot air balloon affect how high it can fly? I hypothesized that the teardrop control would fly the highest and the pillow shaped balloon would raise the least. My hypothesis for volume vs. height is that the greater the volume the higher it will fly. I built five different shaped balloons with the same volumes. The five shapes were a teardrop, rectangle, pillow, diamond, and cylinder. I also tested 2 different volumes. I inflated them with a hair dryer. I found that the diamond shaped balloon flew the highest and that the control flew the lowest. I believe that this is because the diamond shaped balloon had four seams and the teardrop shape had eight seams, which makes it have more air friction and does not allow it to fly as high. I concluded that it is not shape that affects how high a balloon can fly, but it is how many seams the balloon has that determine the height a balloon can fly. In the second experiment the balloon with the greatest volume flew the highest. I believe that is because it allowed for more heat into the balloon. I concluded that shape does affect how high a hot air balloon can fly.

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CSEF Official Abstract and Certification

Fair Category

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Num

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Title:

Student Name(s):

Fair Category

Abstract:

Network performance is one of the most crucial aspects when looking at a network. In the world of computers, faster is better. There are many ways to improve network performance, but one of the most intuitive is to create a network optimally. What that means is to create the network in such a way that it is not only easy to maintain, but that its various nodes (servers or computers which communicate with each other in the network) are connected in a way to communicate from Node A to Node B as fast as possible. In my project, I coded a program in Java which allows the user to use a weighted graph. This is a collection of connected dots which represent nodes, and each line has a value which is representative of the communication time in order to represent a network. The program then runs Prim's algorithm in order to find the minimum cost spanning tree, or a path to connect all of the nodes in the shortest weight. Since Prim's algorithm does this by finding the lowest communication values from Node A to Node B, then to node C, Prim's algorithm may not yield the most efficient path. However, Prim's algorithm has very small memory consumption. If the user is willing to sacrifice memory, then he has the option to confirm this result with Djikistra's algorithm, which is currently known to output the most efficient path in a weighted graph.

Word Count

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Natural disasters can cause an immense amount of damage to all homes and families. Although these disasters are unavoidable, preparation is not. In my experiment I tested the problem of which sea wall was most effective in protecting coastal homes against flooding and hurricanes. To test this I created a model representation of a beach with waves of water crashing down on different types of barriers protecting the sand behind it. This model was constructed in a rectangular box with a ramp at one end acting as a sand dune. On the sand dune, I laid the different barriers such as wood pylons, sand bags, and small rocks. The waves were formed by a fan that was set at high speed and angled at the back of the water for 2 minutes. I hypothesized that the sand bags would be the best type of barrier against both flooding and natural disasters because it not only absorbed the water but also absorbed the energy and force the wave had crashing down. As data I measured the amount of water that had passed through the barrier onto the flat surface of sand beyond the sea wall. In conclusion and from the data we can see that the best barrier to use as protection against these natural disasters is in fact the sand bags as they only allowed 6 cm of water pass through. This experiment gave us an insight as to ways in protecting ourselves in the future against natural disasters that have taken their toll on people all over the world.

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Title:

Student Name(s):

Fair Category

Abstract:

Clean water will be a precious commodity. The clean water will run out eventually and humans will have to find other ways to tap into other water sources. (In an efficient way) The process that I did research on was electrolysis. This is when hydrogen and oxygen are split by sending an electrical current through the water. The cathode reacts and hydrogen is formed while the anode reacts and the oxidation reaction takes place where the oxygen is formed. The hydrogen and oxygen are split into H⁺ and OH⁻. This process would be powered with a photovoltaic cell, so it would be clean energy. If the experiment was completed than the hydrogen and oxygen would have been funneled into a copper box with a condensing coil to recombine the hydrogen and oxygen to form pure drinkable water. This process would create clean water without using any energy from coal or any other fossil fuel. If the experiment would have been accomplished I would have expected the photovoltaic cell to produce energy to power electrolysis which in turn would have split the hydrogen and oxygen into two separate containers. Those containers would recombine into a copper box, were the hydrogen and oxygen would form to create clean water.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In this experiment, I tested whether the type of tread (slick, semi-slick, knobby) on a 26'' (66.04 cm) tire affected the amount of traction it had with the ground. I predicted that if a bike tire with treads that have larger indents and taller treads created more traction on the ground, then the knobby tire tread would have removed the most dirt from the plastic bin because they the thick knobs of the treads poke into loose surfaces(like dirt), which increases grip. The final averages that were found at the end of the experiment were (in order of slick, semi- slick and knobby): 49cm, 180cm, and 108cm. Each tire's data tended to stay within a range of numbers (i.e. slick stayed in a range of 23cm-50cm). These results proved my results wrong. This experiment was significant because it helped figure out what type of tire tread you would want to use when traction is important. For example, many mountain bikers need tires that grip the ground really well in order to ride safely of trails. This experiment showed what type of tire is best for these situations.

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CSEF Official Abstract and Certification

Fair Category

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Num

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Num

Title:

Student Name(s):

Fair Category

Abstract:

One proposed method of creating hydrogen fuel, on the macro scale, is by developing photo-induced water-splitting catalysts. These devices use photons from the sun to start a reaction that splits water molecules to produce hydrogen gas, and as a harmless byproduct, oxygen gas. Various styles of these solar powered water splitting cells have been created since the technology's conception in 1972. In an effort to boost the efficiency of this technology, my project focuses on mixing the strong but stable oxidizer, manganese dioxide (MnO₂), in various quantities with titanium dioxide (TiO₂) in the anode of a Graetzel-style water splitting solar cell. Mixtures of 0.5%, 1%, 5%, and 10% MnO₂ by mass will be mixed with TiO₂ (along with a 0% MnO₂ control). The mixtures were produced by weighing out the appropriate amounts of each chemical on a scale in a ventilated hood, then pouring the MnO₂ into the TiO₂ paste. The mixture was stirred until homogeneous. The paste was then applied to the conductive side of an FTO glass slide, and the cells were then sintered on a hot plate at 450°C for 45 minutes. Afterwards, the slides were soaked in a 2.5mM solution of N-719 dye in ethanol for 18 hours. For the experiment, the catalysts ran in a beaker of DI water at pH 8.4, under an incandescent light, and on a scale. I then recorded the scale reading every minute to tell how much water mass is being lost to oxygen and hydrogen gas.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Peak Electricity: The Generation of Electricity Using a Centrifugal Airflow Fan Blade, Propelled by the Flow of Hot Air from a Soffit

Student Name(s): O. Kelly

Fair Category

Word Count

Abstract:

If successful, centrifugal airflow fan blade systems, used as renewable energy sources, have the potential to be more advantageous and environmentally friendly than solar-powered and wind-powered generators. The purpose of my experiment was to first determine if the flow of hot air in an attic can produce electricity by spinning a centrifugal airflow fan blade located in the bay of two rafters of the roof, and connecting the fan blade to a standard bicycle generator. Secondly, it was to determine proof of principle using hot air from a hairdryer in an attic simulator (with the dimensions of part of an attic) to determine if it would cause the centrifugal airflow fan blade to spin. It was hypothesized that the centrifugal airflow fan blade would spin in both systems, successfully creating electricity. The centrifugal airflow fan blade failed to spin (measured in revolutions-per-minute) when located in either location, thereby proving my hypothesis incorrect. However, the principle itself was successfully proven when the hairdryer was positioned six inches away from the centrifugal airflow fan blade, causing the fan blade to spin rapidly. With a stronger airflow current, possibly produced in a hot attic during summer months, the centrifugal airflow fan blade could spin and power a generator to produce electricity. The fan blade's inability to spin at low-strength airflow currents may have resulted from the high level of friction of the centrifugal fan blade. Therefore, this experiment should be repeated with a low-friction centrifugal fan blade and a low-friction generator spindle.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6032

Student Name(s):

Fair Category

Word Count

Abstract:

End users need higher and higher levels of information assurance and random number generation is a key enabling technology. The medical field, for instance, has been subject in recent years to additional privacy and data storage rules specified by HIPAA and HITECH acts that put even more pressure on the owners of medical information. A true Random Number Generator (RNG) has not been approved by the National Institute of Standards and Technology. This experiment will develop an architectural concept for a mobile and autonomous RNG, a small handheld device easily operable from any computer, and not dependent upon communication with any remote network resource and the vulnerabilities inevitably introduced. The plan will depend on seeds for data which will be sampled from atmospheric metrics gathered from local workstation sensor input such as electromagnetic wave emissions or ionizing radiation. Tools from the University of Utah will be utilized to create these random numbers and later verify their true randomness. My RNG will be designed with an eye for characteristics defined by Barak and Halevi. One such characteristic is that the entropy of the internal state is guaranteed not to decrease. The final design architecture would document the choices made, the advantages and disadvantages of those choices, the final degree of randomness achieved, and would be readily available for building an operational device.

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CSEF Official Abstract and Certification

Fair Category

Proj.
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Title:

Student Name(s):

Fair Category

Abstract:

Background & Purpose: As a result of ongoing US military conflicts, unmanned aerial vehicles (UAVs) are often highlighted in the popular media. While UAVs are commonly found in a military context, they are rapidly becoming adopted in areas of law enforcement and earth sciences. The broader application of UAVs in non-military settings calls for more intuitive ways of control by less technically inclined end-users. The purpose of this engineering project was to construct and couple a UAV (quadcopter) with an innovative and intuitive method of wireless control. **Procedures:** A quadcopter was assembled de novo using hardware components including a carbon fiber frame, 4 brushless motors and electronic speed controllers to drive the propellers, one wireless microcontroller, and power sources. A modified sports glove was fitted with tactile switches and an accelerometer. These were wired to a second wireless microcontroller mounted to a light-weight plastic mold to fit the forearm. **Instructional algorithms** were written for the quadcopter and hand-arm mounted microcontrollers in the C++ programming language. **Observations/Results:** The hand-arm mounted controller was able to interpret sensory input received from the accelerometer and tactile switches on the glove and accurately send instructions to the quadcopter to vary individual motor speeds using different pulse widths. It was also able to control UAV altitude, pitch, and roll. **Conclusion:** A quadcopter was constructed with a viable wireless hand-arm mounted controller. Using simple hand gestures, control of the UAV was more intuitive. Refinement of this control method may have broad applications for UAVs in other settings.

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CSEF Official Abstract and Certification

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Student Name(s):

Fair Category

Word Count

Abstract:

The study of water turbines is important for the new drive for green energy. In this experiment different water turbines will be tested to see which is more effective in creating energy, or in this case able to hold weight. Water turbines provide energy to 7% of the United States, and are cost effective compared to other not as accurate means of creating energy. Water turbines are used on rivers and in dams to create energy for people to use. Hydropower plants are limited both by available rivers and by competing uses for those rivers, such as recreation, tourism, industry, etc. In order to extract the energy from the water, a water turbine must be placed and used. Water turbines are an environmentally friendly way of creating energy from the natural flow of water, or by the creation of a dam. Water covers 75% of this earth and can be a very effective way of extracting energy rather than getting energy from oil. The experiment that is going to be conducted in this experiment will test how the different size of blades affects the ability of the turbine to do work (create a force/lift the attached weight. Overall, it is important to understand how the size, shape, and distance between the blades affects how effective a water turbine is in creating useable energy. Although this experiment will not include creating and storing energy, the amount of force created will be able to do work and see how much time it will take to lift a certain amount of weight. In conclusion, it is important to study how the different means of creating a water turbine affects the turbines ability to do work. Creating clean new energy that is effective in this world is difficult, but is highly needed in this world. The world needs clean fossil fuel free energy, and this experiment may help advance the effectiveness of water turbines all over the world, in all four corners of the world.

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CSEF Official Abstract and Certification

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Wind turbines present a highly desirable method of power generation due to their low carbon footprint and reliance on renewable resources. However, these turbines lose much of their power generation due to rotational friction between mechanical gears. The purpose of this research project was to determine if a magnetic gearbox could attain higher efficiency and durability than conventional gearboxes. A basic planetary gearbox was constructed which had a 1:2 ratio between the central drive shaft and four surrounding gears. By using the attractive and repulsive properties of magnets, a gearbox was created that eliminated physical contact between the gears. North and south facing magnets acted as teeth for the gears. Each shaft off the four surrounding gears was then connected to its own small generator, which produced measurable voltage. It has been proven that magnetically interlocked gears provide a functional alternative to conventional gears. Thus far, data suggests that the model magnetic gearbox is not quite as efficient as conventional generators. However, additional ramifications may yield increased performance. This concept holds promise for application in any power generation embodiment including wind or hydroelectric. Future studies will aim to match the efficiency of traditional generators, while surpassing them in gearbox durability.

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Student Name(s):

Fair Category

Abstract:

Current trends show that there has been a six-fold increase in digital information in the past four years, over twice exceeding the current total storage capacity. Shingled-write disks look to address this lack of storage by overlapping write tracks on a hard drive as to increase data density (and therefore capacity) while maintaining readability. An emulator of a shingle-write disk, developed by University of California, Santa Cruz's Storage Systems Research Center, was implemented on a standard hard drive. Disk track, skew and geometry were analyzed and used to set up the emulator on a machine running Fedora 17. Benchmarks were taken of disk bandwidth before and after implementation to measure the effect that disk shingling had on disk performance. The results from this experiment lead to a direct comparison between shingled technology and conventional technology, enabling evaluation of shingled disks as an avenue for feasible, high-density data storage.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6038

Student Name(s):

Fair Category

Abstract:

The purpose of this experiment is to ascertain whether viable alternatives to Klyr Fire (the generally accepted binder composed of methyl-ethyl cellulose) exist in plique à jour enameling. Viable here is construed to mean a material that can be added to wet enamels and increase the amount of area that the enamel can cover without being provided with backing; essentially, strengthening the enamel so that it can properly adhere to the framework of silver and be transferred to the kiln without the enamel falling through. As it stands, enameling is a somewhat secretive art, but having participated in it before, I set out to discover an answer through cutting out increasingly large squares of silver, starting from a 6 mm.² square, and increasing by 2 mm. with each successive square. Then I added 2 mL of diluted Elmer's glue, a polyvinyl acetate based binder, to a 25 gram sample of wet enamel and proceeded to use it to fill in silver frames while simultaneously filling frames with the methyl-ethyl cellulose based Klyr Fire. While after a few tries, I could fire an entire square with dimensions 1.2 x 1.2 cm. that had been treated with Klyr Fire, the enamel treated with polyvinyl acetate only filled a frame of dimensions .8 x .8 cm. This confirms that the commercial binder in use is indeed the more effective than the other I tested, and can be used to further legitimize the product already in use.

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Proj. Num Title:

Student Name(s):

Fair Category

Abstract:

The analysis of open star clusters is important in understanding the evolutionary properties of the Milky Way Galaxy. The goal of this project is to determine how various properties of open clusters have physically and dynamically changed over time. Properties of open clusters that were investigated in this experiment were distance, diameter, mass, age, density, and evaporation time. It was found that there is likely no correlation between cluster age and cluster distances, diameters, densities, and evaporation times. However, the results of this investigation suggest that the number of stars in open clusters and the masses of open clusters decrease as age decreases. It was found at the 2 sigma confidence level that the number of cluster members decreases at rates ranging from 114 to 173 stars per billion years, and cluster formation may have ended 1.27 billion years ago to ending in 0.07 billion years. These findings suggest that the cessation of visible light in the Milky Way is in the distant future because once open star cluster formation ends; it is only a matter of time before remaining stars burn out.

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Word Count

Abstract:

The purpose of this project was to investigate which geometric, three-dimensional figure is the most "invisible" to radar by bouncing light off various shapes and measuring the amount of light reflected. In this experiment light waves were used to simulate radar waves. It was hypothesized that the shape with the most ridges and jagged edges would reflect the least amount of light. A black box, 24" x 12" x 12" was created using foam board with a cutout to insert the light source. Various wooden shapes were adhered to 3x6 pine planks and hung one-at-a-time in the box opposite the flashlight. A light meter sensor was attached to the inside of the box above the flashlight. The experiment consisted of two rounds of testing. The first set of trials tested the shapes' ability to reflect light back to the sensor. Each shape was tested in three trials and an average "reflectivity" recorded. The procedure was repeated for each shape. The second round of testing added color as a variable. Each plank was painted black and the procedure repeated for each plank: three trials and an average. Data collected and analyzed indicated the least amount of light reflected by the black painted shapes, but the reflective data collected was inconclusive in determining the most "invisible" shape. Future studies may include increasing depth of the shape as well as investigating varying texture and color of paint.

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Word Count

Abstract:

The stopping ability in cars is frequently an issue in a persons safety. The reasons stopping ability is so affected in our everyday lives is because there are so many factors when driving. Over time, there have been deaths associated with an inability to stop. I wanted to demonstrate the different factors while driving to improve the safety for all drivers. For my experiment I tested the road conditions (smooth or imperfect road), tire treads(smooth or treads), and deicing treatments (Calcium Magnesium Acetate or sand-salt). Using a radio controlled car, I was able to measure the car's distance on each factor. After testing all 3 situations, I observed that the imperfection road increases your stopping ability because of all the imperfections. The ride might not be as smooth, but, when stopping, it is safer. The deicing treatment of CMA was most effect in getting rid of the ice and therefore it increases stopping ability. And the smooth tire treads increase your stopping ability. Our experiment proved that depending on the situation your car will be affected, your stopping ability will increased, and your danger level will rise .

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Student Name(s):

Fair Category

Word Count

Abstract:

Shoulder Posture Perfect Backpack Insert Design Back problems like neck pain, and chronic back pain are more prominent for U.S children. The reason is that backpack's design does not distribute the load well along the back, which causes substantial pressure to the back and shoulders. The objective of the Posture Perfect Backpack Support is to design a backpack which will help children when they carry a large load of school books; so they will be able to carry it comfortably while keeping good posture. It will properly distribute the load from the backpack across the wearer's body. First we made a strong frame so that the back is held in a straight position. On top of this curved area we placed a layer of memory foam making it comfortable for the wearer. Finally on the lower back portion of the insert there is an airbag to help lighten the load and provide comfort. In order to make sure our insert was effective we ran a series of tests on it. We experimented with two bags one with the insert and one without the insert. Each participant will be asked to carry a backpack for 15 minutes, and they will comment on how they feel about wearing the backpack. The backpack with the insert performed better than without the insert. The insert effectively spread the weight over the surface of the back and did not put extra stress on any part of the body like the other bags.

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Word Count

Abstract:

In this experiment, the problem was; “How does the amount of glycerin affect the size of the bubbles and the amount of time the bubbles last?” The hypothesis was; “If I add more glycerin to my bubble solution then how will the size of bubbles and amount of time it last be affected?” The final results that were collected were that the first solution used to make the bubbles in this experiment caused the bubbles to last an average of 7.5 seconds. The results collected for the second solution used to make the bubbles caused the bubbles to last on an average of 11.5 seconds. In the third trial the solution used to make the bubbles caused them to last on an average of 19.5 seconds. The trend shown by the data was that the third solution was the best solution used to make bubbles. These results were compatible with my hypothesis because my hypothesis questioned how the size of the bubbles and amount of time they lasted would be affected if I added more glycerin. My question reigned true because when I added more glycerin to my bubble solution my bubbles lasted longer and appeared much bigger in size. The significance of this experiment was to discover a better way to create bubbles because they are a fun summer activity and I thought it would be much more intriguing to see bigger bubbles that last a lot longer.

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:
6045

Student Name(s):

Fair Category

Word Count

Abstract:

Quantum computing is an emerging field being pursued by many researchers across the globe. It opens up the possibility for improved protein folding simulations to counteract improper folding of macro-molecules which causes diseases such as cancer, Alzheimer's disease, and diabetes. However, the implementation of quantum computers faces the obstacle of excessive error and noise which disrupts messages and connection due to the inherent instability of a qubit, or a 'quantum-bit.' To allow for more robust quantum computers and more reliable computations, quantum error correction codes have been developed. The engineering goal of this project is to research, develop, and test the effectiveness of quantum error-correction codes, namely stabilizer codes. This research project involved the development of a program run on a classical computer that simulates the effectiveness of stabilizer codes in correcting error as a percent of all expected error using simple group theory and the Montecarlo method. Success in error correction through multiple stabilizer codes was confirmed by observing the commutation and anti-commutation between the input codeword and the stabilizer code. The quantum error correction code that was tested may be used to increase the robustness of a quantum computer that will be developed in future research by multiple orders of magnitude.

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CSEF Official Abstract and Certification

Fair Category

Proj. Num

Fair Category

Proj. Num

Title:

Student Name(s):

Abstract:

The original goal was to do research on mathematical sequences and find the general summation formula for any kind of sequence. By doing the work, I did derive many interesting results relating to mathematical sequences including:

1. Finding the general summation formula for any "differentiable sequence".

The Maclaurin series will be applied into this proof instead of Taylor series in order to make it easier. Use Maclaurin series to unfold each term of summation formula and factor the summation formula.

$$\sum_{x=1}^k f(x) = \sum_{n=0}^{\infty} \frac{f^n(0)}{n!} \sum_{x=1}^k x^n$$

Then prove the general summation formula for power sequences and apply it to the general summation formula for any "differentiable sequence" and get final results.

$$\sum_{x=1}^k f(x) = \lim_{\phi \rightarrow \infty} \sum_{n=0}^{\phi} \sum_{p=1}^{n+1} \sum_{\alpha=1}^{p-1} (-1)^{p+1-\alpha} \frac{a_{\alpha}}{(p+1-\alpha)! (n+2-p)!} \frac{d^n f(0)}{dx^n}$$

The general summation formula of "differentiable sequence" is the most general summation formula we can find for the sum of sequences.

2. Finding a new way to determine a converging series.

Use analytic geometry to find any general summation formula or call it convenient series. Draw many circles on coordinate system. The largest circle has a center point on x-axis and intersection point with the linear function, where the intersection point is vertically above the center point. Then draw the second circle whose center point is on x-axis as well, and it tangents to the first circle; the intersection point for the second circle with the linear function is vertically above the center point as well. Keep on drawing circles, (There are infinite circles). However, the sum of all those diameters is constant. After using it to prove the geometric series, use relationship to find other series

$$a_n + a_{n+1} = f^{-1}(a_n) - f^{-1}(a_{n+1})$$

Where $f^{-1}(x)$ is inverse function of $f(x)$.

The general way to find a new series will be $\sum_{i=1}^{\infty} 2a_n = f^{-1}(a_1) + a_1$ which is same as

$$\sum_{i=1}^{\infty} a_n = \frac{f^{-1}(a_1) + a_1}{2}$$

However, not all a_{n+1} can be represented as function about a_n , for example, suppose $f(x) = x^2$ then $f^{-1}(x) = \sqrt{x}$. Therefore, $a_n + a_{n+1} = f^{-1}(a_n) - f^{-1}(a_{n+1})$ can be written as

$$a_n + a_{n+1} = \sqrt{a_n} - \sqrt{a_{n+1}}$$

Therefore, the analytic geometry can only find some certain series, for example geometric series.

3. Finding a new way to determine the product of geometrical sequences.

When I try to find general summation formula of any series, I used logarithmic function to apply to series and found an interesting way to prove the product of geometrical sequences instead. The logarithmic function of geometrical sequences is arithmetic sequence (maybe this has been found already). Then by using summation formula of arithmetic sequence, we can find the product of geometrical.

4. Finding new properties and some property equations for a group of sequences such as Fibonacci number, Tribonacci number.

This research is based on calculator, I list many ordered numbers and try to find the relationship between each two numbers. It is might a new conjecture of Tribonacci sequence, it might give a new equation to find the ratio between two terms as the sequence goes to infinite, then by summarizing the rule, find a new general equation of the ratio for any those kinds of sequence, for example Fibonacci Number.

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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. Title: A General Study of Different Exposures of Acid Rain
Concentrations on Plant Height

Student Name(s): R. Shpak

Fair Category

Abstract:

Acid rain is a term describing high levels of nitric and sulfuric acids found in the atmosphere by way of rain, fog, or snow. This project will determine how different exposures to acid rain affect a plant's ability to grow, as acid rain causes harmful chemical reactions between the metals and minerals of soil and the acid, and is known to cause soil erosion. It was hypothesized that at an exposure time of acid rain twice a week, the plants would cease to grow at a regular rate. In this experiment, one control was tested with only water, and three different exposures of once, twice, and three times a week were tested on pea plants. Acid rain was mimicked by a mixture of vinegar and water with a pH of 4.0. After four weeks of testing, the data showed an irregular growth rate starting in Group 1. In total, Group 1 had a growth rate of 50.00%, compared to the control group with a 54.10% rate. Group 2 plants grew steadily with an overall growth rate of 46.63%. Group 3 had a 39.5% growth rate, with the plants in this group gradually decreasing in growth rate each week. The hypothesis was disproved, as regular growth began decreasing with acid rain by just once a week. Knowing how acid rain affects plants can help design a method of reversing its effects by designing a way to counteract the reaction between the acid and the metals in soil.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In this science fair project, I am going to learn about the biomechanics of pitching by investigating how body position and physics interact to produce fast pitching. For my hypothesis I think that the use of a continuous motion delivering a baseball pitch, will be faster and more accurate than just pure arm strength delivering the ball. I believe that using a motion to throw/pitch the ball will produce more accurate and faster ball delivery because if pitcher are just plain flat-footed, they are not as strong or don't produce a stronger force then when you use your whole body. For my experiment I had my volunteers first stand 60 feet away from the target I built. The target I built is a normal strike zone. I had a volunteers throw using four different techniques (sidearm, overhand, $\frac{3}{4}$, and no stride). Everyone that I tested supported my hypothesis. Each person's stride that they used from regular stride (which was usually $\frac{3}{4}$) to overhand, and to sidearm, they all were more accurate and faster than the no stride delivery. In the end I determined that, in fact, body position does affect baseball and the accuracy of the pitcher, and it doesn't matter how big and how strong a person is. It doesn't mean they cannot throw a ball better, and faster than you. It just simply comes down to the biomechanics to become a good pitcher.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6050

Student Name(s):

Fair Category

Abstract:

Scientists have expressed significant interest in Dye Sensitized Solar Cells (DSSCs) as an easily manufactured, inexpensive means of generating clean energy. An equally substantial interest for clean energy storage has also emerged, which can be satisfied with photo-electrochemical water-splitting through Photo-Electrochemical Cells (PECs). This study seeks to optimize and investigate the performance of a TiO₂-based DSSC, enhanced by co-sensitization of Nile Red (NR), Nile Blue A (NB), Rhodamine 110 (R110) and Anthocyanin (A) fluorescent dyes, for the purpose of assisting an Optimized PEC that uses a C-Phycocyanin (C-PC algae extract) enhanced Fe₂O₃ photo-anode. This project culminates in the construction of a Novel Dual Solar Apparatus which can be practically applied for electricity generation and/or the storage of this energy by photo-induced water-splitting. The efficiency fetter on DSSCs was addressed with dye co-sensitization which significantly augmented the solar cell's spectral bandwidth for voltage response to UV-Vis wavelengths of incident light. The Optimized DSSC achieved a 3% solar conversion efficiency allowing for a 59% increase in output voltage capacity and a 129% increase in output current potential in comparison to a conventional Anthocyanin DSSC. The efficiency of an Fe₂O₃ photo-anode was substantially enhanced by employing the C-PC light-trapping nanostructures by covalent cross-coupling (CCC) which allowed for a 13.4% increase in PEC performance, a photo-anodic voltage increase of 127%, and a photo-current improvement of 66%. Finally, the Novel Optimized Dual Solar Apparatus was able to generate hydrogen gas at a rate 57% greater than that of a Dual Solar Apparatus without a PV metal oxide anode. With additional research and innovation, the Dual Solar Apparatus can be augmented for modern-day application alongside current hydrogen fuel cells.

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:

Bananas often go brown and undesirable before they are eaten. The browning witnessed, however, is not in relation to whether it is safe to eat; rather, it is the reaction between oxygen and the enzyme Polyphenol Oxidase, or PPO. This study was conducted to test a possible home method of keeping bananas from browning by using factors that are known to inhibit enzyme activity. The effects of temperature, oxygen exposure, and acidity were tested on eight bananas over the course of a week. This was done by subjecting bananas to a mix of room temperature, (69° Fahrenheit), refrigeration, (37° Fahrenheit), plastic wrap to reduce air exposure, and grapefruit juice to reduce the pH. One banana was also put in the freezer, (30° Fahrenheit). Each banana was inspected every other day for square centimeters of brown compared to the banana's total surface area. The control banana, plastic wrapped banana and sprayed bananas, gained 15.77, 16.81, and 10.01 percent coverage respectively, while the sprayed and wrapped banana gained 1.68% coverage. The refrigerated bananas: the control, wrapped, sprayed, and wrapped after spraying gained 96.2, 93.98, 91.36, and 86.1 percent respectively. It is important to understand that while all these bananas are from the same bunch, they started with different amounts of brown to begin with. While this might make it hard to see slight differences in bananas, it was clear the colder it is, the more browning occurs, and the bananas subjected to both spray and wrapping had the least amount of browning.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title: HYDROHARMONICS The Mathematics Behind Music and the
Frequency of Musical Notes in Water
6052

Student Name(s): R. Forte

Fair Category

Abstract:

This experiment was performed in order to determine if there was a relationship between the volume of water in a glass and the musical note that is produced at that volume. The problem was to mathematically predict what musical notes could be produced when striking a glass of water that contained different volumes of water in the glass. The original hypothesis was that if there was a mathematical relationship between the volume of water in the glass and the musical note produced at that volume, it would be possible to predict what musical note would be produced using any glass filled to that volume. After multiple trials using the same glass, in which musical tuners were used to determine which musical notes corresponded to the volume of water in the glass for each note, average volumes of water were calculated for each note. Changes from one note to another occurred when the average volume of water was at 46.1%, 52.3%, 62.7%, 73.3%, 78.8%, 84.1%, 88.8%, 94.2%, and 98.4%. When graphed, a linear relationship could be seen between the average volume of water in the glass and the note produced at that volume. This mathematical relationship was then applied to other glasses, to see if the correct musical notes could be produced. Surprisingly, although the notes did change at some predicted volumes, at others they did not. The hypothesis was not completely supported by the data. However, this experiment showed the significance of how music and mathematics are closely tied together.

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:

The study of sound and how it travels has long been something many people have studied and learned about. My project focuses on how the travel of sound and how loud the sound is is effected by the shape, size, and material of an area around where the sound is coming from. I tested this by placing an iphone in the bottom of the container and playing a song, then i used a decibel reader to record the amount of decibels produced. I did this for all types of containers and compared them to one another. Just like i had guessed in my hypothesis the glass funnel shaped container created the loudest sound, and overall the funnel shaped containers were the most efficient in creating a louder sound. This information i discovered from my research can help with a lot of things related to sound volume, such as how speaker are made to create the best sound possible.

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 optical properties of Zinc Sulfide have been extensively studied, and it has been found that doping the substance with manganese two positive increased these properties, including the ability of zinc sulfide to downshift UV photons into the visible spectrum. A thin film of these ZnS:Mn²⁺ particles was synthesized with the stated goal of solar cell application, since photovoltaic cells use visible light, the product of ZnS downshifting, with increased efficiency compared to UV light. Application of zinc sulfide nanocrystals to photovoltaic cells has proven the initial hypothesis surrounding increased cell efficiency as highlighted through voltage and current increase. Double the voltage output was observed in the altered cell compared to the unaltered control cell when both were placed equidistant from a broadband UV source, while current remained constant. In ambient light from fluorescent bulbs, the nano-coated cell displayed an average of 50% increase in voltage with constant current at 7 milliamps. In conditions that closer resemble the intensity and spectra of the sun, power output was recorded at levels 40% higher in the coated cell than in the non-coated cell. Increased transmission, decreased reflectance and the effects of downshifting UV photons by the ZnS: Mn²⁺ nano-crystals made for more effective capture and more efficient use of light by the photovoltaic cell.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The Affects of Protein on Equine Performance There are a number of horse feeds available that claim they can help increase the endurance of a performance horse by providing increased levels of protein compared to standard feed. I could find very little research on the possible effects of increased protein levels on equine performance, so I decided to explore the subject. My hypothesis is that increased protein will help to build equine endurance. To test this hypothesis, I an using three different horses who have been eating a standard grain as part of their diet. I began by having each horse run a mile, then taking heart rates before and after (at 5, 10, 15 and 20 minutes) to track recovery, as well was recording the mile time. I have switched to a high-protein “performance” grain for each horse for a two week period and will run the test again. I will then switch to another high grain for two weeks, then ran the test a final time. If my hypothesis is correct, recovery from the run, as measured return of heart rate to normal levels, should be quicker when the horses are consuming the high-protein grain. Based on my early data I have come to the conclusion that horses fed a grain with mid to high levels of protein recover more quickly from endurance exercise.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6056

Student Name(s):

Fair Category

Abstract:

A great amount of human body heat is expelled as waste, which could be an alternative means of generating electrical energy. This project examines the effects of thermocouple length on voltage output and investigates various thermoelectric properties and principles to construct a hat to power a small device with electricity generated from excess body heat. Wires in 37 combinations made from 7 different metals were tested for resistance and voltage before and after a temperature gradient was applied. These wires were assembled into thermopiles of ten thermocouples with lengths of .5 ft, 1 ft, and 2 ft (both 32 and 18 gauge). Each individual thermocouple consisted of two wires that were measured, cut, soldered, and coated with liquid electrical tape. One end of the thermoelectric generator was heated to 98°, core body temperature, and the other end at 70°, a comfortable ambient temperature. Based on data collected, 1ft, 32 gauge, nickel and galvanized steel was selected for use in the hat made of 125 thermocouples. To increase the output voltage, a boost converter circuit was built with several capacitors, a transformer, and a DC/DC converter. Many months were spent researching thermodynamics, selecting and preparing materials, and developing test procedures. As predicted, voltage increased with thermocouple length and never achieved thermal equilibrium. The voltage increase can be explained through Ohm's Law as an increase in resistance, and results in a decrease in the overall current. This hat is a novel example of harvesting power from excess body heat.

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:
6058

Student Name(s):

Fair Category

Abstract:

Two of the most abundant resources available are water and energy produced from the sun. Both are being tested by scientists in a variety of methods to yield energy. Photocatalysis is the process of accelerating a photoreaction using a catalyst. Photocatalytic water splitting is possible through photodissociation in the presence of a catalyst, using visible or infrared light, resulting in the creation of H₂ and O₂ gases. The possibility of energy production from water is highly desirable, since it is an abundant, renewable, and inexpensive resource. This investigation will quantitate H₂ production from water by means of photodissociation. A proper catalyst is essential in this process; as such, tris-[1-(4-methoxyphenyl)-2-phenyl-1,2-ethylenedithiolenic-S,S']tungsten, denoted as PCC, was used, and created through a three-step synthesis. 4-methoxybenzoin is first prepared, then converted to a thiophosphate ester, and lastly reacted with a tungstate solution (in 1M HCl) to yield the desired tungsten tris-dithiolene complexes. The desired isomer was separated via flash-chromatography, and dried under vacuum to provide the desired PCC catalyst. The PCC catalyst requires a co-solvent in water; thus a solution of the PCC and Methylviologen is created in 80/20 acetone/water. A custom-built photoreactor was constructed, using a 50W Visible Halogen lamp as the light source, with UV cut-off via a glass barrier. The catalyst reagents were illuminated in the photoreactor for 24 hours, and the H₂ produced was measured via GC with TCD. Concentration of H₂ produced was determined via a Beer's Law regression of analytical standard dilutions. 1.38 ml of H₂ gas is produced per gram of PCC catalyst, representing more than 200% increase compared to recent literature, where a UV-emitting, mercury lamp was used.

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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:

Metal based batteries are resource dependent and environmentally harmful. Cellulose based batteries have a low manufacturing cost, flexible and completely biodegradable; however, they are limited in performance due to the terrestrial plant cellulose fiber's low surface area. It is suggested that the use of algae cellulose will improve the efficacy of the cellulose battery due the high cellulose fiber surface area. The purpose of this experiment is to develop an algae cellulose battery that has a higher energy capacity than the existing terrestrial plant cellulose batteries. *Gracilaria tikvahiae* (*Gracilaria*) and *Laminaria saccharina* (*Kelp*) were used to construct three types of batteries; a *Gracilaria* battery, a *Kelp* based and a terrestrial plant cellulose battery (control). After multiple trails, a novel technique was developed to turn the algae into unique uniform paper sheets without damaging the cellulose fibers. The battery discharge was measured in milliamps over one hour and the capacity, milliamps-hour per gram, was calculated. As the milliamp values decreased the time interval for each value increased. The *Kelp* battery had the longest time interval per milliamp value; 1.845 milliamps for 47 minutes. The *Kelp* battery had a capacity of 0.0566 milliwatt-hours per gram. The *Gracilaria* battery had 0.0358 milliwatt-hours per gram and the cellulose battery had 0.0392 milliwatt-hours per gram. The data shows that *Kelp* cellulose increases the efficacy of the battery by 44.4% over the terrestrial cellulose cell. When connected in a series, three *Kelp* cells produced 2.1 volts surpassing the voltage of a AA battery by 0.6 volts.

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CSEF Official Abstract and Certification

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Proj.
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Title:

Student Name(s):

Fair Category

Abstract:

Anxiety related disorders are one of the most common mental illness in the USA, yet only 1/3 of those diagnosed are treated. Similarly, depression affects 1 in 10 people, while bipolar disorder affects 1 in 25. The treatment of such disorders costs billions of dollars annually, making the need for better disease identification and prevention necessary. Studies and models such as the Adverse Childhood Experience and the Problem-Behavior Theory attempt to relate childhood forms of trauma or abuse to future risky behavior and disorders. However, these studies fail to correlate specific forms of childhood trauma (e.g. physical abuse, sexual abuse, exposure to drugs) to specific future disorders (e.g. depression, anxiety, schizophrenia). This study utilizes survey data obtained from clinical questionnaires at reputed medical schools. The data are processed in Excel and analyzed in Weka and Knime, two programs used widely for data mining. A Naïve Bayesian model was created to analyze specific questions and relationships to brain scan data and diagnoses of anxiety, depression, and excessive hostility. The model was tested using an 80%-20% train-test split and yielded high (>0.75) AUROCs for various tested features in each of the diagnosis features. The data were analyzed using feature elimination, which resulted in certain features being identified as significant determination factors of future forms of depression and brain irregularities. The results, when presented to psychiatrists and neurologist alike, can provide a better understanding of how macroscopic factors in childhood development can lead to irregularities in neurological and mental stability.

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Student Name(s):

Fair Category

Abstract:

In this experiment, it will be tested whether a sports drink or a natural juice contain more electrolytes. Electrolytes are any type of substance that will separate into ions in a solution. In the body, they are what are lost during exercise in the form of sweat and or energy. Electrolytes are important because they are what cells use to provide voltage through membranes, carry electrical impulses, and cause muscle contractions that help someone move. The concentration of electrolytes will be measured using a multimeter for coconut water, orange and pineapple juice, tap water, deionized water, and Gatorade. By applying a 9V battery charge to the substance, the multimeter then will read the current of the substance in (amps) and its ions reacting to the voltage being provided. After the 3 trials the current is then averaged for each liquid, the conductance (proportional to the electrolyte concentration) is calculated with the equation: $\text{Conductance (Siemens)} = \frac{\text{Current (amps)}}{\text{Voltage (V)}}$ to conclude the electrolyte concentration for each liquid. Coconut water had the highest concentration of electrolytes, concluding that natural substances can replenish the body better than an artificial drink. Gatorade was originally hypothesized to have the most electrolytes, but came just above tap water. Future work for this experiment can include testing other substances for their concentration of electrolytes. This experiment can also be applied to anyone participating in physical activity and seeking a good source for muscle replenishment.

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:
6062

Student Name(s):

Fair Category

Word Count

Abstract:

Cancer is an extremely deadly disease with approximately 1,500 Americans dying daily. Chemotherapy and radiation are the two most common treatments that have been used to put the cancer into remission. However, these two therapies subject one's entire body to treatment when it's only necessary at the cancerous site. In this study, the growth of a tumor and the effects colloidal gold nanoparticle delivering the doxorubicin treatment had were simulated using mathematical models. To investigate the effects of the nanoparticle treatment, it was necessary to develop an equation to simulate the growth of the tumor. Using matrices and ASCEND mathematical software, it was possible to graph the population of cancerous cells over time representing the growth of the tumor with different combinations of treatment. There were several trials including chemotherapy alternated with nanoparticles as well as the two treatments in sequence. However, after obtaining the population results for all of the treatments, the nanoparticle therapy alone worked the best. After almost 5 days, the log of the population of cells was almost 0 with the gold nanoparticles. With these results, it's possible to achieve many important changes in society. The results show that nanoparticle treatment, in theory, provides promising results. Although it would need to be tested within animals and eventually human subjects, this research suggests a novel treatment for cancer that what is currently being used. Targeted and nanoparticle cancer therapy are the future of oncology and with them the effects of cancer can be minimized.

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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:

My project's purpose was to determine the effects of diverting wind from one side of a vertical axis wind turbine. I believed that if this was to be done, the efficiency and RPMs of the wind turbine would be increased. Experimentation was done by counting the RPMs of 2 separate vertical axis wind turbines when exposed to wind from a fan. One of these wind turbines had relatively large blades, and the other had relatively small blades. After testing each one without a wind diverter to obtain a control group, a wind diverter was placed at varying angles and distances from the wind turbine, to determine if this significantly increased RPMs. In the wind turbine with larger blades, efficiency was increased by a maximum of 150%, and was increased by approximately 80% with the smaller bladed wind turbine. Maximum efficiency was observed from 45 degrees to 20 degrees along all testing. Because of this increase in efficiency and speed, this wind diverter could greatly increase power output of a vertical axis wind turbine. One extension of this project is to use a metal sheathing surrounding the wind turbine that deflects wind to maximum efficiency. This sheathing could be placed on multiple ball bearings in a circular track around the wind turbine, and then attached to a form of sail, pulling it into the most efficient position at all times. This sail would control the sheathing, so that it would not require any extra power to operate.

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 experiment was to compare the ambient, internal, and reflective temperatures of various roofing materials including aluminum, asphalt and wood shingles, a grass roof, and a roof with secured solar panels. It was hypothesized that the grass roof would provide the greatest insulation, produce the lowest ambient temperature around the structure, and reflect the least amount of heat as measured by surface temperature. Six wooden structures were constructed out of 1/4" plywood. Each structure measured approximately 8" x 8" x 8" with a slanted roof. Each roof was covered with aluminum foil, an asphalt shingle, wood shingles, a grass roof, solar panels, or left as exposed plywood for a control. A hole was drilled through each completed roof and a digital thermometer inserted. The hole was insulated with sticky tack to keep the thermometer upright. The six structures were placed simultaneously under six 48" florescent bulbs and four 100watt incandescent bulbs for heat and internal temperature recorded 6-8 hours per day. Ambient temperature of each structure was taken with two thermometers placed on opposite sides of each structure for an hour each day. Reflective temperature was taken once per day by placing a thermometer directly on the roofing material for 5 minutes. At the conclusion of the experiment, the original hypothesis was supported as data suggested the grass roof had the greatest insulating ability, produced the lowest ambient temperature, and reflected the least amount of heat. Future studies may include conducting the experiment outdoors in the spring.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

This project presents a novel application of the search heuristic genetic algorithm (GA) into the field of digital image processing through a MATLAB program that enables the user to naturally sharpen images without any expert knowledge. The outcome is a fully automatic software that evolves a set of sharpening filters and optimizes the amount of blur removed. The used method first blurs the image using an approximated point-spread function. Then, the GA is implemented into the program to evolve a population of spatial sharpening filters (unsharp masks, high-pass, regularized filters, etc.). The order and magnitude of each filter, as well as their parameters, are optimized using the input image as the GA fitness function. Finally, this hybrid filter is modified and re-applied to the image in order to return a naturally sharpened image. In a single iteration of the program, the hybrid filter image refines and sharpens an image more effectively than any single image-sharpening filter. However, further research and programming can also be done to make the software less computationally intensive and reduce the time it takes to carry out the algorithms.

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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:

There are two main concerns with the emission of sulfur dioxide (SO₂) gas from volcanos and pH levels of acid rain dropping. First is how much SO₂ was emitted during an eruption or other sort of volcanic activity. Secondly, is how high the volcano shoots the SO₂ gas into the earth's atmosphere. To find a correlation between amount of SO₂ gas, and the change in pH a linear regression statistical test was used to analyze the data. The same test was repeated for the height of the eruption to pH change. An analysis of the results of the test showed that in fact there was almost no relationship between the amount of SO₂ gas and pH falling. The residual (r) value for this statistical test for was a mere $r = -0.4$. This shows almost no correlation, however the altitude the SO₂ was ejected to compared to pH change showed an r value of $r = -0.7$. This shows a mediocre correlation, and that there is some statistical significance between SO₂ altitude and pH change. However the amount of SO₂ released and the change of pH in acid rain showed little to no statistical significance.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Myocardial infarction (MI), commonly known as a heart attack, is one of the leading causes of death in the United States. MI can cause cardiac deformation and leakage of Ca²⁺ from necrotic cells. However, previous studies showed that five years post-MI, a third of patients develop heart failure with 22-64% of MI occurring without obvious symptoms. This study demonstrated the synthesis of a Ca²⁺ sensitive alginate-dendrimer Fluorescence Resonance Energy Transfer (FRET) system that can be used for MI detection and preservation, even without symptoms. FRET, energy transfer from an excited donor fluorescent (fluorescein isothiocyanate) to acceptor fluorescent (rhodamine B), was utilized as a measurement device to prove and optimize the system; it allowed for higher fluorescence emission and estimated particle proximity to prove the gelation effects of the nanoparticle. The Ca²⁺ sensitive alginate dendrimer nanoparticle was successfully synthesized by the attachment of fluorescence onto generation-3 dendrimers and alginic acid. In the presence of calcium, FRET occurred, indicating aggregation and gelation of the nanoparticle. Sensitivity was optimized with spectrometers by varying nanoparticle concentration and calcium exposure. The FRET system was optimized with the combination of 500 ug/mL–1 mg/mL fluorescein isothiocyanate and 1mg/mL Rhodamine B when exposed to 20-200 mg/mL Ca²⁺. This novel synthesis of Ca²⁺ sensitive alginate nanoparticles can target calcium-damaged myocytes for MI diagnosis and prevention. The alginate-dendrimer nanoparticle would be able to detect change in calcium, even in silent MI, and aggregate to form a temporary scaffold to dissuade from future heart failure and cardiac deformation.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The tradition of wine making has been around for centuries; it has been used for both secular and non-secular celebrations, and continues to be popularly consumed today. The basic principals for wine making have not changed since the creation of the drink. This experiment was designed to test the three best methods of winemaking developed over time: An Ancient method, a Traditional method and a Modern method. These methods were simulated and executed in my garage. Each batch of wine was crushed, and the Must was left to ferment according to the traditions of the method. Once fermentation was completed the rest of the juices were pressed out of the Must and the liquid was placed into five gallon carboy's and one gallon jugs to further ferment and be stored. The focus of the experiment was to see if changes in the methodology for the production of wine had an effect on the quality of the wine, in particular the sugar content, alcohol content, and pH levels in the wine. The tests indicated that while the methods have greatly changed, they have not entirely improved.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Although pure ethanol combusts cleanly with oxygen producing less carbon monoxide and other harmful substances, it produces about 30% less energy than gasoline. Hydrogen peroxide is a strong oxidizing agent that is slightly acidic and completely miscible with water. It is mainly used to bleach due to its oxidizing properties but also has various domestic uses in lower concentrations. As a strong oxidizer, hydrogen peroxide spontaneously decomposes into oxygen gas and water through an exothermic reaction. As hydrogen peroxide decomposes spontaneously to form oxygen gases and energy which catalyzes the combustion of flammable substances, adding hydrogen peroxide to ethanol might result in the production of a higher level of energy. With the use of hydrogen peroxide, it is possible that the increased amount of oxygen can lower carbon monoxide emission that is produced when combusting ethanol. I will measure the heat produced by the mixtures by igniting them below a beaker filled with 20ml of water and measure the temperature of the water in thirty second periods. This will be repeated over the course of three trials per different percents of mixtures. As a result, although pure ethanol burned at the highest temperatures, the 80% and 60% mixtures burned for a longer period of time at slightly lower temperatures. The mixtures also proved to be more efficient with no apparent residue left after the mixtures were completely combusted.

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:

Throughout the years, identity theft has become a major problem throughout the United States. Approximately fifteen million United States residents have their identities used fraudulently each year with financial losses totaling upwards of fifty billion dollars a year. With the advancement in technology we have today, we should apply our basic knowledge of Biometric Recognition and apply it to one of the most commonly used device in the world, the ATM machine. Biometric Recognition is another term for identifying a person by their fingerprints, their voice, and/or by their DNA. Identities such as your veins in your finger or your DNA, cannot be altered. Vein patterns are unique to every individual. Apart from size, the pattern does not change over time. Vein recognition technology has a False Rejection Rate (FRR) of 0.01% and a False Acceptance Rate (FAR) of 0.0001%, therefore making it suitable for high-security applications. Vein recognition can provide "one-to-many matching", thereby enhancing security. The Finger Vein Authentication System is user friendly. Therefore, this technology cannot be related to any privacy concerns considering it does not associate with criminal activity like fingerprints do. It takes less than two seconds to identify/ authenticate the individual and is considered more hygienic than other fingerprint readers. I've concluded that identity theft will be eliminated completely, if we were to add the Finger Vein Authentication system to the United State's ATM machine, identity theft would not be possible, and fifteen million United States residents would save up to three thousand dollars each year.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6073

Student Name(s):

Fair Category

Word Count

Abstract:

In today's fast paced society, speeding is a major concern. A speed radar trap is a system that takes a picture of the license plate of any vehicle that is exceeding the speed limit. The traps have proven to be successful in limiting the number of casualties due to speeding. Since the price for a trap is steep, the basis for this experiment is to significantly reduce the cost of the speed radar trap using a novel approach without compromising the effectiveness of the system. This goal was accomplished using an open source micro-controllable board called an arduino board. A velocity gun and a Cannon camera were also used to create this system. The first step to creating the trap was to hack the camera to take a picture when it received a signal. The second step was to wire a velocity gun to the arduino board and code it to send a signal every time it senses motion. Currently, the velocity gun is in the process of being coded to only send a signal when over a set speed. Finally, the system will be evaluated. In the future, a cost analysis could be done to see if the speed radar trap could be even less expensive. This project is projected to be completed by the Science Fair.

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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:

Human generated energy is a resource which has attracted attention over the years. There are multiple means for the body to expend energy. In order to take advantage of this source of energy, I created a knee brace device with two brushless electromagnetic motor generators. This generator is driven by the movement of the wearer's knee, and the translated electric energy was calculated according to the wearer's speed. The knee brace was modified to give the wearer greater freedom when walking. Measuring the resistance of the generators and the average output voltage according to speed, allowed me to calculate the current average current of 0.01 A, or 10mA. Testing the device suggested that the device is capable of slowly charging a mobile device. Each generator is capable of generating energy, but the overall device is not a viable solution for charging a mobile device to full power. A more efficient device calls for a higher gear ratio, so a wearer would be generating a higher current. The device also turns out to be uncomfortable; the knee brace provided insufficient comfort, and after a while, the wearer must devote extra energy to the device. Overall, the device is capable of generating energy, but it is not realistic to use it as a long term source of energy.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

Copper contamination in drinking water poses a serious human health risk. The purpose of this project is to form a rapid water filtration process using crushed oyster shells to remove dissolved copper from drinking water. To begin experimentation, a stock solution of copper, target 4ppm concentration, was prepared. The way to prepare the stock solution is first take 1000ml of distilled water, then add 16mg of copper II sulfate and mix until completely dissolved. The purpose of the stock solution is to have a base line for experimentation and for testing the control. The experimental design to remove copper from drinking water using crushed oyster shells was to combine 100ml of stock solution with 35g of crushed oyster shells for a period of 72 hours. Copper testing was conducted every 24 hours to determine the remaining concentration of copper in the solution. The data shows that the oyster shells absorbed the copper, this proves the original hypothesis. Starting with a stock solution of 3.57ppm of copper the shells absorbed an average of 72% of the copper within 24 hours and an average of 95% of the copper was removed over the total 72 hour test period. The stock solution remained at a constant concentration of 3.57ppm and the control which was not exposed to oyster shells remained at 3.57ppm. The future research will be to try different types of shells like lobster, crab and shrimp to determine which one is better to remove copper.

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

Abstract:

Currently there is an interest in utilizing the thermal energy stored in asphalt pavement for the heating of buildings, water, and even production of electricity; especially in large applications such as parking lots and airports. One technique used to harvest this thermal heat is circulating a fluid through pipes embedded in the asphalt. This method takes advantage of the tremendous amount of energy stored in asphalt; however, the heat exchange between the sun, asphalt, and the circulation fluid is generally poor, making it an inefficient way of producing heat and energy. In order to improve the efficiency of the heat exchange, common fluids such as H₂O, saline solution, ethylene glycol (anti-freeze), and ammonium chloride were tested based on their availability and/or specific heats which tells how the compound or solution responds to heat input. This study aims to determine which circulation fluid would yield the greatest efficiency in the heat exchange. Testing was done by circulating each fluid through pipes embedded in an asphalt slab which was heated by heat lamps, simulating the solar radiation. The change in temperature of the fluid from the input and output was taken over an extended period of time for comparison with other liquids. It is expected that the thermal energy captured by the system using ammonium chloride, with the lowest specific heat of 1.57 J/g°C, will be the greatest of the liquids, and will also be heated more rapidly than the others which would make the system more efficient.

Word Count

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6078

Student Name(s):

Fair Category

Word Count

Abstract:

The laser induced movement of molecules across a liquid-liquid interface has significant potential in changing the way medications are introduced to cells, as it causes minimal damage to the surrounding cells and doesn't require mechanical intervention. Previous methods of laser transport have required high-powered lasers and relatively durable drug molecules for transportation. This research investigates induced movement of a chemotherapy drug through the use of optical tweezers, which is created by focusing the beam of a laser to a point that can be used to trap particles. This effect can be used to move complex drug molecules across an interface without harming the molecules, and only utilizes an 8 mW He-Ne laser. Experimentation involved successfully transporting particles of the cancer drug Doxorubicin across a membrane between two immiscible liquids, from a liquid in which it is not soluble (water) into a liquid in which it is soluble (chloroform). Transportation was achieved using a simplified optical tweezers configuration, including a lower-powered laser relative to traditional setups. In 250 μ l of water, 73 ng of solid Doxorubicin were transported into 550 μ l of a neighboring chloroform layer, corresponding to the transport of 7.3×10^{16} molecules with a single illumination. Movement and subsequent presence of the Doxorubicin in the chloroform layer was confirmed using the drug's natural fluorescent properties, with detection based on 550 and 590 nm emissions with an excitation wavelength of 230 nm. Practical application would use this method to transport miniscule amounts of drug molecules across a cell membrane.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6079

Student Name(s):

Fair Category

Word Count

Abstract:

To ascertain the effect of stellar wind outflows in extrasolar stars on presence of gaseous planets in that system, this study used rotational velocity as an indicator of stellar wind due to its importance in actual calculation for stellar wind torque. By observing star-planet creation models, scientists will be able to more efficiently allocate resources into looking for planets among the billions in this galaxy that share similar properties to Earth and compare the similarities and differences. A series of studies from Sean Matt and Ralph E. Pudritz have modeled stellar wind models using known variables that include rotational velocity among others - it is therefore assumed that the higher rotational velocity a star has, the more active its stellar wind will be. It was hypothesized that planetary host stars will exhibit higher rotational velocities than non-planetary host stars. 203 planetary host stars and 315 non-planetary host stars had masses and rotational velocities recorded. Statistical values such as mean, standard deviation, minimum and maximum were recorded and compared amongst the control (non-planet hosting stars) and the planet-hosting stars. Results show that planet-hosting stars have an average rotational velocity of ~3.3 km/s whereas non-planet hosting stars have an average rotational velocity of ~131.1 km/s; this is almost 4000% that of the planet-hosting stars and proves the researcher's hypothesis incorrect. Range of planet-hosting stars' rotational velocities was 9.44 km/s and non-planet hosting stars 341.00 km/s, indicating planet-hosting stars are extremely sensitive to excessively high rotational velocity, and therefore stellar wind activity.

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CSEF Official Abstract and Certification

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Proj.
Num

Proj. Title:

Student Name(s):

Fair Category

Abstract:

The experiment tested the effect of different angles, measured from the ground, of the window, which were 90°, 120°, 150°, and 180°, on the heat generated by a passive solar enclosure. The hypothesis stated that the 180° would have the highest average ending temperature because it would receive the most direct sunlight, which would heat the enclosure more. The average ending temperatures for the water in the four enclosures were as follows, the 90° angle had an average of 9.4°C, the 120° angle had an average of 9.2°C, the 150° angle had an average of 7.6°C, and the 180° angle had an average of 7.3°C. The overall trend of this data was that as the angle of the window decreased, the average ending temperature increased, which did not support the hypothesis. The significance of this data was that it could help people who are trying to design passive solar houses to help them harness more of the sun's heat

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CSEF Official Abstract and Certification

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Title:

Student Name(s):

Fair Category

Abstract:

Carbon nanotubes, a relatively new nanotechnology, shows potential to improve devices in the fields of optics, electronics, and materials science. The unique electrical properties of nanotubes will be investigated in this study. The goal of this study is to discern whether multi-walled carbon nanotubes are effective at detecting the toxin lead (Pb) in tap water with changes in their electrical resistivity. To conduct the study, the initial electrical resistivity (ohms) of the nanotubes was recorded to determine if their resistivity changes after exposure to lead. A control group using plain tap water was also be exposed to the nanotubes. The change in resistivity was recorded after different concentrations of lead particles in tap water were applied to the nanotubes(0.03 g/125 mL, 0.05 g/125 mL, 0.08 g/125 mL). Results indicate that the nanotubes' resistivity increases when exposed to lead particles dissolved in room temperature water. Along with this, the higher concentration of lead particles in tap water increased the change in resistivity. The control group, as a basis for comparison, supported this conclusion because the average resistivity decreased when only water was applied. The implications for this experiment mainly concern the development of sensors for tap water sources to detect the presence of lead. This is useful in both newer and older homes, where lead-free houses can still contain 8% lead in the plumbing. Also, nanotubes could have applications in detecting harmful gases when exposed to them, such as carbon monoxide.

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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 project that I conducted my research on then to design was a laptop with a printer attached to the underside of it. I hypothesized that an on-the-go printer attached to a laptop would be beneficial to not only an average student but to business owners as well. Going into the project I knew that there would be complications involved in such an invention. I knew that I'd have to deal with bulkiness, and the question of what type of ink would be the most effective. Through the course of my research I found that the best way to go about creating this contraption would be to use a thermal process as opposed to ink. The document will appear on the paper by heat changing the chemicals on the chemical laden paper. The design being a regular laptop with an extra 1-1½ inch extra under the keyboard. There will be a slot for an 8x11 inch paper to go into and another identical slot directly above for the paper to come out. The printer will be big enough to hold 5-10 pieces of paper. The paper will rotate from the bottom and through the top slot, where the thermal process will occur, and come out as the document. Business owners will be able to print documents on demand as a temporary copy. My intention of designing this invention was to find a solution for situations when you need a document printed to be handed off but there is no printer available.

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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:

For many years, scientists have looked for ways to lengthen battery life, with success being limited to the design of extended-life batteries that eventually require recharging. This study seeks to provide a real-time power alternative, where the energy expended during finger-impact with the laptop keyboard can be used to supply a portion of the voltage required to power the device. The aim of this study was to determine the efficiency of piezoelectric materials at capturing the mechanical energy expended during typing, for the eventual conversion to useful electrical energy. A single bender piezo measuring 21x7.8x0.7 mm (Noliac Industries) was installed beneath the spacebar of a laptop computer. The voltage output of the "Keyboard Spacebar Piezo" (KSP) converter was evaluated as a function of force applied during typing, and overall duration of the typing exercise. As varying force was applied to the spacebar key, the piezo output was found to be directly proportional to the force applied (described by the relation of $y=0.3927x + 0.1633$), with a maximum voltage output of 2.27 Volts at 4.5N force. A robotic key depression apparatus was constructed, and used to provide 1.4 N force on the KSP, at a rate of 1.33 Hz, over prolonged times. A KSP device was installed beneath the spacebar of a AA battery-powered, portable (Bluetooth) keyboard, and the extended lifetime of operation, due to KSP battery assistance, was determined. Over prolonged typing at 1.4N force and 0.52V piezo output, the KSP was found to increase the output condition of the AA rechargeable battery by 0.012 V in 4 hr, and 0.015 V in 8 hours, both from a full charge of 1.44 Volts. Interpretation of the wireless keyboard battery output decay for both the normal and KSP-supported power supplies suggests that piezo support can prolong the practical lifetime of the AA battery by 27%, from 63 to 80 hours of operation.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6084

Student Name(s):

Fair Category

Word Count

Abstract:

The issue of excessive intake of refined carbohydrates plays a major role in developments of obesity, diabetes, and other detrimental conditions. Solutions have been presented, but include significantly altering diets in difficult fashions. A more favorable option is hindering starch degradation by using natural dietary supplements—such as extracts from fibrous and proteinic Phaseolus vulgaris as inhibitors. If extract solutions are made of three different beans (Cicer arietinum, Phaseolus lunatus, and Glycine max), then G. max will be the best inhibitor as it's the most fibrous and proteinic of all. Inhibitors were extracted by salt precipitation via ammonium sulfate, and then amylase activity was determined by establishing a reaction system with the inhibitor and enzyme and added starch. Following the reaction, an iodine test was performed to determine starch content. Each bean yielded inhibitory results; a purple color was displayed from the iodine indicating that starch wasn't broken down. However, not all samples were at the same level on color scale. Based on results, the hypothesis wasn't supported because G. max didn't show the darkest color--it displayed the lightest. C. arietinum actually inhibited amylase the most. With each sample ranked from 1-3, 3 being most inhibition and 1 least, the p value of 0.2425 indicated that the hypothesis was null. Further avenues of research would include advanced studies of C. arietinum by quantifying the degree of inhibition, purifying and working to make inhibitor in a form people could ingest if they're unable to have high glucose concentrations.

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CSEF Official Abstract and Certification

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Student Name(s):

Fair Category

Word Count

Abstract:

In the past year, Connecticut was hit by a few severe storms that resulted in electrical outages for several days where portable generators were used by many families. One major downfall of generators is their noise level. The common generator is about 90 decibels without a load. This experiment is to basically reduce the sound level of a common household generator. It was expected that the Stanley muffler and resonator would produce less sound than that of the stock muffler. This experiment is aimed at exploring different muffler designs, intended to reduce the noise generated from a common generator. Four different noise reducing designs were tested. All of these designs were then tested using a sound meter from two distances. A standard stock muffler, a sound resonator, a Stanley muffler, and a Stanley muffler and resonator were used to test the dB readings from fixed distances. Results indicated that the Stanley muffler and resonator worked the best and decreased the sound of the generator by 17%.

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CSEF Official Abstract and Certification

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Proj. Title:

Student Name(s):

Fair Category

Abstract:

With new technology emerging, our pocket and lap held devices are becoming power hungry. We constantly have to charge these devices to access their applications. How can we extend or replace the battery life without having to buy battery accessories and or extensions? Implementing aspects of the energy-harvesting tile from Pavegen, our idea was to shrink the concept to the size of the keys on laptops. As we type, the gathered amount of energy can be converted into electricity to help sustain the device's battery and prolong the time you can go without charging. If the laptop is charging from an outlet, the generated energy from typing can also be stored into lithium polymer batteries to serve as a "back-up" battery. Based on research it was found that each keystroke generates about 0.2 joules of kinetic energy. An average person has about 6,000 keystrokes per hour to 12,000 keystrokes per hour. At minimum we can generate about 1,200 joules of energy per hour while we type. Based on research, the energy-generating keyboard may be viable for sustaining battery life rather than replacing the battery completely. Although this may be implemented for laptops, it can be adjusted to the pocket and or handheld phones and devices as well.

Word Count

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Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of this experiment was to see the changes in absorbance wavelength when minerals and vitamins were suspended in a solvent. The ability to detect the colour of various substances could be used in medical or forensic fields, since doing so otherwise could be expensive. I had predicted that various solutes would be distinguished from one another when the absorbance peak of light was measured. In my investigation, I created a spectrophotometer, or a device that measures light and colour, with a few simple materials, including a camera found on most cell phones and iPods. In order to gain the photos of different spectra, I first had to set up several different cuvettes, three samples of each solute. The room needed to be entirely dark aside from the LED and iPod back-light, otherwise the diffraction grating would produce too many spectra and of various light sources. After collecting all of my data, I found that certain substances, such as vitamin c and calcium, had a much shorter range in their absorbance peak when compared to standard food colouring. I measured the absorbance peak by using a special program written to read spectra and generate data. My hypothesis was proven because the cell phone spectrophotometer did indeed detect the differences in absorbance peak between different substances.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6088

Student Name(s):

Fair Category

Abstract:

Rare isotopes can be artificially manufactured and their physical properties measured during their short lifetimes. Magnetic moment is a measure of the magnetic field created by a nucleus, and quadrupole moment is a measure of the nonsphericalness of a nucleus. It was hypothesized that the logical connection between the shape of charge distribution in the nucleus and the magnetic moment would result in a statistical association between these measures. Previously collected measures of these properties for rare isotopes were analyzed for an association, using only data from specific cases in order to keep confounding variables from creating bias. The cases considered were nuclei with an even number of protons and neutrons in the first excited energy state with spin-parity 2+. The data strongly suggested a linear relationship between quadrupole and magnetic moment of isotopes grouped by element. This suggests that the arrangement of nucleons is generally more influential than their individual magnetic moment contributions. A few elements do not display this pattern, possibly because some other factor is more influential than the connection between magnetic and quadrupole moment. Future research should consider looking for this alternate factor by considering the connection between the pariah elements.

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:

Biodiesel is a natural renewable domestic fuel alternative for diesel engines made from vegetable oils. It contains no petroleum, is nontoxic and biodegradable. The leading reason that prevents biodiesel from being a mainstream alternative fuel is the formation of a post combustion residue (PCR). This PCR requires frequent engine maintenance to prevent premature engine failure. Current technology offsets this by blending 50% biodiesel with 50% petroleum diesel (50/50 Blend), but this is still not a standalone alternative fuel. In an attempt to eliminate the problematic PCR, biodiesel was synthesized from canola oil using a sodium hydroxide/methanol treatment. Then 3.0mL of biodiesel product was combined with a 0.10mL cetane additive. The cetane additive reduces PCR by postponing the combustion process allowing the temperature of the engine to rise. Higher temperatures allow for more efficient combustion of the biodiesel which generates reduced PCR. Additionally, the cetane increased the fuel efficiency dramatically. When the biodiesel was combusted, the non-treated biodiesel had an average energy output of 7.85 BTU's/3mL, while the treated biodiesel had an average energy output of 10.74 BTU's/3mL leading to a net increase of 2.89 BTU's/3mL of biodiesel(the 50/50 Blend output was 6.51 BTU's/3mL). The average mass of the PCR of the non-treated biodiesel was 5.82g. The average mass of the PCR of the treated biodiesel was only 0.27g decreasing the total mass 95.5% (the 50/50 Blend had an average PCR mass of 0.22g). The increased energy output and reduced PCR makes the treated biodiesel a more marketable fuel.

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CSEF Official Abstract and Certification

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Num

Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Applications of pesticides using currents are not always effective. Using fogging or crop dusting methods leads to the application of pesticides beyond the intended area. An alternative method to distributing pesticides was created through using the natural design of a samara seed. Using this design, a model samara was created using wood and paper. The samaras were dropped from 24ft balcony and their displacement was plotted to measure the scatter of the model samara. The same test was also conducted with a fan to simulate wind and turbulence. It was seen during the experimentation that the samaras pushed and bumped against each other in the group of the samaras. In addition, the samaras blocked the wind from samaras that were farther from the wind source. This caused the samaras to drop or spin out of control, reducing the dispersion of the samaras. The experimentation shows that the samaras are incapable of the mass dispersion needed for crop dusting because of the inconsistent dispersion when dropped in groups.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The purpose of my research is to determine if there is a correlation between the melting of the polar ice caps and hurricane activity. I know that clouds and precipitation are caused by low-pressure systems, so my first question is does the melting of the ice caps cause a low pressure system? Secondly, if it does is this enough to create a spiraling hurricane off the equator? My hypothesis is that as polar caps melt, oceans rise and create lower pressure resulting in increased tropical storms and hurricanes. Therefore, there is a correlation between the melting of the polar caps and the occurrence of hurricanes. A total of 593 hurricanes were charted on an excel spreadsheet from 1995 through 2012 in both the Atlantic and Pacific regions. Important data collected in this project included the month, day and year of the tropical storm or hurricane, the duration of the storm, and the storm's intensity. The Saffir-Simpson Hurricane Wind Scale was used to indicate whether the storm was a tropical storm or a category 1 - 5 hurricane. A category one hurricane would have winds reaching 95 miles per hour whereas a category five hurricane reaches winds of 157 miles per hour or greater. The storm data is then compared to the Arctic Sea ice extent as recorded by the National Snow and Ice Data Center (NSIDC) from 1995 through 2012. According to the NSIDC data the surface area of the Arctic ice caps has the least surface area from late July through October with the lowest average drop in mid-September. This data corresponds inversely with the number of hurricanes in the Atlantic and Pacific. Eighty-five percent of the hurricane activity according to the National Weather Service occurred in the months of July through October. The inflection point, if we treat this as a function, of the surface area of the polar caps vs. the date would be late July, and the point that it zeros out would be mid-September. The results of my data indicate it's the

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6092

Student Name(s):

Fair Category

Abstract:

The Artificial Neural Network is a type of computer algorithm which is based off of the human mind. It emulates the way in which the neurons in the brain are connected in order to recognize patterns. Since Neural Networks have a plethora of applications, they can be used to recognize signals despite interference, distinguish handwriting, or even identify malignant cancer or other diseases. Neural Networks must be trained to recognize a particular pattern or set of patterns. The purpose of this project is to optimize the effectiveness of Neural Network through various learning algorithms. Various techniques for training Neural Networks were researched. Based on this research, the algorithms were coded using Microsoft Visual C# and experimentation began. The algorithms were trained with various sets of patterns. The networks were then fed inputs to see how well they recognized these patterns. Additional noise was applied to the inputs to see how well they could recognize disturbed patterns. The Neural Networks were then compared on their accuracy under different conditions and the time which was required for them to be trained. Three learning algorithms, specifically, were chosen: the commonly used Back Propagation algorithm, the Genetic algorithm, and the Simulated Annealing algorithm. This project discovered which algorithms are most effective and under what circumstances. With this information Neural Networks can be trained more effectively and their results can be improved. By improving Neural Networks they will be better able to recognize diseases, signals, image patterns and other problems to which they are applied.

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CSEF Official Abstract and Certification

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Proj.
Num

Proj. Title:
6093

Student Name(s):

Fair Category

Abstract:

Following an oil spill, the timely and effective removal of oil contaminants is imperative. Current methods of soaking up oil contaminants include the use of carbon nanotubes infused with boron, the implementation of hair mats, and mycoremediation via mushrooms. These ideas can be effective, but are difficult to employ, and costly. Previous research has indicated that Bentonite powder ($Al_2O_3 \cdot 4SiO_2 \cdot 2H_2O$), when combined with a spongy medium, can act as a potent oil absorber in remediating large, visible quantities of long-chain hydrocarbons of crude oil in water. These heavier hydrocarbons ($>C_{13}$) are soaked up into large spongy masses, which must be collected & disposed of at measurable cost. What remains in the contaminated water are the lighter hydrocarbons (C_5-C_{12}), which are often dispersed, either intentionally by dispersants, or naturally, as their solubility in water is slightly better than their heavy hydrocarbon counterparts. This research investigated the creation of a novel paper medium, based on basic newspaper pulp, that includes 10% Bentonite. This novel paper, when applied to the top of soluble, light hydrocarbon (LHC) contaminated water, was able to remediate up to 14 mg of commercial gasoline contaminants per gram of Bentonite paper during 4 days of floatation. A 0.1 gram sample of 10% BP was able to remediate 12.8 mg/l benzene in 110 ml of water, or 64% of the original 20 mg/l content. SEM, EDS, & Visible light scattering analyses support the integrity of the Bentonite paper medium in "wave-motion" water over 4 days of contact, and remediation of LHC contaminants was analytically supported by the fluorescence of benzene in gasoline, at its 40 mg/l solubility in water. Unlike previous Bentonite-based sponges, the LHC-saturated paper is retrieved from the contamination site, and burned, so that the original light hydrocarbon water contaminants are re-purposed as a fuel source.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

I had 18 trials with this lab experiment. Out of them, only one trial was successful. I ran into problems when trying to extract caffeine out of the the beverages. The first issue was the separation of the isopropanol containing caffeine from water. After numerous trials, I hypothesized that 91% isopropanol was not strong enough, so I went though the experiment using 99% isopropanol and gathered positive results. After solving this issue I moved on to the next steps in the experiment. Some of the trials made it smoothly through the protocol. After boiling off the remaining liquid, I ended up with nothing. This lead me to think I worked with the wrong layer from the separatory funnel. I redid the lab a few more times using the alternative layer but still never gathered clear lab results. I ran out of time to continue using this method to see if I could gather the desired results. There were two beverage that each had individual problems. The green tea tended to not filter due to escaped leaves or over saturation of salt because there was less liquid in the solution than the other beverages(125mL verse 200mL). I was never able to separate the 5-Hour Energy into two layers. I hypothesize that the energy blend, 1870mg of taurine, glucuronolactone, malic acid, N-Acetyl L-tyrosine, L-phenylalanine, caffeine, and citicoline, was too closely bonded to isolate the caffeine. One of the ingredients could possibly block the caffeine from separating itself with the isopropanol.

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Student Name(s):

Fair Category

Abstract:

Natural bodies of water are critical parts of the environment. Each of their characteristics affects the areas around it. One such characteristic is the electrical resistance of the water. Electrical resistance is an object's opposition to the flow of an electrical current. The lower the electrical resistance, measured in ohms (Ω), the easier it is for an electrical current to pass through it. It can have major implications on the natural plant and fish species in the water. This project tested the electrical resistance of 5 bodies of water: Lake Terramuggus in Marlborough, Lake Pocotopaug in East Hampton, the Connecticut River, the Long Island Sound, and the Kitchen Sink. My hypothesis was that if the resistance of water from several different sources is tested, then the water from the Long Island Sound will have the least resistance because of its salinity. My procedure included collecting the same amount of water from each source and then using a multimeter to measure the resistance. My results supported the hypothesis because the Long Island Sound water had the least resistance with 4.5 k Ω . On the flip side of that, the Connecticut River had an electrical resistance of 25 k Ω . Practical applications of this data include that scientists can look at how different fish species react to changes in the level of electrical resistance in the water they inhabit. This could include both short and long term effects. There are environmental scientists around the world that continually monitor electrical resistance of water.

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Abstract:

This study was done to determine which size and type of body of water has the best quality for a trout. Trout are fish that need a higher quality of water to survive than other fish. Trout often live in rivers, especially more than other fish. I wondered if this was because of the water quality, or just the flow of the river. The actual problem tested was: How does the size and type of water source affect its water quality? To test this, I took samples from four different bodies of water: King Lake (a small lake), Candlewood Lake (a large lake), Saugatuck River, and Saugatuck Reservoir. To determine the water quality, I tested the water in pH levels (found with pH meter), total dissolved solids, (found by TDS meter), hardness (Total Hardness Drop Test), and total alkalinity (Total Alkalinity Drop Test). I also tested the total suspended solids (syringe and filter) for a visual representation of the quality of the water. For the Hardness Drop Test and the Alkalinity Drop test, my dad showed me how to perform the tests before I did them. Overall, I conducted three different trials to ensure validity.

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Abstract:

My problems were: Do ¼ inch neodymium magnets cause a motor to spin faster than a ½ inch neodymium magnet? Do temporary magnets such as electromagnets and nails cause a motor to produce more RPM than a permanent neodymium magnet? Will placing ½ inch neodymium magnets 5cm, 7cm, 10cm away from the motor make the motor spin more than if the magnets were on the motor? Experiment 1: • A piece of copper wire with reflective tape attached to the end. • Four ½ inch neodymium magnets attached to the battery's negative side. • Looped center of wire, placed loop on positive pole and made the ends of the wire touch the magnets. • Used a tachometer to measure the RPM. • Repeated steps using ¼ inch neodymium magnets. Experiment 2: • Repeated first experiment, replacing the neodymium magnets with an electromagnet and a nail. Experiment 3: • Repeated first experiment, placing 1/2 magnets 5 cm, 7cm, 10cm away from the battery. In conclusion the ¼ inch magnets produced more RPM than the ½ inch magnets did. Experiment 2- Neodymium magnet produced more RPM than the temporary magnets because the electromagnet was unusable when connected to its power source; not able to provide sufficient magnetism to be of any use. The other temporary magnet used a nail, magnetized by rubbing a neodymium magnet on it, also not strong enough to produce any RPM. Any distances away from the battery the magnets did not produce any RPM.

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Title:

Student Name(s):

Fair Category

Abstract:

The secret to a "perfect" violin has remained a mystery for nearly five centuries. The project conducted investigates violin acoustics specifically through the correlation between the wolf tone and the material of a sound post. The sound post's complex task is to transfer oscillations created by the string from the top bout to the bottom bout of the instrument. The wolf tone is the canceling frequency of the natural frequency of the violin. This project explores varying the material of the sound posts and determining their affect on the frequency of the wolf tone of the violin. The seven different sound posts used are classified in three different categories: wood, metal, and plastic. Using a very finite tuner, the wolf tone of the violin was found per each sound post. The data collected displayed different frequencies of each wolf tone with different sound post materials. After the data was collected, it was concluded that the density of the sound post material correlated with the frequency of the wolf tone. The more dense the sound post material, the higher the wolf tone's frequency. For example, a titanium sound post produces a high wolf tone frequency than a maple wood sound post. These results could change the way violin makers construct violins. This project will help innovate future violins and will be one step closer to uncovering the mystery behind the "perfect" violin.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title: Non-toxic Biological Indicator of Food Spoilage in Pasteurized Milk of Varying Fat Content for Consumer Use

Student Name(s): A. McGowan

Fair Category

Abstract:

The curdled milk left unattended in the back of consumers refrigerator is a pertinent problem, and if solved, could be used to help alleviate some of the consumer waste in our nation. Creating an indicator cap which responds to pH change in milk (lactic acid byproduct) could be an efficient way to notify the consumer, where their milk is in relationship to spoilage rate. Various samples of milk at expiration date (whole and skimmed) were tested for pH and plated in Trypticase Soy Agar (TSA), incubated for 2 days at 30°C. Colonies of bacteria were counted and a comparison was drawn between pH and spoiled milk bacteria count. When pH of skim milk averaged to 6.68 and the average bacterial count between 8 plated samples was 1.2×10^8 CFU/mL. The pH of the whole milk sample was 6.69 and had an average bacterial count of 8 plated samples of 1.6×10^8 CFU/mL. There is negligible differences between whole and skim milk in bacterial count as associated with pH. This suggests that bacterial count is inverse to pH. Once the milk reaches a level of complete spoilage (between 10^8 and 10^8) the pH of spoiled milk was determined. The indicator for milk spoilage calibrated based upon this pH and incorporate into a transparent cap where Bromophenol Blue will be present to change color when the milk is spoiled.

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: A comparative analysis of the conditions that influence biodegradation rate of starch-based bioplastics

Student Name(s): S. Sud

Fair Category

Word Count

Abstract:

The purpose of this study was to determine which environmental factors, individually or in combination, have the greatest impact on the biodegradation rate of mass-produced biodegradable bioplastics currently being used as packaging materials. Precipitation, UV radiation, and soil fauna were the three factors that were tested. It was hypothesized that the combination of all three factors would lead to the fastest degradation of the bioplastic. The experiment was conducted using eight plastic bins filled with one kilogram of soil. After the control bin, which only contained soil and a 4" round sample of bioplastic, the remaining bins each included a 4" sample of bioplastic and were subjected to various combinations of the three variables: precipitation, UV radiation, soil fauna. Precipitation was simulated by the addition of 100 mL's of water each day. UV radiation was simulated by UV bulb and two heat bulbs, and fauna were included as five earthworms placed in designated bins. At the conclusion of the experiment, the original hypothesis was qualitatively and quantitatively not supported as the sample of bioplastic subjected to only precipitation and soil fauna was more degraded than the sample of bioplastic exposed to all three factors. Although the precipitation/soil fauna sample was reduced in mass and surface area, the results were not statistically significant. Future studies may include conducting the experiment for an increased time interval as well as adding additional microbes to the soil.

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:

Tim Hoch 1/25/2013 Baseball Bat-Making Efficiency For my experiment, I'm testing which bat hits a baseball the furthest. I manufactured the three bats maple, ash, and birch. I used a wood lathe to make these bats. Once I have completed this task the real testing begins. I used a pitching machine and hit 14 baseballs with each bat. I took the farthest three balls hit by each bat and average them together in order to see which bat hit a baseball the farthest distance. I will measure the distance of the baseballs in feet. I will be testing this experiment at the softball field on Fishers Island. If one of the bats just so happens to break before we each hit 14 baseballs, that bat will be exempt from hitting and I will take the top balls it previously hit. Durability may be a factor because 28 full on baseballs swings could wear down a bat. The pitch machine holds 14 balls at a time and tosses them up at a constant speed and placement so the user has 14 swings to try and hit the ball as far as possible. I calibrated the string that is inside a baseball (which was well over 300 feet long) to measure the distance and made a giant ruler to attach to home plate. After conducting my experiments the average of trial one and trial two for the ash bat was 298.5 feet. The average of trial one and two for the birch bat was 267.5 feet. The average of trial one and trial two for the maple bat was 279.5 feet. The average of the aluminum bat for trial one and trial two was 283 feet. Two of these bats are used in Major League Baseball. They are Maple and Ash. Depending on the type of hitting the user is will suit the best possible distance the ball will travel. After conducting this experiment it is clear that ash was a little better than maple distance wise due to the fact that I am a leadoff hitter and do not usually hit for power.

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CSEF Official Abstract and Certification

Fair Category

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Num

Proj. Title:
Proj. Num

Student Name(s):

Fair Category

Word Count

Abstract:

In our society we are being faced with the growing problem of bacteria and its ability to adapt and become immune to different medicines. In my experiment I ventured into the field of bioengineering and tested the effects of natural surfaces on inhibiting bacterial growth. I was looking to discover and search for what can prevent bacteria from growing; instead of just killing the bacteria. I conducted my experiment using the surfaces of plants. Specifically I focused my research on the pitcher plant. The pitcher plant has a unique pattern on its inside that causes insects to hydroplane right into its bottomless pit. I tested its properties by growing cultures of ecoli k12 on the plants surface and on a control sample of plain plastic. I found that the plants surface inhibits bacterial growth and contained no colonies of bacteria. The non-pitcher plant patterned samples failed to inhibit bacterial growth by allowed colonies to grow. Ultimately, my research has shown that the pitcher plant inhibits bacterial growth due to its specific pattern which prevents bacteria from colonizing and reproducing. In addition, due to the pitcher plants slippery surface and specific pattern the colonies were unable to colonize, leading to no bacterial growth. This application can help our society by preventing the spread of harmful bacteria instead of having to kill bacteria that has already colonized and infected our society.

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CSEF Official Abstract and Certification

Fair Category

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Num

Title:

Student Name(s):

Fair Category

Word Count

Abstract:

In our physics class, we learned that the refractive index of water varies with temperature. Based on this information, we theorized that; due to its transparency, the refractive index of air should also change with respect to temperature and this change can pose a problem for people wearing glasses. Firstly, we got the temperature data from www.weather.com for the hottest day (+38 oC) and coldest day (-31 oC) for our town, Putnam, CT. Because water solidifies when its temperature is below 0 oC, we calculated the refractive index of water at +38 oC and +4 oC. Then, by the experiment, we measured angle of incidence and angle of refraction, and calculated the refractive index of water by using the Snell's law equation. We found that; while the refractive index of water changes with temperature by only %1, and the refractive index of air changes as little as 1/10000 between -31 oC and +38 oC. Afterwards, we conducted a survey in Putnam, inquiring whether the people wearing glasses sensed any change in their vision in hot and cold days. Only 4 among 50 people said they marked a slight change, however, they couldn't give any explanation. We concluded that; the effect of temperature on the refractive index of air is infinitesimal, and therefore has no impact on the lives of people wearing glasses.

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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:

In our experiment, we tested which fan blade design was the most efficient. The results from our experiment could then be applied to wind farms, where the most efficient blades can catch the most wind and produce the most energy. This would lead to more money saved, and more profits earned. We studied this problem: which fan blade, when wind is applied from a fan, would produce the most rotations per minute, and therefore, be the most efficient? Our investigation's trials began with constructing the Lego mount used to hold the fan blades as they spin. Once that was made, we fabricated three sets of blades out of Styrofoam. One set had a simple, rectangular design, one was built like a 1/4 pipe, and the last was ovular in shape with a caving-inward curve in the center. Once the blades and mount were complete, the blades were placed at the pivot points near the top of the mount and the NXT Mindstorms kit was set up. From here, the trials were conducted using a fan placed at different distances from the mount, while the NXT kit recorded the blades' RPM using a light sensor. After three sets of trials were obtained from the three distances, the results were clear: the rectangular blades had the most RPM. From all three different distances, the flat blade proved to provide the highest quantity of RPM, so it can be determined to be the most efficient of the three.

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CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj.
Num

Title:

Student Name(s):

Fair Category

Abstract:

The beauty industry is such a huge one in today's society. Beauty drives people to try crazy diets, undergo surgery, and spend huge amounts of money on extreme makeovers. There are advertisements everywhere for different beauty products. We investigated two brands of shampoo and conditioner combinations. We tested to see which brand left hair softer and more vibrant. The two brands were Suave and Pantene because those products have the most satisfaction ratings and we often see commercials for them. After testing we found that Pantene was the best because it left the hair softer. In addition the color was more vibrant after washing.

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:

Have you ever wondered what made glow sticks glow? What about if they can actually glow forever? Well, this can be answered. You may not have known that the chemical in glow sticks, called luminol, is also used in crime scenes. The substance in glow sticks, called, hydrogen peroxide, distilled water, sodium carbonate, and copper sulfate pentahydrate, combined with heat, acts as a catalyst, which is something that speeds up a chemical reaction. The glow sticks can glow for a longer time, and even brighter when heat is added. What we did was cut the glow sticks and let the luminol pour into the cups. We placed them in the different settings and got the results. This glow is made through chemiluminescence. The hypothesis in this experiment was if we increase the temperature of luminol, then the luminol will glow brighter. The luminol got brighter when heat was added. The materials that really made the difference were the stove and the refrigerator because they really changed the temperature, which was the basis for the experiment. The design of the experiment didn't change any of the validity of the results. The only thing that we could have did better was use plastic clear cups instead of paper obscure cups.

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title:
6505

Student Name(s):

Fair Category

Word Count

Abstract:

The objective of this project was to engineer an effective method of retrieving spilled oil. It was assumed that the oil in need of collection had been spilled from a shipping vessel and been pre-doped with nano-magnets. To simulate doped crude oil, ferrofluid was mixed with mineral oil to create two concentrations, 1x and 5x. To simulate the ocean, a glass aquarium tank was filled $\frac{1}{3}$ with salt water. Two 6x4 inch wood blocks, coated on all sides (except the top) with 27 mm sheet metal, were used to simulate boats. The first boat was attached to an electromagnet. The block was placed in the tank and the electromagnet suspended in the water. Ferrofluid/oil solution was released and timed in how long it took to find and adhere to the electromagnet. The "unattracted" portion of the solution was removed and measured to determine efficiency of retrieval. The trial was repeated, and then twice more using the 5x solution. The second boat, with 10 permanent magnets attached to the sheet metal, was tested in the same fashion with the 1x and 5x solutions. Data collected and analyzed indicated as the ferrofluid concentration increased, the amount of "unattached" solution decreased. Data also suggested that the neodymium magnets were more successful in preventing the ferrofluid mixture from spreading throughout the water in the tank. Future studies may include variations with the layout of the magnets, types of magnets, increased voltage in the electromagnet, and an efficiency trial in an authentic ocean environment.

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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:
Proj. Num

Student Name(s):

Fair Category

Abstract:

This project was inspired by the concern in the safety of the world's oceanic ecosystems. To test how plastic chemically affects seawater, this experiment was conducted with two problems. How does the heating of varying amounts of plastic from water bottles on the water's surface affect the dissolved oxygen (DO) levels in Atlantic seawater? Also, in what way does increasing depth in seawater affect the change in DO levels in polluted seawater? This was tested by placing Long Island Sound water samples into 4 containers (3 equal size and 1 larger), shredding varying amounts of water bottles into a slurry onto the samples in order to mimic the plastic pollution found in oceans, and heating the samples for 40 minutes under 125 watt UV lights (to mimic mid-day sunlight). Once heated, the DO levels were tested through a series of careful chemical reactions known as the Winkler Test. This test involves fixing the free oxygen molecules in the samples adding certain chemicals. The results obtained were unexpected, but explainable. The container with no plastic had the lowest DO, the container with the middle amount of plastic had the highest, and the container with the most plastic had the middle DO. Also, it was found that the deeper container had a lower DO than the less deep container with an equal amount of plastic. These results conclude that there is an optimal level of plastic for high DO levels in seawater, and that there is less oxygen in deeper, polluted seawater.

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

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:

About 18 million tons of monoethylene glycol (MEG) is produced yearly worldwide. About 85% of this is used for the production of polyethylene terephthalate (PET), which in turn is converted into bottles, fibers, film and other uses. MEG is produced with hydrolysis by reacting ethylene oxide with water. However, this reaction produces three harmful byproducts: Diethylene glycol (DEG), Triethylene glycol (TEG), and Tetraethylene (TEEG) glycol. All three of these toxic byproducts are poisons that cause kidney and nervous system damage and failure. Factories that produce PET naturally produce enormous amounts of these toxic byproducts and a degradation method is needed for the waste in case of leakage. Traditional management of poisoning from those byproducts includes the use of ethanol. Inspired from the treatment method for MEG poisoning, in this experiment, Fomepizole was tested as a degrading agent for all byproducts. Like ethanol, Fomepizole is a competitive inhibitor of alcohol dehydrogenase. Sets of 0.25% solution of each byproduct (in separate flasks) with varying amounts of fomepizole (0.1 mL, 0.3 mL, 0.5 mL) in distilled water were prepared. Also, sets of byproduct solutions with varying concentrations (0.1%, 0.25%, 0.5%) with 0.2 mL of fomepizole were prepared. After 6 hours of reaction, collected samples were analyzed by using Proton Nuclear Magnetic Resonance (H-NMR) Spectroscopy. Results showed that there was a decrease of up to 92.1% in DEG, 74.8% in TEG and 55.4% in TEEG concentrations. Results also indicated that the optimum ratio of Fomepizole to be used has a different trend for each byproduct. This experiment revealed that Fomepizole can be used as an effective poison removal method for DEG, TEG and TEEG.

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:
6509

Student Name(s):

Fair Category

Word Count

Abstract:

The original objective of this experiment was to create a flexible and transparent solar cell utilizing the material graphene – a two-dimensional, single-atom thick allotrope of carbon, known for its high strength, flexibility, and conductivity. The objective shifted slightly after project initiation and was refocused on finding an economical method of creating and applying graphene to the solar cell without compromising transparency and flexibility. The project consisted of the creation, suspension, and application of graphene using inexpensive and unconventional methods. Graphene was successfully synthesized through the combustion reaction of carbon dioxide and magnesium and isolated using hydrochloric acid. The suspension of the graphene in a liquid was necessary in order to apply it evenly to a surface. Through various heating techniques and pulverization, suspension was achieved when the graphene was broken down into sheets within the solvent. It was then applied to a hydrophilic surface using various application techniques and was tested for conductivity. At the conclusion of the experiment, the original objective was not accomplished. With continued research the objective may be realized by further spreading the graphene into sheets using processes such as sonication to achieve more uniform coverage; improving conductivity testing by measuring the sheet resistance using a four-point electrical probe; and by building the desired flexible and transparent solar cell using graphene in place of indium tin oxide.

Special Categories Selected by Student:

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- Yes No

CSEF Official Abstract and Certification

Fair Category

Proj.
Num

Proj. Title: Adaptive Leading Edge Droop Mechanism to Increase Fuel Efficiency and Flight Safety on Private Aircraft

Student Name(s): M. Chris, J. Reidy, J. Witz

Fair Category

Word Count

Abstract:

Stalling, a phenomenon most attributable to private aircraft, occurs when the separation of airflow over and under the wing becomes significant and results in the sudden loss of lift and control over the aircraft. A common solution to this problem is the leading edge cuff, which is a device that adds a droop to the outboard leading edge of a wing in order to enhance airflow attachment to the wing. However, a leading edge cuff also increases the drag, and thus fuel consumption, during cruise conditions. The goal of this project was to design an adaptive leading edge cuff for private aircraft which will decrease drag by utilizing corresponding fuel efficient wing cuff angles at all conditions, while increasing stall angle by adapting the wing cuff angle for this purpose when high angles of attack are approached. Therefore, our design will not only increase fuel efficiency but also increase flight safety by reducing the risk of stalling in flight. Computational fluid dynamics analyses of the various leading edge droop configurations at the different climb, cruise, and descent conditions of flight indicated that incorporation of the designed mechanism on all private aircraft, given 429,500 flights per year, will save 631,436 gallons of fuel, corresponding to savings of \$3,902,275, per year. This correlates to reductions in 11,577,381 pounds of CO₂ emissions, which is about the amount absorbed by 241,195 trees, per year.

Special Categories Selected by Student:

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4. Is this project a continuation? Yes No

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- Yes No

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Proj.
Num

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Num

Title: Windbelts: The Future of Wind Power; The Effect of Magnet Thickness, Coil Configuration, and Film Elasticity on the Electrical

Student Name(s): D. Giebisch, N. Gallant

Fair Category

Word Count

Abstract:

The Windbelt, a novel small-scale wind power electrical generator, relies on a vibrating film with attached magnets to produce an electrical current. Unfortunately, its electrical efficiency must be improved to compete against miniature wind turbines and solar panels. Therefore, this study aims to determine the effects of magnet thickness, coil placement, and film elasticity on the electrical output of a Windbelt. It is hypothesized that a Windbelt configured with a medium magnet thickness, three sets of copper coils, and a low elasticity will generate significantly more electrical power than the original design of two magnets, one pair of coils, and a high elasticity. After constructing the Windbelt, experimentation is done using a house fan with a controlled wind speed. Magnet thickness is varied in increments between 0.25 cm and 1.27 cm to determine an optimal magnet thickness. Coils are placed in various configurations of two to ten coils. Two film materials with different elasticities are tested. The results of this experiment provide an optimal experimental configuration which produces approximately six times as much electrical power as the original Windbelt. This new configuration utilizes thicker magnets, more coil generators, and a more elastic film than the original design. These results establish the Windbelt as a compelling replacement to small wind turbines and other renewable energies.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The objective of this project is to discover which roof shingle materials absorbed the greatest amount of light. The proposed hypothesis states that asphalt will absorb the least amount of light since the material becomes weaker when exposed, while slate will absorb the most because it is known for its heat absorption. To test the hypothesis, a wooden box was constructed to model a house. A light meter that measures light in LUX was placed inside while the reading was placed outside. A light bulb outlet with a 60 watt light bulb was positioned 30 cm above the center of the constructed house's top. The light meter and the light bulb were started. One minute passed and the number soon became stable. The number stated on the light meter was recorded. This was tested with no roof shingles making it the control group. A wood tile was then placed on top of the wooden box. The same steps were applied. The number stated was then subtracted from the amount of LUX stated in the control group. The difference was how much LUX the roof material absorbed. This entire process was then repeated using an asphalt mat, then again with a slate tile. The result of this experiment supported the hypothesis as asphalt absorbed the least amount of light while slate absorbed the most. This discovery gives us more insight into roofing materials and which may be the best for homes to improve energy efficiency like heating and cooling costs.

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Num

Title: A comparative analysis of a mycelia-based foam alternative versus expanded polystyren as effective insulators adn packaging materials

Student Name(s): K. Pendo, M. Raman

Fair Category

Abstract:

The purpose of this project was to compare the flame resistance, impact resistance, and insulating ability of an alternative packing/insulating material composed of fungal mycelia grown on an agricultural byproduct skeleton to that of traditional expanded polystyrene used in shipping and housing insulation. It was hypothesized that the alternative fungal mycelia would have superior flame resistance, be capable of withstanding more severe impact, and be capable of providing better insulation than expanded polystyrene. Experimentation consisted of three tests. The first test was for insulation. At 1-minute intervals for 40 minutes, temperature of a 200ml beaker of boiling water insulated by a mycelia-based foam box was recorded. Three trials were conducted, and the procedure was repeated using an expanded polystyrene foam box. The second test was for flame resistance. Three 4"x4" squares (expanded polystyrene, regular mycelia-based foam, flame resistant mycelia-based foam) were cut and massed, and then burned. Remnants were massed and duration of burn recorded. The third test was for impact resistance. After building small boxes from mycelia-based foam and expanded polystyrene, an egg drop test was conducted from increasing heights until the egg broke. Data was analyzed and at the conclusion of the experiment, the original hypothesis was supported with statistical significance and indicated the alternative fungal mycelia had superior flame resistance, was capable of withstanding more severe impact, and was capable of providing better insulation than expanded polystyrene. Future studies may include modifying the mycelia-based foam to use in the food industry.

Word Count

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

The basis of this experiment is electrical generation through passive convection. The experimental device is a pyramid shaped glass structure framed in wood with an open 24" square bottom. The top has a 3" square opening which allows for the release of warm air to power a wind turbine. As the convection process continues, the air will begin rise at which point the force of the airflow will cause a wind turbine to spin. The result of this the movement is the production of an electrical charge. To test the efficiency of the device we will measure the velocity of the wind generated as well as the temperature differential between the outside air temperature and the temperature of the air inside the device. A wind gauge will also be a priority for measuring the wind speed generated. An overview of the data indicates that the device generated an average wind speed of 1.10625 knots with an associated average temperature differential of 1.2675°C proves the initial hypothesis correct. This device and its success represent a novel approach to generating electricity and utilizing the radiant energy of the sun converting to convective energy.

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Proj. Title:

Student Name(s):

Fair Category

Word Count

Abstract:

Hypothesis: If we boil penne, shells, bowties and elbows then the bowtie type will absorb the most water because of the shape. We picked this because we felt it had more surface area than any other type of pasta. What causes people to get full? It can be a combination of many things: what you eat, how fast, how hungry you felt. We decided to look into what you ate focusing on pasta shape. We saw that people eat different amounts of pasta based on the shape before we get full. This led us to investigating which shape absorbs most water. Initially we took the dry mass of the pasta. Once cooked and cooled we took the new mass. With this information we were able to calculate the percent change in mass. We did see a difference of how the shape affects the amount of water it absorbs. There was a range from 51.4 grams to 77.1 grams in how much water was absorbed in one cup of cooked pasta.

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:

In many third world countries, food preservation is a major problem. Many times electricity is unreliable, and ice is uncommon, making refrigeration impossible. In this project we examined this problem and look for methods that would cool drinks and food without electricity or ice. So to tests this the methods tested of using evaporation with sand between two pots, evaporation from newspaper, and a cooling keyboard cleaner called difluoroethane. Our research showed that though the difluoroethane was the least available method it was the most successful. However, as the other methods are more available and because the results did not show a great difference between the different methods, this data is at the moment still inconclusive.

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

2013 Conn. Science & Engineering Fair

Applied Technology

Project Number	Title
2505	Mold Resistance of Different Building Materials Post-Hurricane
2515	Solar power applied to energy output
3018	Agar Extraction
3021	Who is Seeing Red? A Biometric Study of Anger
3036	?Electroencephalography to Analyze and control the human Hand
3048	Leukotriene A4 Hydrolase Inhibition as a Novel Rheumatoid Arthritis Treatment
3050	Telepractice and Stuttering
3069	The Growth of the Stony Coral, <i>Leptoseris</i> , in Low Levels of Electric Current
3080	A Novel Design for the Integration of a Microbial Desalination Cell in a Microbial Fuel Cell for the Production of Energy and Purification of Water
4004	Robots as Teachers
4006	Retrofitting a Building
4011	Methods That Utilize Available Solar and Thermal Energy to Charge Your Electrical Device in a Power Outage Using a Thermoelectric Generator
4014	Analysis of Fabric Flammability Rates and Effect of Chemical Flame Retardants, versus Effect Natural Flame Retardants.
4015	A Battery That Makes Cents
4017	Dry Ice Engine
4021	Robot Artistic Ability
4023	The Creation Of Seismic Waves
4024	The Python Weather Station
4025	Simulated Logic in Robots
4026	Energy of the Future
4033	Comparing the Electrical Load of a Fuel Cell and a Rechargeable Battery
4038	The Effect of Heat Treatment on the Strength of Steel
4042	Fighting The Wave
4044	Maglev Modeling
5001	Solar Car: Affect of Different Colored Films on a Solar Panel
5005	jj
5006	Perfect Plastic
5009	How Can Water Help Win A War?
5012	Robotic Rubik's Cube Solver
5018	The Best Roof for a New England Home
5020	Comparative Study of Three Renewable Energy Sources: Solar Power, Wind Power, and Hydroelectric Power
5021	Free Electricity from Your Car
5032	A Gauss Rifle: A Magnetic Linear Accelerator
5034	Effect of Temperature on Magnetism
5038	Electromagnetism - The effect of coils.
5039	Designing an efficient and affordable Solar Panel Iphone Charger
5044	What's in Your Water
5047	Automating A Simple Electromagnetic Generator to Power A Device By Switching AC Current To DC Current
5049	Lift and Drag in Kites
5502	Earth, Wind, and Fire- comparing water, wind, and solar based fuels
5503	Do Metals Have Antimicrobial Properties?
5508	Salt Water Energy

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Applied Technology

Project Number	Title
5510	Tape vs. Texture
5512	The Adhesion of Athletic Bandages
5514	Assessing Human Emotional Responses to Robots
5521	A New Mathematical-Equation Based Approach for Faster and Efficient Digital Video Transmission
5522	Human Behavior and Robotic Interaction
5523	Efficiency of Plane Designs
5526	Sound Proofing Your World
5527	Stressful
5531	How does the shape and size of a sound direction apparatus affect the decible level of sound?
5534	Power Pitching?
5537	What form of data compression is most compressing?
5539	Watts Up?
5540	Evaluating the Performance of a Model Solar Updraft Tower Power Plant
5544	Hydro or Wind?
5545	Flow Rate vs. Heat Transfer of Fluid
5547	Particle Wave Duality Forward Into The Unknown
5549	Wind Turbine Blade Efficiency Through Extensions and Winglet Modifications
5550	As The Wind Turns
5551	Power! A study of various airplane engines and the forces they generate
5554	Gender Bias with Robots
5555	"I'm Melting!" The Wicked Witch of the West and Ice Agree Global Warming is a Problem
5560	The Effect Of RAM and CPU Speed on Windows System Speed
5562	Converting Waste to Electricity using Efficient Microbial Fuel Cell
5564	Growing Green
6001	An Investigation of a Novel TiO ₂ Coating for Improved Surrounding Air Quality & Reduced Solar Cell Maintenance
6003	New Invention that will harness wave power to convert to unlimited rotational energy
6004	Applications of high-tech swimsuit technology
6006	Utilization Of A Small Unmanned Aerial System for Optimization of Deer Tick Population Management
6007	Using Modified Coal Ash to clean water contaminated with oil
6008	Hydroxyapatite Sol-gel Coatings on Titanium Substrates for Bioengineering Applications
6011	The Effects of Rotor Blade Orientation on the Electrical Output of a Wind Turbine
6014	Fabrication of a Flexible, Tunable Color Changing Skin using Magnetically Responsive Fe ₃ O ₄ Photonic Crystal Structures
6017	Development and Testing of a Bicep Other Arm Movements for a Humanoid Robot with Human-like Force Capabilities
6020	Integration of Photovoltaic and Peltier-Seebeck Thermoelectric Effects to Optimize the Power Density of a Hybrid Solar Panel
6022	The Power of Sound and Acoustic Levitation
6023	A Hot Air Balloon's Ability to Fly
6026	Purifying water using solar power and electrolysis
6028	Wavelength Optimization of Quantum Dot Luminescent Solar Concentrators (LSC) using Tris(8-hydroxyquinoline) for Increased Quantum Efficiency
6031	Peak electricity: Generating Energy Using a Centrifugal Airflow Fan Blade, Propelled by Hot Air Flowing from a Soffit Vent to a Ridge Vent On a Roof
6032	Design of a New Mobile and Autonomous True Random Number Generator.
6037	The Use of a Shingled Write Layout to Improve upon Current Hard Drive Capacity
6041	The Most "Invisible" Geometric Shape: The Future of Stealth Technology

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Applied Technology

Project Number	Title
6043	Shoulder Posture Perfect Backpack Insert Design
6050	Nanostructured C-Phycocyanin Enhanced Hematite Thin-Film Photoanode Co-Sensitized with Plural Organic Dyes to Yield a Highly Efficient Solar Cell
6054	Integration of Photoluminescent Manganese-doped ZnS Nanocrystals for Improved Solar Cell Response
6056	Thermoelectricity
6059	Cellulose Algae Salt Battery
6063	The Artificial Leaf: Capturing Solar Energy Using Photochemical Reactants to Separate Hydrogen and Oxygen in Water
6065	Roofing Material Selection: The Impact on Ambient, Internal, and Reflective Temperatures
6066	Digital Image Sharpening through Optimization of Filtering Parameters based on Genetic Algorithms
6072	Production of 1,3 Propanediol from Glycerol Fermentation
6074	Generating Energy from the Swing Flexion, Swing Extension, Stance Flexion, and Stance Extension Stages of Knee Motion Using a Two-Generator, Brushless, Electromagnetic Knee Brace Device
6075	Removing Copper From Drinking Water
6078	Laser-induced Propulsion of Anticancer-Doxorubicin Using a Combined Optical Tweezing and Radiation-induced Interface Deformation
6081	The Effect of Lead (Pb) particles on the Electrical Resistivity of Carbon Nanotubes
6082	Laptop With Built In Printer
6083	Intrinsic Laptop Energy Capture via Keyboard Piezoelectric Conversion
6086	Design for a generating battery life through keyboard
6089	Reduction of Biodiesel Post Combustion Residue
6092	A Comparative Analysis of Possible Optimization Techniques for Artificial Neural Networks
6093	Novel Creation of a Hydrocarbon-Soaking Paper for Remediation and Reuse of Nanoscale Oil Contaminants in Water
6102	Bat Making Efficiency
6103	Bio-mimicry: The Antimicrobial Properties of Nanoscopic Silicon Replications of the Lotus Leaf and the Pitcher Plant
6501	Determining the index of refraction of water and air as a function of temperature and exploring how the vision of people wearing glasses are affected by temperature change.
6502	Blades Of Fury: Wind Blade Efficiency
6505	Subsurface Recovery of Spilled Crude Oil Using Nanomagnet Retrieval System
6509	Application of Graphene in Improving Efficiency and Practicality of Transparent and Flexible Photovoltaic Cells
6510	Adaptive Leading Edge Droop Mechanism to Increase Fuel Efficiency and Flight Safety on Private Aircraft
6511	Windbelts: The Future of Wind Power; The Effect of Magnet Thickness, Coil Configuration, and Film Elasticity on Electrical Output of a Windbelt
6514	Passive Electrical Generation Through Convection

Scientific Disciplines Selected by Student

Conn. Science & Engineering Fair

Animal Sciences

Project Number	Title
1015	Salty Shrimp
2003	Walking on Egg Shells
2017	The effects of physical activity on anxiety and short term memory in rats.
2032	Effect Caffeine and Alcohol on Daphnia Heart Rate
2501	Natural Alternative To Household Pesticides
2509	Feeding Worms
2531	A Comparative Study of the Effects of Organic and Chemical Fertilizers on <i>Lubricus terrestris</i>
2536	Bird Song Variation and Genetic Drift in Common Yellowthroats
2539	Being Green? What is the LC50 Rate of Green and Standard Detergents on <i>Myelis edilus</i> ?
2541	WHICH ECOSYSTEM HAS THE MOST LIFE?
3002	The Effects of Ocean Acidification on Oyster Larvae (<i>Crassostrea virginica</i>)
3011	The Affect of High Fructose Corn Syrup and Blueberries on a Rat's Memory.
3012	Multi-Trophic Aquaponics
3013	The Duration of the Alarm Response of <i>Pogonomyrmex barbatus</i> (Red Hartvester Ant) as Subject to the concentration of Pheromone Stimuli.
3015	The advantages of the navigational behavior of the slime mold <i>Physarum polycephalum</i> .
3017	The Effects of Concentrated Drugs on Heartrate
3023	Best Breed of Warmblood for Show Jumping
3026	Finding Clues to Genomic Disorders by Analyzing Evolutionary Variants in DNA Repeats
3030	Correlation of <i>Carcharhinus leucas</i> (Bull Sharks) Behavior with Human Interactions as Related to Feeding Patterns and Migration in Fresh and SaltWater
3038	The Presence and Magnitude of Melanomacrophages in the Livers of Sharks
3048	Leukotriene A4 Hydrolase Inhibition as a Novel Rheumatoid Arthritis Treatment
3056	New species of Xantusiidae from the Middle Miocene of New Mexico
3061	Light's Role on the Symbiotic Relationship between Zooxanthellae and <i>Ricordea florida</i>
3065	An Analysis of the Hemocyanin Content of Atlantic Horseshoe Crabs (<i>Limulus polyphemus</i>) Prior to Hemolymph Extraction in Order to Determine Organism Health Status.
3068	A self-powered Controller for a live <i>Blaberus discoidalis</i>
3069	The Growth of the Stony Coral, <i>Leptoseris</i> , in Low Levels of Electric Current
3072	Biological Control of The Emerald Ash Borer Using Entomopathogenic Fungus
3086	A Theoretical Examination of Changes in Community Structure due to Consumptive and Competitive Species Interactions During Climate Change
3089	EFFECT OF SHORT-TERM CIGARETTE SMOKE EXPOSURE ON FOOD CONSUMPTION IN <i>GRYLLUS ASSIMILLIS</i> .
3502	Comparing the Ability of the Human Body to Digest Factory and Grass-Fed Beef
3507	A Novel Approach to the Synthesis of a High-Performance Biomaterial
3510	Effect of Stress on Grasshoppers' Dietary Patterns
3511	Green Crabs Effect on the Native Crabs Species in the Poquonock River
5533	Sugar in Milk
6006	Utilization Of A Small Unmanned Aerial System for Optimization of Deer Tick Population Management
6055	You Are What You Eat

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Behavioral and Social Sciences

Project Number	Title
1001	Color or Plain, It's just not the same
1002	What sounds are dogs (poodles) attracted to?
1003	Does eating chocolate make people happy?
1005	Th Effect of Distractions on Drivers and how this Effects Their Reaction Time.
1008	The Effect of Distractions on 12-14 Year old Females
1018	The Affect of the Senses on the Short-Term Memory Ages 12-14
2002	Does the content of an article affect the reader's heart rate?
2012	Is audio or visual information better remembered?
2013	Mr. Bouba & Mrs. Ki ki
2030	Effect of Age on Optical Illusion Recognition
2501	Natural Alternative To Household Pesticides
2533	The best ways to Study
2535	Hair Dying and Bleaching
3006	The Effect of Music Tempos on an Exerciser's Heart Rate
3008	Digital Disruption of Comprehensive Concentration
3015	The advantages of the navigational behavior of the slime mold Physarum polycephalum.
3021	Who is Seeing Red? A Biometric Study of Anger
3026	Finding Clues to Genomic Disorders by Analyzing Evolutionary Variants in DNA Repeats
3030	Correlation of Carcharhinus leucas (Bull Sharks) Behavior with Human Interactions as Related to Feeding Patterns and Migration in Fresh and SaltWater
3043	The Effect of Different Colored Cone Cells on the Fatigue Rate of the Human Retina
3050	Telepractice and Stuttering
3051	Mental Rotation of Three-Dimensional Faces
3052	How different learning techniques tested on different age categories affect memorization skills?
3055	The Effect of Paranormal Activity on Temperature and EMF Ratings
3071	Stress in Adolescents: The Causes in Modern Society
3088	What Do We Remember More: Color or Shape?
3092	Girls vs. Boys: Is gender correlated with stress?
3093	Ethnogenesis and State Formation in the Mycenaean State of Pylos: A-pu2/Iklaina as a Diagnostic
3097	The Power of Suggestion
3504	People and Politics: Is There Bias?
3510	Effect of Stress on Grasshoppers' Dietary Patterns
4018	Does Cell Phone Distraction Effect Your Reaction?
4022	How different positions affect scores in a video game
5007	Do the Eyes Have it?
5534	Power Pitching?
5543	What Are the Chances of Winning a Mirrored Chess Game?
5561	Got glue?
6006	Utilization Of A Small Unmanned Aerial System for Optimization of Deer Tick Population Management
6060	The Correlation between Psychosocial Disorders and Childhood Psychological Stresses and Neurological Data
6082	Laptop With Built In Printer

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Biochemistry

Project Number	Title
1003	Does eating chocolate make people happy?
1006	The Affects of Natural Sorbents on Petroleum
1007	Does Smoking Affect Lung Capacity?
1016	Degrading DNA
1019	Collectin' D.N.A
1020	Analysis of Arsenic in Food from Natural Produce, Effect on Cell Bioavailability, and Effect of Chelators on Absorption.
2004	Coli Forms in Your Drinking Water
2007	What is the relationship between dissolved oxygen and coliform in the Pequonnock River?
2011	Taste Buds: Are You A Super taster
2015	Roundup And It's Effect On Microorganisms
2501	Natural Alternative To Household Pesticides
2503	Quantitative Analysis of Nitrate and Phosphate "Runoff" Pollution on Long Island Sound, Marine Life, and Hypoxia
2504	An investigation into the use of pyrocystis fusiformis as an early indicator of acidic pollution.
2510	Are Energy Drinks Worth THE Risk?
2513	The Effects of OTC Pain Killers on Gastric Health and the Development of Ulcers
2518	The Phytoremediation Efficacy of Elodea Canadensis, Lemna Minor, and Brassica Juncea in Copper Sulfate Contaminated Water
2519	THE AMOUNT OF TIME EXPOSED TO NON-IONIZING RADIATION VERSUS THE EFFECT ON SEED GEMINATION AND PLANT GROWTH FOR FRENCH BREAKFAST RADISHES.
2525	The Antioxidant Mystery
2526	Fertilizer: Phenomenal or Fatal
2527	The Effect of Chlorine on Extractable DNA
2531	A Comparitive Study of the Effects of Organic and Chemical Fertilizers on Lubricus terrestris
2532	Analysis of Allelopathic Effect of Grasses on Common Weeds
2538	TACE Inhibitors As Non-Biological Drugs For Treating Rheumatoid Arthritis
2539	Being Green? What is the LC50 Rate of Green and Standard Detergents on Myelis edilus?
2542	THE EFFECT THAT SUCROSE HAS ON THE AMOUNT OF GLUCOSE DIABETICS DIGEST FROM VARIOUS FOODS
3004	The Effect of the D126G Mutation on the Aggregation Propensity of CRABP
3014	Characterizing the Boundaries of the Lipid Bilayer Surrounding Intramembrane Protease GlpG
3017	The Effects of Concentrated Drugs on Heartrate
3025	The Correlation Between Environmental Chitinase Activities and Asthma Severity
3027	Morphogenesis of and Chromosome Segregation in Escherichia coli Branching Mutants
3029	The Effects of Omega-3 and Omega-6 on Breast Cancer Growth Rates
3031	The Effects Of Citric Acid On Calcuim Carbonate
3032	Investigating the role of p53 in ovarian cancer cell response to the chemotherapeutic drugs cisplatin and veliparib
3033	The effects of bovine serum albumin (BSA) on restriction digestion and analysis of Lambda Phage DNA
3037	The Efficacy of Bentonite as a Means of Purifying Water
3040	Specific Single Nucleotide Polymorphisms are More Frequent in Multiple Sclerosis Patients as Opposed to Healthy Individuals—A Genome-wide Association Study
3047	Evaluation of Degenerative Disc Disease of Lumbar Spine
3048	Leukotriene A4 Hydrolase Inhibition as a Novel Rheumatoid Arthritis Treatment
3058	The Bioconversion of Lythrum salicaria to Biofuel and Biofuel Precursors Using the Endophytic Fungus Ascocoryne sarcoides as a Biocatalyst
3059	Creation of Alginate Hydrogel Microparticles with Optimum Encapsulation for Cancer Drug Release
3060	The Extraction of Tryptophan from Egg Whites by Aqueous Biphasic Solution

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Biochemistry

Project Number	Title
3063	Effects of Epibrassinolide-24 on Onion Plant Metabolism
3065	An Analysis of the Hemocyanin Content of Atlantic Horseshoe Crabs (<i>Limulus polyphemus</i>) Prior to Hemolymph Extraction in Order to Determine Organism Health Status.
3067	The Effect of Common Biocide Exposure on Bacterial Resistance
3070	The Use of <i>Limulus</i> Amebocyte Lysate as a Natural Antibacterial Agent, Food Sanitizer, and Environmentally Friendly Pesticide
3081	The Effect of Tannic Acid in the Soil Surrounding <i>Melissa officinalis</i> and the Resulting Concentration of Tannins in the Plant's Extract
3082	The Effects of Adding Xanthan Gum to Rice Starch and Sugar Mixtures on Gelatinization Time, Viscosity, and Texture
3098	The Effect of Ethanol on Liver Catalase
3501	Effects of Caffeine and Caffeinated Beverages on Bacterial Growth
3507	A Novel Approach to the Synthesis of a High-Performance Biomaterial
3509	Virtual screening of non-covalent Inhibitors for β -lactamase from <i>Enterobacter cloacae</i> P99
3512	What is the X-Factor?
3513	Usage of Organic Materials (such as banana peels) to Purify Water
3514	Use of Selective Breeding in Providing a Viable Food Source Under Irradiated Conditions.
3515	Can You See Vitamin C
4003	Enzyme frenzy
4031	Effect of Plastic on Food Evaporation, Nutrient Value, Oxidation, and Antioxidant Levels.
4034	Water Tablets
4036	Truth... or a Fraud?
5503	Do Metals Have Antimicrobial Properties?
5533	Sugar in Milk
5535	An Investigation of How the Environmentally Harmful Levels of Algal Bloom Due to Fertilizer Run-off into the Fresh and Coastal Sea Waters of Connecticut Can Be Reduced.
5557	Comparison of Absorption Rates of Natural vs. Artificial Sugars and Effect of Antioxidant Spice Enhancers on Absorption Rates
5562	Converting Waste to Electricity using Efficient Microbial Fuel Cell
6049	Biomechanics of Pitching
6051	Homemade Method of Preventing Browning in Bananas
6062	Using cAu-TNF Nanoparticle For Targeted Cancer Therapy: A Simulation
6072	Production of 1,3 Propanediol from Glycerol Fermentation
6084	Efficient Amylase Inhibition by usage of <i>Cicer arietinum</i> , <i>Phaseolus lunatus</i> , and <i>Glycine max</i>
6100	Non-toxic Biological indicator of Food Spoilage in Pasteurized Milk of Varying Fat Content for Consumer Use
6101	An Investigation of the Biodegradation Rate and Efficiency of Starch-Based Bioplastics
6508	A novel approach to degrade harmful byproducts formed during the production of Polyethylene Terephthalate (PET) by using Fomepizole.
6513	A comparative analysis of a mycelia-based foam alternative versus expanded polystyrene as effective insulators and packaging materials.

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Cellular and Molecular Biology

Project Number	Title
2015	Roundup And It's Effect On Microorganisms
2024	The Investigations of Catalase Enzymes
2517	Intragenic Competition Between Bioluminescent Dinoflagellates
2518	The Phytoremediation Efficacy of Elodea Canadensis, Lemna Minor, and Brassica Juncea in Copper Sulfate Contaminated Water
2519	THE AMOUNT OF TIME EXPOSED TO NON-IONIZING RADIATION VERSUS THE EFFECT ON SEED GEMINATION AND PLANT GROWTH FOR FRENCH BREAKFAST RADISHES.
2538	TACE Inhibitors As Non-Biological Drugs For Treating Rheumatoid Arthritis
2542	THE EFFECT THAT SUCROSE HAS ON THE AMOUNT OF GLUCOSE DIABETICS DIGEST FROM VARIOUS FOODS
3001	Protoporphyrin IX Fluorescence In Glioblastoma Multiforme: An In Vitro Analysis of Optimum Incubation Periods With Exogenous 5-Aminolevulinic Acid
3003	Nonsymbiotic vs. Symbiotic Nitrogen-Fixing Bacteria on the Crop Yield of Leguminosae
3004	The Effect of the D126G Mutation on the Aggregation Propensity of CRABP
3009	Development of an in vitro model for implantation
3010	Population Dynamics and Characterization of Inteins
3022	GOOD TO THE LAST BEAT...
3024	Natural Antibiotics: Garlic vs. Onion
3025	The Correlation Between Environmental Chitinase Activities and Asthma Severity
3026	Finding Clues to Genomic Disorders by Analyzing Evolutionary Variants in DNA Repeats
3027	Morphogenesis of and Chromosome Segregation in Escherichia coli Branching Mutants
3029	The Effects of Omega-3 and Omega-6 on Breast Cancer Growth Rates
3032	Investigating the role of p53 in ovarian cancer cell response to the chemotherapeutic drugs cisplatin and veliparib
3033	The effects of bovine serum albumin (BSA) on restriction digestion and analysis of Lambda Phage DNA
3040	Specific Single Nucleotide Polymorphisms are More Frequent in Multiple Sclerosis Patients as Opposed to Healthy Individuals—A Genome-wide Association Study
3041	Regulation of Borrelia Burgdorferi-Induced Inflammation by TAM Receptors
3044	Identification of Telomere Length Differences Between Maize Mutants and Their Wild-type Forms
3045	Role of Macrophage Inhibitory Factor (MIF) In DNA Damage Response
3046	Finding and Analyzing Motifs Uniquely Expressed Upstream in A. thaliana: Intron-Mediated Enhancement Candidates
3047	Evaluation of Degenerative Disc Disease of Lumbar Spine
3048	Leukotriene A4 Hydrolase Inhibition as a Novel Rheumatoid Arthritis Treatment
3054	Action Potentials in Physarum polycephalum
3057	Friend or Foe: Caffeine
3061	Light's Role on the Symbiotic Relationship between Zooxanthellae and Ricordea florida
3062	Studying Antigen Presenting Cells that Activate gamma-delta T cells in the Mesenteric Lymph Nodes Following Oral Listeria monocytogenes Infection
3064	Candidiasis Inhibition and Promotion of Wound Healing via a Novel Hydrophilic Dressing
3065	An Analysis of the Hemocyanin Content of Atlantic Horseshoe Crabs (Limulus polyphemus) Prior to Hemolymph Extraction in Order to Determine Organism Health Status.
3067	The Effect of Common Biocide Exposure on Bacterial Resistance
3076	The Role of Soluble Adenylyl Cyclase (sAC) in the Prevention of Tumor Formation
3077	Cardiovascular Pharmacogenomics: Assessing New Genetic Variants for Warfarin and Clopidogrel Response
3083	Occurance of bacteria in public vs. private settings and the effect of different sanitation methods on bacterial growth
3084	The effects of spring water on the growth rate of bean plants
3085	CCG-1423 Regulates MKL1 Nuclear Localization in Megakaryocytes
3087	The Anti-Cancer Effects of Tetrahydrocannabinol (THC) in Breast Carcinoma Cells

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Cellular and Molecular Biology

Project Number	Title
3090	The Effect of MEK Inhibition on HT29 and CAKI1 Cancer Cells
3501	Effects of Caffeine and Caffeinated Beverages on Bacterial Growth
3502	Comparing the Ability of the Human Body to Digest Factory and Grass-Fed Beef
3506	Chlorophyll Enhanced Dye Sensitized Solar Cells
3507	A Novel Approach to the Synthesis of a High-Performance Biomaterial
3508	The Effects of Herbal Remedies on Breast Cancer Cells in Cell Culture
4036	Truth... or a Fraud?
5503	Do Metals Have Antimicrobial Properties?
5526	Sound Proofing Your World
6010	Morphological Modeling of Taurine Function in Mice to Study Oxidant Injury to Lung and Kidney Tissue
6013	Prediction of cancer tissue-origin based on molecular sequencing evidence using a machine learning-based classifier algorithm
6045	Improved quantum error correcting methods for optimization of protein structures by folding
6103	Bio-mimicry: The Antimicrobial Properties of Nanoscopic Silicon Replications of the Lotus Leaf and the Pitcher Plant

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Chemistry

Project Number	Title
1006	The Affects of Natural Sorbents on Petroleum
1019	Collectin' D.N.A
2010	Pain Relieving Faster?!
2014	Using Bioluminescent Diatoms To Help Detect Water Contamination.
2018	Fluoride Free Water?
2026	The Science Of Tempering Chocolate
2501	Natural Alternative To Household Pesticides
2506	A Comparison of the Effect of Treated and Untreated Well Water on the Growth of Grass
2518	The Phytoremediation Efficacy of Elodea Canadensis, Lemna Minor, and Brassica Juncea in Copper Sulfate Contaminated Water
2531	A Comparative Study of the Effects of Organic and Chemical Fertilizers on <i>Lubricus terrestris</i>
2538	TACE Inhibitors As Non-Biological Drugs For Treating Rheumatoid Arthritis
2539	Being Green? What is the LC50 Rate of Green and Standard Detergents on <i>Myelis edilus</i> ?
3017	The Effects of Concentrated Drugs on Heartrate
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3029	The Effects of Omega-3 and Omega-6 on Breast Cancer Growth Rates
3031	The Effects Of Citric Acid On Calcuim Carbonate
3048	Leukotriene A4 Hydrolase Inhibition as a Novel Rheumatoid Arthritis Treatment
3058	The Bioconversion of <i>Lythrum salicaria</i> to Biofuel and Biofuel Precursors Using the Endophytic Fungus <i>Ascocoryne sarcoides</i> as a Biocatalyst
3060	The Extraction of Tryptophan from Egg Whites by Aqueous Biphasic Solution
3081	The Effect of Tannic Acid in the Soil Surrounding <i>Melissa officinalis</i> and the Resulting Concentration of Tannins in the Plant's Extract
3082	The Effects of Adding Xanthan Gum to Rice Starch and Sugar Mixtures on Gelatinization Time, Viscosity, and Texture
3501	Effects of Caffeine and Caffeinated Beverages on Bacterial Growth
3505	Sun Protection Cream with Mugwort Preservative
3509	Virtual screening of non-covalent Inhibitors for β -lactamase from <i>Enterobacter cloacae</i> P99
4001	A More Efficient Way of Baking Cupcakes
4003	Enzyme frenzy
4009	Rain, Rain, Go Away
4017	Dry Ice Engine
4028	IODINE CLOCK REACTION, THE FUSION OF IONS
4030	Air Particles and Air Quality
4031	Effect of Plastic on Food Evaporation, Nutrient Value, Oxidation, and Antioxidant Levels.
4032	Meltdown
4036	Truth... or a Fraud?
4041	Kiss This
5004	"Thawts" on Ice
5006	Perfect Plastic
5008	Charles's Law: The Effect of Temperature on the Volume of a Gas
5016	Which Daily Beverage Stains Teeth More and does Brushing with a Whitener Help?
5019	The Better Bubble
5020	Comparative Study of Three Renewable Energy Sources: Solar Power, Wind Power, and Hydroelectric Power
5033	Burning Calories: How Much Energy is Stored in Different Types of Food?
5037	Changing Particle Mass to Attempt to Change The Rate of Carbon Dioxide Release

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Chemistry

Project Number	Title
5042	Does the temperature affect the brightness of Luminol?
5045	Corrosion Of Different Metals
5055	Pain, Pain Go Away!
5504	Make It Glow
5505	OXIDATION REDUCTION REACTIONS IN APPLES AND BANANAS
5508	Salt Water Energy
5511	Homemade Ice Packs
5517	Chocolate Melt: Amount of Cocoa in Chocolate vs. Time It Takes to Melt
5519	The effect of name brand detergent, eco friendly detergent, and value brand detergent on grape juice stains
5520	Biofuels
5532	Melt Away
5535	An Investigation of How the Environmentally Harmful Levels of Algal Bloom Due to Fertilizer Run-off into the Fresh and Coastal Sea Waters of Connecticut Can Be Reduced.
5557	Comparison of Absorption Rates of Natural vs. Artificial Sugars and Effect of Antioxidant Spice Enhancers on Absorption Rates
5558	Evaluating Lead Levels of Water in Older Homes
5562	Converting Waste to Electricity using Efficient Microbial Fuel Cell
6001	An Investigation of a Novel TiO ₂ Coating for Improved Surrounding Air Quality & Reduced Solar Cell Maintenance
6002	Devising Methods for the Resolutions of Enantiomers
6005	Trace Metals Found in Pet Food
6007	Using Modified Coal Ash to clean water contaminated with oil
6008	Hydroxyapatite Sol-gel Coatings on Titanium Substrates for Bioengineering Applications
6014	Fabrication of a Flexible, Tunable Color Changing Skin using Magnetically Responsive Fe ₃ O ₄ Photonic Crystal Structures
6015	Quantification of Carbon Nanotube (CNT) Dispersion in Various Solvents
6026	Purifying water using solar power and electrolysis
6028	Wavelength Optimization of Quantum Dot Luminescent Solar Concentrators (LSC) using Tris(8-hydroxyquinoline) for Increased Quantum Efficiency
6029	Effect of MnO ₂ on the Hydrogen Production of a TiO ₂ Based Water Splitting Solar Cell
6038	Viable Alternatives to Methyl-Ethyl Cellulose as a Binder in Plique à Jour Enameling
6044	Bubbleology
6050	Nanostructured C-Phycocyanin Enhanced Hematite Thin-Film Photoanode Co-Sensitized with Plural Organic Dyes to Yield a Highly Efficient Solar Cell
6054	Integration of Photoluminescent Manganese-doped ZnS Nanocrystals for Improved Solar Cell Response
6057	Caffeine Concentrations in Different Beverages
6058	Quantitative Analysis of H ₂ Production via Photocatalytic Water Splitting
6059	Cellulose Algae Salt Battery
6061	Can natural substances replenish the body better than a specialized substance?
6063	The Artificial Leaf: Capturing Solar Energy Using Photochemical Reactants to Separate Hydrogen and Oxygen in Water
6069	Wine Making; From Caves to Chemistry
6070	Boosting Ethanol's Heat Production
6072	Production of 1,3 Propanediol from Glycerol Fermentation
6075	Removing Copper From Drinking Water
6078	Laser-induced Propulsion of Anticancer-Doxorubicin Using a Combined Optical Tweezing and Radiation-induced Interface Deformation
6081	The Effect of Lead (Pb) particles on the Electrical Resistivity of Carbon Nanotubes

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Chemistry

Project Number	Title
6087	The Effects of Vitamins and Minerals on Absorbance Wavelength
6089	Reduction of Biodiesel Post Combustion Residue
6093	Novel Creation of a Hydrocarbon-Soaking Paper for Remediation and Reuse of Nanoscale Oil Contaminants in Water
6094	Extraction and Comparison of Caffeine Levels
6095	Electrical Resistance of Water
6100	Non-toxic Biological indicator of Food Spoilage in Pasteurized Milk of Varying Fat Content for Consumer Use
6101	An Investigation of the Biodegradation Rate and Efficiency of Starch-Based Bioplastics
6504	Does Temperature Affect the Glow of Luminol?
6505	Subsurface Recovery of Spilled Crude Oil Using Nanomagnet Retrieval System
6506	An Ecological Outlook on the Effects of Pollution on Dissolved Oxygen Levels in Seawater
6508	A novel approach to degrade harmful byproducts formed during the production of Polyethylene Terephthalate (PET) by using Fomepizole.
6509	Application of Graphene in Improving Efficiency and Practicality of Transparent and Flexible Photovoltaic Cells
6516	Cooling Off

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Computer Science

Project Number	Title
3014	Characterizing the Boundaries of the Lipid Bilayer Surrounding Intramembrane Protease GlpG
3026	Finding Clues to Genomic Disorders by Analyzing Evolutionary Variants in DNA Repeats
3046	Finding and Analyzing Motifs Uniquely Expressed Upstream in <i>A. thaliana</i> : Intron-Mediated Enhancement Candidates
3068	A self-powered Controller for a live <i>Blaberus discoidalis</i>
3086	A Theoretical Examination of Changes in Community Structure due to Consumptive and Competitive Species Interactions During Climate Change
4004	Robots as Teachers
4021	Robot Artistic Ability
4024	The Python Weather Station
4025	Simulated Logic in Robots
5012	Robotic Rubik's Cube Solver
5030	The Idea Generator
5049	Lift and Drag in Kites
5050	Stability of Digital Data
5514	Assessing Human Emotional Responses to Robots
5520	Biofuels
5521	A New Mathematical-Equation Based Approach for Faster and Efficient Digital Video Transmission
5522	Human Behavior and Robotic Interaction
5526	Sound Proofing Your World
5537	What form of data compression is most compressing?
5538	Controlling Mobile Robots With Sensors
5539	Watts Up?
5554	Gender Bias with Robots
5560	The Effect Of RAM and CPU Speed on Windows System Speed
6003	New Invention that will harness wave power to convert to unlimited rotational energy
6006	Utilization Of A Small Unmanned Aerial System for Optimization of Deer Tick Population Management
6009	Automatic Detection and Classification of Alzheimer's Disease From MRI Scans Using Principal Component Analysis and Artificial Neural Networks
6012	maximizing the solar collection of a solar panel by mobilizing the system
6013	Prediction of cancer tissue-origin based on molecular sequencing evidence using a machine learning-based classifier algorithm
6016	Effect the Ability to Attend to and Recall Movement Patterns
6024	Finding the Shortest Distance Between Nodes in a Network
6032	Design of a New Mobile and Autonomous True Random Number Generator.
6033	The Use of Pulse Width Modulation for Sensory Input Control of an Unmanned Aerial Vehicle (UAV) in the C++ Programming Language
6037	The Use of a Shingled Write Layout to Improve upon Current Hard Drive Capacity
6045	Improved quantum error correcting methods for optimization of protein structures by folding
6060	The Correlation between Psychosocial Disorders and Childhood Psychological Stresses and Neurological Data
6062	Using cAu-TNF Nanoparticle For Targeted Cancer Therapy: A Simulation
6066	Digital Image Sharpening through Optimization of Filtering Parameters based on Genetic Algorithms
6071	Fingerprint- Scanning ATM
6082	Laptop With Built In Printer
6088	Correlation Between Nuclear Magnetic Moment and Quadrupole Moment for Rare Isotopes
6092	A Comparative Analysis of Possible Optimization Techniques for Artificial Neural Networks

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Earth Science

Project Number	Title
1006	The Affects of Natural Sorbents on Petroleum
1010	Evaporation vs. Filtration
1012	Is the earth getting hotter? Investigating the Greenhouse Effect.
2004	Coli Forms in Your Drinking Water
2016	Too Hot To Handle
2022	Tsunami
2501	Natural Alternative To Household Pesticides
2504	An investigation into the use of pyrocystis fusiformis as an early indicator of acidic pollution.
2506	A Comparison of the Effect of Treated and Untreated Well Water on the Growth of Grass
2511	"Wood" it burn well?
2512	Harvesting Fog
2514	The Effects of Acid Rain on the Pteridophyta
2515	Solar power applied to energy output
2518	The Phytoremediation Efficacy of Elodea Canadensis, Lemna Minor, and Brassica Juncea in Copper Sulfate Contaminated Water
2521	The Colors of Ozone
2526	Fertilizer: Phenomenal or Fatal
2529	Salinity Study Before and After a Salt Marsh Restoration
2530	What is the level of phosphates in our local bodies of water?
2531	A Comparative Study of the Effects of Organic and Chemical Fertilizers on Lubricus terrestris
2537	Caffeine: Not Just for People!
3003	Nonsymbiotic vs. Symbiotic Nitrogen-Fixing Bacteria on the Crop Yield of Leguminosae
3012	Multi-Trophic Aquaponics
3028	Insecticides: Killing Grass While Killing Bugs?
3053	Sustainable Enhancement of Plant Growth & Disease Reduction Using Biochar Soil Additives
3072	Biological Control of The Emerald Ash Borer Using Entomopathogenic Fungus
3086	A Theoretical Examination of Changes in Community Structure due to Consumptive and Competitive Species Interactions During Climate Change
3099	Comparative Suppression of Soil-borne Pathogens via Earthworm Bioturbation of Wood and Plant-based Biochars
3507	A Novel Approach to the Synthesis of a High-Performance Biomaterial
4008	Poison In the Ground
4023	The Creation Of Seismic Waves
4038	The Effect of Heat Treatment on the Strength of Steel
4042	Fighting The Wave
4044	Maglev Modeling
5001	Solar Car: Affect of Different Colored Films on a Solar Panel
5002	Tsunamis: The Effects of Water Depth and Sea Floor Variation on Wave Velocity
5006	Perfect Plastic
5022	Salt of the Earth
5036	Let It Flow When It Blows!
5044	What's in Your Water
5045	Corrosion Of Different Metals
5052	Oily Calories
5515	The Effects of Acid Rain on Limestone, Granite, and Marble
5518	Renewable Energy

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Earth Science

Project Number	Title
5540	Evaluating the Performance of a Model Solar Updraft Tower Power Plant
5544	Hydro or Wind?
5545	Flow Rate vs. Heat Transfer of Fluid
5555	"I'm Melting!" The Wicked Witch of the West and Ice Agree Global Warming is a Problem
5556	High fructose corn syrup versus sugar: Observing the behaviors of invertebrates that are fed sugar and high fructose.
5564	Growing Green
6006	Utilization Of A Small Unmanned Aerial System for Optimization of Deer Tick Population Management
6018	The Earth's Wrath: Soil and its effects on buildings during an earthquake
6026	Purifying water using solar power and electrolysis
6065	Roofing Material Selection: The Impact on Ambient, Internal, and Reflective Temperatures
6067	Effects of Volcanic Activity on Acid Rain Levels
6077	Ocean Currents--Modeling the "Ocean Conveyor Belt"
6091	Melting Polar Caps and Northern Hemisphere Weather: Is there a correlation between the melting of the polar caps and weather conditions in the northern hemisphere?
6095	Electrical Resistance of Water
6098	How Different Tsunami Barriers Protect the Shoreline
6101	An Investigation of the Biodegradation Rate and Efficiency of Starch-Based Bioplastics

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Engineering: Materials & Bioengineering

Project Number	Title
1006	The Affects of Natural Sorbents on Petroleum
2505	Mold Resistance of Different Building Materials Post-Hurricane
2508	Strain put on the Patellar Tendon
3018	Agar Extraction
3021	Who is Seeing Red? A Biometric Study of Anger
3025	The Correlation Between Environmental Chitinase Activities and Asthma Severity
3026	Finding Clues to Genomic Disorders by Analyzing Evolutionary Variants in DNA Repeats
3039	Application of a Poly-electrolytic Layer-by-Layer Assembled Thin Film to Prevent Post-operative Abdominal Adhesions
3058	The Bioconversion of Lythrum salicaria to Biofuel and Biofuel Precursors Using the Endophytic Fungus Ascocoryne sarcoides as a Biocatalyst
3068	A self-powered Controller for a live Blaberus discoidalis
3073	The best floor board material for a flood zone
3099	Comparative Suppression of Soil-borne Pathogens via Earthworm Bioturbation of Wood and Plant-based Biochars
3507	A Novel Approach to the Synthesis of a High-Performance Biomaterial
4006	Retrofitting a Building
4007	Cars: Pulling Their Own Weight
4038	The Effect of Heat Treatment on the Strength of Steel
4043	Measuring the Buoyancy of Boats
4044	Maglev Modeling
5006	Perfect Plastic
5034	Effect of Temperature on Magnetism
5046	Designs that Shake with Earthquakes
5048	Which Blade is Best?
5503	Do Metals Have Antimicrobial Properties?
5509	Aerodynamics and Bridge Design
5526	Sound Proofing Your World
5536	What is the best way to clean up oil?
5545	Flow Rate vs. Heat Transfer of Fluid
5552	Measure the Surface Tension of Water
5553	Save the beach house
5555	"I'm Melting!" The Wicked Witch of the West and Ice Agree Global Warming is a Problem
5559	other bags
5561	Got glue?
5562	Converting Waste to Electricity using Efficient Microbial Fuel Cell
5563	Does the design of the bridge affect it capacity
5564	Growing Green
6001	An Investigation of a Novel TiO ₂ Coating for Improved Surrounding Air Quality & Reduced Solar Cell Maintenance
6003	New Invention that will harness wave power to convert to unlimited rotational energy
6004	Applications of high-tech swimsuit technology
6008	Hydroxyapatite Sol-gel Coatings on Titanium Substrates for Bioengineering Applications
6014	Fabrication of a Flexible, Tunable Color Changing Skin using Magnetically Responsive Fe ₃ O ₄ Photonic Crystal Structures
6015	Quantification of Carbon Nanotube (CNT) Dispersion in Various Solvents
6017	Development and Testing of a Bicep Other Arm Movements for a Humanoid Robot with Human-like Force Capabilities

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Engineering: Materials & Bioengineering

Project Number	Title
6020	Integration of Photovoltaic and Peltier-Seebeck Thermoelectric Effects to Optimize the Power Density of a Hybrid Solar Panel
6023	A Hot Air Balloon's Ability to Fly
6028	Wavelength Optimization of Quantum Dot Luminescent Solar Concentrators (LSC) using Tris(8-hydroxyquinoline) for Increased Quantum Efficiency
6031	Peak electricity: Generating Energy Using a Centrifugal Airflow Fan Blade, Propelled by Hot Air Flowing from a Soffit Vent to a Ridge Vent On a Roof
6038	Viable Alternatives to Methyl-Ethyl Cellulose as a Binder in Plique à Jour Enameling
6040	Self-assembling nano-structures and Meta-materials
6045	Improved quantum error correcting methods for optimization of protein structures by folding
6050	Nanostructured C-Phycocyanin Enhanced Hematite Thin-Film Photoanode Co-Sensitized with Plural Organic Dyes to Yield a Highly Efficient Solar Cell
6054	Integration of Photoluminescent Manganese-doped ZnS Nanocrystals for Improved Solar Cell Response
6058	Quantitative Analysis of H ₂ Production via Photocatalytic Water Splitting
6062	Using cAu-TNF Nanoparticle For Targeted Cancer Therapy: A Simulation
6063	The Artificial Leaf: Capturing Solar Energy Using Photochemical Reactants to Separate Hydrogen and Oxygen in Water
6065	Roofing Material Selection: The Impact on Ambient, Internal, and Reflective Temperatures
6068	Ca ²⁺ Sensitive Alginate-Dendrimer FRET System for the Detection of MI
6072	Production of 1,3 Propanediol from Glycerol Fermentation
6078	Laser-induced Propulsion of Anticancer-Doxorubicin Using a Combined Optical Tweezing and Radiation-induced Interface Deformation
6081	The Effect of Lead (Pb) particles on the Electrical Resistivity of Carbon Nanotubes
6082	Laptop With Built In Printer
6085	The Effect of an Altered Muffler on a Portable Generator in Relation to its Sound Level
6086	Design for a generating battery life through keyboard
6090	The Use of Samaras for the Safe Dispersion of Pesticides from Aerial Craft
6093	Novel Creation of a Hydrocarbon-Soaking Paper for Remediation and Reuse of Nanoscale Oil Contaminants in Water
6099	The Analysis of Violin Resonance: Subjective Versus Objective.
6100	Non-toxic Biological indicator of Food Spoilage in Pasteurized Milk of Varying Fat Content for Consumer Use
6101	An Investigation of the Biodegradation Rate and Efficiency of Starch-Based Bioplastics
6102	Bat Making Efficiency
6103	Bio-mimicry: The Antimicrobial Proprieties of Nanoscopic Silicon Replications of the Lotus Leaf and the Pitcher Plant
6507	Comparing Bridge Types
6511	Windbelts: The Future of Wind Power; The Effect of Magnet Thickness, Coil Configuration, and Film Elasticity on Electrical Output of a Windbelt
6512	Light Absorption Of Roof Shingles
6513	A comparative analysis of a mycelia-based foam alternative versus expanded polystyrene as effective insulators and packaging materials.

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Engineering: Electrical & Mechanical

Project Number	Title
2515	Solar power applied to energy output
3012	Multi-Trophic Aquaponics
3021	Who is Seeing Red? A Biometric Study of Anger
3036	?Electroencephalography to Analyze and control the human Hand
3068	A self-powered Controller for a live Blaberus discoidalis
3078	Remote Control Glove
4004	Robots as Teachers
4006	Retrofitting a Building
4010	Overcoming Rotational Inertia
4011	Methods That Utilize Available Solar and Thermal Energy to Charge Your Electrical Device in a Power Outage Using a Thermoelectric Generator
4015	A Battery That Makes Cents
4016	Building Bridges
4017	Dry Ice Engine
4021	Robot Artistic Ability
4024	The Python Weather Station
4025	Simulated Logic in Robots
4026	Energy of the Future
4027	The EXCITING ELECTRICAL CURRENT
4033	Comparing the Electrical Load of a Fuel Cell and a Rechargeable Battery
4038	The Effect of Heat Treatment on the Strength of Steel
4042	Fighting The Wave
4043	Measuring the Buoyancy of Boats
4044	Maglev Modeling
5001	Solar Car: Affect of Different Colored Films on a Solar Panel
5009	How Can Water Help Win A War?
5011	Impact of Various Parameters on Solar Panel Efficiency
5012	Robotic Rubik's Cube Solver
5014	The Effect of Different Types of Light Bulbs on the Relative Efficiency
5015	Transfer of Heat
5020	Comparative Study of Three Renewable Energy Sources: Solar Power, Wind Power, and Hydroelectric Power
5026	ELECTRICAL CONDUCTIVITY OF SALT WATER
5029	Crystal Radio
5032	A Gauss Rifle: A Magnetic Linear Accelerator
5035	Amp Up Your Knowledge About Electricity
5038	Electromagnetism - The effect of coils.
5039	Designing an efficient and affordable Solar Panel Iphone Charger
5040	Rubber Band Energy
5046	Designs that Shake with Earthquakes
5047	Automating A Simple Electromagnetic Generator to Power A Device By Switching AC Current To DC Current
5048	Which Blade is Best?
5049	Lift and Drag in Kites
5051	What Color of Light is Most Visible Through Fog?
5053	Simple Machine Design and Uses

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Engineering: Electrical & Mechanical

Project Number	Title
5502	Earth, Wind, and Fire- comparing water, wind, and solar based fuels
5506	CAPILLARY ACTION
5514	Assessing Human Emotional Responses to Robots
5516	Inertia Propulsion
5521	A New Mathematical-Equation Based Approach for Faster and Efficient Digital Video Transmission
5522	Human Behavior and Robotic Interaction
5523	Efficiency of Plane Designs
5524	the mechanics of an elevator
5525	Tidal Power: Extracting Energy from Ocean Tides
5526	Sound Proofing Your World
5527	Stressful
5528	Wind power
5531	How does the shape and size of a sound direction apparatus affect the decible level of sound?
5538	Controlling Mobile Robots With Sensors
5539	Watts Up?
5540	Evaluating the Performance of a Model Solar Updraft Tower Power Plant
5542	Smart Servos
5544	Hydro or Wind?
5545	Flow Rate vs. Heat Transfer of Fluid
5547	Particle Wave Duality Forward Into The Unknown
5549	Wind Turbine Blade Efficiency Through Extensions and Winglet Modifications
5550	As The Wind Turns
5554	Gender Bias with Robots
5565	Which battery creates the best solenoid?
6003	New Invention that will harness wave power to convert to unlimited rotational energy
6006	Utilization Of A Small Unmanned Aerial System for Optimization of Deer Tick Population Management
6011	The Effects of Rotor Blade Orientation on the Electrical Output of a Wind Turbine
6012	maximizing the solar collection of a solar panel by mobilizing the system
6017	Development and Testing of a Bicep Other Arm Movements for a Humanoid Robot with Human-like Force Capabilities
6019	Creating a Perpetual Motion Generator with Permanent Magnets and Ceramic Ball Bearings
6020	Integration of Photovoltaic and Peltier-Seebeck Thermoelectric Effects to Optimize the Power Density of a Hybrid Solar Panel
6022	The Power of Sound and Acoustic Levitation
6023	A Hot Air Balloon's Ability to Fly
6025	Coastal Home Protection
6026	Purifying water using solar power and electrolysis
6028	Wavelength Optimization of Quantum Dot Luminescent Solar Concentrators (LSC) using Tris(8-hydroxyquinoline) for Increased Quantum Efficiency
6031	Peak electricity: Generating Energy Using a Centrifugal Airflow Fan Blade, Propelled by Hot Air Flowing from a Soffit Vent to a Ridge Vent On a Roof
6032	Design of a New Mobile and Autonomous True Random Number Generator.
6033	The Use of Pulse Width Modulation for Sensory Input Control of an Unmanned Aerial Vehicle (UAV) in the C++ Programming Language
6036	Development of a frictionless magnetic drive to increase efficiency in wind driven turbines
6037	The Use of a Shingled Write Layout to Improve upon Current Hard Drive Capacity
6041	The Most "Invisible" Geometric Shape: The Future of Stealth Technology

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Engineering: Electrical & Mechanical

Project Number	Title
6048	The Bedini Circuit
6054	Integration of Photoluminescent Manganese-doped ZnS Nanocrystals for Improved Solar Cell Response
6056	Thermoelectricity
6059	Cellulose Algae Salt Battery
6063	The Artificial Leaf: Capturing Solar Energy Using Photochemical Reactants to Separate Hydrogen and Oxygen in Water
6064	Alternative Wind Turbine Design
6071	Fingerprint- Scanning ATM
6073	Developing an Inexpensive Speed Radar Trap Using an Arduino Board
6074	Generating Energy from the Swing Flexion, Swing Extension, Stance Flexion, and Stance Extension Stages of Knee Motion Using a Two-Generator, Brushless, Electromagnetic Knee Brace Device
6078	Laser-induced Propulsion of Anticancer-Doxorubicin Using a Combined Optical Tweezing and Radiation-induced Interface Deformation
6081	The Effect of Lead (Pb) particles on the Electrical Resistivity of Carbon Nanotubes
6082	Laptop With Built In Printer
6083	Intrinsic Laptop Energy Capture via Keyboard Piezoelectric Conversion
6086	Design for a generating battery life through keyboard
6102	Bat Making Efficiency
6501	Determining the index of refraction of water and air as a function of temperature and exploring how the vision of people wearing glasses are affected by temperature change.
6502	Blades Of Fury: Wind Blade Efficiency
6505	Subsurface Recovery of Spilled Crude Oil Using Nanomagnet Retrieval System
6507	Comparing Bridge Types
6509	Application of Graphene in Improving Efficiency and Practicality of Transparent and Flexible Photovoltaic Cells
6510	Adaptive Leading Edge Droop Mechanism to Increase Fuel Efficiency and Flight Safety on Private Aircraft
6511	Windbelts: The Future of Wind Power; The Effect of Magnet Thickness, Coil Configuration, and Film Elasticity on Electrical Output of a Windbelt

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Energy & Transportation

Project Number	Title
2515	Solar power applied to energy output
3055	The Effect of Paranormal Activity on Temperature and EMF Ratings
3058	The Bioconversion of <i>Lythrum salicaria</i> to Biofuel and Biofuel Precursors Using the Endophytic Fungus <i>Ascocoryne sarcoides</i> as a Biocatalyst
3080	A Novel Design for the Integration of a Microbial Desalination Cell in a Microbial Fuel Cell for the Production of Energy and Purification of Water
4002	pHast Food
4007	Cars: Pulling Their Own Weight
4010	Overcoming Rotational Inertia
4011	Methods That Utilize Available Solar and Thermal Energy to Charge Your Electrical Device in a Power Outage Using a Thermoelectric Generator
4015	A Battery That Makes Cents
4023	The Creation Of Seismic Waves
4026	Energy of the Future
4029	Marble Roller Coaster
4033	Comparing the Electrical Load of a Fuel Cell and a Rechargeable Battery
4038	The Effect of Heat Treatment on the Strength of Steel
4044	Maglev Modeling
4046	The speed of marble drop.
5001	Solar Car: Affect of Different Colored Films on a Solar Panel
5002	Tsunamis: The Effects of Water Depth and Sea Floor Variation on Wave Velocity
5009	How Can Water Help Win A War?
5011	Impact of Various Parameters on Solar Panel Efficiency
5013	How Useful is Your Wind
5014	The Effect of Different Types of Light Bulbs on the Relative Efficiency
5020	Comparative Study of Three Renewable Energy Sources: Solar Power, Wind Power, and Hydroelectric Power
5028	Fuel Cell Project
5031	What's the Fastest Way to Cool a Soda?
5032	A Gauss Rifle: A Magnetic Linear Accelerator
5036	Let It Flow When It Blows!
5039	Designing an efficient and affordable Solar Panel Iphone Charger
5041	The Heat Is On!
5051	What Color of Light is Most Visible Through Fog?
5502	Earth, Wind, and Fire- comparing water, wind, and solar based fuels
5508	Salt Water Energy
5513	Singing Wine Glass
5516	Inertia Propulsion
5523	Efficiency of Plane Designs
5526	Sound Proofing Your World
5529	Making Gas Mileage More Efficient
5531	How does the shape and size of a sound direction apparatus affect the decible level of sound?
5539	Watts Up?
5540	Evaluating the Performance of a Model Solar Updraft Tower Power Plant
5544	Hydro or Wind?
5545	Flow Rate vs. Heat Transfer of Fluid

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Energy & Transportation

Project Number	Title
5546	Goldberg Goes Gagham Style
5549	Wind Turbine Blade Efficiency Through Extensions and Winglet Modifications
5550	As The Wind Turns
5551	Power! A study of various airplane engines and the forces they generate
5562	Converting Waste to Electricity using Efficient Microbial Fuel Cell
6001	An Investigation of a Novel TiO ₂ Coating for Improved Surrounding Air Quality & Reduced Solar Cell Maintenance
6003	New Invention that will harness wave power to convert to unlimited rotational energy
6004	Applications of high-tech swimsuit technology
6011	The Effects of Rotor Blade Orientation on the Electrical Output of a Wind Turbine
6012	maximizing the solar collection of a solar panel by mobilizing the system
6019	Creating a Perpetual Motion Generator with Permanent Magnets and Ceramic Ball Bearings
6020	Integration of Photovoltaic and Peltier-Seebeck Thermoelectric Effects to Optimize the Power Density of a Hybrid Solar Panel
6026	Purifying water using solar power and electrolysis
6028	Wavelength Optimization of Quantum Dot Luminescent Solar Concentrators (LSC) using Tris(8-hydroxyquinoline) for Increased Quantum Efficiency
6029	Effect of MnO ₂ on the Hydrogen Production of a TiO ₂ Based Water Splitting Solar Cell
6031	Peak electricity: Generating Energy Using a Centrifugal Airflow Fan Blade, Propelled by Hot Air Flowing from a Soffit Vent to a Ridge Vent On a Roof
6034	Impact of Angle of Incidence on Solar Panel Efficiency
6035	Does blade size matter?
6036	Development of a frictionless magnetic drive to increase efficiency in wind driven turbines
6041	The Most "Invisible" Geometric Shape: The Future of Stealth Technology
6042	The Traction Between the Wheels and the Road
6048	The Bedini Circuit
6050	Nanostructured C-Phycocyanin Enhanced Hematite Thin-Film Photoanode Co-Sensitized with Plural Organic Dyes to Yield a Highly Efficient Solar Cell
6054	Integration of Photoluminescent Manganese-doped ZnS Nanocrystals for Improved Solar Cell Response
6056	Thermoelectricity
6058	Quantitative Analysis of H ₂ Production via Photocatalytic Water Splitting
6059	Cellulose Algae Salt Battery
6063	The Artificial Leaf: Capturing Solar Energy Using Photochemical Reactants to Separate Hydrogen and Oxygen in Water
6064	Alternative Wind Turbine Design
6065	Roofing Material Selection: The Impact on Ambient, Internal, and Reflective Temperatures
6072	Production of 1,3 Propanediol from Glycerol Fermentation
6076	The General Study of Alternative Fluids for Asphalt Solar Thermal Collectors
6083	Intrinsic Laptop Energy Capture via Keyboard Piezoelectric Conversion
6086	Design for a generating battery life through keyboard
6089	Reduction of Biodiesel Post Combustion Residue
6093	Novel Creation of a Hydrocarbon-Soaking Paper for Remediation and Reuse of Nanoscale Oil Contaminants in Water
6502	Blades Of Fury: Wind Blade Efficiency
6505	Subsurface Recovery of Spilled Crude Oil Using Nanomagnet Retrieval System
6509	Application of Graphene in Improving Efficiency and Practicality of Transparent and Flexible Photovoltaic Cells
6510	Adaptive Leading Edge Droop Mechanism to Increase Fuel Efficiency and Flight Safety on Private Aircraft
6511	Windbelts: The Future of Wind Power; The Effect of Magnet Thickness, Coil Configuration, and Film Elasticity on Electrical Output of a Windbelt

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Energy & Transportation

**Project
Number**

Title

6514 Passive Electrical Generation Through Convection

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Environmental Sciences

Project Number	Title
1001	Color or Plain, It's just not the same
1006	The Affects of Natural Sorbents on Petroleum
1010	Evaporation vs. Filtration
1011	What is the most favorable environment to preserve perishable food?
1012	Is the earth getting hotter? Investigating the Greenhouse Effect.
1015	Salty Shrimp
1020	Analysis of Arsenic in Food from Natural Produce, Effect on Cell Bioavailability, and Effect of Chelators on Absorption.
1021	Are papaya seeds an effective fertilizer?
2004	Coli Forms in Your Drinking Water
2005	Acid Rain And Its Affects on Aquatic Algae.
2014	Using Bioluminescent Diatoms To Help Detect Water Contamination.
2016	Too Hot To Handle
2020	Can bioluminescent phytoplankton be an early warning alarm for rising ocean temperatures?
2023	Composting Banana Peels
2503	Quantitative Analysis of Nitrate and Phosphate "Runoff" Pollution on Long Island Sound, Marine Life, and Hypoxia
2504	An investigation into the use of pyrocystis fusiformis as an early indicator of acidic pollution.
2506	A Comparison of the Effect of Treated and Untreated Well Water on the Growth of Grass
2514	The Effects of Acid Rain on the Pteridophyta
2515	Solar power applied to energy output
2517	Intragenetic Competition Between Bioluminescent Dinoflagellates
2518	The Phytoremediation Efficacy of Elodea Canadensis, Lemna Minor, and Brassica Juncea in Copper Sulfate Contaminated Water
2520	The effect of oil spills on sea plants
2521	The Colors of Ozone
2522	Roots and Gravity
2526	Fertilizer: Phenomenal or Fatal
2529	Salinity Study Before and After a Salt Marsh Restoration
2531	A Comparitive Study of the Effects of Organic and Chemical Fertilizers on Lubricus terrestris
2532	Analysis of Allelopathic Effect of Grasses on Common Weeds
2539	Being Green? What is the LC50 Rate of Green and Standard Detergents on Myelis edilus?
2541	WHICH ECOSYSTEM HAS THE MOST LIFE?
3007	The Negative Effects of Phosphates on the Environment
3016	Does Magic Salt have a Chemical Composition that has an Effect on the Environment
3025	The Correlation Between Environmental Chitinase Activities and Asthma Severity
3028	Insecticides: Killing Grass While Killing Bugs?
3037	The Efficacy of Bentonite as a Means of Purifying Water
3038	The Presence and Magnitude of Melanomacrophages in the Livers of Sharks
3049	Quantifying the Effects of Lionfish (Pterois volitans) through Food Web Analysis and Ecopath V 6.0 Modeling on the Mahahual (Mexico) Reef Zone
3053	Sustainable Enhancement of Plant Growth & Disease Reduction Using Biochar Soil Additives
3070	The Use of Limulus Amebocyte Lysate as a Natural Antibacterial Agent, Food Sanitizer, and Environmentally Friendly Pesticide
3072	Biological Control of The Emerald Ash Borer Using Entomopathogenic Fungus
3079	The Effect of Nitrates on Dissolved Oxygen and Algae Growth
3081	The Effect of Tannic Acid in the Soil Surrounding Melissa officinalis and the Resulting Concentration of Tannins in the Plant's Extract

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Environmental Sciences

Project Number	Title
3083	Occurance of bacteria in public vs. private settings and the effect of different sanitation methods on bacterial growth
3086	A Theoretical Examination of Changes in Community Structure due to Consumptive and Competitive Species Interactions During Climate Change
3095	An Assessment of the Reefs in the Windward Islands due to the Presence of Pterios volitans
3099	Comparative Suppression of Soil-borne Pathogens via Earthworm Bioturbation of Wood and Plant-based Biochars
3510	Effect of Stress on Grasshoppers' Dietary Patterns
3514	Use of Selective Breeding in Providing a Viable Food Source Under Irradiated Conditions.
4008	Poison In the Ground
4009	Rain, Rain, Go Away
4014	Analysis of Fabric Flammability Rates and Effect of Chemical Flame Retardants, versus Effect Natural Flame Retardants.
4023	The Creation Of Seismic Waves
4026	Energy of the Future
5002	Tsunamis: The Effects of Water Depth and Sea Floor Variation on Wave Velocity
5006	Perfect Plastic
5011	Impact of Various Parameters on Solar Panel Efficiency
5017	Keeping it Green with Oranges: The Use of Orange Peels to Create a Better Biofuel
5022	Salt of the Earth
5027	Impact of using ice-melting chemicals on the coastal waters surrounding the Mystic River Estuary, Beebe Cove and the Noank Marina
5045	Corrosion Of Different Metals
5503	Do Metals Have Antimicrobial Properties?
5526	Sound Proofing Your World
5535	An Investigation of How the Environmentally Harmful Levels of Algal Bloom Due to Fertilizer Run-off into the Fresh and Coastal Sea Waters of Connecticut Can Be Reduced.
5540	Evaluating the Performance of a Model Solar Updraft Tower Power Plant
5555	"I'm Melting!" The Wicked Witch of the West and Ice Agree Global Warming is a Problem
5558	Evaluating Lead Levels of Water in Older Homes
5559	other bags
5561	Got glue?
5564	Growing Green
6001	An Investigation of a Novel TiO ₂ Coating for Improved Surrounding Air Quality & Reduced Solar Cell Maintenance
6003	New Invention that will harness wave power to convert to unlimited rotational energy
6005	Trace Metals Found in Pet Food
6006	Utilization Of A Small Unmanned Aerial System for Optimization of Deer Tick Population Management
6007	Using Modified Coal Ash to clean water contaminated with oil
6011	The Effects of Rotor Blade Orientation on the Electrical Output of a Wind Turbine
6020	Integration of Photovoltaic and Peltier-Seebeck Thermoelectric Effects to Optimize the Power Density of a Hybrid Solar Panel
6028	Wavelength Optimization of Quantum Dot Luminescent Solar Concentrators (LSC) using Tris(8-hydroxyquinoline) for Increased Quantum Efficiency
6031	Peak electricity: Generating Energy Using a Centrifugal Airflow Fan Blade, Propelled by Hot Air Flowing from a Soffit Vent to a Ridge Vent On a Roof
6047	A General Study of Different Exposures of Acid Rain Concentrations on Plant Height
6065	Roofing Material Selection: The Impact on Ambient, Internal, and Reflective Temperatures
6067	Effects of Volcanic Activity on Acid Rain Levels
6072	Production of 1,3 Propanediol from Glycerol Fermentation

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Environmental Sciences

Project Number	Title
6081	The Effect of Lead (Pb) particles on the Electrical Resistivity of Carbon Nanotubes
6091	Melting Polar Caps and Northern Hemisphere Weather: Is there a correlation between the melting of the polar caps and weather conditions in the northern hemisphere?
6095	Electrical Resistance of Water
6096	The Effect of Type of Water Source on Water Quality
6101	An Investigation of the Biodegradation Rate and Efficiency of Starch-Based Bioplastics
6506	An Ecological Outlook on the Effects of Pollution on Dissolved Oxygen Levels in Seawater
6508	A novel approach to degrade harmful byproducts formed during the production of Polyethylene Terephthalate (PET) by using Fomepizole.
6513	A comparative analysis of a mycelia-based foam alternative versus expanded polystyrene as effective insulators and packaging materials.

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Environmental Management

Project Number	Title
1006	The Affects of Natural Sorbents on Petroleum
1012	Is the earth getting hotter? Investigating the Greenhouse Effect.
2016	Too Hot To Handle
2018	Fluoride Free Water?
2501	Natural Alternative To Household Pesticides
2503	Quantitative Analysis of Nitrate and Phosphate "Runoff" Pollution on Long Island Sound, Marine Life, and Hypoxia
2514	The Effects of Acid Rain on the Pteridophyta
2515	Solar power applied to energy output
2518	The Phytoremediation Efficacy of Elodea Canadensis, Lemna Minor, and Brassica Juncea in Copper Sulfate Contaminated Water
2520	The effect of oil spills on sea plants
2526	Fertilizer: Phenomenal or Fatal
2529	Salinity Study Before and After a Salt Marsh Restoration
2532	Analysis of Allelopathic Effect of Grasses on Common Weeds
2534	THE EFFECT OF IRON ON THE GROWTH OF DINOFLAGELLATES IN ESTUARINE WATER
2539	Being Green? What is the LC50 Rate of Green and Standard Detergents on Myelis edilus?
2541	WHICH ECOSYSTEM HAS THE MOST LIFE?
3007	The Negative Effects of Phosphates on the Environment
3020	The Impact of Noise Pollutants on Coastal Invertebrates
3028	Insecticides: Killing Grass While Killing Bugs?
3035	The Oxidation Proclamation: Eradicating Odor Oppression in Wastewater
3037	The Efficacy of Bentonite as a Means of Purifying Water
3053	Sustainable Enhancement of Plant Growth & Disease Reduction Using Biochar Soil Additives
3058	The Bioconversion of Lythrum salicaria to Biofuel and Biofuel Precursors Using the Endophytic Fungus Ascocoryne sarcoides as a Biocatalyst
3065	An Analysis of the Hemocyanin Content of Atlantic Horseshoe Crabs (Limulus polyphemus) Prior to Hemolymph Extraction in Order to Determine Organism Health Status.
3069	The Growth of the Stony Coral, Leptoseris, in Low Levels of Electric Current
3072	Biological Control of The Emerald Ash Borer Using Entomopathogenic Fungus
3080	A Novel Design for the Integration of a Microbial Desalination Cell in a Microbial Fuel Cell for the Production of Energy and Purification of Water
3095	An Assessment of the Reefs in the Windward Islands due to the Presence of Pterios volitans
3099	Comparative Suppression of Soil-borne Pathogens via Earthworm Bioturbation of Wood and Plant-based Biochars
3513	Usage of Organic Materials (such as banana peels) to Purify Water
3514	Use of Selective Breeding in Providing a Viable Food Source Under Irradiated Conditions.
4023	The Creation Of Seismic Waves
4042	Fighting The Wave
4047	The Effect of Different Landscaping Methods on the Prevention of Topsoil Erosion
5002	Tsunamis: The Effects of Water Depth and Sea Floor Variation on Wave Velocity
5006	Perfect Plastic
5026	ELECTRICAL CONDUCTIVITY OF SALT WATER
5027	Impact of using ice-melting chemicals on the coastal waters surrounding the Mystic River Estuary, Beebe Cove and the Noank Marina
5036	Let It Flow When It Blows!
5535	An Investigation of How the Environmentally Harmful Levels of Algal Bloom Due to Fertilizer Run-off into the Fresh and Coastal Sea Waters of Connecticut Can Be Reduced.
5540	Evaluating the Performance of a Model Solar Updraft Tower Power Plant

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Environmental Management

Project Number	Title
5545	Flow Rate vs. Heat Transfer of Fluid
5555	"I'm Melting!" The Wicked Witch of the West and Ice Agree Global Warming is a Problem
5562	Converting Waste to Electricity using Efficient Microbial Fuel Cell
5564	Growing Green
6001	An Investigation of a Novel TiO ₂ Coating for Improved Surrounding Air Quality & Reduced Solar Cell Maintenance
6003	New Invention that will harness wave power to convert to unlimited rotational energy
6006	Utilization Of A Small Unmanned Aerial System for Optimization of Deer Tick Population Management
6007	Using Modified Coal Ash to clean water contaminated with oil
6020	Integration of Photovoltaic and Peltier-Seebeck Thermoelectric Effects to Optimize the Power Density of a Hybrid Solar Panel
6025	Coastal Home Protection
6026	Purifying water using solar power and electrolysis
6028	Wavelength Optimization of Quantum Dot Luminescent Solar Concentrators (LSC) using Tris(8-hydroxyquinoline) for Increased Quantum Efficiency
6031	Peak electricity: Generating Energy Using a Centrifugal Airflow Fan Blade, Propelled by Hot Air Flowing from a Soffit Vent to a Ridge Vent On a Roof
6042	The Traction Between the Wheels and the Road
6056	Thermoelectricity
6063	The Artificial Leaf: Capturing Solar Energy Using Photochemical Reactants to Separate Hydrogen and Oxygen in Water
6065	Roofing Material Selection: The Impact on Ambient, Internal, and Reflective Temperatures
6075	Removing Copper From Drinking Water
6082	Laptop With Built In Printer
6089	Reduction of Biodiesel Post Combustion Residue
6093	Novel Creation of a Hydrocarbon-Soaking Paper for Remediation and Reuse of Nanoscale Oil Contaminants in Water
6101	An Investigation of the Biodegradation Rate and Efficiency of Starch-Based Bioplastics
6505	Subsurface Recovery of Spilled Crude Oil Using Nanomagnet Retrieval System
6508	A novel approach to degrade harmful byproducts formed during the production of Polyethylene Terephthalate (PET) by using Fomepizole.
6509	Application of Graphene in Improving Efficiency and Practicality of Transparent and Flexible Photovoltaic Cells
6513	A comparative analysis of a mycelia-based foam alternative versus expanded polystyrene as effective insulators and packaging materials.
6514	Passive Electrical Generation Through Convection

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Mathematical Sciences

Project Number	Title
1005	Th Effect of Distractions on Drivers and how this Effects Their Reaction Time.
2515	Solar power applied to energy output
3026	Finding Clues to Genomic Disorders by Analyzing Evolutionary Variants in DNA Repeats
3030	Correlation of Carcharhinus leucas (Bull Sharks) Behavior with Human Interactions as Related to Feeding Patterns and Migration in Fresh and SaltWater
3086	A Theoretical Examination of Changes in Community Structure due to Consumptive and Competitive Species Interactions During Climate Change
4006	Retrofitting a Building
4007	Cars: Pulling Their Own Weight
4010	Overcoming Rotational Inertia
4026	Energy of the Future
4029	Marble Roller Coaster
4035	Comparison of Golf Balls Travel Distance Using A Trebuchet
4044	Maglev Modeling
4045	Massive Movement
5003	The Study of Fractography
5006	Perfect Plastic
5011	Impact of Various Parameters on Solar Panel Efficiency
5012	Robotic Rubik's Cube Solver
5030	The Idea Generator
5032	A Gauss Rifle: A Magnetic Linear Accelerator
5033	Burning Calories: How Much Energy is Stored in Different Types of Food?
5049	Lift and Drag in Kites
5050	Stability of Digital Data
5520	Biofuels
5521	A New Mathematical-Equation Based Approach for Faster and Efficient Digital Video Transmission
5526	Sound Proofing Your World
5528	Wind power
5529	Making Gas Mileage More Efficient
5538	Controlling Mobile Robots With Sensors
5540	Evaluating the Performance of a Model Solar Updraft Tower Power Plant
5543	What Are the Chances of Winning a Mirrored Chess Game?
5549	Wind Turbine Blade Efficiency Through Extensions and Winglet Modifications
6003	New Invention that will harness wave power to convert to unlimited rotational energy
6006	Utilization Of A Small Unmanned Aerial System for Optimization of Deer Tick Population Management
6009	Automatic Detection and Classification of Alzheimer's Disease From MRI Scans Using Principal Component Analysis and Artificial Neural Networks
6020	Integration of Photovoltaic and Peltier-Seebeck Thermoelectric Effects to Optimize the Power Density of a Hybrid Solar Panel
6023	A Hot Air Balloon's Ability to Fly
6026	Purifying water using solar power and electrolysis
6028	Wavelength Optimization of Quantum Dot Luminescent Solar Concentrators (LSC) using Tris(8-hydroxyquinoline) for Increased Quantum Efficiency
6031	Peak electricity: Generating Energy Using a Centrifugal Airflow Fan Blade, Propelled by Hot Air Flowing from a Soffit Vent to a Ridge Vent On a Roof
6032	Design of a New Mobile and Autonomous True Random Number Generator.
6041	The Most "Invisible" Geometric Shape: The Future of Stealth Technology

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Mathematical Sciences

Project Number	Title
6045	Improved quantum error correcting methods for optimization of protein structures by folding
6046	Research on the general summation formula of any sequence and ancillary results.
6052	HYDROHARMONICS The Mathematics Behind Music and the Frequency of Musical Notes in Water
6056	Thermoelectricity
6060	The Correlation between Psychosocial Disorders and Childhood Psychological Stresses and Neurological Data
6062	Using cAu-TNF Nanoparticle For Targeted Cancer Therapy: A Simulation
6066	Digital Image Sharpening through Optimization of Filtering Parameters based on Genetic Algorithms
6067	Effects of Volcanic Activity on Acid Rain Levels
6082	Laptop With Built In Printer
6091	Melting Polar Caps and Northern Hemisphere Weather: Is there a correlation between the melting of the polar caps and weather conditions in the northern hemisphere?
6092	A Comparative Analysis of Possible Optimization Techniques for Artificial Neural Networks
6501	Determining the index of refraction of water and air as a function of temperature and exploring how the vision of people wearing glasses are affected by temperature change.

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Medicine and Health Sciences

Project Number	Title
1003	Does eating chocolate make people happy?
1007	Does Smoking Affect Lung Capacity?
1013	The Effect of Certain Physical Activities on Blood Pressure of 13-year-old Females
1019	Collectin' D.N.A
1020	Analysis of Arsenic in Food from Natural Produce, Effect on Cell Bioavailability, and Effect of Chelators on Absorption.
2004	Coli Forms in Your Drinking Water
2010	Pain Relieving Faster?!
2502	Which French Fry Lasts the Longest?
2510	Are Energy Drinks Worth THE Risk?
2513	The Effects of OTC Pain Killers on Gastric Health and the Development of Ulcers
2516	Food Calories
2519	THE AMOUNT OF TIME EXPOSED TO NON-IONIZING RADIATION VERSUS THE EFFECT ON SEED GEMINATION AND PLANT GROWTH FOR FRENCH BREAKFAST RADISHES.
2538	TACE Inhibitors As Non-Biological Drugs For Treating Rheumatoid Arthritis
2540	How do different substances affect a rose petal?
2542	THE EFFECT THAT SUCROSE HAS ON THE AMOUNT OF GLUCOSE DIABETICS DIGEST FROM VARIOUS FOODS
3001	Protoporphyrin IX Fluorescence In Glioblastoma Multiforme: An In Vitro Analysis of Optimum Incubation Periods With Exogenous 5-Aminolevulinic Acid
3005	Determining the Effects of Cyberknife Radiosurgery for Trigeminal Neuralgia
3006	The Effect of Music Tempos on an Exerciser's Heart Rate
3009	Development of an in vitro model for implantation
3011	The Affect of High Fructose Corn Syrup and Blueberries on a Rat's Memory.
3017	The Effects of Concentrated Drugs on Heartrate
3018	Agar Extraction
3021	Who is Seeing Red? A Biometric Study of Anger
3022	GOOD TO THE LAST BEAT...
3023	Best Breed of Warmblood for Show Jumping
3024	Natural Antibiotics: Garlic vs. Onion
3025	The Correlation Between Environmental Chitinase Activities and Asthma Severity
3026	Finding Clues to Genomic Disorders by Analyzing Evolutionary Variants in DNA Repeats
3027	Morphogenesis of and Chromosome Segregation in Escherichia coli Branching Mutants
3031	The Effects Of Citric Acid On Calcuim Carbonate
3032	Investigating the role of p53 in ovarian cancer cell response to the chemotherapeutic drugs cisplatin and veliparib
3034	The Effect of Change in Exercise on Vertical Jump Height
3039	Application of a Poly-electrolytic Layer-by-Layer Assembled Thin Film to Prevent Post-operative Abdominal Adhesions
3040	Specific Single Nucleotide Polymorphisms are More Frequent in Multiple Sclerosis Patients as Opposed to Healthy Individuals—A Genome-wide Association Study
3041	Regulation of Borrelia Burgdorferi-Induced Inflammation by TAM Receptors
3042	Efficacy of Honey Against Bacterial Biofilms
3043	The Effect of Different Colored Cone Cells on the Fatigue Rate of the Human Retina
3045	Role of Macrophage Inhibitory Factor (MIF) In DNA Damage Response
3047	Evaluation of Degenerative Disc Disease of Lumbar Spine
3048	Leukotriene A4 Hydrolase Inhibition as a Novel Rheumatoid Arthritis Treatment
3060	The Extraction of Tryptophan from Egg Whites by Aqueous Biphasic Solution

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Medicine and Health Sciences

Project Number	Title
3062	Studying Antigen Presenting Cells that Activate gamma-delta T cells in the Mesenteric Lymph Nodes Following Oral <i>Listeria monocytogenes</i> Infection
3064	Candidiasis Inhibition and Promotion of Wound Healing via a Novel Hydrophilic Dressing
3065	An Analysis of the Hemocyanin Content of Atlantic Horseshoe Crabs (<i>Limulus polyphemus</i>) Prior to Hemolymph Extraction in Order to Determine Organism Health Status.
3066	FDG-PET, PIB-PET, and CSF Biomarkers in Cognitively Normal Middle-Aged and Elderly Subjects
3070	The Use of <i>Limulus</i> Amebocyte Lysate as a Natural Antibacterial Agent, Food Sanitizer, and Environmentally Friendly Pesticide
3074	Temporal lobe epilepsy and neuronal heterotopia in Brodmann area 20: A quantitative analysis
3076	The Role of Soluble Adenylyl Cyclase (sAC) in the Prevention of Tumor Formation
3077	Cardiovascular Pharmacogenomics: Assessing New Genetic Variants for Warfarin and Clopidogrel Response
3083	Occurance of bacteria in public vs. private settings and the effect of different sanitation methods on bacterial growth
3085	CCG-1423 Regulates MKL1 Nuclear Localization in Megakaryocytes
3090	The Effect of MEK Inhibition on HT29 and CAKI1 Cancer Cells
3096	A Meta-analysis of Subthalamic versus Pallidal Deep Brain Stimulation for Parkinson's Disease
3501	Effects of Caffeine and Caffeinated Beverages on Bacterial Growth
3502	Comparing the Ability of the Human Body to Digest Factory and Grass-Fed Beef
3509	Virtual screening of non-covalent inhibitors for β -lactamase from <i>Enterobacter cloacae</i> P99
3512	What is the X-Factor?
4012	Zap That Zit
4031	Effect of Plastic on Food Evaporation, Nutrient Value, Oxidation, and Antioxidant Levels.
4039	Pointe Comfort
5024	H2O vs Gatorade
5034	Effect of Temperature on Magnetism
5055	Pain, Pain Go Away!
5503	Do Metals Have Antimicrobial Properties?
5512	The Adhesion of Athletic Bandages
5530	Does Caffeine Affect Blood Pressure?
5531	How does the shape and size of a sound direction apparatus affect the decible level of sound?
5534	Power Pitching?
5557	Comparison of Absorption Rates of Natural vs. Artificial Sugars and Effect of Antioxidant Spice Enhancers on Absorption Rates
5561	Got glue?
6006	Utilization Of A Small Unmanned Aerial System for Optimization of Deer Tick Population Management
6009	Automatic Detection and Classification of Alzheimer's Disease From MRI Scans Using Principal Component Analysis and Artificial Neural Networks
6013	Prediction of cancer tissue-origin based on molecular sequencing evidence using a machine learning-based classifier algorithm
6026	Purifying water using solar power and electrolysis
6045	Improved quantum error correcting methods for optimization of protein structures by folding
6060	The Correlation between Psychosocial Disorders and Childhood Psychological Stresses and Neurological Data
6062	Using cAu-TNF Nanoparticle For Targeted Cancer Therapy: A Simulation
6068	Ca ²⁺ Sensitive Alginate-Dendrimer FRET System for the Detection of MI
6081	The Effect of Lead (Pb) particles on the Electrical Resistivity of Carbon Nanotubes
6501	Determining the index of refraction of water and air as a function of temperature and exploring how the vision of people wearing glasses are affected by temperature change.
6503	What does your shampoo do to you?

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Medicine and Health Sciences

**Project
Number**

Title

6508	A novel approach to degrade harmful byproducts formed during the production of Polyethylene Terephthalate (PET) by using Fomepizole.
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Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Microbiology

Project Number	Title
1004	Little Light Lot of Life
1010	Evaporation vs. Filtration
1014	Zap That Zit
1017	Are You Wearing Makeup or Bacteria?
2004	Coli Forms in Your Drinking Water
2006	Germ Catcher
2008	"Gross"eries
2015	Roundup And It's Effect On Microorganisms
2504	An investigation into the use of pyrocystis fusiformis as an early indicator of acidic pollution.
2505	Mold Resistance of Different Building Materials Post-Hurricane
2517	Intragenetic Competition Between Bioluminescent Dinoflagellates
2518	The Phytoremediation Efficacy of Elodea Canadensis, Lemna Minor, and Brassica Juncea in Copper Sulfate Contaminated Water
2524	Coliform Bacteria: Detect & Destroy 2
2534	THE EFFECT OF IRON ON THE GROWTH OF DINOFLAGELLATES IN ESTUARINE WATER
3003	Nonsymbiotic vs. Symbiotic Nitrogen-Fixing Bacteria on the Crop Yield of Leguminosae
3019	Ecological Differentiation of Bacillus Ecotypes found along a Salinity Gradient in Death Valley, CA
3024	Natural Antibiotics: Garlic vs. Onion
3027	Morphogenesis of and Chromosome Segregation in Escherichia coli Branching Mutants
3032	Investigating the role of p53 in ovarian cancer cell response to the chemotherapeutic drugs cisplatin and veliparib
3033	The effects of bovine serum albumin (BSA) on restriction digestion and analysis of Lambda Phage DNA
3040	Specific Single Nucleotide Polymorphisms are More Frequent in Multiple Sclerosis Patients as Opposed to Healthy Individuals—A Genome-wide Association Study
3042	Efficacy of Honey Against Bacterial Biofilms
3054	Action Potentials in Physarum polycephalum
3061	Light's Role on the Symbiotic Relationship between Zooxanthellae and Ricordea florida
3062	Studying Antigen Presenting Cells that Activate gamma-delta T cells in the Mesenteric Lymph Nodes Following Oral Listeria monocytogenes Infection
3067	The Effect of Common Biocide Exposure on Bacterial Resistance
3070	The Use of Limulus Amebocyte Lysate as a Natural Antibacterial Agent, Food Sanitizer, and Environmentally Friendly Pesticide
3075	Sanitize your Hands
3077	Cardiovascular Pharmacogenomics: Assessing New Genetic Variants for Warfarin and Clopidogrel Response
3080	A Novel Design for the Integration of a Microbial Desalination Cell in a Microbial Fuel Cell for the Production of Energy and Purification of Water
3083	Occurance of bacteria in public vs. private settings and the effect of different sanitation methods on bacterial growth
3085	CCG-1423 Regulates MKL1 Nuclear Localization in Megakaryocytes
3091	Acne is gross... Why is it on my face???
3094	Determining Tardigrade as a Possible Model for Genetics Research
3501	Effects of Caffeine and Caffeinated Beverages on Bacterial Growth
3503	Are you bananas?
5503	Do Metals Have Antimicrobial Properties?
5535	An Investigation of How the Environmentally Harmful Levels of Algal Bloom Due to Fertilizer Run-off into the Fresh and Coastal Sea Waters of Connecticut Can Be Reduced.
6072	Production of 1,3 Propanediol from Glycerol Fermentation
6100	Non-toxic Biological indicator of Food Spoilage in Pasteurized Milk of Varying Fat Content for Consumer Use
6103	Bio-mimicry: The Antimicrobial Proprieties of Nanoscopic Silicon Replications of the Lotus Leaf and the Pitcher Plant

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Physics and Astronomy

Project Number	Title
2009	Static Electricity
2027	Growing Plants In A Biosphere Mars.
4006	Retrofitting a Building
4010	Overcoming Rotational Inertia
4013	How does the certain liquids affect the trajectory of light
4014	Analysis of Fabric Flammability Rates and Effect of Chemical Flame Retardants, versus Effect Natural Flame Retardants.
4020	Containing Heat
4026	Energy of the Future
4027	The EXCITING ELECTRICAL CURRENT
4029	Marble Roller Coaster
4032	Meltdown
4035	Comparison of Golf Balls Travel Distance Using A Trebuchet
4038	The Effect of Heat Treatment on the Strength of Steel
4044	Maglev Modeling
4045	Massive Movement
5001	Solar Car: Affect of Different Colored Films on a Solar Panel
5002	Tsunamis: The Effects of Water Depth and Sea Floor Variation on Wave Velocity
5010	Bernoulli Effect: the magic ball
5011	Impact of Various Parameters on Solar Panel Efficiency
5023	Can speed, size and weight of an asteroid affect the size of moon craters?
5025	How to build a homemade light bulb and choosing a light bulb filament
5032	A Gauss Rifle: A Magnetic Linear Accelerator
5034	Effect of Temperature on Magnetism
5038	Electromagnetism - The effect of coils.
5048	Which Blade is Best?
5049	Lift and Drag in Kites
5501	How Weight Distribution Affects Flight Distance
5506	CAPILLARY ACTION
5507	Pressure Kicks
5513	Singing Wine Glass
5521	A New Mathematical-Equation Based Approach for Faster and Efficient Digital Video Transmission
5523	Efficiency of Plane Designs
5526	Sound Proofing Your World
5534	Power Pitching?
5540	Evaluating the Performance of a Model Solar Updraft Tower Power Plant
5541	Throwing
5545	Flow Rate vs. Heat Transfer of Fluid
5546	Goldberg Goes Gagghnam Style
5547	Particle Wave Duality Forward Into The Unknown
5548	Does the temperature of a tennis ball effect the height of its bounce?
5549	Wind Turbine Blade Efficiency Through Extensions and Winglet Modifications
5551	Power! A study of various airplane engines and the forces they generate
5559	other bags

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Physics and Astronomy

Project Number	Title
6003	New Invention that will harness wave power to convert to unlimited rotational energy
6004	Applications of high-tech swimsuit technology
6006	Utilization Of A Small Unmanned Aerial System for Optimization of Deer Tick Population Management
6012	maximizing the solar collection of a solar panel by mobilizing the system
6017	Development and Testing of a Bicep Other Arm Movements for a Humanoid Robot with Human-like Force Capabilities
6019	Creating a Perpetual Motion Generator with Permanent Magnets and Ceramic Ball Bearings
6020	Integration of Photovoltaic and Peltier-Seebeck Thermoelectric Effects to Optimize the Power Density of a Hybrid Solar Panel
6021	Geomagnetic Storms and GPS Systems
6022	The Power of Sound and Acoustic Levitation
6026	Purifying water using solar power and electrolysis
6028	Wavelength Optimization of Quantum Dot Luminescent Solar Concentrators (LSC) using Tris(8-hydroxyquinoline) for Increased Quantum Efficiency
6031	Peak electricity: Generating Energy Using a Centrifugal Airflow Fan Blade, Propelled by Hot Air Flowing from a Soffit Vent to a Ridge Vent On a Roof
6039	Analysis of Open Star Clusters Predicts the Fate of the Milky Way
6041	The Most "Invisible" Geometric Shape: The Future of Stealth Technology
6053	How Geometric and Material effect the Decibels Produced
6054	Integration of Photoluminescent Manganese-doped ZnS Nanocrystals for Improved Solar Cell Response
6078	Laser-induced Propulsion of Anticancer-Doxorubicin Using a Combined Optical Tweezing and Radiation-induced Interface Deformation
6079	Role of Stellar Wind on Distribution of Terrestrial Building Blocks and Protoplanetary Genesis
6088	Correlation Between Nuclear Magnetic Moment and Quadrupole Moment for Rare Isotopes
6091	Melting Polar Caps and Northern Hemisphere Weather: Is there a correlation between the melting of the polar caps and weather conditions in the northern hemisphere?
6097	Amazing Magnets
6501	Determining the index of refraction of water and air as a function of temperature and exploring how the vision of people wearing glasses are affected by temperature change.
6509	Application of Graphene in Improving Efficiency and Practicality of Transparent and Flexible Photovoltaic Cells
6510	Adaptive Leading Edge Droop Mechanism to Increase Fuel Efficiency and Flight Safety on Private Aircraft
6514	Passive Electrical Generation Through Convection

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Plant Sciences

Project Number	Title
1021	Are papaya seeds an effective fertilizer?
2001	How Does The Color of The Light Affect The Growth of Peas?
2005	Acid Rain And Its Affects on Aquatic Algae.
2014	Using Bioluminescent Diatoms To Help Detect Water Contamination.
2016	Too Hot To Handle
2020	Can bioluminescent phytoplankton be an early warning alarm for rising ocean temperatures?
2021	Go Green by Growing Green
2025	Lentils under water
2027	Growing Plants In A Biosphere Mars.
2029	Strength of Perfume
2031	What is the Effect of Organic Fertilizer in Improving Plant Growth?
2502	Which French Fry Lasts the Longest?
2504	An investigation into the use of pyrocystis fusiformis as an early indicator of acidic pollution.
2506	A Comparison of the Effect of Treated and Untreated Well Water on the Growth of Grass
2507	The Effect of pH levels on plant growth
2514	The Effects of Acid Rain on the Pteridophyta
2517	Intragenetic Competition Between Bioluminescent Dinoflagellates
2518	The Phytoremediation Efficacy of Elodea Canadensis, Lemna Minor, and Brassica Juncea in Copper Sulfate Contaminated Water
2519	THE AMOUNT OF TIME EXPOSED TO NON-IONIZING RADIATION VERSUS THE EFFECT ON SEED GEMINATION AND PLANT GROWTH FOR FRENCH BREAKFAST RADISHES.
2520	The effect of oil spills on sea plants
2522	Roots and Gravity
2523	Does the Color of a Light Effect Plant Growth?
2525	The Antioxidant Mystery
2526	Fertilizer: Phenomenal or Fatal
2528	Plants Are Sensitive Too
2529	Salinity Study Before and After a Salt Marsh Restoration
2532	Analysis of Allelopathic Effect of Grasses on Common Weeds
2537	Caffeine: Not Just for People!
2541	WHICH ECOSYSTEM HAS THE MOST LIFE?
3003	Nonsymbiotic vs. Symbiotic Nitrogen-Fixing Bacteria on the Crop Yield of Leguminosae
3007	The Negative Effects of Phosphates on the Environment
3012	Multi-Trophic Aquaponics
3018	Agar Extraction
3024	Natural Antibiotics: Garlic vs. Onion
3028	Insecticides: Killing Grass While Killing Bugs?
3044	Identification of Telomere Length Differences Between Maize Mutants and Their Wild-type Forms
3053	Sustainable Enhancement of Plant Growth & Disease Reduction Using Biochar Soil Additives
3063	Effects of Epibrassinolide-24 on Onion Plant Metabolism
3070	The Use of Limulus Amebocyte Lysate as a Natural Antibacterial Agent, Food Sanitizer, and Environmentally Friendly Pesticide
3072	Biological Control of The Emerald Ash Borer Using Entomopathogenic Fungus
3081	The Effect of Tannic Acid in the Soil Surrounding Melissa officinalis and the Resulting Concentration of Tannins in the Plant's Extract
3084	The effects of spring water on the growth rate of bean plants

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Plant Sciences

Project Number	Title
3099	Comparative Suppression of Soil-borne Pathogens via Earthworm Bioturbation of Wood and Plant-based Biochars
3503	Are you bananas?
3513	Usage of Organic Materials (such as banana peels) to Purify Water
3514	Use of Selective Breeding in Providing a Viable Food Source Under Irradiated Conditions.
4036	Truth... or a Fraud?
5006	Perfect Plastic
5017	Keeping it Green with Oranges: The Use of Orange Peels to Create a Better Biofuel
5535	An Investigation of How the Environmentally Harmful Levels of Algal Bloom Due to Fertilizer Run-off into the Fresh and Coastal Sea Waters of Connecticut Can Be Reduced.
5556	High fructose corn syrup versus sugar: Observing the behaviors of invertebrates that are fed sugar and high fructose.
5564	Growing Green
6006	Utilization Of A Small Unmanned Aerial System for Optimization of Deer Tick Population Management
6103	Bio-mimicry: The Antimicrobial Proprieties of Nanoscopic Silicon Replications of the Lotus Leaf and the Pitcher Plant

Composite Scientific Disciplines

Scientific Disciplines Selected by Student

Conn. Science & Engineering Fair

Biotechnology

Project Number	Title
1003	Does eating chocolate make people happy?
1004	Little Light Lot of Life
1006	The Affects of Natural Sorbents on Petroleum
1007	Does Smoking Affect Lung Capacity?
1010	Evaporation vs. Filtration
1013	The Effect of Certain Physical Activities on Blood Pressure of 13-year-old Females
1014	Zap That Zit
1015	Salty Shrimp
1016	Degrading DNA
1017	Are You Wearing Makeup or Bacteria?
1019	Collectin' D.N.A
1020	Analysis of Arsenic in Food from Natural Produce, Effect on Cell Bioavailability, and Effect of Chelators on Absorption.
1021	Are papaya seeds an effective fertilizer?
2001	How Does The Color of The Light Affect The Growth of Peas?
2003	Walking on Egg Shells
2004	Coli Forms in Your Drinking Water
2005	Acid Rain And Its Affects on Aquatic Algae.
2006	Germ Catcher
2007	What is the relationship between dissolved oxygen and coliform in the Pequonnock River?
2008	"Gross"eries
2010	Pain Relieving Faster?!
2011	Taste Buds: Are You A Super taster
2014	Using Bioluminescent Diatoms To Help Detect Water Contamination.
2015	Roundup And It's Effect On Microorganisms
2016	Too Hot To Handle
2017	The effects of physical activity on anxiety and short term memory in rats.
2020	Can bioluminescent phytoplankton be an early warning alarm for rising ocean temperatures?
2021	Go Green by Growing Green
2024	The Investigations of Catalase Enzymes
2025	Lentils under water
2027	Growing Plants In A Biosphere Mars.
2029	Strength of Perfume
2031	What is the Effect of Organic Fertilizer in Improving Plant Growth?
2032	Effect Caffeine and Alcohol on Daphnia Heart Rate
2501	Natural Alternative To Household Pesticides
2502	Which French Fry Lasts the Longest?
2503	Quantitative Analysis of Nitrate and Phosphate "Runoff" Pollution on Long Island Sound, Marine Life, and Hypoxia
2504	An investigation into the use of pyrocystis fusiformis as an early indicator of acidic pollution.
2505	Mold Resistance of Different Building Materials Post-Hurricane
2506	A Comparison of the Effect of Treated and Untreated Well Water on the Growth of Grass
2507	The Effect of pH levels on plant growth
2508	Strain put on the Patellar Tendon
2509	Feeding Worms
2510	Are Energy Drinks Worth THE Risk?

Scientific Disciplines Selected by Student

Conn. Science & Engineering Fair

Biotechnology

Project Number	Title
2513	The Effects of OTC Pain Killers on Gastric Health and the Development of Ulcers
2514	The Effects of Acid Rain on the Pteridophyta
2516	Food Calories
2517	Intragenetic Competition Between Bioluminescent Dinoflagellates
2518	The Phytoremediation Efficacy of Elodea Canadensis, Lemna Minor, and Brassica Juncea in Copper Sulfate Contaminated Water
2519	THE AMOUNT OF TIME EXPOSED TO NON-IONIZING RADIATION VERSUS THE EFFECT ON SEED GEMINATION AND PLANT GROWTH FOR FRENCH BREAKFAST RADISHES.
2520	The effect of oil spills on sea plants
2522	Roots and Gravity
2523	Does the Color of a Light Effect Plant Growth?
2524	Coliform Bacteria: Detect & Destroy 2
2525	The Antioxidant Mystery
2526	Fertilizer: Phenomenal or Fatal
2527	The Effect of Chlorine on Extractable DNA
2528	Plants Are Sensitive Too
2529	Salinity Study Before and After a Salt Marsh Restoration
2531	A Comparative Study of the Effects of Organic and Chemical Fertilizers on <i>Lubricus terrestris</i>
2532	Analysis of Allelopathic Effect of Grasses on Common Weeds
2534	THE EFFECT OF IRON ON THE GROWTH OF DINOFLAGELLATES IN ESTUARINE WATER
2536	Bird Song Variation and Genetic Drift in Common Yellowthroats
2537	Caffeine: Not Just for People!
2538	TACE Inhibitors As Non-Biological Drugs For Treating Rheumatoid Arthritis
2539	Being Green? What is the LC50 Rate of Green and Standard Detergents on <i>Myelis edilus</i> ?
2540	How do different substances affect a rose petal?
2541	WHICH ECOSYSTEM HAS THE MOST LIFE?
2542	THE EFFECT THAT SUCROSE HAS ON THE AMOUNT OF GLUCOSE DIABETICS DIGEST FROM VARIOUS FOODS
3001	Protoporphyrin IX Fluorescence In Glioblastoma Multiforme: An In Vitro Analysis of Optimum Incubation Periods With Exogenous 5-Aminolevulinic Acid
3002	The Effects of Ocean Acidification on Oyster Larvae (<i>Crassostrea virginica</i>)
3003	Nonsymbiotic vs. Symbiotic Nitrogen-Fixing Bacteria on the Crop Yield of Leguminosae
3004	The Effect of the D126G Mutation on the Aggregation Propensity of CRABP
3005	Determining the Effects of Cyberknife Radiosurgery for Trigeminal Neuralgia
3006	The Effect of Music Tempos on an Exerciser's Heart Rate
3007	The Negative Effects of Phosphates on the Environment
3009	Development of an in vitro model for implantation
3010	Population Dynamics and Characterization of Inteins
3011	The Affect of High Fructose Corn Syrup and Blueberries on a Rat's Memory.
3012	Multi-Trophic Aquaponics
3013	The Duration of the Alarm Response of <i>Pogonomyrmex barbatus</i> (Red Hartvester Ant) as Subject to the concentration of Pheromone Stimuli.
3014	Characterizing the Boundaries of the Lipid Bilayer Surrounding Intramembrane Protease GlpG
3015	The advantages of the navigational behavior of the slime mold <i>Physarum polycephalum</i> .
3017	The Effects of Concentrated Drugs on Heartrate
3018	Agar Extraction

Scientific Disciplines Selected by Student

Conn. Science & Engineering Fair

Biotechnology

Project Number	Title
3019	Ecological Differentiation of Bacillus Ecotypes found along a Salinity Gradient in Death Valley, CA
3021	Who is Seeing Red? A Biometric Study of Anger
3022	GOOD TO THE LAST BEAT...
3023	Best Breed of Warmblood for Show Jumping
3024	Natural Antibiotics: Garlic vs. Onion
3025	The Correlation Between Environmental Chitinase Activities and Asthma Severity
3026	Finding Clues to Genomic Disorders by Analyzing Evolutionary Variants in DNA Repeats
3027	Morphogenesis of and Chromosome Segregation in Escherichia coli Branching Mutants
3028	Insecticides: Killing Grass While Killing Bugs?
3029	The Effects of Omega-3 and Omega-6 on Breast Cancer Growth Rates
3030	Correlation of Carcharhinus leucas (Bull Sharks) Behavior with Human Interactions as Related to Feeding Patterns and Migration in Fresh and SaltWater
3031	The Effects Of Citric Acid On Calcuim Carbonate
3032	Investigating the role of p53 in ovarian cancer cell response to the chemotherapeutic drugs cisplatin and veliparib
3033	The effects of bovine serum albumin (BSA) on restriction digestion and analysis of Lambda Phage DNA
3034	The Effect of Change in Exercise on Vertical Jump Height
3037	The Efficacy of Bentonite as a Means of Purifying Water
3038	The Presence and Magnitude of Melanomacrophages in the Livers of Sharks
3039	Application of a Poly-electrolytic Layer-by-Layer Assembled Thin Film to Prevent Post-operative Abdominal Adhesions
3040	Specific Single Nucleotide Polymorphisms are More Frequent in Multiple Sclerosis Patients as Opposed to Healthy Individuals—A Genome-wide Association Study
3041	Regulation of Borrelia burgdorferi-Induced Inflammation by TAM Receptors
3042	Efficacy of Honey Against Bacterial Biofilms
3043	The Effect of Different Colored Cone Cells on the Fatigue Rate of the Human Retina
3044	Identification of Telomere Length Differences Between Maize Mutants and Their Wild-type Forms
3045	Role of Macrophage Inhibitory Factor (MIF) In DNA Damage Response
3046	Finding and Analyzing Motifs Uniquely Expressed Upstream in A. thaliana: Intron-Mediated Enhancement Candidates
3047	Evaluation of Degenerative Disc Disease of Lumbar Spine
3048	Leukotriene A4 Hydrolase Inhibition as a Novel Rheumatoid Arthritis Treatment
3053	Sustainable Enhancement of Plant Growth & Disease Reduction Using Biochar Soil Additives
3054	Action Potentials in Physarum polycephalum
3056	New species of Xantusiidae from the Middle Miocene of New Mexico
3057	Friend or Foe: Caffeine
3058	The Bioconversion of Lythrum salicaria to Biofuel and Biofuel Precursors Using the Endophytic Fungus Ascocoryne sarcoides as a Biocatalyst
3059	Creation of Alginate Hydrogel Microparticles with Optimum Encapsulation for Cancer Drug Release
3060	The Extraction of Tryptophan from Egg Whites by Aqueous Biphasic Solution
3061	Light's Role on the Symbiotic Relationship between Zooxanthellae and Ricordea florida
3062	Studying Antigen Presenting Cells that Activate gamma-delta T cells in the Mesenteric Lymph Nodes Following Oral Listeria monocytogenes Infection
3063	Effects of Epibrassinolide-24 on Onion Plant Metabolism
3064	Candidiasis Inhibition and Promotion of Wound Healing via a Novel Hydrophilic Dressing
3065	An Analysis of the Hemocyanin Content of Atlantic Horseshoe Crabs (Limulus polyphemus) Prior to Hemolymph Extraction in Order to Determine Organism Health Status.
3066	FDG-PET, PIB-PET, and CSF Biomarkers in Cognitively Normal Middle-Aged and Elderly Subjects
3067	The Effect of Common Biocide Exposure on Bacterial Resistance

Scientific Disciplines Selected by Student

Conn. Science & Engineering Fair

Biotechnology

Project Number	Title
3068	A self-powered Controller for a live <i>Blaberus discoidalis</i>
3069	The Growth of the Stony Coral, <i>Leptoseris</i> , in Low Levels of Electric Current
3070	The Use of <i>Limulus Amebocyte Lysate</i> as a Natural Antibacterial Agent, Food Sanitizer, and Environmentally Friendly Pesticide
3072	Biological Control of The Emerald Ash Borer Using Entomopathogenic Fungus
3073	The best floor board material for a flood zone
3074	Temporal lobe epilepsy and neuronal heterotopia in Brodmann area 20: A quantitative analysis
3075	Sanitize your Hands
3076	The Role of Soluble Adenylyl Cyclase (sAC) in the Prevention of Tumor Formation
3077	Cardiovascular Pharmacogenomics: Assessing New Genetic Variants for Warfarin and Clopidogrel Response
3080	A Novel Design for the Integration of a Microbial Desalination Cell in a Microbial Fuel Cell for the Production of Energy and Purification of Water
3081	The Effect of Tannic Acid in the Soil Surrounding <i>Melissa officinalis</i> and the Resulting Concentration of Tannins in the Plant's Extract
3082	The Effects of Adding Xanthan Gum to Rice Starch and Sugar Mixtures on Gelatinization Time, Viscosity, and Texture
3083	Occurance of bacteria in public vs. private settings and the effect of different sanitation methods on bacterial growth
3084	The effects of spring water on the growth rate of bean plants
3085	CCG-1423 Regulates MKL1 Nuclear Localization in Megakaryocytes
3086	A Theoretical Examination of Changes in Community Structure due to Consumptive and Competitive Species Interactions During Climate Change
3087	The Anti-Cancer Effects of Tetrahydrocannabinol (THC) in Breast Carcinoma Cells
3089	EFFECT OF SHORT-TERM CIGARETTE SMOKE EXPOSURE ON FOOD CONSUMPTION IN <i>GRYLLUS ASSIMILLIS</i> .
3090	The Effect of MEK Inhibition on HT29 and CAKI1 Cancer Cells
3091	Acne is gross... Why is it on my face???
3094	Determining Tardigrade as a Possible Model for Genetics Research
3096	A Meta-analysis of Subthalamic versus Pallidal Deep Brain Stimulation for Parkinson's Disease
3098	The Effect of Ethanol on Liver Catalase
3099	Comparative Suppression of Soil-borne Pathogens via Earthworm Bioturbation of Wood and Plant-based Biochars
3501	Effects of Caffeine and Caffeinated Beverages on Bacterial Growth
3502	Comparing the Ability of the Human Body to Digest Factory and Grass-Fed Beef
3503	Are you bananas?
3506	Chlorophyll Enhanced Dye Sensitized Solar Cells
3507	A Novel Approach to the Synthesis of a High-Performance Biomaterial
3508	The Effects of Herbal Remedies on Breast Cancer Cells in Cell Culture
3509	Virtual screening of non-covalent Inhibitors for β -lactamase from <i>Enterobacter cloacae</i> P99
3510	Effect of Stress on Grasshoppers' Dietary Patterns
3511	Green Crabs Effect on the Native Crabs Species in the Poquonock River
3512	What is the X-Factor?
3513	Usage of Organic Materials (such as banana peels) to Purify Water
3514	Use of Selective Breeding in Providing a Viable Food Source Under Irradiated Conditions.
3515	Can You See Vitamin C
4003	Enzyme frenzy
4006	Retrofitting a Building
4007	Cars: Pulling Their Own Weight
4012	Zap That Zit

Scientific Disciplines Selected by Student

Conn. Science & Engineering Fair

Biotechnology

Project Number	Title
4031	Effect of Plastic on Food Evaporation, Nutrient Value, Oxidation, and Antioxidant Levels.
4034	Water Tablets
4036	Truth... or a Fraud?
4038	The Effect of Heat Treatment on the Strength of Steel
4039	Pointe Comfort
4043	Measuring the Buoyancy of Boats
4044	Maglev Modeling
5006	Perfect Plastic
5017	Keeping it Green with Oranges: The Use of Orange Peels to Create a Better Biofuel
5024	H2O vs Gatorade
5034	Effect of Temperature on Magnetism
5046	Designs that Shake with Earthquakes
5048	Which Blade is Best?
5055	Pain, Pain Go Away!
5503	Do Metals Have Antimicrobial Properties?
5509	Aerodynamics and Bridge Design
5512	The Adhesion of Athletic Bandages
5526	Sound Proofing Your World
5530	Does Caffeine Affect Blood Pressure?
5531	How does the shape and size of a sound direction apparatus affect the decible level of sound?
5533	Sugar in Milk
5534	Power Pitching?
5535	An Investigation of How the Environmentally Harmful Levels of Algal Bloom Due to Fertilizer Run-off into the Fresh and Coastal Sea Waters of Connecticut Can Be Reduced.
5536	What is the best way to clean up oil?
5545	Flow Rate vs. Heat Transfer of Fluid
5552	Measure the Surface Tension of Water
5553	Save the beach house
5555	"I'm Melting!" The Wicked Witch of the West and Ice Agree Global Warming is a Problem
5556	High fructose corn syrup versus sugar: Observing the behaviors of invertebrates that are fed sugar and high fructose.
5557	Comparison of Absorption Rates of Natural vs. Artificial Sugars and Effect of Antioxidant Spice Enhancers on Absorption Rates
5559	other bags
5561	Got glue?
5562	Converting Waste to Electricity using Efficient Microbial Fuel Cell
5563	Does the design of the bridge affect it capacity
5564	Growing Green
6001	An Investigation of a Novel TiO2 Coating for Improved Surrounding Air Quality & Reduced Solar Cell Maintenance
6003	New Invention that will harness wave power to convert to unlimited rotational energy
6004	Applications of high-tech swimsuit technology
6006	Utilization Of A Small Unmanned Aerial System for Optimization of Deer Tick Population Management
6008	Hydroxyapatite Sol-gel Coatings on Titanium Substrates for Bioengineering Applications
6009	Automatic Detection and Classification of Alzheimer's Disease From MRI Scans Using Principal Component Analysis and Artificial Neural Networks
6010	Morphological Modeling of Taurine Function in Mice to Study Oxidant Injury to Lung and Kidney Tissue

Scientific Disciplines Selected by Student

Conn. Science & Engineering Fair

Biotechnology

Project Number	Title
6013	Prediction of cancer tissue-origin based on molecular sequencing evidence using a machine learning-based classifier algorithm
6014	Fabrication of a Flexible, Tunable Color Changing Skin using Magnetically Responsive Fe ₃ O ₄ Photonic Crystal Structures
6015	Quantification of Carbon Nanotube (CNT) Dispersion in Various Solvents
6017	Development and Testing of a Bicep Other Arm Movements for a Humanoid Robot with Human-like Force Capabilities
6020	Integration of Photovoltaic and Peltier-Seebeck Thermoelectric Effects to Optimize the Power Density of a Hybrid Solar Panel
6023	A Hot Air Balloon's Ability to Fly
6026	Purifying water using solar power and electrolysis
6028	Wavelength Optimization of Quantum Dot Luminescent Solar Concentrators (LSC) using Tris(8-hydroxyquinoline) for Increased Quantum Efficiency
6031	Peak electricity: Generating Energy Using a Centrifugal Airflow Fan Blade, Propelled by Hot Air Flowing from a Soffit Vent to a Ridge Vent On a Roof
6038	Viable Alternatives to Methyl-Ethyl Cellulose as a Binder in Plique à Jour Enameling
6040	Self-assembling nano-structures and Meta-materials
6045	Improved quantum error correcting methods for optimization of protein structures by folding
6049	Biomechanics of Pitching
6050	Nanostructured C-Phycocyanin Enhanced Hematite Thin-Film Photoanode Co-Sensitized with Plural Organic Dyes to Yield a Highly Efficient Solar Cell
6051	Homemade Method of Preventing Browning in Bananas
6054	Integration of Photoluminescent Manganese-doped ZnS Nanocrystals for Improved Solar Cell Response
6055	You Are What You Eat
6058	Quantitative Analysis of H ₂ Production via Photocatalytic Water Splitting
6060	The Correlation between Psychosocial Disorders and Childhood Psychological Stresses and Neurological Data
6062	Using cAu-TNF Nanoparticle For Targeted Cancer Therapy: A Simulation
6063	The Artificial Leaf: Capturing Solar Energy Using Photochemical Reactants to Separate Hydrogen and Oxygen in Water
6065	Roofing Material Selection: The Impact on Ambient, Internal, and Reflective Temperatures
6068	Ca ²⁺ Sensitive Alginate-Dendrimer FRET System for the Detection of MI
6072	Production of 1,3 Propanediol from Glycerol Fermentation
6078	Laser-induced Propulsion of Anticancer-Doxorubicin Using a Combined Optical Tweezing and Radiation-induced Interface Deformation
6081	The Effect of Lead (Pb) particles on the Electrical Resistivity of Carbon Nanotubes
6082	Laptop With Built In Printer
6084	Efficient Amylase Inhibition by usage of Cicer arietinum, Phaseolus lunatus, and Glycine max
6085	The Effect of an Altered Muffler on a Portable Generator in Relation to its Sound Level
6086	Design for a generating battery life through keyboard
6090	The Use of Samaras for the Safe Dispersion of Pesticides from Aerial Craft
6093	Novel Creation of a Hydrocarbon-Soaking Paper for Remediation and Reuse of Nanoscale Oil Contaminants in Water
6099	The Analysis of Violin Resonance: Subjective Versus Objective.
6100	Non-toxic Biological indicator of Food Spoilage in Pasteurized Milk of Varying Fat Content for Consumer Use
6101	An Investigation of the Biodegradation Rate and Efficiency of Starch-Based Bioplastics
6102	Bat Making Efficiency
6103	Bio-mimicry: The Antimicrobial Proprieties of Nanoscopic Silicon Replications of the Lotus Leaf and the Pitcher Plant
6501	Determining the index of refraction of water and air as a function of temperature and exploring how the vision of people wearing glasses are affected by temperature change.
6503	What does your shampoo do to you?

Scientific Disciplines Selected by Student

Conn. Science & Engineering Fair

Biotechnology

Project Number	Title
6507	Comparing Bridge Types
6508	A novel approach to degrade harmful byproducts formed during the production of Polyethylene Terephthalate (PET) by using Fomepizole.
6511	Windbelts: The Future of Wind Power; The Effect of Magnet Thickness, Coil Configuration, and Film Elasticity on Electrical Output of a Windbelt
6512	Light Absorption Of Roof Shingles
6513	A comparative analysis of a mycelia-based foam alternative versus expanded polystyrene as effective insulators and packaging materials.

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Environmental

Env. Mgmt & Env. Analysis

Project Number	Title
1001	Color or Plain, It's just not the same
1006	The Affects of Natural Sorbents on Petroleum
1010	Evaporation vs. Filtration
1011	What is the most favorable environment to preserve perishable food?
1012	Is the earth getting hotter? Investigating the Greenhouse Effect.
1015	Salty Shrimp
1020	Analysis of Arsenic in Food from Natural Produce, Effect on Cell Bioavailability, and Effect of Chelators on Absorption.
1021	Are papaya seeds an effective fertilizer?
2004	Coli Forms in Your Drinking Water
2005	Acid Rain And Its Affects on Aquatic Algae.
2014	Using Bioluminescent Diatoms To Help Detect Water Contamination.
2016	Too Hot To Handle
2018	Fluoride Free Water?
2020	Can bioluminescent phytoplankton be an early warning alarm for rising ocean temperatures?
2023	Composting Banana Peels
2501	Natural Alternative To Household Pesticides
2503	Quantitative Analysis of Nitrate and Phosphate "Runoff" Pollution on Long Island Sound, Marine Life, and Hypoxia
2504	An investigation into the use of pyrocystis fusiformis as an early indicator of acidic pollution.
2506	A Comparison of the Effect of Treated and Untreated Well Water on the Growth of Grass
2514	The Effects of Acid Rain on the Pteridophyta
2515	Solar power applied to energy output
2517	Intragenetic Competition Between Bioluminescent Dinoflagellates
2518	The Phytoremediation Efficacy of Elodea Canadensis, Lemna Minor, and Brassica Juncea in Copper Sulfate Contaminated Water
2520	The effect of oil spills on sea plants
2521	The Colors of Ozone
2522	Roots and Gravity
2526	Fertilizer: Phenomenal or Fatal
2529	Salinity Study Before and After a Salt Marsh Restoration
2531	A Comparative Study of the Effects of Organic and Chemical Fertilizers on Lubricus terrestris
2532	Analysis of Allelopathic Effect of Grasses on Common Weeds
2534	THE EFFECT OF IRON ON THE GROWTH OF DINOFLAGELLATES IN ESTUARINE WATER
2539	Being Green? What is the LC50 Rate of Green and Standard Detergents on Myelis edilus?
2541	WHICH ECOSYSTEM HAS THE MOST LIFE?
3007	The Negative Effects of Phosphates on the Environment
3016	Does Magic Salt have a Chemical Composition that has an Effect on the Environment
3020	The Impact of Noise Pollutants on Coastal Invertebrates
3025	The Correlation Between Environmental Chitinase Activities and Asthma Severity
3028	Insecticides: Killing Grass While Killing Bugs?
3035	The Oxidation Proclamation: Eradicating Odor Oppression in Wastewater
3037	The Efficacy of Bentonite as a Means of Purifying Water
3038	The Presence and Magnitude of Melanomacrophages in the Livers of Sharks
3049	Quantifying the Effects of Lionfish (Pterois volitans) through Food Web Analysis and Ecopath V 6.0 Modeling on the Mahahual (Mexico) Reef Zone
3053	Sustainable Enhancement of Plant Growth & Disease Reduction Using Biochar Soil Additives

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Environmental

Env. Mgmt't & Env. Analysis

Project Number	Title
3058	The Bioconversion of <i>Lythrum salicaria</i> to Biofuel and Biofuel Precursors Using the Endophytic Fungus <i>Ascocoryne sarcoides</i> as a Biocatalyst
3065	An Analysis of the Hemocyanin Content of Atlantic Horseshoe Crabs (<i>Limulus polyphemus</i>) Prior to Hemolymph Extraction in Order to Determine Organism Health Status.
3069	The Growth of the Stony Coral, <i>Leptoseris</i> , in Low Levels of Electric Current
3070	The Use of <i>Limulus</i> Amebocyte Lysate as a Natural Antibacterial Agent, Food Sanitizer, and Environmentally Friendly Pesticide
3072	Biological Control of The Emerald Ash Borer Using Entomopathogenic Fungus
3079	The Effect of Nitrates on Dissolved Oxygen and Algae Growth
3080	A Novel Design for the Integration of a Microbial Desalination Cell in a Microbial Fuel Cell for the Production of Energy and Purification of Water
3081	The Effect of Tannic Acid in the Soil Surrounding <i>Melissa officinalis</i> and the Resulting Concentration of Tannins in the Plant's Extract
3083	Occurance of bacteria in public vs. private settings and the effect of different sanitation methods on bacterial growth
3086	A Theoretical Examination of Changes in Community Structure due to Consumptive and Competitive Species Interactions During Climate Change
3095	An Assessment of the Reefs in the Windward Islands due to the Presence of <i>Pterios volitans</i>
3099	Comparative Suppression of Soil-borne Pathogens via Earthworm Bioturbation of Wood and Plant-based Biochars
3510	Effect of Stress on Grasshoppers' Dietary Patterns
3513	Usage of Organic Materials (such as banana peels) to Purify Water
3514	Use of Selective Breeding in Providing a Viable Food Source Under Irradiated Conditions.
4008	Poison In the Ground
4009	Rain, Rain, Go Away
4014	Analysis of Fabric Flammability Rates and Effect of Chemical Flame Retardants, versus Effect Natural Flame Retardants.
4023	The Creation Of Seismic Waves
4026	Energy of the Future
4042	Fighting The Wave
4047	The Effect of Different Landscaping Methods on the Prevention of Topsoil Erosion
5002	Tsunamis: The Effects of Water Depth and Sea Floor Variation on Wave Velocity
5006	Perfect Plastic
5011	Impact of Various Parameters on Solar Panel Efficiency
5017	Keeping it Green with Oranges: The Use of Orange Peels to Create a Better Biofuel
5022	Salt of the Earth
5026	ELECTRICAL CONDUCTIVITY OF SALT WATER
5027	Impact of using ice-melting chemicals on the coastal waters surrounding the Mystic River Estuary, Beebe Cove and the Noank Marina
5036	Let It Flow When It Blows!
5045	Corrosion Of Different Metals
5503	Do Metals Have Antimicrobial Properties?
5526	Sound Proofing Your World
5535	An Investigation of How the Environmentally Harmful Levels of Algal Bloom Due to Fertilizer Run-off into the Fresh and Coastal Sea Waters of Connecticut Can Be Reduced.
5540	Evaluating the Performance of a Model Solar Updraft Tower Power Plant
5545	Flow Rate vs. Heat Transfer of Fluid
5555	"I'm Melting!" The Wicked Witch of the West and Ice Agree Global Warming is a Problem
5558	Evaluating Lead Levels of Water in Older Homes
5559	other bags

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Environmental

Env. Mgmt't & Env. Analysis

Project Number	Title
5561	Got glue?
5562	Converting Waste to Electricity using Efficient Microbial Fuel Cell
5564	Growing Green
6001	An Investigation of a Novel TiO ₂ Coating for Improved Surrounding Air Quality & Reduced Solar Cell Maintenance
6003	New Invention that will harness wave power to convert to unlimited rotational energy
6005	Trace Metals Found in Pet Food
6006	Utilization Of A Small Unmanned Aerial System for Optimization of Deer Tick Population Management
6007	Using Modified Coal Ash to clean water contaminated with oil
6011	The Effects of Rotor Blade Orientation on the Electrical Output of a Wind Turbine
6020	Integration of Photovoltaic and Peltier-Seebeck Thermoelectric Effects to Optimize the Power Density of a Hybrid Solar Panel
6025	Coastal Home Protection
6026	Purifying water using solar power and electrolysis
6028	Wavelength Optimization of Quantum Dot Luminescent Solar Concentrators (LSC) using Tris(8-hydroxyquinoline) for Increased Quantum Efficiency
6031	Peak electricity: Generating Energy Using a Centrifugal Airflow Fan Blade, Propelled by Hot Air Flowing from a Soffit Vent to a Ridge Vent On a Roof
6042	The Traction Between the Wheels and the Road
6047	A General Study of Different Exposures of Acid Rain Concentrations on Plant Height
6056	Thermoelectricity
6063	The Artificial Leaf: Capturing Solar Energy Using Photochemical Reactants to Separate Hydrogen and Oxygen in Water
6065	Roofing Material Selection: The Impact on Ambient, Internal, and Reflective Temperatures
6067	Effects of Volcanic Activity on Acid Rain Levels
6072	Production of 1,3 Propanediol from Glycerol Fermentation
6075	Removing Copper From Drinking Water
6081	The Effect of Lead (Pb) particles on the Electrical Resistivity of Carbon Nanotubes
6082	Laptop With Built In Printer
6089	Reduction of Biodiesel Post Combustion Residue
6091	Melting Polar Caps and Northern Hemisphere Weather: Is there a correlation between the melting of the polar caps and weather conditions in the northern hemisphere?
6093	Novel Creation of a Hydrocarbon-Soaking Paper for Remediation and Reuse of Nanoscale Oil Contaminants in Water
6095	Electrical Resistance of Water
6096	The Effect of Type of Water Source on Water Quality
6101	An Investigation of the Biodegradation Rate and Efficiency of Starch-Based Bioplastics
6505	Subsurface Recovery of Spilled Crude Oil Using Nanomagnet Retrieval System
6506	An Ecological Outlook on the Effects of Pollution on Dissolved Oxygen Levels in Seawater
6508	A novel approach to degrade harmful byproducts formed during the production of Polyethylene Terephthalate (PET) by using Fomepizole.
6509	Application of Graphene in Improving Efficiency and Practicality of Transparent and Flexible Photovoltaic Cells
6513	A comparative analysis of a mycelia-based foam alternative versus expanded polystyrene as effective insulators and packaging materials.
6514	Passive Electrical Generation Through Convection

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Engineering

Project Number	Title
1006	The Affects of Natural Sorbents on Petroleum
2505	Mold Resistance of Different Building Materials Post-Hurricane
2508	Strain put on the Patellar Tendon
2515	Solar power applied to energy output
3012	Multi-Trophic Aquaponics
3018	Agar Extraction
3021	Who is Seeing Red? A Biometric Study of Anger
3025	The Correlation Between Environmental Chitinase Activities and Asthma Severity
3026	Finding Clues to Genomic Disorders by Analyzing Evolutionary Variants in DNA Repeats
3036	?Electroencephalography to Analyze and control the human Hand
3039	Application of a Poly-electrolytic Layer-by-Layer Assembled Thin Film to Prevent Post-operative Abdominal Adhesions
3058	The Bioconversion of Lythrum salicaria to Biofuel and Biofuel Precursors Using the Endophytic Fungus Ascocoryne sarcoides as a Biocatalyst
3068	A self-powered Controller for a live Blaberus discoidalis
3073	The best floor board material for a flood zone
3078	Remote Control Glove
3099	Comparative Suppression of Soil-borne Pathogens via Earthworm Bioturbation of Wood and Plant-based Biochars
3507	A Novel Approach to the Synthesis of a High-Performance Biomaterial
4004	Robots as Teachers
4006	Retrofitting a Building
4007	Cars: Pulling Their Own Weight
4010	Overcoming Rotational Inertia
4011	Methods That Utilize Available Solar and Thermal Energy to Charge Your Electrical Device in a Power Outage Using a Thermoelectric Generator
4015	A Battery That Makes Cents
4016	Building Bridges
4017	Dry Ice Engine
4021	Robot Artistic Ability
4024	The Python Weather Station
4025	Simulated Logic in Robots
4026	Energy of the Future
4027	The EXCITING ELECTRICAL CURRENT
4033	Comparing the Electrical Load of a Fuel Cell and a Rechargeable Battery
4038	The Effect of Heat Treatment on the Strength of Steel
4042	Fighting The Wave
4043	Measuring the Buoyancy of Boats
4044	Maglev Modeling
5001	Solar Car: Affect of Different Colored Films on a Solar Panel
5006	Perfect Plastic
5009	How Can Water Help Win A War?
5011	Impact of Various Parameters on Solar Panel Efficiency
5012	Robotic Rubik's Cube Solver
5014	The Effect of Different Types of Light Bulbs on the Relative Efficiency
5015	Transfer of Heat
5020	Comparative Study of Three Renewable Energy Sources: Solar Power, Wind Power, and Hydroelectric Power

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Engineering

Project Number	Title
5026	ELECTRICAL CONDUCTIVITY OF SALT WATER
5029	Crystal Radio
5032	A Gauss Rifle: A Magnetic Linear Accelerator
5034	Effect of Temperature on Magnetism
5035	Amp Up Your Knowledge About Electricity
5038	Electromagnetism - The effect of coils.
5039	Designing an efficient and affordable Solar Panel Iphone Charger
5040	Rubber Band Energy
5046	Designs that Shake with Earthquakes
5047	Automating A Simple Electromagnetic Generator to Power A Device By Switching AC Current To DC Current
5048	Which Blade is Best?
5049	Lift and Drag in Kites
5051	What Color of Light is Most Visible Through Fog?
5053	Simple Machine Design and Uses
5502	Earth, Wind, and Fire- comparing water, wind, and solar based fuels
5503	Do Metals Have Antimicrobial Properties?
5506	CAPILLARY ACTION
5509	Aerodynamics and Bridge Design
5514	Assessing Human Emotional Responses to Robots
5516	Inertia Propulsion
5521	A New Mathematical-Equation Based Approach for Faster and Efficient Digital Video Transmission
5522	Human Behavior and Robotic Interaction
5523	Efficiency of Plane Designs
5524	the mechanics of an elevator
5525	Tidal Power: Extracting Energy from Ocean Tides
5526	Sound Proofing Your World
5527	Stressful
5528	Wind power
5531	How does the shape and size of a sound direction apparatus affect the decible level of sound?
5536	What is the best way to clean up oil?
5538	Controlling Mobile Robots With Sensors
5539	Watts Up?
5540	Evaluating the Performance of a Model Solar Updraft Tower Power Plant
5542	Smart Servos
5544	Hydro or Wind?
5545	Flow Rate vs. Heat Transfer of Fluid
5547	Particle Wave Duality Forward Into The Unknown
5549	Wind Turbine Blade Efficiency Through Extensions and Winglet Modifications
5550	As The Wind Turns
5552	Measure the Surface Tension of Water
5553	Save the beach house
5554	Gender Bias with Robots
5555	"I'm Melting!" The Wicked Witch of the West and Ice Agree Global Warming is a Problem
5559	other bags

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Engineering

Project Number	Title
5561	Got glue?
5562	Converting Waste to Electricity using Efficient Microbial Fuel Cell
5563	Does the design of the bridge affect it capacity
5564	Growing Green
5565	Which battery creates the best solenoid?
6001	An Investigation of a Novel TiO ₂ Coating for Improved Surrounding Air Quality & Reduced Solar Cell Maintenance
6003	New Invention that will harness wave power to convert to unlimited rotational energy
6004	Applications of high-tech swimsuit technology
6006	Utilization Of A Small Unmanned Aerial System for Optimization of Deer Tick Population Management
6008	Hydroxyapatite Sol-gel Coatings on Titanium Substrates for Bioengineering Applications
6011	The Effects of Rotor Blade Orientation on the Electrical Output of a Wind Turbine
6012	maximizing the solar collection of a solar panel by mobilizing the system
6014	Fabrication of a Flexible, Tunable Color Changing Skin using Magnetically Responsive Fe ₃ O ₄ Photonic Crystal Structures
6015	Quantification of Carbon Nanotube (CNT) Dispersion in Various Solvents
6017	Development and Testing of a Bicep Other Arm Movements for a Humanoid Robot with Human-like Force Capabilities
6019	Creating a Perpetual Motion Generator with Permanent Magnets and Ceramic Ball Bearings
6020	Integration of Photovoltaic and Peltier-Seebeck Thermoelectric Effects to Optimize the Power Density of a Hybrid Solar Panel
6022	The Power of Sound and Acoustic Levitation
6023	A Hot Air Balloon's Ability to Fly
6025	Coastal Home Protection
6026	Purifying water using solar power and electrolysis
6028	Wavelength Optimization of Quantum Dot Luminescent Solar Concentrators (LSC) using Tris(8-hydroxyquinoline) for Increased Quantum Efficiency
6031	Peak electricity: Generating Energy Using a Centrifugal Airflow Fan Blade, Propelled by Hot Air Flowing from a Soffit Vent to a Ridge Vent On a Roof
6032	Design of a New Mobile and Autonomous True Random Number Generator.
6033	The Use of Pulse Width Modulation for Sensory Input Control of an Unmanned Aerial Vehicle (UAV) in the C++ Programming Language
6036	Development of a frictionless magnetic drive to increase efficiency in wind driven turbines
6037	The Use of a Shingled Write Layout to Improve upon Current Hard Drive Capacity
6038	Viable Alternatives to Methyl-Ethyl Cellulose as a Binder in Plique à Jour Enameling
6040	Self-assembling nano-structures and Meta-materials
6041	The Most "Invisible" Geometric Shape: The Future of Stealth Technology
6045	Improved quantum error correcting methods for optimization of protein structures by folding
6048	The Bedini Circuit
6050	Nanostructured C-Phycocyanin Enhanced Hematite Thin-Film Photoanode Co-Sensitized with Plural Organic Dyes to Yield a Highly Efficient Solar Cell
6054	Integration of Photoluminescent Manganese-doped ZnS Nanocrystals for Improved Solar Cell Response
6056	Thermoelectricity
6058	Quantitative Analysis of H ₂ Production via Photocatalytic Water Splitting
6059	Cellulose Algae Salt Battery
6062	Using cAu-TNF Nanoparticle For Targeted Cancer Therapy: A Simulation
6063	The Artificial Leaf: Capturing Solar Energy Using Photochemical Reactants to Separate Hydrogen and Oxygen in Water
6064	Alternative Wind Turbine Design

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Engineering

Project Number	Title
6065	Roofing Material Selection: The Impact on Ambient, Internal, and Reflective Temperatures
6068	Ca ²⁺ Sensitive Alginate-Dendrimer FRET System for the Detection of MI
6071	Fingerprint- Scanning ATM
6072	Production of 1,3 Propanediol from Glycerol Fermentation
6073	Developing an Inexpensive Speed Radar Trap Using an Arduino Board
6074	Generating Energy from the Swing Flexion, Swing Extension, Stance Flexion, and Stance Extension Stages of Knee Motion Using a Two-Generator, Brushless, Electromagnetic Knee Brace Device
6078	Laser-induced Propulsion of Anticancer-Doxorubicin Using a Combined Optical Tweezing and Radiation-induced Interface Deformation
6081	The Effect of Lead (Pb) particles on the Electrical Resistivity of Carbon Nanotubes
6082	Laptop With Built In Printer
6083	Intrinsic Laptop Energy Capture via Keyboard Piezoelectric Conversion
6085	The Effect of an Altered Muffler on a Portable Generator in Relation to its Sound Level
6086	Design for a generating battery life through keyboard
6090	The Use of Samaras for the Safe Dispersion of Pesticides from Aerial Craft
6093	Novel Creation of a Hydrocarbon-Soaking Paper for Remediation and Reuse of Nanoscale Oil Contaminants in Water
6099	The Analysis of Violin Resonance: Subjective Versus Objective.
6100	Non-toxic Biological indicator of Food Spoilage in Pasteurized Milk of Varying Fat Content for Consumer Use
6101	An Investigation of the Biodegradation Rate and Efficiency of Starch-Based Bioplastics
6102	Bat Making Efficiency
6103	Bio-mimicry: The Antimicrobial Proprieties of Nanoscopic Silicon Replications of the Lotus Leaf and the Pitcher Plant
6501	Determining the index of refraction of water and air as a function of temperature and exploring how the vision of people wearing glasses are affected by temperature change.
6502	Blades Of Fury: Wind Blade Efficiency
6505	Subsurface Recovery of Spilled Crude Oil Using Nanomagnet Retrieval System
6507	Comparing Bridge Types
6509	Application of Graphene in Improving Efficiency and Practicality of Transparent and Flexible Photovoltaic Cells
6510	Adaptive Leading Edge Droop Mechanism to Increase Fuel Efficiency and Flight Safety on Private Aircraft
6511	Windbelts: The Future of Wind Power; The Effect of Magnet Thickness, Coil Configuration, and Film Elasticity on Electrical Output of a Windbelt
6512	Light Absorption Of Roof Shingles
6513	A comparative analysis of a mycelia-based foam alternative versus expanded polystyrene as effective insulators and packaging materials.

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Sustainability

Project Number	Title
1001	Color or Plain, It's just not the same
1006	The Affects of Natural Sorbents on Petroleum
1010	Evaporation vs. Filtration
1011	What is the most favorable environment to preserve perishable food?
1012	Is the earth getting hotter? Investigating the Greenhouse Effect.
1015	Salty Shrimp
1020	Analysis of Arsenic in Food from Natural Produce, Effect on Cell Bioavailability, and Effect of Chelators on Absorption.
1021	Are papaya seeds an effective fertilizer?
2004	Coli Forms in Your Drinking Water
2005	Acid Rain And Its Affects on Aquatic Algae.
2014	Using Bioluminescent Diatoms To Help Detect Water Contamination.
2016	Too Hot To Handle
2018	Fluoride Free Water?
2020	Can bioluminescent phytoplankton be an early warning alarm for rising ocean temperatures?
2022	Tsunami
2023	Composting Banana Peels
2501	Natural Alternative To Household Pesticides
2503	Quantitative Analysis of Nitrate and Phosphate "Runoff" Pollution on Long Island Sound, Marine Life, and Hypoxia
2504	An investigation into the use of pyrocystis fusiformis as an early indicator of acidic pollution.
2505	Mold Resistance of Different Building Materials Post-Hurricane
2506	A Comparison of the Effect of Treated and Untreated Well Water on the Growth of Grass
2508	Strain put on the Patellar Tendon
2511	"Wood" it burn well?
2512	Harvesting Fog
2514	The Effects of Acid Rain on the Pteridophyta
2515	Solar power applied to energy output
2517	Intragenetic Competition Between Bioluminescent Dinoflagellates
2518	The Phytoremediation Efficacy of Elodea Canadensis, Lemna Minor, and Brassica Juncea in Copper Sulfate Contaminated Water
2520	The effect of oil spills on sea plants
2521	The Colors of Ozone
2522	Roots and Gravity
2526	Fertilizer: Phenomenal or Fatal
2529	Salinity Study Before and After a Salt Marsh Restoration
2530	What is the level of phosphates in our local bodies of water?
2531	A Comparative Study of the Effects of Organic and Chemical Fertilizers on Lubricus terrestris
2532	Analysis of Allelopathic Effect of Grasses on Common Weeds
2534	THE EFFECT OF IRON ON THE GROWTH OF DINOFLAGELLATES IN ESTUARINE WATER
2537	Caffeine: Not Just for People!
2539	Being Green? What is the LC50 Rate of Green and Standard Detergents on Myelis edilus?
2541	WHICH ECOSYSTEM HAS THE MOST LIFE?
3003	Nonsymbiotic vs. Symbiotic Nitrogen-Fixing Bacteria on the Crop Yield of Leguminosae
3007	The Negative Effects of Phosphates on the Environment
3012	Multi-Trophic Aquaponics

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Sustainability

Project Number	Title
3016	Does Magic Salt have a Chemical Composition that has an Effect on the Environment
3018	Agar Extraction
3020	The Impact of Noise Pollutants on Coastal Invertebrates
3021	Who is Seeing Red? A Biometric Study of Anger
3025	The Correlation Between Environmental Chitinase Activities and Asthma Severity
3026	Finding Clues to Genomic Disorders by Analyzing Evolutionary Variants in DNA Repeats
3028	Insecticides: Killing Grass While Killing Bugs?
3035	The Oxidation Proclamation: Eradicating Odor Oppression in Wastewater
3036	?Electroencephalography to Analyze and control the human Hand
3037	The Efficacy of Bentonite as a Means of Purifying Water
3038	The Presence and Magnitude of Melanomacrophages in the Livers of Sharks
3039	Application of a Poly-electrolytic Layer-by-Layer Assembled Thin Film to Prevent Post-operative Abdominal Adhesions
3049	Quantifying the Effects of Lionfish (<i>Pterois volitans</i>) through Food Web Analysis and Ecopath V 6.0 Modeling on the Mahahual (Mexico) Reef Zone
3053	Sustainable Enhancement of Plant Growth & Disease Reduction Using Biochar Soil Additives
3055	The Effect of Paranormal Activity on Temperature and EMF Ratings
3058	The Bioconversion of <i>Lythrum salicaria</i> to Biofuel and Biofuel Precursors Using the Endophytic Fungus <i>Ascocoryne sarcoides</i> as a Biocatalyst
3065	An Analysis of the Hemocyanin Content of Atlantic Horseshoe Crabs (<i>Limulus polyphemus</i>) Prior to Hemolymph Extraction in Order to Determine Organism Health Status.
3068	A self-powered Controller for a live <i>Blaberus discoidalis</i>
3069	The Growth of the Stony Coral, <i>Leptoseris</i> , in Low Levels of Electric Current
3070	The Use of <i>Limulus</i> Amebocyte Lysate as a Natural Antibacterial Agent, Food Sanitizer, and Environmentally Friendly Pesticide
3072	Biological Control of The Emerald Ash Borer Using Entomopathogenic Fungus
3073	The best floor board material for a flood zone
3078	Remote Control Glove
3079	The Effect of Nitrates on Dissolved Oxygen and Algae Growth
3080	A Novel Design for the Integration of a Microbial Desalination Cell in a Microbial Fuel Cell for the Production of Energy and Purification of Water
3081	The Effect of Tannic Acid in the Soil Surrounding <i>Melissa officinalis</i> and the Resulting Concentration of Tannins in the Plant's Extract
3083	Occurance of bacteria in public vs. private settings and the effect of different sanitation methods on bacterial growth
3086	A Theoretical Examination of Changes in Community Structure due to Consumptive and Competitive Species Interactions During Climate Change
3095	An Assessment of the Reefs in the Windward Islands due to the Presence of <i>Pterios volitans</i>
3099	Comparative Suppression of Soil-borne Pathogens via Earthworm Bioturbation of Wood and Plant-based Biochars
3507	A Novel Approach to the Synthesis of a High-Performance Biomaterial
3510	Effect of Stress on Grasshoppers' Dietary Patterns
3513	Usage of Organic Materials (such as banana peels) to Purify Water
3514	Use of Selective Breeding in Providing a Viable Food Source Under Irradiated Conditions.
4002	pHast Food
4004	Robots as Teachers
4006	Retrofitting a Building
4007	Cars: Pulling Their Own Weight
4008	Poison In the Ground
4009	Rain, Rain, Go Away

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Sustainability

Project Number	Title
4010	Overcoming Rotational Inertia
4011	Methods That Utilize Available Solar and Thermal Energy to Charge Your Electrical Device in a Power Outage Using a Thermoelectric Generator
4014	Analysis of Fabric Flammability Rates and Effect of Chemical Flame Retardants, versus Effect Natural Flame Retardants.
4015	A Battery That Makes Cents
4016	Building Bridges
4017	Dry Ice Engine
4021	Robot Artistic Ability
4023	The Creation Of Seismic Waves
4024	The Python Weather Station
4025	Simulated Logic in Robots
4026	Energy of the Future
4027	The EXCITING ELECTRICAL CURRENT
4029	Marble Roller Coaster
4033	Comparing the Electrical Load of a Fuel Cell and a Rechargeable Battery
4038	The Effect of Heat Treatment on the Strength of Steel
4042	Fighting The Wave
4043	Measuring the Buoyancy of Boats
4044	Maglev Modeling
4046	The speed of marble drop.
4047	The Effect of Different Landscaping Methods on the Prevention of Topsoil Erosion
5001	Solar Car: Affect of Different Colored Films on a Solar Panel
5002	Tsunamis: The Effects of Water Depth and Sea Floor Variation on Wave Velocity
5006	Perfect Plastic
5009	How Can Water Help Win A War?
5011	Impact of Various Parameters on Solar Panel Efficiency
5012	Robotic Rubik's Cube Solver
5013	How Useful is Your Wind
5014	The Effect of Different Types of Light Bulbs on the Relative Efficiency
5015	Transfer of Heat
5017	Keeping it Green with Oranges: The Use of Orange Peels to Create a Better Biofuel
5020	Comparative Study of Three Renewable Energy Sources: Solar Power, Wind Power, and Hydroelectric Power
5022	Salt of the Earth
5026	ELECTRICAL CONDUCTIVITY OF SALT WATER
5027	Impact of using ice-melting chemicals on the coastal waters surrounding the Mystic River Estuary, Beebe Cove and the Noank Marina
5028	Fuel Cell Project
5029	Crystal Radio
5031	What's the Fastest Way to Cool a Soda?
5032	A Gauss Rifle: A Magnetic Linear Accelerator
5034	Effect of Temperature on Magnetism
5035	Amp Up Your Knowledge About Electricity
5036	Let It Flow When It Blows!
5038	Electromagnetism - The effect of coils.

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Sustainability

Project Number	Title
5039	Designing an efficient and affordable Solar Panel Iphone Charger
5040	Rubber Band Energy
5041	The Heat Is On!
5044	What's in Your Water
5045	Corrosion Of Different Metals
5046	Designs that Shake with Earthquakes
5047	Automating A Simple Electromagnetic Generator to Power A Device By Switching AC Current To DC Current
5048	Which Blade is Best?
5049	Lift and Drag in Kites
5051	What Color of Light is Most Visible Through Fog?
5052	Oily Calories
5053	Simple Machine Design and Uses
5502	Earth, Wind, and Fire- comparing water, wind, and solar based fuels
5503	Do Metals Have Antimicrobial Properties?
5506	CAPILLARY ACTION
5508	Salt Water Energy
5509	Aerodynamics and Bridge Design
5513	Singing Wine Glass
5514	Assessing Human Emotional Responses to Robots
5515	The Effects of Acid Rain on Limestone, Granite, and Marble
5516	Inertia Propulsion
5518	Renewable Energy
5521	A New Mathematical-Equation Based Approach for Faster and Efficient Digital Video Transmission
5522	Human Behavior and Robotic Interaction
5523	Efficiency of Plane Designs
5524	the mechanics of an elevator
5525	Tidal Power: Extracting Energy from Ocean Tides
5526	Sound Proofing Your World
5527	Stressful
5528	Wind power
5529	Making Gas Mileage More Efficient
5531	How does the shape and size of a sound direction apparatus affect the decible level of sound?
5535	An Investigation of How the Environmentally Harmful Levels of Algal Bloom Due to Fertilizer Run-off into the Fresh and Coastal Sea Waters of Connecticut Can Be Reduced.
5536	What is the best way to clean up oil?
5538	Controlling Mobile Robots With Sensors
5539	Watts Up?
5540	Evaluating the Performance of a Model Solar Updraft Tower Power Plant
5542	Smart Servos
5544	Hydro or Wind?
5545	Flow Rate vs. Heat Transfer of Fluid
5546	Goldberg Goes Gagghnam Style
5547	Particle Wave Duality Forward Into The Unknown
5549	Wind Turbine Blade Efficiency Through Extensions and Winglet Modifications

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Sustainability

Project Number	Title
5550	As The Wind Turns
5551	Power! A study of various airplane engines and the forces they generate
5552	Measure the Surface Tension of Water
5553	Save the beach house
5554	Gender Bias with Robots
5555	"I'm Melting!" The Wicked Witch of the West and Ice Agree Global Warming is a Problem
5556	High fructose corn syrup versus sugar: Observing the behaviors of invertebrates that are fed sugar and high fructose.
5558	Evaluating Lead Levels of Water in Older Homes
5559	other bags
5561	Got glue?
5562	Converting Waste to Electricity using Efficient Microbial Fuel Cell
5563	Does the design of the bridge affect it capacity
5564	Growing Green
5565	Which battery creates the best solenoid?
6001	An Investigation of a Novel TiO ₂ Coating for Improved Surrounding Air Quality & Reduced Solar Cell Maintenance
6003	New Invention that will harness wave power to convert to unlimited rotational energy
6004	Applications of high-tech swimsuit technology
6005	Trace Metals Found in Pet Food
6006	Utilization Of A Small Unmanned Aerial System for Optimization of Deer Tick Population Management
6007	Using Modified Coal Ash to clean water contaminated with oil
6008	Hydroxyapatite Sol-gel Coatings on Titanium Substrates for Bioengineering Applications
6011	The Effects of Rotor Blade Orientation on the Electrical Output of a Wind Turbine
6012	maximizing the solar collection of a solar panel by mobilizing the system
6014	Fabrication of a Flexible, Tunable Color Changing Skin using Magnetically Responsive Fe ₃ O ₄ Photonic Crystal Structures
6015	Quantification of Carbon Nanotube (CNT) Dispersion in Various Solvents
6017	Development and Testing of a Bicep Other Arm Movements for a Humanoid Robot with Human-like Force Capabilities
6018	The Earth's Wrath: Soil and its effects on buildings during an earthquake
6019	Creating a Perpetual Motion Generator with Permanent Magnets and Ceramic Ball Bearings
6020	Integration of Photovoltaic and Peltier-Seebeck Thermoelectric Effects to Optimize the Power Density of a Hybrid Solar Panel
6022	The Power of Sound and Acoustic Levitation
6023	A Hot Air Balloon's Ability to Fly
6025	Coastal Home Protection
6026	Purifying water using solar power and electrolysis
6028	Wavelength Optimization of Quantum Dot Luminescent Solar Concentrators (LSC) using Tris(8-hydroxyquinoline) for Increased Quantum Efficiency
6029	Effect of MnO ₂ on the Hydrogen Production of a TiO ₂ Based Water Splitting Solar Cell
6031	Peak electricity: Generating Energy Using a Centrifugal Airflow Fan Blade, Propelled by Hot Air Flowing from a Soffit Vent to a Ridge Vent On a Roof
6032	Design of a New Mobile and Autonomous True Random Number Generator.
6033	The Use of Pulse Width Modulation for Sensory Input Control of an Unmanned Aerial Vehicle (UAV) in the C++ Programming Language
6034	Impact of Angle of Incidence on Solar Panel Efficiency
6035	Does blade size matter?
6036	Development of a frictionless magnetic drive to increase efficiency in wind driven turbines

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Sustainability

Project Number	Title
6037	The Use of a Shingled Write Layout to Improve upon Current Hard Drive Capacity
6038	Viable Alternatives to Methyl-Ethyl Cellulose as a Binder in Plique à Jour Enameling
6040	Self-assembling nano-structures and Meta-materials
6041	The Most "Invisible" Geometric Shape: The Future of Stealth Technology
6042	The Traction Between the Wheels and the Road
6045	Improved quantum error correcting methods for optimization of protein structures by folding
6047	A General Study of Different Exposures of Acid Rain Concentrations on Plant Height
6048	The Bedini Circuit
6050	Nanostructured C-Phycocyanin Enhanced Hematite Thin-Film Photoanode Co-Sensitized with Plural Organic Dyes to Yield a Highly Efficient Solar Cell
6054	Integration of Photoluminescent Manganese-doped ZnS Nanocrystals for Improved Solar Cell Response
6056	Thermoelectricity
6058	Quantitative Analysis of H ₂ Production via Photocatalytic Water Splitting
6059	Cellulose Algae Salt Battery
6062	Using cAu-TNF Nanoparticle For Targeted Cancer Therapy: A Simulation
6063	The Artificial Leaf: Capturing Solar Energy Using Photochemical Reactants to Separate Hydrogen and Oxygen in Water
6064	Alternative Wind Turbine Design
6065	Roofing Material Selection: The Impact on Ambient, Internal, and Reflective Temperatures
6067	Effects of Volcanic Activity on Acid Rain Levels
6068	Ca ²⁺ Sensitive Alginate-Dendrimer FRET System for the Detection of MI
6071	Fingerprint- Scanning ATM
6072	Production of 1,3 Propanediol from Glycerol Fermentation
6073	Developing an Inexpensive Speed Radar Trap Using an Arduino Board
6074	Generating Energy from the Swing Flexion, Swing Extension, Stance Flexion, and Stance Extension Stages of Knee Motion Using a Two-Generator, Brushless, Electromagnetic Knee Brace Device
6075	Removing Copper From Drinking Water
6076	The General Study of Alternative Fluids for Asphalt Solar Thermal Collectors
6077	Ocean Currents--Modeling the "Ocean Conveyor Belt"
6078	Laser-induced Propulsion of Anticancer-Doxorubicin Using a Combined Optical Tweezing and Radiation-induced Interface Deformation
6081	The Effect of Lead (Pb) particles on the Electrical Resistivity of Carbon Nanotubes
6082	Laptop With Built In Printer
6083	Intrinsic Laptop Energy Capture via Keyboard Piezoelectric Conversion
6085	The Effect of an Altered Muffler on a Portable Generator in Relation to its Sound Level
6086	Design for a generating battery life through keyboard
6089	Reduction of Biodiesel Post Combustion Residue
6090	The Use of Samaras for the Safe Dispersion of Pesticides from Aerial Craft
6091	Melting Polar Caps and Northern Hemisphere Weather: Is there a correlation between the melting of the polar caps and weather conditions in the northern hemisphere?
6093	Novel Creation of a Hydrocarbon-Soaking Paper for Remediation and Reuse of Nanoscale Oil Contaminants in Water
6095	Electrical Resistance of Water
6096	The Effect of Type of Water Source on Water Quality
6098	How Different Tsunami Barriers Protect the Shoreline
6099	The Analysis of Violin Resonance: Subjective Versus Objective.
6100	Non-toxic Biological indicator of Food Spoilage in Pasteurized Milk of Varying Fat Content for Consumer Use

Scientific Disciplines Selected by Student

2013 Conn. Science & Engineering Fair

Sustainability

Project Number	Title
6101	An Investigation of the Biodegradation Rate and Efficiency of Starch-Based Bioplastics
6102	Bat Making Efficiency
6103	Bio-mimicry: The Antimicrobial Properties of Nanoscopic Silicon Replications of the Lotus Leaf and the Pitcher Plant
6501	Determining the index of refraction of water and air as a function of temperature and exploring how the vision of people wearing glasses are affected by temperature change.
6502	Blades Of Fury: Wind Blade Efficiency
6505	Subsurface Recovery of Spilled Crude Oil Using Nanomagnet Retrieval System
6506	An Ecological Outlook on the Effects of Pollution on Dissolved Oxygen Levels in Seawater
6507	Comparing Bridge Types
6508	A novel approach to degrade harmful byproducts formed during the production of Polyethylene Terephthalate (PET) by using Fomepizole.
6509	Application of Graphene in Improving Efficiency and Practicality of Transparent and Flexible Photovoltaic Cells
6510	Adaptive Leading Edge Droop Mechanism to Increase Fuel Efficiency and Flight Safety on Private Aircraft
6511	Windbelts: The Future of Wind Power; The Effect of Magnet Thickness, Coil Configuration, and Film Elasticity on Electrical Output of a Windbelt
6512	Light Absorption Of Roof Shingles
6513	A comparative analysis of a mycelia-based foam alternative versus expanded polystyrene as effective insulators and packaging materials.
6514	Passive Electrical Generation Through Convection