

2012 Science Fair



**Connecticut  
Science Fair**

March 13 - 17

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# **Student Abstracts**

2012 Connecticut Science Fair

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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 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.**

## Fair Categories

	Life Sciences	Physical Sciences
7 <sup>th</sup> & 8 <sup>th</sup> Grade Team	LT (1001 - 1999)	PT (4001 - 4999)
7 <sup>th</sup> Grade	L7 (2001 - 2499)	P7 (5001 - 5499)
8 <sup>th</sup> 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
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## 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

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1001

Word Count

164

Proj. Title: Is Your Daphnia Hopped Up On Caffeine?

Proj. Num  
1001

StudentName(s): G. Moran, J. Oliver-White

**Abstract:**

Caffeine is frequently an ingredient in energy drinks and weight loss products. The reason for this is that caffeine is a stimulant and increases metabolism by increasing heart rate. Over the years, there have been deaths associated with both products. We wanted to demonstrate that caffeine did in fact raise heart rate and the increase in heart rate corresponded with the amount of caffeine in the beverage. For our experiment we used drinks and not diet aids. We tested espresso, Red Bull, and Pepsi on Daphnia (water flea). Daphnia are freshwater crustaceans and have a transparent carapace. This allowed us to view the heart and count the beats before and after exposure to caffeine. After testing all 3 products, we observed that espresso significantly increased the daphnia's heart beat. What surprised us was that the Red Bull quickly killed the daphnia. Our experiment proved that caffeinated beverage do in fact increase heart rate and may lead to problems in people with undiagnosed heart arrhythmias.

Scientific Disciplines Selected by Student: ME

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7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1002

Word Count

236

Proj. Title: Is it REALLY Blood?

Proj. Num  
1002

StudentName(s): A. Christoforides, J. Mollenthiel

**Abstract:**

The field of forensic science has advanced significantly over the past century in helping solve crimes and mysteries across the globe. There are two types of tests that forensic scientists use to determine if a sample taken at a crime scene is blood. The two tests are called presumptive and confirmatory. If the presumptive test is positive, then a confirmatory test is required to definitively determine that the sample is really blood (Lyle, 2004). An example of a presumptive test is the Kastle-Meyer Test. This project focused on demonstrating whether or not the Kastle-Test can detect non-human blood (i.e. juices from store bought meat or non-meat food products) and how sensitive the test is. The results of experiment one demonstrated that the kit detects not only non-human blood juices from store bought meat, it also reacts with certain vegetables (e.g. horseradish) thereby requiring the subsequent confirmatory testing. This is important information especially for forensic scientists who are collecting evidence at a crime scene because what may seemingly be human blood could be animal blood, juice from raw meat, or other interfering substances. The results of experiment two demonstrated that the Kastle-Meyer Test is sensitive up to a concentration of 0.001. This is also important information for forensic scientists who are investigating crime scenes because it proves that even traces of blood can be detected by the Kastle-Meyer Test kit.

Scientific Disciplines Selected by Student: CH ME

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7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1003

Word Count

225

Proj. Title: Do magnets affect the growth of radishes?

Proj. Num  
1003

StudentName(s): M. Gaudet, R. Fiedler

**Abstract:**

The objective of this experiment is to be able to understand whether or not magnets affect the growth of radishes and also, to avoid taking the wrong turn in terms of the growth of our plants. Magnets attract iron due to the influence of their magnetic field upon the iron, before a piece of iron first enters the magnetic field of a magnet. The polarization of the iron's atoms is random. As it is exposed to the magnetic field, the atoms of the iron begin to align their electrons with the flow of the magnetic field, which makes the iron magnetized as well. This, in turn, creates an attraction between the two magnetized objects. Since this interaction occurs, it pulls down the radishes due to the iron content inside of the radish. We grew four plants, two with magnets and two without. After a period of twenty-five days we pulled the radishes out of the pot and analyzed the growth of the roots around the magnets and we also measured from the longest root to the top of each of the radishes stem. The length from the longest root to the stem is where we received the data shown on our presentation. Our hypothesis was in fact proven because the radishes with magnets were in fact shorter then the other plants in our experiment.

Scientific Disciplines Selected by Student: PS

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Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1004

Word Count

189

Proj. Title: Algae the key to our future

Proj. Num  
1004

StudentName(s): E. Diaz, S. Orzechowski

**Abstract:**

Our purpose is to compare the growth of algae species when they were growing together vs when they were growing separately. we want to achieve high efficiency so we can create biodiesel from algae. The algae we grew were Chlorella Vulgaris and Botryococcus Braunii. Our hypothesis is that when the two algae are growing together they will grow faster and achieve high efficiency in order to make more biodiesel. Our conclusion is that these specific algae specimens grew faster together and created high efficiency. As shown in our charts, when grown together they grew twice as fast than when grown separately. We did also find out that Chlorella Vulgaris alone is comprised of forty percent of fatty acid which can be turned into oil and Botryococcus Braunii is comprised of 25 percent fatty acid. When together they hold 65 percent of oil content. Our experimentation doesn't stop here, we would like to continue our studies and find out what the absolute best methods are for creating biodiesel. Maybe one day our research will become a part of a big journey on trying to save the Earth for future generations.

Scientific Disciplines Selected by Student: EV PS

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7th Grade	L7	P7
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High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

Word Count

253

1005

Proj. Title: The Effectiveness of Natural Acne Products vs. Chemical Commercial Products

Proj. Num  
1005

StudentName(s): M. Comer, G. Byrne

**Abstract:**

The problem in this experiment was whether commercial or natural acne products work better on preventing bacteria. The hypothesis predicted that natural products would be more effective, because of the natural antiseptic properties that each product had. First, the plates were inoculated with staphylococcus epidermis. Then disks were soaked in product and placed on the plates. The products used were tea tree oil, witch hazel, apple cider vinegar, Clearasil, Proactive, and Clean & Clear. Three disks were used for each product and they were left in an incubator for 36 hours, which acted as an ideal environment for the growth of bacteria. When the plates were taken out of the incubator, the zone of inhibition (where the bacterium did not grow) was measured. Depending on the size and existence of a zone of inhibition, each product was proved effective or ineffective. The hypothesis that natural products were more effective than chemical products was refuted. When the plates were taken out it was clear that most of the natural products did not work. Tea tree oil was the only one (out of natural products) that had a zone of inhibition. The other two natural products had no zone of inhibition, meaning the bacterium was resistant. In the Clearasil and Proactive, there were discernable zone of inhibitions, meaning the bacterium was sensitive. Clean and clear had no zone of inhibition. Although tea tree oil had the largest zone of inhibition, meaning it was the most effective, on average, commercialized chemical products had higher zones of inhibition.

Scientific Disciplines Selected by Student: ME

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7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1007

Word Count

252

Proj. Title: Environmental Effects

Proj. Num: 1007

StudentName(s): C. Crouse, S. Pallas

**Abstract:**

We chose to investigate this experiment because “green” products are shown all over the media today. They are such a big topic in the world, and especially in America. We thought if we put “green” and conventional dish soaps on cat grass, then the plants treated with the “green” soaps will survive longer, but still be harmed because they are made up of biodegradable ingredients but still contain harmful chemicals. First, we had to dilute all four detergents (two biodegradable and two conventional) into 100,50,25,12.5,6,3, and 0 percent. Then, we had to pour five mL of each dilution onto the correct cup of cat grass. Over the next week to two and a half weeks, we observed the plants and recorded how many days it took for the plants to lose their moisture. Our hypothesis was wrong. In our case, it didn’t matter what detergent or what percentage concentration was used on the plants, they died consistently within the trials. We found the sunlight was what mainly affected the trials, not the detergents. We concluded that people should not buy expensive “green” products because they don’t make a significant difference over conventional products. To improve upon this experiment we would try to further control the amount of sunlight given to the plants, use more plants, and complete more trials to prove the accuracy of this experiment. Overall, we found that it was the sunlight that affected the plants the most, not the detergent because the plants died consistently within trials, not detergents.

Scientific Disciplines Selected by Student: EA EV PS

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7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1008

Word Count

248

Proj. Title: Weed Massacre

Proj. Num: 1008

StudentName(s): M. Phillips, E. Lynders

### Abstract:

After Hurricane Irene, the grass along the shoreline was killed by flooding seawater. We wondered if saltwater is as effective as store-bought weed killer. Our hypothesis is that saltwater or pure salt will kill weeds as successfully as Round Up, a commercial weed killer, but in a more eco-friendly way. Twenty Common Cat Sear weeds were transplanted into plastic cups filled with soil; we separated them into four groups- Round Up, pure salt, seawater, and control. The first day, we applied two sprays of Round Up to the first group, one teaspoon of salt to the second group, and ¼ of a cup of seawater to the third group. We added three tablespoons of water to each group. We repeated this process every three days for three weeks, recording the results. The results showed that the pure salt was the most effective, killing all five weeds in 2 weeks. Each time we applied Round Up to the weeds, they would wilt, but grow back. By the third week, all the weeds with Round Up were dead. The weeds given seawater were unaffected. The weeds in the control group remained healthy. The results were not what we expected. Round Up eventually did kill the weeds but salt killed them faster. We suspect salt's powerful effect is a result of its natural desiccant qualities. Unexpectedly, seawater did not affect growth, because it was too dilute. Our project proved that salt is a better weed killer than Round Up.

Scientific Disciplines Selected by Student: EA EM EV PS

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7th & 8th Team	LT	PT
7th Grade	L7	P7
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High Sch. Team	LST	PST

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1010

Word Count

252

Proj. Num

1010

Title: Testing The Effect of pH Levels of Polluted Fresh Water on Elodea Canadensis Life Span

StudentName(s): L. Cirone, A. Brubaker

### Abstract:

The purpose of this experiment is to find out if making the pH level of polluted fresh water neutral will keep the Elodea Canadensis alive. Each trial will be polluted by one of three types of pollution: Miracle-Gro®, motor oil, or Windex®. It is predicted that the Elodea Canadensis growing in polluted water will turn brown and die first. The Elodea Canadensis growing in water that has been polluted and the pH has been altered will turn a greenish brown but not die. The Elodea Canadensis growing in unpolluted fresh water will stay green and not die throughout all 14 days. Begin this experiment by planting 4 Elodea Canadensis living specimens in aquarium gravel. Fill each bin with water. Pollute the water with Windex, motor oil or Miracle-Gro®. Measure and record the pH of each bin. Add vinegar if the pH is above 7.0 and add baking soda if the pH is below 7.0. Record the color of each Elodea Canadensis using the color scale throughout both weeks of testing. It was observed that the Elodea Canadensis growing in unpolluted fresh water remained green throughout the testing. The Elodea Canadensis growing in water with an altered pH remained green for about 7 days. The plants growing in polluted water died within 2 to 5 days. It is concluded that the hypothesis is correct. This experiment could be improved by having more trials, having a longer testing time, testing in an area with a stable temperature, and testing each plant separately.

Scientific Disciplines Selected by Student: EA EM PS

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1011

Word Count

183

Proj. Title: one nasty fact

Proj. Num  
1011

StudentName(s): D. Arteaga, k. santiago

**Abstract:**

Our project is about live bacteria and organisms' sure that when your in your house you may have a cup of water and think to your self i will have some later and like thirty minutes to one hour later you will come back and drink it. But don't you wonder what will or has grown in the water. Well that is what our project is about. In this project we will show what grows in the water once it is left out. We will use salt water, tap water, and filtered water. In this experiment you will find out about all the different types of species in long island sound. You will find out about even the dangerous and ones that can get you sick. And about the ones that are not harmful. Also in this experiment you can find out the bacteria that is good for you in the tap and some that are not so good. Once it comes to the end of our experiment you will be amazed at what you find out water might be in your water

Scientific Disciplines Selected by Student: MI

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1012

Word Count

177

Proj. Title: The Effect of Electromagnetic Fields on Scenedesmus Algae Cells

Proj. Num  
1012

StudentName(s): K. Ringes, M. Renzi

**Abstract:**

The objective of this experiment was to determine if and how much increasingly stronger electromagnetic fields affect the growth of the algae cells. It was predicted that with stronger electromagnetic fields exposed to the Scenedesmus algae, a greater amount of algae will be produced. The algae was exposed to different levels of electromagnetism over 24 hours. Four test tubes had different amounts of coils of electrical wire wrapped around them. Test Tube 5 was the control. Therefore, there were no coils around this test tube. The experiment was performed twice. The average amount of change in Test Tube 1 was a 63% decrease. The average amount of change in Test Tube 2 was a 68% decrease. The average amount of change in Test Tube 3 was a 31% decrease. The average amount of change in Test Tube 4 was a 22% decrease. The average amount of change in Test Tube 5, the control, was a 29% decrease. It is concluded that the hypothesis was incorrect. Overall, there was no growth of algae at any level of electromagnetism.

Scientific Disciplines Selected by Student: EN EM MI PS

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7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1013

Word Count

174

Proj. Title: Can Pepsi Kill?

Proj. Num  
1013

StudentName(s): K. Johnson, A. Agarwal

**Abstract:**

Abstract- Hypothesis: If antithetic acidic mixtures reconstitute H2O amid the Chinese Water Torture then the more chemically enhanced adulteration will penetrate a deeper hole in the apple. Despite the civility and violence behind Chinese Water Torture, isn't mankind always looking for ways to make life simpler and easier? If there was a torture method that took days, and all you had to do was hook up a dropper and a Pepsi bottle wouldn't comic book companies as well as communist countries jump on it? In simple words, we took household acids and tested their affect on apples; the apples symbolizing the human heads. Results indicate that Pepsi was the most effective. From this experiment we learned that Pepsi is not only an acid but has such a strong and painful pH that it can trump ancient methods along with good old freezing tap water. We found that acids take a tedious amount of time to test, even when scaled down, but their implications on human skin must be extremely painful; thus the term torture.

Scientific Disciplines Selected by Student: CH

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7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1014

Word Count

177

Proj. Title: Hydration Benefits with Fruits and Vegetables and Effect on "Cell" Absorption

Proj. Num  
1014

StudentName(s): D. Hodakov, B. Lipsker

**Abstract:**

The goal of our experiment was to find an alternate way to stay hydrated. Can we “Eat Your Water” and gain benefits through fruits and vegetables with high water content? After dehydrating selected produce, we analyzed “cell” bioavailability (simulated cells), nutritional benefits, and antioxidant values. All produce contained a high percentage of water (averaging more than 80%) including: Tomato (94%) Honeydew (90%) Cantaloupe (89%) Pineapple (86%) Kale (91%) Spinach (90%) Carrots (89%) Mushrooms (88%) • Most produce was quickly bioavailable. □ Fruits averaged an absorption rate of 50mg/min. □ Vegetables averaged an absorption rate of 25 mg/min. • There appeared to be a negative correlation between cell absorption rates and antioxidant levels. (Sugar content and/or fiber can slow absorption. • There is a positive correlation between antioxidant and nutritional values. (and increased water content). • All tested produce contained nutritional benefits. □ Vitamins (C&A): Orange, pineapple, berries, carrots □ Minerals (Potassium and Iron): Melons, Apricots, Kale □ Fiber: Kidney Beans □ Carbohydrates: Corn, Potato □ Protein: Soy, Beans You can definitely “Eat Your Water” and stay hydrated!

Scientific Disciplines Selected by Student: BI ME MI

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Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1015

Word Count

140

Proj. Title: X-rays: Friend or Foe

Proj. Num: 1015

StudentName(s): H. Soucy, A. Yerkes

**Abstract:**

The purpose of this experiment was to see whether X-rays have an effect on the growth of green bean seeds. The hypothesis stated that although X-rays can be harmful, small amounts of medical X-rays are not enough to cause tissue damage. We exposed green bean seeds to X-rays for a varied amount of exposures at Guilford Veterinary Hospital under the supervision of Dr. Anita Soucy. We monitored their growth for eight days by recording the heights of the bean sprouts. The two groups of seeds that received the larger number of exposures grew the highest. The hypothesis was correct because the X-rays had no negative effect on the growth of the plants. This experiment shows that small amounts of medical X-rays such as those needed to diagnose an illness or injury are not harmful.

Scientific Disciplines Selected by Student: PS

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Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1016

Word Count

239

Proj. Title: Harvesting Wild Yeast to Make Our Own Unique, Local Sourdough Bread

Proj. Num  
1016

StudentName(s): U. Shea, S. Brady, B. Hurst

**Abstract:**

In a previous project, we made sourdough starter cultures from wild and commercial yeast to see which ones would make higher quality bread. Afterwards, we decided to repeat the experiment, and this time control temperature, humidity, exposure to air and the recipe for each of our test samples. We hoped to perfect the sourdough starter made with wild yeast, because we wanted to create a “mother culture” that was unique to our locality. With this experiment, we were trying to see what factors would affect our wild yeast culture, or if a commercial starter would be the better route. In each of four plastic containers, we mixed 240g of bread flour with 325g of well water, and to two we added 0.5ml commercial yeast. We covered two samples with lids and left two open to the air. In a fifth container, we used chlorinated tap water to see if the chlorine would kill the yeast and ruin the starter. After two weeks, we used the starters to leaven dough and bake bread. We rated the breads’ density, odor, texture and appearance on a scale of 1-10. Our results showed that all of our sourdoughs were at least somewhat successful, even the sourdough with chlorinated water. Clearly, we were able to harvest local wild yeast for a unique bread; however, not surprisingly, the wild yeast was less successful than commercial yeast, which has been honed and perfected for many decades.

Scientific Disciplines Selected by Student: BI

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1017

Word Count

243

Proj. Title: The Effects of Global Warming On Marine Life

Proj. Num  
1017

StudentName(s): K. Stafko, A. Maddalena

**Abstract:**

The purpose of this experiment was to show that Global warming is having an effect on marine life . The impact on Marine life affects the world’s food supply. We must recognize that even the smallest increase in acidity can have large implications on the future of our marine life. To test this hypothesis we placed one ounce of crushed clamshells in an instant ocean solution changing the pH just slightly 7.8, 7.6 and 7.4 from a controlled 8.2 pH representing the current Oceans ph. We took careful took measurements with a pH meter and then sealed the jars so that they would be airtight. Making sure the Ocean water was right up to the lid. We then monitored the shells over a period of 4 weeks. We then strained the clamshells and dried them on a paper towel. We weighed the shells on a scale in grams. The results showed that the shells with a pH of 7.4 and 7.6 pH had decreases in average weight of 3 grams. In the short amount of time we had the shells in the Ocean Water solution we saw a change in weight. Marine life is extremely fragile, the slightest increase in acidity can cause shells to become weak, and subject to disease, attacks from predators the coral reefs are dying. The Oceans absorb about 1/3 of the earth's co2. We see the most drastic results in areas with colder water temperature like in the Artic.

Scientific Disciplines Selected by Student: BI CH EM EV

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
BE = Behavioral & Social Sciences	EV = Environmental Analysis
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1018

Word Count

287

Proj. Title: Eco-Friendly, Equally Effective?

Proj. Num  
1018

StudentName(s): E. Lloyd, A. Prawl, S. Silpot

**Abstract:**

The reason for this investigation was to analyze whether eco-friendly cleaners are truly equally effective. Our hypothesis was that the non eco-friendly cleaning product (bleach) will kill more bacteria, due to the fact that bleach contains much more harmful chemicals than Seventh Generation. In our investigation, we set up two agar petri-dishes to be designated to each variable, including the control. Wearing gloved and masks, we swabbed the handle of the girls' bathroom door at school. We gently rubbed the surfaces of the agar petri-dishes with the swabs, then sealed the dishes. We recorded the amount of bacteria that grew on the petri-dishes after a period of two days, by counting the colonies. 36 drops of each disinfectant was measured to be placed on each of the corresponding pertri-dishes. We measured the bacteria colony annihilation for the following three days. Based on the data, we analyzed that they bleach killed more bacteria than Seventh Generation. The Seventh Generation averaged 16 colonies annihilated compared to the bleach, which averaged 47 colonies. Therefore, bleach was clearly more effective, although Seventh Generation did work. In conclusion, we have found that bleach is a better cleaning product to use for disinfection than Seventh Generation. Although bleach worked well, we are not sure that it is the best choice for household use. This is because perhaps it worked too well, killing important organisms that it comes in contact with after it has been used for cleaning. It is also important to remember that exposure to certain germs (micro-organisms) helps to build antibodies so that people can maintain a better immune system. Maybe it is not necessary to annihilate them, just reduce their amount and strength.

Scientific Disciplines Selected by Student: BI CB EM EV PS

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1019

Word Count

247

Proj. Title: The Mighty Houseplant

Proj. Num  
1019

StudentName(s): K. Giffault, P. Giffault

**Abstract:**

Abstract In reading about indoor air pollution and how we are affected by it, we became intrigued by how ordinary house plants could be used to greatly improve indoor air quality. Our experiment was designed to determine if plants could improve the air quality in our home. In our hypothesis, we stated that if we put five kinds of houseplants in five rooms for four- ten weeks, then over time the plants will decrease the indoor air pollution using a process called phytoremediation. First, we tested the air quality of the rooms without plants. Then, we put the five plants in each room and tested the results each week for five weeks. The small/large particles were tested with a DC1100 air quality monitor. With this device, we were able to measure small/large particles per 0.1 cubic foot of air. Overall, the small and large particles decreased dramatically. In our conclusion we chose to accept our hypothesis because our results clearly showed the amount of particles in the air decreased. It is very important to have clean indoor air for your health. People spend ninety percent of their time indoors where levels of pollution can be two to five times higher than outside. Health problems from poor air quality include asthma, headaches and cancer. This is why we thought that if we could succeed with this experiment, then others might want to have more plants in their homes or offices to make their air less polluted.

Scientific Disciplines Selected by Student: EA EV PS

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1020

Word Count

146

Proj. Title: Say Cheese

Proj. Num: 1020

StudentName(s): C. DiMaiolo, S. Stevenson

**Abstract:**

This experiment was conducted to see if certain emotions displayed in pictures are contagious. We wanted to find out whether smiling vs. crying displaying images are more contagious. We showed test subjects two pictures, one displaying a happy emotion and the other displaying a sad emotion. We showed the picture for about five seconds then recorded in the data table whether or not the subject showed a physical reaction. Smiling was more contagious with most of our test subjects especially since we used very expressive pictures of the emotions we wanted to display. Others might look over this experiment and use many other, different emotion displaying pictures (such as mad). If other people were to do this experiment again they would probably want to allow test subjects to see pictures longer. Also to explain what they were testing in more detail before they showed the pictures.

Scientific Disciplines Selected by Student: BE

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
| 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                  |
| EB = Engineering: Materials & Bioengineering | PS = Plant Science                        |

- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1021

Word Count

298

Proj. Title: Which medium gathers the most snail mucus?

Proj. Num  
1021

StudentName(s): Y. Schectman, G. Silver

### Abstract:

One day, I saw some wild snails in my aquarium, and decided to test what type of medium can collect the most mucus from snails, as it can be used for acne and skin regeneration. We hypothesized that if an edible substance such as lettuce is used as a medium then it will collect more mucus than a non-edible substance because the snails will be attracted to it. We also thought that the rocks would collect more mucus than the cotton ball would. We placed two leaves of lettuce in a 5 gallon aquarium with four snails in it. After five days we took out the lettuce, let it drip to remove excess water, and measured the mass of the collected mucus. We did this again with two cotton balls, and rocks, each with a roughly equal available surface area. We performed three trials for each medium. The lettuce collected the most mucus for the first two trials, then the rocks, and the cotton balls collected nothing. However, in the third trial, the results were very different from the first two. In the third trial the cotton balls collected the most mucus, the lettuce collected less, and the rocks collected very little mucus. We are unsure why the third trial collected more mucus with each of the mediums, we believe it may be because the snails were more acclimated to the foreign substances in the aquarium. This problem could be eliminated by acclimating the snails before the experiment, using different snails each time, or by performing more trials to get more accurate results, however we did not have enough time to do so. By comparing the averages of each medium, either including or excluding the final trial, our hypothesis was supported because the lettuce collected the most.

Scientific Disciplines Selected by Student: AS EN EM

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1022

Word Count

199

Proj. Num

1022

Title: Analysis of Omega Oils as Cancer Inhibitors and Antioxidants plus Effect on Cell Bioavailability

StudentName(s): R. Kantor, B. Hecht

**Abstract:**

We may have found “The Answer to Cancer!” We were trying to find the most effective Omega 3/ Omega 6 oils on the inhibition of cancer. Using Agrobacterium Tumefaciens, a plant cancer, we tested the Zone of Inhibition, tumor growth on plants, “cell” bioavailability, and antioxidant strength. We covered all areas and discovered amazing and accurate results. Our best cancer inhibitors follow with averaged test results (based on data from each of the four experiments). The most effective Omega 3 oils are: • DHA supplement inhibits cancer by 90% • Krill oil inhibits cancer by 85% • Cod liver oil inhibits cancer by 55% • Fish oil inhibits cancer by 65% These Omega 6 oils were most successful (although less effective than the omega 3 oils). • Avocado oil inhibits cancer by 10% • Citrus oil inhibits cancer by 6% Combining Omega 3 oils with Omega 6 oils improved all Omega 6 results, especially: • Krill and avocado oil inhibits cancer by 60% • Krill and corn oil inhibits cancer by 45% • Krill and safflower oil inhibits cancer by 45% There was a positive correlation between all Omega oils’ cancer inhibition and antioxidant strength. Hopefully, our experiments will help others in search for “The Answer to Cancer.”

Scientific Disciplines Selected by Student: BI ME MI

**Scientific Disciplines**

**Fair Categories**

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- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

Word Count

211

1024

Proj. Title: The Battle of Lung Capacity

Proj. Num  
1024

StudentName(s): M. Enright, M. Shubert

**Abstract:**

In our project, The Battle of Lung Capacity, we tested the lung capacities of instrumentalists verses chours members. We also tested a control group of people who don't play an instrument or sing. We had each person blow up three balloons in one breath. We then measured the ballons' circumferneces and averaged them per person. We found that the instrumentalists narrowly defeated the chours members with an overal average of 19.74 inches. The chours members had an overal average of 19 inches. Our hypothesis was proven by our data. In conclusion we decided that, to get more conclusive results, we would test more than 20 people per group. This would help us see if there is a larger difference in lung capacity between instrumentalists and chours members. We also found a few errors in our project. We found that some air was lost in the tying of the balloons. Also, we noticed that it is very hard to get a exact circumference measurement for a balloon. We know this because there are so many different places to measure on a balloon; so it is almost impossible to measure at the same spot every time. Lastly, we found this experiment instrument intruiging and informative because we are both indtrumentalists and chrous members.

Scientific Disciplines Selected by Student: ME

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1025

Word Count

221

Proj. Title: Drastic Plastics

Proj. Num  
1025

StudentName(s): T. Smith-Val, I. Morgan

**Abstract:**

The purpose of our experiment was to find which type of plastic, HDPE2 or corn plastic, would decompose faster in irrigated soil. We believed that the corn plastic was going to decompose faster because it is made with naturally occurring materials. If we found this to be true, then a recommendation could be made for companies to eliminate the use of HDPE2 in order to reduce the amount of waste our planet produces. To begin our experiment, we cut three samples of each type of plastic into 2cm x 2cm square pieces. We then buried the samples in different containers with varying amounts of soil. Once a week, we unearthed the pieces and measured their lengths and widths. We then reburied the samples, and poured water into each container of soil to simulate a natural environment. The results of our experiment found that the average shrinkage for corn plastic was .26cm<sup>2</sup>, while the HDPE2 samples shrank an average of .20 cm<sup>2</sup>. We concluded that corn plastics decompose at a faster rate than traditional plastics like HDPE2. According to our data the difference between amounts of decomposed plastic was .06cm<sup>2</sup>. Based on our findings, we recommend that corn plastic is the clear choice for future plastic production in order to reduce the amount of non-decomposable waste we store on the planet.

Scientific Disciplines Selected by Student: EA EM PS

### Scientific Disciplines

### Fair Categories

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

1026

Word Count

242

Proj. Title: Colorful Choices

Proj. Num: 1026

StudentName(s): I. Vineyard, O. Fassett

**Abstract:**

Does your favorite color, out of the colors red, orange, yellow, green, blue, and brown, affect which M&M you will pick based on your age? We chose this problem because we are interested in color preference and how it affects choices. Our hypothesis was that the 7th graders would pick the most M&Ms that were their favorite color. First, we poured 50 M&Ms of each color into a large, plastic bowl. Next, we selected 10 7-year olds, 10 12-year olds, and 10 moms. Then, we had each participant pick 10 M&Ms 1 at a time. After that, we recorded the amount of each color chosen. Finally, we analyzed the results. An average of 25% of M&Ms chosen were the 2nd graders favorite color. An average of 36% of M&Ms chosen were the 7th graders favorite color. An average of 23% of M&Ms chosen were the adults favorite color. The 7th graders had the highest percentage, and had the most biased choices. The 2nd graders either didn't have a favorite color or didn't know their favorite color immediately. The 7th graders knew their favorite color immediately. The adults picked more randomly than the other two groups, but they still had no trouble stating their favorite color. This probably means that although moms know what their favorite color is, they don't think about it when making everyday choices. In conclusion, our data matched our hypothesis.

Scientific Disciplines Selected by Student: BE

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LT

# Connecticut Science Fair Abstract

Project Number

Word Count

222

1027

Proj. Title: Hidden Horrors: Do Germs Lurk in our School?

Proj. Num  
1027

StudentName(s): M. Casino, R. Hewitt

**Abstract:**

Abstract You wash your hands after going to the bathroom. You wash your hands before you eat. Why? Because we are told to wash our hands to wash away germs. But germs are everywhere around us, so do we wash our hands after everything we do? Most of us do not. In our school, we expect to find germs in logical places like the bathroom. In this project, we asked the question "Do Germs Lurk in our School?". The purpose of this science project was to determine if germs lurk in unexpected places; in places that we touch regularly, but do not think to wash our hands afterwards. The experiment was done by swabbing different areas within our school and then attempting to grow bacteria in sealed Petri dishes from the samples taken by those swabs. The sealed Petri dishes were stored in zip baggies and kept in a constant temperature, provided fresh air daily and observed on a daily basis. Growth was measured through the use of a grid that was used on all the dishes. A log was kept of all observations and photographs were taken daily. The hypothesis was that if samples are obtained from locations within our school, then bacteria will grow from those samples. The results of this science fair project proved the hypothesis to be correct.

Scientific Disciplines Selected by Student: MI

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

Word Count

180

2001

Proj. Title: Battling Bacteria of the Mouth

Num

2001

StudentName(s): J. Allen

### Abstract:

A typical human mouth has billions of bacteria. Halitosis is an oral health condition characterized by consistently odorous breath. The most common cause of halitosis is the anaerobic bacteria that live in a person's mouth. Mouthwashes can help treat bad breath by killing bacteria or neutralizing the volatile sulfur compounds they produce. The purpose of this study was to determine which mouthwash kills more oral bacteria. Two people had their mouths swabbed with sterile cotton-tipped swabs and mixed them in saline. One milliliter was then mixed with 3 ml each of Listerine, Scope, Crest Pro-Health Complete Rinse, and saline for 15 and then for 45 seconds. A small sample from each time and mouthwash was plated on petri dishes and the number and types of colonies counted. Each of the mouthwashes had much less bacteria than the saline which means that they were effective in killing bacteria. Listerine had no bacteria but Scope and Crest both had some bacteria. This suggests that all three mouthwashes were effective in killing mouth bacteria but that Listerine was the most effective.

Scientific Disciplines Selected by Student: ME MI

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

Word Count

248

2002

Proj. Title: REDUCE! REUSE! RECYCLE! - The Biodegradable Factor

Proj. Num  
2002

StudentName(s): J. Greene

### Abstract:

We all have a responsibility to recycle our trash. Biodegradation is the natural recycling of waste in the environment by microorganisms. In this experiment, I wanted to observe how fast or slow certain materials decompose, or biodegrade, under different conditions, during a time period of ten days. I predicted that food items would biodegrade faster than paper products or man-made products, regardless of soil sample; and that the soil sample treated with Rid-X would speed up the degradation process of the food items. Biodegradation was determined by putting food items, in four different soil samples. These samples consisted of untreated yard dirt, organic potting soil, organic potting soil treated with plant food, and organic potting soil treated with Rid-X. The same procedure was used with the paper product group and the man made material group. After ten days, the degree of biodegradation was determined by measuring the size of the items in each of the soil samples. It was found that the items in the food group displayed a higher level of decomposition in all soil samples compared to the other two groups. However, the food items in the soil sample with the plant food, not the Rid-X, displayed the highest level of decomposition of all the food group samples. The contribution of this project is to show the importance of using the recycling program in our state because some disposable items will not biodegrade for a long time and will hurt the environment.

Scientific Disciplines Selected by Student: EM EV

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2003

Word Count

249

Proj. Num

2003

Title: Depleting Oyster Population: Alarming Coincidence or CO2

StudentName(s): A. Avdiu

**Abstract:**

The purpose of my project is to further research on ocean acidification and it's affect on oysters. Due to growing acidic conditions of oceans, oysters are struggling to build and maintain healthy shells. Out of the four groups of shell material tested, Group C, the environment replicating acidic conditions predicted in 90-100 years, will decalcify the most. Key Materials: -10 cut oyster shells. Size: 1/2cm by 1/2cm to 1cm by 1cm. -Hydrogen peroxide Experiment Specifications: Testing four shell groups in different pH levels, charting decalcification rate. Group A: pH conditions of oceans pre-industrial revolution. Three shell fragments Group B: pH conditions oceans are at currently. Three shell fragments. Group C: pH conditions predicted by 2100. Three shell fragments. Group CG: Control group, water in original state. One shell fragment. To get desired pH levels, hydrogen peroxide (HP) proved most affective to lower pH. Ratio of HP/water to lower pH: 1/2tsp HP : 100ml water : lowers by 12-16pH units. Daily alterations needed to keep the pH constant. Pre-experiment, mid-experiment, post-experiment measurements were taken of the shells. My hypothesis was correct. Group A and B decreased by an average area of 0.09cm and 0.2cm while C decreased by 0.24cm. The control group showed no change. Based on results, when pH levels reach those predicted by 2100, the oysters' shell will decalcify, leaving the oysters prone to predators. If we continue to pollute the environment, this will directly affect the population of young and adult oysters world-wide.

Scientific Disciplines Selected by Student: AS CH EA EM EV

**Scientific Disciplines**

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**Fair Categories**

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2004

Word Count

264

Proj. Title: Bioluminescent Dinoflagellates and Environmental Acidity

Proj. Num  
2004

StudentName(s): A. Marmer-Adams

### Abstract:

**Purpose:** I wanted to understand Harmful Algal Blooms (HABs) better, and so needed to use non-toxic surrogates. Studying closely-related organisms' bioluminescence in varying pH media would allow tracking their growth in conditions approximating acid rain as well as their growth's impact on environmental pH. **Materials/Methods:** I used a pH meter/thermometer; acids; ultraviolet/incandescent/infrared light and three Pyrocystis algal species. Initial growth media were Erdschreiber's Solution, Enriched Seawater. All algae were light-cycled several days to begin bioluminescence. Extra UV/IR light in the known absorption bands of Pyrocystis photopigments was provided to maximize bioluminescence measurability. I measured their growth (bioluminescence), media pH/temperature along two major variables: initial pH during growth phase, and species. Several pH conditions were set, ranging from upper bounds of acid-rain acidity (5.75) to alkalinity of the Erdschreiber's/Enriched Seawater (8.43). At the end of the planned growth cycles, some samples were shocked with acid solutions (5.16, 6.09) to gauge the survival range of Pyrocystis. **Results:** Twenty-five of 36 cultures (69.4%) were able to grow into bioluminescence, all raising the media pH strongly from initial conditions; 2/2 fusiformis, 1/2 lunula and 0/8 noctiluca (overall 25%) were able to grow/bioluminesce under acidic conditions. **Conclusion:** Results show both that Pyrocystis significantly affect environmental pH in close surroundings and that environmental pH affects growth of Pyrocystis, with two of three species showing 75% growth success (50% strong growth) in acidic environments as low as pH=6.09. Acid rains may well further HABs among bioluminescent dinoflagellate species; similar research on related toxic Alexandrium dinoflagellates is planned.

Scientific Disciplines Selected by Student: AS BI CH EV MI PS

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CS = Computer Science	MI = Microbiology
EA = Earth Science	PH = Physics & Astronomy
EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2005

Word Count

177

Proj. Title: In Which of the Three Environments Does A Green Banana Ripen the Fastest?

Proj. Num  
2005

StudentName(s): A. Zohrabian

**Abstract:**

I have enjoyed performing my experiment on bananas. My question was, "In Which of the Three Environments Does A Green Banana Ripen the Fastest?" I thought that the banana in the warmest environment would ripen faster than the other two bananas. I took three green, unripen bananas and put them in three different environments around the house. I put the first one in the kitchen counter, the second in the refrigerator, and the third in the garage. I tested my experiment for one week and found my hypothesis was correct. The banana in room temperature, the kitchen counter, turned yellow faster than the other bananas. The banana in the refrigerator did not ripen but turned black and hard. The banana in the garage became slimy and black and also did not ripen. The results of the third banana could've been affected by the weather and the warm climate in the kitchen counter could've caused the first green banana to ripen faster. Through this experiment, I have learned that bananas in warm climates ripen faster and more efficiently.

Scientific Disciplines Selected by Student: PS

**Scientific Disciplines**

**Fair Categories**

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

- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |



Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2006

Word Count

240

**Proj. Num** 2006 **Title:** Could an Aquatic Plant Absorb Eighty Percent of the Carbon Dioxide in the Atmosphere during the Eocene Period?

**StudentName(s):** K. Fennell

**Abstract:**

The Eocene began fifty-five million years ago as the hottest time since the dinosaurs died out. The mean annual temperature of the High Arctic was as high as 18-20oC. But by the middle of the Eocene, the Earth began to cool, so that by thirty-four million years ago glaciers covered Antarctica. A recent explanation for the cooling involves the fresh water fern, Azolla, which grew in a fresh water layer in the Arctic Ocean. The landlocked ocean became very saline, and toxic to decomposers. Azolla absorbed large amounts of carbon dioxide, but did not release it in death. Instead dead plants became the oil and gas deposits. Here I test this theory by observing Azolla in tanks to recreate Arctic conditions. First, I tested whether Azolla could survive the extended Arctic darkness. Second, I measured the nutrients Azolla required in the water, to see what conditions would have been necessary to support Azolla. Third, I compared how Azolla decomposed in very salty sea water compared with how it decomposed in ordinary sea water. The experiments showed that Azolla was very sensitive to darkness. Azolla also required very high concentrations of nutrients in the water to grow rapidly. And finally it appeared that high salt concentration in fact prevented decomposition. The results of my various tests combined, demonstrate that my hypothesis stating that Azolla caused a significant decline in the carbon dioxide fifty-five million years ago is plausible.

**Scientific Disciplines Selected by Student:** PS

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2007

Word Count

249

Proj. Title: Peel Power

Proj. Num  
2007

StudentName(s): J. Siveyer

### Abstract:

Purpose: Runoff water can absorb heavy metals such as lead and copper that can pollute water courses such as rivers or lakes. These heavy metals can cause health problems like kidney and nervous system disorders. We have chemicals to purify the water but they can cause their own bad effects and are expensive. I decided to test banana peels, a material that is easy to acquire and inexpensive, to remove the heavy metals. Procedure: 210 grains Copper Sulfate was added to clean water (8L) to simulate polluted runoff. That water was poured into .5L containers. Dried, minced banana peels were added to the .5L container of water. Data was recorded at 5, 15, 40, 120, and 240 minutes after the bananas were put in, using an Aquarium Pharmaceuticals test kit that was used on 5ml samples taken from the .5L container. Data: For some tests, the banana peels lowered the amount of copper from 4ppm to about 3ppm in less than 4 hours. In other tests, the bananas turned the water yellow, making it hard to interpret results. If the peels were dried before mincing, the water stayed clearer when the peel was added, making it easier to read the indicator. Conclusion: I found that banana peels are able to absorb copper from polluted water. I also found that different copper test kits showed different results for the amount of copper in the solution. I would need to find more a consistent test kit if I continue this work.

Scientific Disciplines Selected by Student: CH EM EV PS

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2008

Word Count

236

Proj. Title: Food is Fuel

Proj. Num: 2008

StudentName(s): S. Broderick

**Abstract:**

The experiment I chose was determining whether eating breakfast actually improves your run time. I thought this experiment was useful because recently there have been studies proving that not eating breakfast can allow you to lose weight faster. For my experiment I chose four subjects to test. They included me, my mom, my older sister, and twin sister. All on separate days, each of us would either eat breakfast and run or just run the marked half mile. In order to ensure the liability I ran the trial 3 times for each (eating and not eating). I made all the variables constant, by conducting each of the six total trials on separate days. Besides the first day, my hypothesis was supported because all of the times after eating breakfast were faster. On the first day, however, of running after eating breakfast, the times were slower because the wind had increased. My conclusion reached is that even though you may lose more weight without eating, not eating can cause problems later on. One problem is your metabolism shutting down. To improve my validity, I realized that the weather needs to be similar for all the days that I conducted trials. Also I should make the age ranges more similar. Lastly, should have everybody sleep for the same amount as each other. Over all, this experience enhanced my knowledge about the dangers of exercising on an empty stomach.

Scientific Disciplines Selected by Student: ME

**Scientific Disciplines**

**Fair Categories**

- AT = Applied Technology
- AS = Animal Science
- BE = Behavioral & Social Sciences
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- CS = Computer Science
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2009

Word Count

247

Proj. Title: Is my water potable?

Proj. Num  
2009

StudentName(s): M. Nobel

**Abstract:**

I tested the potability of water from different natural sources. Is there any way to find the potability of water without equipment? Does clarity in any way indicate the potability of water? I took water samples from nine natural sources, tested them with reliable methods, and compared the resulting data with each sample's clarity. First, I rated the clarity of each sample. Then I tested the TDS levels with a meter. Next, I tested for harmful bacteria in the water. I performed the gram staining procedure. However, it was inconclusive as it said nearly nothing about how dangerous the bacteria are. I purchased a water testing kit that would allow me to test for bacteria. This kit also included equipment to test for lead, pesticides, nitrites, nitrates, chlorine, hardness, and pH in my samples. To test for bacteria, I placed each sample into a sterilized vile with a material that would change color if the water had enough bacteria to be unsafe to drink. The samples were placed in a warm area for 48 hours. To test for lead and pesticide, test strips were used and examined after 10 minutes. The Nitrite/Nitrate test was a dip test strip that could be examined after one minute after being soaked by the sample water. The pH also required a test strip, with a 25 second wait. I have concluded that there is no strict correlation between any of the elements of potable water and the clarity of water.

Scientific Disciplines Selected by Student: BI EV ME

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
| 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                  |
| EB = Engineering: Materials & Bioengineering | PS = Plant Science                        |

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2010

Word Count

236

Proj. Title: Total Suspended Solids

Proj. Num: 2010

StudentName(s): M. Gaciarz

**Abstract:**

We all want clean, safe water. Suspended solids left in water can harm us and the ecosystem. The reason why I did this experiment was to see how effective present systems are in removing total suspended solids from sewage water. My hypothesis was that there will be at least an 85 percent reduction in total suspended solids of untreated wastewater. The procedure for this experiment was to first collect samples of influent, primary and effluent water. The collections were done at three different times during the day. I tested for total suspended solids in the influent, primary and effluent samples that were collected. To test the samples I used filtration apparatus, a vacuum pump, a desiccator and a drying oven. I then weighed the samples, recorded the data and calculated the percent reduction of total suspended solids for the three collections. Results revealed the percent reduction of total suspended solids for the morning sample was 99.57%. Total suspended solids reduction for the afternoon sample was 98.68%. Finally, the percent reduction of total suspended solids for the evening sample was 99.37%. The average percent reduction of total suspended solids throughout the day was 99.21%. My hypothesis proved to be correct. There was at least an 85% reduction in the total suspended solids of untreated wastewater. This proved that the present systems of removing total suspended solids are effective and we can be assured of clean, safe water.

Scientific Disciplines Selected by Student: EN EV MA MI

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2011

Word Count

260

Proj. Title: The Efficacy of Bleach as a Disinfectant

Proj. Num  
2011

StudentName(s): N. Bonadies

### Abstract:

This experiment is meant to test which household disinfectant works best on destroying unknown micro-organisms found in an equine environment (a barn). As an equestrian, I wanted to prove that disinfecting certain equipment with bleach would be more effective than using other agents such as alcohol, peroxide, or a placebo. Two samples were taken from the barn. They were identified as Sample A and Sample B. Each sample was used to inoculate Petri dishes (A1, A2 and B1, B2). The Petri dishes were segmented into 4 zones (North, South, East, and West). Paper disks were treated with the disinfectant agents and placed into each zone. I observed how each disinfectant affected the growth of the unknown micro-organism. This test was conducted twice for a total of 8 unique tests. The method used to collect information on the experiment was to make visual observations periodically, log the observations and take photos. As the micro-organism samples (A and B) began to grow in the Petri dishes, I observed halos of differing sizes appearing around disinfectant disks. The area where the bleach disk was placed had the largest halo of no micro-organism growth. Additionally, as the test progressed over time, the bleach was the most effective in prohibiting the micro-organism from over running the disinfectant disk. At the onset of the experiment, I thought that the bleach would be the most powerful disinfectant. The results I obtained from the eight unique tests proved that bleach was the most powerful disinfectant at retarding or destroying the unknown micro-organism.

Scientific Disciplines Selected by Student: BI CH EA

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2012

Word Count

113

Proj. Title: Watch it Rot

2012

StudentName(s): K. Hussain

**Abstract:**

In my experiment, I tested to see whether pesticides and preservatives affect how long a food stays fresh. I tested this by taking a slice of onion with pesticides and a slice without pesticides, and leaving them out to deteriorate for a period of ten days. I did the same procedure with a slice of bread with preservatives and a slice without preservatives. Over the ten days, I recorded my observations, like amounts of mold each had grown, or how the color changed. At the end of the ten day period, I observed and recorded all changes made from the beginning of my experiment. With this knowledge, I formed my results and conclusions.

Scientific Disciplines Selected by Student: BI CB CH PS

**Scientific Disciplines**

**Fair Categories**

- AT = Applied Technology
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- EV = Environmental Analysis
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- ME = Medicine & Health Sciences
- MI = Microbiology
- PH = Physics & Astronomy
- PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2013

Word Count

259

**Proj. Num** 2013 **Title:** The Eco-Friendly Diaper; Landfill Design The Type of Cloth Versus The Rate Of Decomposition .

**StudentName(s):** E. LoPreiato

**Abstract:**

18 billion non-eco-friendly disposable diapers are deposited into shrinking landfill areas yearly. These areas are not recycled to allow reuse. This experiment proposes a rapidly decomposing primary substrate (paper is hypothesized to decompose fastest) for eco-friendly disposable diaper production. Four cloths were deposited in a chicken manure/soil substrate and weighed at 1, 3 and 5 week intervals to determine rate of decomposition. This method was limited by paper's superior decomposition (beyond physical measurement after 1 week). Hence, a dynamic rate of decomposition was devised for paper to calculate its decomposition in relation to the other cloths: initial weight paper - weight paper @ 7 days/7 days versus initial weight of other cloths - weight cloth @ 35 days/35 days

Paper has excellent absorbency. It can be utilized in combination with its decomposition to effectively recycle our landfill areas. It would not introduce toxic materials to the biosolids deposited with them, and allow production of fertilizer for crops. Biogas could also be harvested for sustainable eco-friendly energy production. This proposed landfill would incorporate 3 primary "revolving" areas: Deposition, Biogas Harvesting, and Fertilizer Harvesting. As the Deposition area fills to capacity, it becomes the new Biogas Harvesting area. As the Fertilizer Harvesting area is depleted, it becomes the new Deposition area. As the Biogas area becomes depleted, it becomes the Fertilizer Harvesting area. The use of eco-friendly diapers and the subsequent recycling of bio-solid wastes creates the potential to stimulate our economy by providing jobs, tax incentives, and creating sustainable products for industry and families alike.

**Scientific Disciplines Selected by Student:** ET EM EV PS

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

Word Count

247

2014

Proj. Title: Which Brand Of Orange Juice Has More Vitamin C?

Proj. Num  
2014

StudentName(s): C. McNary

### Abstract:

The purpose of this experiment was, Which Brand of Orange Juice Has More Vitamin C? The three brands chosen are: Florida's Natural, Minute Maid, and Tropicana. Some independent variables are the three different brands of orange juice. A dependent variable in the amount of Vitamin C. This is good experiment for people know which brand of orange juice is healthier for them to drink. First, you needed to boil four cups of water. Add ¼ of a teaspoon on Cornstarch into a large lemonade glass. Next, pour all of the material from the pot into the large lemonade glass. Measure ¼ of a cup of Starch Solution and pour it into each of the 3 glass cups. Add 8 drops of iodine into each of the 3 cups. Keep adding it until it turns blue. Put the brand of juice you are testing into a paper cup. Pull the juice you are testing into a 10ml dropper. Add 1ml at a time and keep track. Keep adding the juice until the color becomes clear. The cup with the least amount of drops has the most Vitamin C. Lastly, repeat all of the steps 3 times for each brand of orange juice. In the results Tropicana had an average amount of 18.3 ml. Next, Minute Maid had an average of 14.6 ml. Lastly, Florida's Natural had an average of 47 ml dropped. Overall Minute Maid has the most Vitamin C. Next, was Tropicana. In last was Florida's Natural.

Scientific Disciplines Selected by Student:

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2015

Word Count

250

Proj. Title: The Effect of Fertilizer on Algal Growth

Proj. Num  
2015

StudentName(s): C. Bernstein

**Abstract:**

The purpose of this investigation was to analyze how nitrogen-based fertilizers affect algal growth, in order to study how surface runoff causes oxygen decline in water ecosystems. Two tests were conducted. Sample chlorella, which are a species of single-celled freshwater green algae, were cultured and placed under fluorescent light. Next, 200mL of algae were placed in 3 containers, and varying amounts of fertilizer were added to containers 2 and 3, with the first container as the control. The results for each test were similar: for the first few days, the containers with fertilizer showed rapid and much more growth than the control. After those first days, the algae with fertilizer started rapidly declining in growth, and the algae that were left sank to the bottom of the containers. The growth continued to diminish, while the control algae stayed the same. These results demonstrated what occurs in a pond environment. The nutrients from the fertilizer, like nitrates, were consumed by the algae and caused them to bloom for the first few days, and then died, and as they decomposed, consumed oxygen. If the containers included similar nutrients to an actual freshwater habitat, the blooming and decomposing would have continued, as these organisms do not need oxygen to do so. This demonstrated a significant issue occurring in water ecosystems today because of surface runoff carrying these fertilizers into water, resulting in hypoxia, which kills other organisms. This test was important in demonstrating exactly how surface runoff is causing environmental destruction.

Scientific Disciplines Selected by Student: CB EA EV PS

### Scientific Disciplines

### Fair Categories

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2016

Word Count

247

Proj. Title: Rain...Runoff...Ramifications?

2016

StudentName(s): J. Kelly

**Abstract:**

I chose to do this project because as a Boy Scout, I like the environment and I am working towards the William T. Hornaday Award. This project, "Rain...Runoff...Ramifications?" evaluates how rainwater runoff from agricultural and industrial land uses affect the Salmon Brook River's water quality locally? If rainwater runoff from agricultural and industrial land uses increase, then chemicals from those areas will enter the river's water, decreasing the river's water quality. This will happen because increased or decreased levels of certain chemicals can be harmful to the Salmon Brook River. First, check the weather report and buy the Low Cost Water Monitoring Kit online. Next, go to the first site located on the map. Go down to the river's edge and follow directions in kit for results. Then, record results and proceed to the next sites and repeat all after next rainfall. The results gathered show that when the rainwater runoff levels increased, chemicals either increased or decreased. Phosphate and Nitrate levels increased on average, and pH levels went down. Also, dissolved oxygen levels went down because of the higher volume of water. Rainwater runoff can greatly affect a river's water quality. It can harm a river's water quality because outside chemicals enter into the river's water, decreasing the water quality, showing that my hypothesis was not rejected. The next thing that I now want to know is, Does the current health of the Salmon Brook River provide a good habitat for fish, like trout?"

Scientific Disciplines Selected by Student: EM EV

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2017

Word Count

238

**Proj. Num** 2017 **Title:** Can homeopathic solutions (phytotherapy) inhibit the growth of Group A Streptococcus (Staphylococcus aureus)

**StudentName(s):** A. Elfeky

**Abstract:**

Phytotherapy (the study of the use of extracts as medicines or health-promoting agents) is an ancient tradition among many cultures and is growing in popularity within the United States. The overuse of antibiotics to treat common bacterial ailments is of concern to the medical community. If certain herbal extracts can inhibit the growth of common bacteria then perhaps these extracts may assist in treating these diseases. The patient would have an alternative and not have to solely rely on antibiotics. In my experiment, I tested the inhibition potential of three homeopathic solutions. Basically, bacteria were grown on agar and a drop of each of the solution being tested was added in the center of each plate. I looked for and measured the diameter of a kill zone where my solutions were added. For each solution, the experiment was carried out in triplicates to validate my results. The average of my 3 trials is as follows: Garlic extract, 0cm, Elderberry extract, 0.67cm and Apple cider vinegar, 2.3cm. I used hand sanitizer as a positive control. That kill zone had an average kill zone radius of 1.33cm. The apple cider vinegar had the greatest inhibition affect on the S. aureus bacteria, followed by the hand sanitizer and the Elderberry. The garlic extract showed no inhibition of bacterial growth. Based on the results of this experiment, apple cider vinegar shows the most potential as a bactericidal agent for Staphylococcus aureus.

**Scientific Disciplines Selected by Student:** CB EA ME MI

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2018

Word Count

247

Proj. Title: Ants, Glucose, Diabetes...Huh?

Proj. Num: 2018

StudentName(s): M. Jayawardena

### Abstract:

**Abstract:** Are ants attracted to sweet tasting substances more than others? Diabetic patients have Glucose in their Urine, normal Urine does not contain Glucose, and if it does rarely in small amounts. Instead of a Diabetic patient's Urine sweet tasting substances are substituted, and salty, sour and spicy foods are given to the ants. If more ants prefer the sweeter substances, there might be a relationship between ant's crowding around certain sick people's Urine because of Glucose (Sugar). **Procedure:** The ants are given 7 different types of food; Pancake Syrup, Strawberry Jam, water/sugar mix, potato, Pickles, Salted fish, spice mix. The liquid foods are smeared onto cotton swabs. A different cotton swabs with food, pickle, salted fish, spice mix, and potato is added at every 30 minute interval. The ants are observed, and the number of ants at the different food types is noted. **Observations:** There were more ants at the sweeter substances. The most amounts of ants were seen near the potato. The ants stayed away from the other substances. **Abstract Results:** The ants prefer the sugary foods instead of salty, sour, and spicy. **Abstract Conclusion:** The ants did prefer the sweeter substances. The potato was their favorite. Potatoes are high in Complex Carbohydrates, which is a simple sugar. Starch is a storage form of Carbohydrates in plant foods. Ants prefer sweeter substances and are attracted to the Urine of certain sick people because it has a sweet taste. A Diabetic's Urine has Glucose (Sugar).

Scientific Disciplines Selected by Student: AS ME

### Scientific Disciplines

### Fair Categories

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

Word Count

298

2019

Proj. Title: When Your Sniffer Snoozes

Proj. Num  
2019

StudentName(s): N. Doran

**Abstract:**

I conducted my experiment to see if the age of a female affects the amount of time it takes for olfactory fatigue to take place. In my experiment I had different aged females smell a teaspoon of apple cider vinegar using a wafting technique. When the female was not able to smell the apple cider vinegar any longer, they told me and I would stop my stopwatch to record that time. I did 10 trials for each of the 8 females that I tested. I left 10 minutes in between each trial so that their olfactory system wasn't used to the odor of the apple cider vinegar when I had them move onto the next trial. In my hypothesis, I thought that the youngest female would have the longest olfactory fatigue because when you are younger, you have a better sense of smell, so you would be able to smell the odor the longest. The oldest female would have the opposite results. I found that the age of a female didn't affect olfactory fatigue. The oldest female did have the shortest olfactory fatigue but the youngest female didn't have the longest olfactory fatigue. Maureen had the shortest olfactory fatigue with an average time of 2:13.29 minutes. She was the oldest female. Emma had the longest olfactory fatigue with an average time of 3:29.99 minutes and she was the 2nd youngest female. When I lined up the results in age order, the olfactory fatigue times went down as the age went up, but then a time would go up and the pattern would be broken. I came to the conclusion that my hypothesis was wrong and that the age of female doesn't really have an effect on the amount of time it takes for olfactory fatigue to take place!

Scientific Disciplines Selected by Student: BE ME

**Scientific Disciplines**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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CS = Computer Science	MI = Microbiology
EA = Earth Science	PH = Physics & Astronomy
EB = Engineering: Materials & Bioengineering	PS = Plant Science

**Fair Categories**

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2020

Word Count

252

Proj. Num

2020

Title: The Study of Ocean and Freshwater Acidification and Its Harmful Effect on the Shells of Aquatic Organisms and the Evaluation of a Banana-Derived Additive to Reduce It.

StudentName(s): A. Kelly

### Abstract:

Worldwide dependence on fossil fuel combustion for energy generates enormous amounts of carbon dioxide, sulfur dioxide, and nitrogen oxide pollutants which are causing oceans, lakes, and rivers to become dangerously acidic. The purpose of this experiment was to examine how this ocean and fresh water acidity harms the protective shell covering of shellfish and to determine if a newly discovered water purification compound can reduce the effect. The hypothesis was that if unusual weather produces heavy rainfall in Connecticut, then the ocean and stream acidity will increase and begin to dissolve local shells, and this acidity/harmful effect can be reduced by a banana peel additive proven to have water purification properties. In Procedure I, ocean and stream samples from various Connecticut locations were collected immediately after Hurricane Irene (8/2011) and later after months of normal weather (11/2011.) In Procedure II, three sets of solutions (@ pH 2.5,4,5,& 6) were formulated and the banana additive was prepared and mixed into two sets. Shells were submerged in all samples, except for one Procedure II/banana additive set. Initial and final (8 day) values of solution pH and shell weights were recorded. All aspects of the hypothesis were proven correct. Every ocean and stream “hurricane” water sample was more acidic than those sampled during “normal weather”, and the total shell weight loss percentage was higher in the “hurricane” (12.5%) vs. the “normal” (0%) water. The banana additive significantly decreased overall weight loss by 66.0%, and lowered acidity at 3 of 4 pH levels (2.5,4,&5.)

Scientific Disciplines Selected by Student: AS BI CH EM EV

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2021

Word Count

235

Proj. Title: Frog Peptides Vs. Bacteria

Proj. Num  
2021

StudentName(s): D. Bierut

### Abstract:

The purpose of my project is to see if peptides that naturally form on frog skin will kill bacteria. This is important because many people are saying that bacteria is adapting to the normal vaccines and that peptides are an answer for this dilemma in medicine. To obtain the peptides I used two green tree frogs, which are native to this area. I used six agar plates. I took a swab and sterilized it so I would not put any unwanted bacteria on it. Then I took a tube of E. Coli, B. Subtillis, and M. Luetes. I swabbed the bacteria in a way so each had a separate plate and each bacteria had two plates each. Of course, I sterilized between every time. In an article I had read, scientists just wet the frogs to obtain bacteria, so I did the same. I washed the frogs off and swabbed their skin. I wiped what was on the skin, on a small portion of the bacteria. A few days later, I checked the bacteria. There was a noticeable difference in bacteria proportions. When I repeat the experiment I will count the colonies of bacteria so I can get a more accurate measurement. I also wish to buy some peptides because the way I have obtained them is not the most effective. I really someday hope to take the project further and apply it in medicine.

Scientific Disciplines Selected by Student: AT AS BI CB CH CS EA EV MA ME MI PH

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

Word Count

247

2022

Proj. Title: One Dog's Poop, Another Man's Treasure!

Proj. Num  
2022

StudentName(s): B. Brigham

### Abstract:

The purpose of this project was to help keep pet manure out of landfills and to make energy from it. Both will help the environment. If I use different types of poops, which one will produce better methane to power a lamp. The independent variable was the type of manure and the dependent variable was the fuel output. The controlled variables were the place, water, and temperature. I constructed a methane digester for each type of poop, but Mom handled the manure. I watched for the collection containers to be pushed up by the production of gas. I tested for gas by measuring the length of time a flame burned within the gas collection container. The first two test trials showed that Co2 was made because the candle flame went out in less than two seconds. The third test showed that methane was formed because the flame burned brightly for more than six seconds. There wasn't much difference between dog and cat. In conclusion, I learned that you can make methane out of poop, but it is really hard to do and takes a long time at about 60 degrees. My experiment was not valid even though I was able to make methane because I didn't repeat the experiment with several sets of digesters and several different sets of dogs and cats. Even if I had found a huge difference between my dog and cat, I wouldn't know if the difference was between just those two animals.

Scientific Disciplines Selected by Student: AS EN ET EM

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2023

Word Count

252

Proj. Title: Hydroponic Tomatoes

Proj. Num: 2023

StudentName(s): O. Pritchard

**Abstract:**

Hydroponics is the process of growing plants in an inert medium or liquid, with added nutrients, without soil. The purpose of this project was to discover in which hydroponic medium plants grew best so that the results could be used to further the successful harvesting of food without soil. My hypothesis was that if tomato plants were grown hydroponically in four different mediums, then the plant in the coir (coconut fiber) would grow the best. This is because the coir is natural and, as an added bonus, has trichoderma fungi, which helps stimulate root growth and holds minerals released to plants as needed. The hydroponic system used for this experiment was an ebb-and-flow system. These systems flood the plant containers three times a day. The mediums used for growing the tomatoes were expanded clay, coir, perlite, and vermiculite. Expanded clay is small clay pebbles that are superheated and filled with air until they expand. Coir is a fibrous part of a coconut husk. Perlite is a type of volcanic glass that turns into light pebbles when heated. Vermiculite is a mineral that expands when heated. After eighteen days of testing, there were nine sprouts in the expanded clay, ten sprouts in the coir, twenty-three sprouts in the perlite, and fifty-two sprouts in the vermiculite. My hypothesis at first appeared incorrect, but upon further growth time, the plants in the coir grew to significantly greater heights in half the time. Hydroponics broadens the possibilities of growing food without soil.

Scientific Disciplines Selected by Student: PS

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2024

Word Count

280

Proj. Title: Music and Its Effect on Reading Speed

Proj. Num  
2024

StudentName(s): S. Weiser

**Abstract:**

The goal was to improve students' reading speeds. In primary research it was found that listening to classical music has shown to help to facilitate neural conduction, music affects different people in different ways and that dissonance is distracting and unnerving as are provocative lyrics. The scientific question was: How does classical music affect a subject's reading speed? The hypothesis was: If classical music is played while a subject is reading, then a subject will read faster than if heavy metal music is played or there is silence because there will be no distracting, dissonant tones and because classical music has been shown to align brain cells so that one may think clearer. To test this, a subject read for two minutes from 'Island of the Blue Dolphins', listened to Piano Sonata D-Dur Hob, read a different passage with the heavy metal song, 'Danger Line' playing and then finally, two minutes of silence as they read. The results showed that the results of my experiment partly supported the hypothesis. The results showed that subjects read faster when listening to classical music than when listening to heavy metal. All 5 supported this. However, the control, silence, caused 3 out of 5 subjects to read even faster than when listening to classical or heavy metal music. This is most likely because silence lacks any of the distractions of heavy metal or even classical music. Furthermore, music affects different people different ways. Silence takes away any possibility of reminders of pain or joy, therefore causing a subject to read faster or slower. This is cause for further research. However, the fact that silence worked better can be used in a classroom environment.

Scientific Disciplines Selected by Student: BE

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2025

Word Count

143

Proj. Title: "Think Fast"

Proj. Num  
2025

StudentName(s): J. Matunas

**Abstract:**

The purpose of the experiment was to see when a person's reaction time is the quickest. The independent variable was the time of day. Also, the dependent variable was the centimeters the subject stopped the meter stick. The procedure for the subjects was: 1. Get tested at the three set times (7 a.m, 12p.m. 7 p.m) 2. The subject was asked to stop the yardstick as quick as possibly with his or her thumb 3. The subjects were tested for two other days at the same designated times. The data that was collected showed that the subject's fastest reaction time was at 12 P.M and the slowest reaction times were at 7 am or 7 p.m. This varied per subject. Finally, the conclusion showed that the subjects had faster reaction times at 12p.m and slower reaction times at 7 a.m. and 7 p.m.

Scientific Disciplines Selected by Student: BE

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2026

Word Count

253

Proj. Title: How Plants React to Different Types of Music During Growth

Proj. Num  
2026

StudentName(s): J. Ong

### Abstract:

The purpose of the experiment was to determine through observation if exposure to music affects plant growth, in order to discover a more sustainable, economic way to boost plant growth. All variables were controlled as much as possible. Three sets of plants were placed in different rooms that had similar window exposure, faced the same direction, were given the same amount of water, and the music could not reach any plant other than the plants it was intended to reach. One set did not receive any contact with music, while the other two did. One set received twelve hours of rap/hip-hop music and the other twelve hours of classical/religious music per day. On the first day, the plants were transplanted and, at the end of every week after that, the plants were photographed. On the final day of recording the plants were photographed again and almost every day the plants girth, height, leaf sizes, and color were observed and recorded. After just the first week or two, it became apparent that the plants subjected to music were growing at a faster rate. Both music exposed plants fared better than the control, but the classical/religious plants were superior in almost all categories especially largest leaf size, number of leaves, and average height of the stems. If music were proven to be an effective plant stimulant, it should become more commonly used, because it is economical and saves materials and fuel that are used to manufacture and distribute commercial plant stimulants.

Scientific Disciplines Selected by Student: EV PS

### Scientific Disciplines

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2027

Word Count

229

Proj. Num

2027

Title: How What we Eat for Breakfast Affects Schoolwork, Mood, Wakefulness, and Energy Throughout the Morning.

StudentName(s): J. Lustbader

### Abstract:

The first meal of the day plays a significant role in how people function during the day. The purpose of this experiment was to determine an energy source for the first meal that helped students function better and longer each day. Thirty students were divided into three groups and administered three different breakfasts on three different days: no food, sugary cereal, or UCAN. UCAN is a long-acting, complex, carbohydrate shake. In my procedure, the subjects waited two hours after the breakfasts were served, the time after which simple sugar in the bloodstream has spiked and dropped. During this time, UCAN's effects were still ongoing because UCAN contains complex carbohydrates. After this two hour period passed, the students were given a brief questionnaire including cognitive testing. The subjects' self-report questionnaires showed that those who had eaten UCAN felt less tired, had more energy, and felt less moody than the other groups. The cognitive testing showed mixed results, but the test that required the greatest amount of immediate sustained concentration, reverse digit recall, clearly showed UCAN was superior to the other two breakfasts. The above results suggest that a complex carbohydrate that does not result in a large glucose drop and causes only a minimal rise in insulin gives one a sense of feeling better and helps to sustain cognitive abilities to do more complex tasks during the day.

Scientific Disciplines Selected by Student: ME

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2028

Word Count

244

Proj. Title: The Sugar Substitution

Proj. Num: 2028

StudentName(s): H. Bissonnette

**Abstract:**

My project centers on baking, because I love to bake, and most everyone today is trying to eat healthier. Most recipes use sugar as the sweetener, and I wanted to see if natural sugar substitutes (thought to be healthier) could taste as sweet as sugar in a cookie recipe, and which would give the closest taste to sugar. I hypothesized if molasses was substituted for sugar in a recipe, then the cookie would taste better than if another natural sugar substitute was used, because molasses most closely relates to the taste of sugar. I made four batches of the same cookie recipe, using sugar first, and then substituting honey, molasses and agave nectar for the sugar in the three next batches. I baked the cookies, then asked friends to taste each of the cookies and rate them for taste, texture, sweetness and appearance on a scale of 1 to 5, then rank them in order of preference. The participant's 'sweetness' ratings for the sugar and the molasses cookies were equal, with agave nectar and honey following. The overall preference rankings were molasses, sugar, honey, and agave nectar. My hypothesis was affirmed as most people preferred the cookie that had molasses substituted for sugar, in terms of the 'sweetness' rating and overall preference. This experiment is a good start to evaluating substitutions for sugar in home baking recipes. Future expansions could include evaluating the actual 'healthiness' of those substitutions in terms of calories, fat, etc.

Scientific Disciplines Selected by Student:

[Empty box for scientific disciplines selected]

**Scientific Disciplines**

**Fair Categories**

- AT = Applied Technology
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2029

Word Count

178

Proj. Title: Plants and Lights

Proj. Num  
2029

StudentName(s): L. Medina

**Abstract:**

Usually people grow plants in sunlight, but what i want to know is how large will bean plants grow using different shades of sunlight, which are red, green, blue, and orange. This project looks at how large plants grow using different colored lights. The four different plants growing under different colored lights had six weeks to grow. They were measured by centimeters and the results were recorded each week. The lights inside the room were turned off to avoid exposing them to sunlight. My hypothesis was that the bean plants growing under the orange and red lights will grow faster than the bean plants growing under the green and blue lights because they are lighter and brighter lights. The experimental results supported my hypothesis by showing that the plants growing under the red and orange lights will grow larger than the others. The orange light, however, grew larger than the plant growing under the red light. This experiment shows that plants growing under an orange or red light will grow larger than a plant growing under normal sunlight.

Scientific Disciplines Selected by Student: EA EM PS

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2031

Word Count

55

Proj. Title: Geotropism: Fact of Fake

Proj. Num: 2031

StudentName(s): K. Vassilopoulos

**Abstract:**

My project is about plant growth. Scientists think you should grow plants right side up so I was thinking gravity would affect plant growth. I tested this hypothesis by buying two plants. I placed one on the table upright and one on its side. I found out that gravity does not affect plant growth. growth

Scientific Disciplines Selected by Student: PS

**Scientific Disciplines**

**Fair Categories**

- AT = Applied Technology
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- PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2032

Word Count

361

Proj. Title: The Greenhouse Effect

Proj. Num: 2032

StudentName(s): J. Moscarelli

### Abstract:

**Objective:** If two greenhouses of the same structure are built and a small plant is placed in one of them, the greenhouse with the plant will have a lower temperature than the greenhouse without the plant because the exchange of carbon dioxide from the plant will disrupt the buildup of greenhouse gases. **Relevance:** The increase of greenhouse gases, specifically carbon dioxide, in the atmosphere has led to an increased warming of the earth's surface since the Industrial Revolution. Plants remove carbon dioxide from the atmosphere. Deforestation leads to an increase in the atmosphere's carbon dioxide level because there are fewer plants to remove the carbon dioxide and when they are cut, they release carbon dioxide into the atmosphere. **Methods:** Two greenhouses were built to simulate the earth's surface and the atmosphere. The greenhouses were built out of wood in the same way and were of the same size. Soil was placed in the bottom of both. A small plant was placed in one of the greenhouses. A piece of plexiglass was placed over both structures to simulate the earth's atmosphere. Thermometers were placed in each greenhouse. Temperatures of the room and of each greenhouse were recorded at four different points of the day. The weather was also recorded at these times. **Results:** Both at the 12pm reading and when the weather was sunny, the temperature in the greenhouse with the plant was lower than the temperature in the greenhouse without the plant. At other times of day or if the weather was cloudy or dark the temperature in greenhouse with the plant was higher than the greenhouse without the plant. **Conclusion:** At 12pm or on days that are sunny, photosynthesis is most efficient at removing carbon dioxide from the atmosphere and results in lower temperature. When there is no sun, or at other times of day, photosynthesis is less efficient at removing carbon dioxide and plant respiration leads to an increase in temperature in the greenhouse with the plant. If this experiment were to be performed outdoors and in a season other than winter, the results may have shown a more pronounced decrease in temperatures in the greenhouse with the plant.

Scientific Disciplines Selected by Student: BI EA EM PS

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2033

Word Count

227

Proj. Title: The Clean Water Project

Proj. Num: 2033

StudentName(s): Y. Gazula

### Abstract:

Abstract All over the world, billions of people die from water-borne diseases each day. The purpose of my science fair project was to see if I could make a filter using natural available materials that could filter dirt, color, and acidity. I figured out how to make a homemade filter using a recycled soda can, charcoal, sand and a few cheese cloths, which I would test to see if it could filter out dirt, color and acidity. I hypothesized that it would not work, because it came into my mind that that is why a lot of people use commercial water filters these days. The constant in my experiment is the homemade filter and the control is the tap water. My dependent variable is the tap water mixed (separate samples) with dirt, lemon water, and coloring, and my independent variable is the tap water. The way I measured the dependent variable was that I took three different samples of water, one mixed with dirt, the second mixed with coloring, and the third with lemon water, I checked the pH of each sample before I filtered it and also after, to see the change after it is filtered. I was really surprised at the results of the homemade filter, Dirt water: (Before): 5.3 (After): 7.2 , Lemon Water: (Before): 3 (After): 6 Colored Water (Before): 4.5 (After): 5.5

Scientific Disciplines Selected by Student: CH EM

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

2034

Word Count

146

Proj. Title: Quiz Performance During Different Times Of The Day

Proj. Num  
2034

StudentName(s): D. Meyers

**Abstract:**

This experiment was performed to determine if the time of day impacts academic performance. First grade students were given four different math quizzes on two separate days. The students were given a quiz at 9:00AM followed by a quiz at 2:00PM on both days. The quizzes were scored, analyzed and compared to each other. The results showed that the quizzes given in the morning had higher average scores than the quizzes given in the afternoon. My hypothesis was supported on both days as evidenced by quiz score averages. On day 1 the morning quiz average was 89% as compared to the afternoon average of 80.01%. On day 2 the morning quiz average score was 92.11% as compared to the afternoon quiz average of 85.54%. An Advantage to these findings is being able to schedule exams and standardized testing to increase the likelihood of higher academic performance.

Scientific Disciplines Selected by Student: BE

**Scientific Disciplines**

**Fair Categories**

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
EB = Engineering: Materials & Bioengineering	PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L7

# Connecticut Science Fair Abstract

Project Number

Word Count

213

2035

Proj. Title: Electricity from where?

Proj. Num  
2035

StudentName(s): G. Goldman

**Abstract:**

Abstract I chose to do this project because I wanted to see if fruit can produce electricity and light a led light. When I first started this project, I made a few mistakes which prevented me from getting enough energy to light a light bulb. I found that the alligator clips need to be connected to the right material. The copper penny from 1960 must be attached to the positive and the zinc nail must be connected to the negative. A penny from 1960 is better to use because it is more likely to have better copper than a newer penny. If the penny is dirty you need to clean it to produce a better connection to the copper. The led light should not be more than 2 volts. It is hard to get 3 volts out of fruit. The highest volt total I was able to get was 2.38 volts. I only needed 4 pieces of fruit which were citrus fruit. Citrus fruit is better to use because it is acidic which helps their juice to conduct electricity. Some citrus fruits are lemons, oranges, grapefruit, and limes. This experiment was interesting since it had a lot of cool facts. I hope I can do this project again because it was fun too.

Scientific Disciplines Selected by Student:

[Empty box for scientific disciplines]

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
| 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                  |
| EB = Engineering: Materials & Bioengineering | PS = Plant Science                        |

- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2501

Word Count

244

Proj. Title: Rock the Brownfields Green: Food for Fungi

Proj. Num: 2501

StudentName(s): A. Hewitt

### Abstract:

Is in situ bioremediation a viable solution to Fairfield County's oil-contaminated soil? Huge amounts of hydrocarbons enter Fairfield County's environment through manufacturing, petroleum spills and underground oil-tank leakages. Pollutants endanger biodiversity because they are hazardous to life. Bioremediation is an innovative biotechnological remedy to restore soil to a healthier state thereby encouraging ecosystems to flourish (Martin, 1983). The cost of soil remediation is prohibitive, since it involves excavation, removal of contaminants and the acquisition of clean fill. One of the primary roles of fungi in the ecosystem is decomposition. The mycelium secretes extracellular enzymes that break down lignin and cellulose composed of long hydrocarbon chains (Jennings, 2010). These hydro-carbon chains are structurally similar to petroleum products (Stamets, 2011). The focus of this study examines the ability of Grey oyster mushrooms, *Pleurotus ostreatus*, to metabolize motor oil. Five test cultures were performed in two phases. Substrates of *Pleurotus ostreatus* mycelium were injected with varying amounts of 30 weight motor oil using a 10cc syringe. One control group in each culture was not injected with motor oil. The temperature, humidity and growth were monitored daily and recorded over 3-4 weeks. The fruiting bodies of the first flush were harvested and massed. In both phases, the data collection revealed, the growth of fruiting bodies occurred exponentially with the presence of motor oil. Therefore, with future testing, the cultivation of Grey oyster mushrooms could remediate soil on many of Fairfield County's oil-contaminated sites.

Scientific Disciplines Selected by Student: EA EM EV

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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BI = Biochemistry	EM = Environmental Management
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CS = Computer Science	MI = Microbiology
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EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2502

Word Count

242

Proj. Title: The Great Plains of Change

Proj. Num  
2502

StudentName(s): J. Kobsa

### Abstract:

The purpose of this experiment was to investigate the effect of amount of water given to corn plants on their growth. This is relevant today because climate change is quickly altering the earth's climate, including precipitation patterns in America's Corn Belt, where most of the world's corn is grown. It was predicted that the control plants and the ones closest to them will grow the best since their water allotment is nearest to the amount that the plants would receive in the real world. The procedure included the installation of an environment that was as close to the real conditions that the plants would weather in the Corn Belt as possible. Twice a week for five weeks, the experiment of two trials of five plants each, each in which one plant received the least amount of water, one received less, one received a control amount, one received more, and one received the most water, was watered varying amounts around the control. On these designated days, their heights and photographs were taken. General observations were recorded every day during those weeks. The data analysis showed that, if the anomalies are disregarded, the hypothesis was supported. The conclusion drawn was one that stated that, based on the data, future effects of climate change in terms of precipitation in the Corn Belt will likely have a negative impact on its corn crop. The experimental process worked sufficiently enough, but definitely would have benefitted from improvements.

Scientific Disciplines Selected by Student: PS

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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CH = Chemistry	ME = Medicine & Health Sciences
CS = Computer Science	MI = Microbiology
EA = Earth Science	PH = Physics & Astronomy
EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

Word Count

249

2503

Proj. Title: Teredo Navalis- A Population Density Study

Proj. Num  
2503

StudentName(s): N. Tatro

### Abstract:

The purpose of this experiment was to test to see if different dock material types affect the population density of Teredo navalis (common shipworms). Four sites with different dock traits were selected. Test boards were dried, weighed, and labeled. Each panel was attached onto white oak strips, with 2 spacers in between them. They were attached onto the wooden docks by using the boat to get to the docks and drilling the panels into the wood. For the steel dock, fabric strips were wrapped around the pilings and drilled into each oak strip to attach the straps. Salinity and temperature were tested every month. After five months, the boards were pulled from the water. Each organism recovery board was dissected and each test board sanded to count how many entrance tubes there were to calculate the population density. The microscope was used to identify species recovered. Based on the data, it seems the site location of the boards affected the panel population more than the dock type. As the amount of worms increased, the wood loss increased. Since both the steel dock sample, and some of the wooden docks had high populations, it doesn't seem to matter if the docks contained wood or not. There was a large difference between Mason Island wooden docks and all the other docks, perhaps because Mason Island had lower salinities and higher temperatures. Also, this dock was closer to the river mouth, while the others docks were more open to Long Island Sound.

Scientific Disciplines Selected by Student: AS CH EA EN EM EV MA

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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CS = Computer Science	MI = Microbiology
EA = Earth Science	PH = Physics & Astronomy
EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2504

Word Count

239

Proj. Title: Carbon Dioxide's Effect on Plant Growth

Proj. Num  
2504

StudentName(s): M. Foster

**Abstract:**

The objective of this experiment was to test the effect of carbon dioxide on carrot and radish growth. When the plants germinated, they were put into two separate environments: the normal environment (greenhouse) and the CO<sub>2</sub> exposed environment (consisting of a plastic structure with holes for ventilation, a tube for watering, and a plate containing CO<sub>2</sub>). At the conclusion of the experiment, it was found that the CO<sub>2</sub> exposed plants could not undergo evapotranspiration because CO<sub>2</sub> clogged their stomata. The temperature of CO<sub>2</sub> exposed plants was warmer than the normal plant's temperature. Condensation was observed on the box caused by CO<sub>2</sub>. This resulted in the unintended effect of mold and fungi growing at a fast rate in the Carbon Dioxide exposed plants because of the moist, warm environment. Fungi and mold seemed to contribute to the plants' postponed growth. For example, the data revealed that carrots grew to 3.5cm and radishes to 1.2cm in the normal group, and for the CO<sub>2</sub> exposed group, carrots grew to 1.5cm and radishes to 0.5 cm. Normal plants mold and fungi began being noticeable on the third week of the experiment and were much less persistent. Carbon Dioxide is detrimental to plant growth as it stalls growth and keeps them from cooling off. Plants are an essential part of life giving needed oxygen to other organisms, keeping the environment at a cool stable temperature. CO<sub>2</sub> has direct effects on both of these necessities.

Scientific Disciplines Selected by Student: EA EM EV PS

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

Word Count

250

2505

Proj. Title: How Does Different Water Solutions (Pollution) Affect Daphnia?

Proj. Num  
2505

StudentName(s): S. Bruno

**Abstract:**

If different solutions of water are tested on daphnia, which solution will kill the most? The question I am trying to answer is what type of water is the purest and contains the least metal and impurities. 10 daphnia were placed in 5 cups, using a pipet. Inside of the cups were 5 different solutions of water: well, stream, control (water the daphnia arrived in, which is spring water), distilled, and bottled water. Then, every day, I recorded how many daphnia were alive. I then fed the daphnia according to how many were alive that day, for example, if 5 daphnia were alive, then I would feed them 5 drops of yeast water (the water is made of their substance). About halfway through the week, I noticed that some daphnia were active, while others stayed at the bottom. The ones that stayed at the bottom usually died the next day; when the daphnia died at the bottom, later they started to look like white fuzz balls; the live daphnia were also shedding their skin. So, the waters with the least metal (daphnia are very sensitive to metal) were the purest. The best solution was well water, because no daphnia died inside it, unlike distilled and bottled water. I could have measured the amount of light and heat the daphnia came into contact with. Also the yeast solution's exact concentration could be more exact. I did this experiment to help people from drinking polluted water, which inspired me for this project.

Scientific Disciplines Selected by Student: AS EV

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2506

Word Count

236

Proj. Title: Balance

Proj. Num  
2506

StudentName(s): V. Conley

**Abstract:**

As a ballet dancer, I know balance is very important. I wanted to learn about how balance works and what affects it. I also wanted to know how sight and sound affect a person's balance. My hypothesis was that if someone can't see or hear their surroundings, then they will have the hardest time balancing. I tested myself and three other subjects using a video camera and a stop watch to time how long each of us could balance on one leg under four conditions: regular, blindfolded, ears covered and ears and eyes both covered. There were three trials of each condition for each person and then I calculated the averages to determine the results. When we had the blindfolds on, we wobbled, jumped, and moved around more than without the blindfolds and we lost our balance in a shorter period of time. With just hearing blocked, there wasn't much change in balance times. When we had both our ears and eyes covered we wobbled, jumped and moved around more than we had every other time. In conclusion, sight and sound does affect balance. Having no sight and no sound makes it harder to balance than having sight and sound. This agrees with research I found out about how the body balances. We use sight, sound and muscles to help us balance and when any of them are taken away we lose our sense of balance.

Scientific Disciplines Selected by Student: ME

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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CS = Computer Science	MI = Microbiology
EA = Earth Science	PH = Physics & Astronomy
EB = Engineering: Materials & Bioengineering	PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2507

Word Count

205

Proj. Num

2507

Title: Analysis of Local Watershed and River Contaminated Sediments, and Effect on River and Long Island Sound Waters

StudentName(s): H. Sessel

### Abstract:

My goal was to take “A Sedimental Journey” of my local water shed (four rivers and sediments) to find causes of increasing pollution. I analyzed nutrients, pollutants, and microbial growth (bacteria, fungi, and coliform) in both sediments and rivers. I then found correlations between sediments and rivers, as well as correlations between nutrients and contaminants. I also used a watershed protocol to determine overall health of rivers, specifically the “Watershed Habitat Evaluation and Biotic Integrity Protocol” (WHEBIP). Important discoveries included:

- Fungi (average growth 95%) exist in each river,
- Bacteria (average growth 90%) in 70% of sites,
- Coliform of bacteria / animal wastes (average growth 60%) exists in all sites,
- High deposits of mercury and lead exist in all sediment sites, especially West, Mill, & Housatonic,
- Low levels of iron exist in 50% of river sites,
- All nutrient levels tested low to none in each sediment sample,
- High levels of phosphates and nitrates exist in all river samples (can lead to depleted oxygen and water life),
- The Watershed Protocol (WHEBIP) reveals poor conditions,
- Most contaminants appear to be “run-off” from residential and industrial sites,
- There is a dangerous negative correlation between nutrient levels and microbial growth, and
- There is a positive correlation between river and sediment contaminants.

Scientific Disciplines Selected by Student: BI EM EV MI

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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BI = Biochemistry	EM = Environmental Management
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CS = Computer Science	MI = Microbiology
EA = Earth Science	PH = Physics & Astronomy
EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2508

Word Count

210

Proj. Title: Indicate Your Vitamin C

Proj. Num  
2508

StudentName(s): J. Anaeto

**Abstract:**

This project is about the difference of Vitamin C in three different juices. I wanted to see whether the juices contain the amount of Vitamin C they say they contain. Sunny D says it contains 120% Vitamin C per serving. While Simply Orange (no pulp) says, it contains 100% Vitamin C per serving. Lastly, Tropicana says it contained 100% Vitamin C per serving. These percents are based upon how much Vitamin C you are supposed to have per day. It does not matter really, if you have a little more than 100% Vitamin C per day. Extra Vitamin C will just be eliminated from your body. I became interested in this project because I always wondered how much Vitamin C some orange juices contain. Then you hear that Orange Juice companies just lie. Nevertheless, I would like to check for myself. I did this, so later when I am in the store, I will choose the drink with the most Vitamin C. This project's purpose is to inform people which juice has the most Vitamin C. This does not inform people on which orange juice is healthier. I hope to educate people and get them interested to try this experiment themselves, but with different items or types of Orange Juice.

Scientific Disciplines Selected by Student: BI ME

**Scientific Disciplines**

**Fair Categories**

- AT = Applied Technology
- AS = Animal Science
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- CS = Computer Science
- EA = Earth Science
- EB = Engineering: Materials & Bioengineering
- EE = Engineering: Electrical & Mechanical
- ET = Energy & Transportation
- EV = Environmental Analysis
- EM = Environmental Management
- MA = Mathematical Sciences
- ME = Medicine & Health Sciences
- MI = Microbiology
- PH = Physics & Astronomy
- PS = Plant Science

- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2509

Word Count

249

Proj. Title: Does Temperature Affect Hibernating Bat's Mortality?

Proj. Num  
2509

StudentName(s): G. Domashinski

**Abstract:**

Does ambient temperature during a bat's hibernation have any effect on survivability of the species? My project concerns how temperature variations given to 13 bats of two species in a flight cage might affect a bat's chances of survival. Prior to the discovery of WNS in 2007, scientists were only aware that bats preferred hibernacula temperatures with temperatures of 34-41 degrees F. WNS has been killing bats off by the millions (the little brown bat and Indiana bat), but why are some bat species plummeting while others are doing well (such as the big brown bat)? I selected the big brown bat (*Eptesicus fuscus*) and the little brown bat (*Myotis lucifugus*). They were exposed to a semi-enclosed cooler. They would either remain in the cooler or resort to a warmer area. The little browns moved from the cold area and scattered around the flight cage. The big browns stayed in the cooler and huddled together to conserve body heat. This showed that though big browns preferred the colder climate, they knew to conserve their own heat even in the lowest possible temperature possible for torpor in bats. WNS is a cold-loving fungus and it would not thrive when the bats are huddled together trying to keep warm with small clusters. The big brown bat made better decisions by huddling together in a small cluster. This experiment suggests that the big brown bats make better choices, per se, and that is why they have a better survival rate.

Scientific Disciplines Selected by Student: AS BE CB

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
BE = Behavioral & Social Sciences	EV = Environmental Analysis
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2510

Word Count

205

Proj. Title: Distracted Driving = Danger

Proj. Num  
2510

StudentName(s): J. Garvey

**Abstract:**

The purpose of this experiment was to find out if texting or talking to someone on the phone while driving affects how well a person drives, and if so, which one is worse. The procedure was to identify eight subjects and using a Simulated Driving Machine (SDM), start the course, with phone against subject's ear. During the drive, have an assistant talk to the driver, asking scripted questions. Repeat procedure, with assistant texting scripted questions to subject. Make sure the subject knows that he/she must immediately respond to texts, and give a reasonably thought-out answer. Then, take a test with no distractions at all. Conduct each test two times for each subject. Record all results, including how many times the subjects went off course, and how long it took for subject to finish each course. The results were that while talking on a cellphone, there was almost double the amount of crashes than when driving normally. The subjects crashed an average of 3 times more texting while driving, than driving with no distractions. When driving with no distractions, the drivers had very few crashes. In conclusion, both talking and texting on a phone affect driver performance, with texting posing the most dangerous distraction.

Scientific Disciplines Selected by Student: BE ET ME

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
BE = Behavioral & Social Sciences	EV = Environmental Analysis
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2511

Word Count

246

Proj. Title: Can Wii Sports be a Form of Exercise?

Proj. Num  
2511

StudentName(s): M. Josephs

**Abstract:**

Can Wii Sports be a Form of Exercise? Matthew Josephs – E7589 Ponus Ridge Middle School, Norwalk, CT The purpose of this project was to determine if Wii Sports can be a form of exercise. My hypothesis was that if a person plays Wii Tennis for ten minutes, his or her heart rate will increase enough for the activity to be considered exercise. I measured the pulse rates of three volunteers after they rested quietly for five minutes and after they played Wii Tennis for ten minutes. Three trials of the experiment were conducted. The average heart rates for the three trials after exergaming were calculated for each volunteer. On average, each volunteer reached the target heart rate required for Wii Tennis to be considered exercise. However, the target heart rates for the three trials were at or close to the minimum target heart rate. Therefore, I conclude that Wii Tennis is a form of light exercise. Wii Tennis provides more activity than a video game where the players are sedentary but not as much activity as actual tennis. A possible extension of this research could be to have volunteers play a different Wii Sports game such as Wii Baseball or a different type of Wii exergame such as Just Dance, or to have the volunteers play actual tennis to see if a person’s heart rate increases enough for the games to be considered exercise and how the results compare to the results from playing Wii Tennis.

Scientific Disciplines Selected by Student:

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2512

Word Count

291

Proj. Title: An Investigation Into Hydrogen Production of Green Algae

Proj. Num  
2512

StudentName(s): P. Hansel

### Abstract:

This project investigates the hydrogen-producing capabilities of cultures of the green algae *Chlamydomonas reinhardtii*, *C. moewusii*, and *Pandorina morum*, and their hydrogen production in different media. Initially, the investigation focused only on the hydrogen production of *C. reinhardtii*. Hydrogenase, an enzyme found in algae, catalyzes the reversible oxidation of molecular hydrogen from water. Hydrogenase is inhibited by the presence of sulfur, a necessary nutrient to the growth of the algae, and by oxygen, produced by the algae themselves, thus requiring anaerobic and sulfur-deficient conditions to function. The algae were originally cultured in complete HSA solution in individual test tubes, later moving to larger beakers. After sufficient growth, the algae suspension was centrifuged, the HSA solution poured off, and the concentrate re-suspended in sulfur-free HSA solution. This was subsequently divided into smaller cultures whose media had different characteristics. Hydrogen production samples are taken daily and analyzed using an electrical conductivity gas chromatograph. The hydrogen baseline was set with a small sample of H<sub>2</sub>, and a peak was apparent at 0.08 μV. All calculations of hydrogen concentration from the cultures are based on this peak. Data collection is ongoing. The results are anticipated to reveal the degree of which the hydrogen production of the algae is affected by the following variables: yeast presence, container type, light intensity, and algae cell density. Cell density per mL was determined using a visible light spectrometer, and the maximum concentration set by a repeatedly centrifuged and purified sample of each algae. The uses of this research span two disciplines; the biological side of the results could provide an insight into how different single-celled organisms coexist, while the physical side includes the construction of an algae bioreactor which generates relatively concentrated hydrogen gas.

Scientific Disciplines Selected by Student: AT BI CB CH EA EE EN ET EM MI PS

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2513

Word Count

141

Proj. Title: Out With Indigestion

Proj. Num: 2513

StudentName(s): K. Mossberg

**Abstract:**

Heartburn affects a large percentage of Americans. The objective of this project was to test how effective certain antacids can be against acid indigestion and heartburn. Three antacid brands (TUMS, Prilosec, and Top Care Acid Reducer), and three home remedies (Fish Oil pills, Apple Cider Vinegar, and Baking Soda) were tested, using a stomach model and a mixture of grease from 80% lean ground beef and lemon juice. This mixture simulates the stomach contents after eating three hamburgers. The Ph was taken before and after each antacid was added. The more the pH increased, the more effective the antacid was. The results were compared to show how effective each antacid was. It was predicted that Prilosec would be the most effective antacid based on cost. As it turned out, TUMS, Baking Soda and Fish Oil pills were the most effective antacids.

Scientific Disciplines Selected by Student: BI ME

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
| 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                  |
| EB = Engineering: Materials & Bioengineering | PS = Plant Science                        |

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2514

Word Count

230

Proj. Num

2514

Title: A Device for Detecting Microhematuria to Aid the Diagnosis of Schistosomiasis

StudentName(s): P. Kage

### Abstract:

Schistosomiasis is a tropical disease that affects millions of people mostly in poor countries and causes tremendous suffering in children and adults. It is easily treatable with medications if it is diagnosed early. My project is to find a simple, effective, and affordable method to diagnose schistosomiasis in patients by using reagents contained on an ordinary piece of paper. Schistosomiasis is a water-borne parasitic disease that causes chronic liver and kidney damage, inflammation of the colon, bloody diarrhea, and right-sided heart failure. Schistosomiasis is spread by fresh-water snails. The schistosome multiply in the snails, get released and enter the human body through the skin when people get in contact with contaminated water. My invention screens for early urinary schistosomiasis. My invention consists of a paper strip to detect blood in the urine found in urinary schistosomiasis. It costs only a few pennies and can be easily mass-produced. It consists of paper, stabilized hydrogen peroxide (from OxiClean™, a bleaching agent), wax (from a solid wax printer like a Xerox© Phaser™), and guaiacol (which turns blue in the presence of blood and hydrogen peroxide). In essence, my invention is an economic and effective diagnostic test. It costs mere pennies, is made from easily obtainable ingredients, and is easily deployable. Early detection allows early treatment that helps millions of people avoid the long-term disabling effects of this disease.

Scientific Disciplines Selected by Student: CH ME MI

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2515

Word Count

255

**Proj. Num** 2515 **Title:** Polypropylene Oil Magnets: A Comparison of this Novel Approach using Ferrofluids to established Methods of Oil Spill Removal including OEMs, Woodchips, Hay, and Compost

**StudentName(s):** A. Khan

**Abstract:**

Oil spills can be quite detrimental to animals, plants and the environment. They can also pose health risks to humans. While there are well-known methods of managing oil spills, it is important for us to explore even better ways that are environmentally-friendly, cost effective, and efficient. In my experiment, I compared established methods for cleaning oil spills using OEMs, woodchips, hay, and compost, to my own method of polypropylene oil magnets with ferrofluids. I tested layers of polypropylene cloth tied around a magnet and lowered it to the surface of either a beaker or bowl containing 200 mL H<sub>2</sub>O, 20mL of motor oil and 5 drops of ferrofluids. The ferrofluids immediately began to move toward the magnet with the oil following. I timed how long it would take the oil to be absorbed by the cloth and using a pipette for the remainder. The average amount of oil cleaned per minute (mL/min) for 0, 1, 3, and 5 layers of cloth respectively were: beakers (surface area of oil- 7.06 in<sup>2</sup>) – 3.87, 2.99, 5.43, 4.67; bowls (SA- 23.8 in<sup>2</sup>) – 2.53, 2.03, 1.91, 1.96. OEMs, woodchips, hay and compost respectively cleaned 0.0014mL/min, 7.51, 2.18, and 8.55. Results showed that polypropylene oil magnets work more efficiently in a smaller surface area and with three layers of cloth. Their performance is not as efficient compared to woodchips and hay but much more efficient than using OEMs. An advantage to choosing this method of oil spill clean-up is that it does not deplete natural resources.

**Scientific Disciplines Selected by Student:** EM MI

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2516

Word Count

150

Proj. Title: The Effect of Different Organic Materials on the Number of Ants Repelled

Proj. Num  
2516

StudentName(s): N. Cazzaniga

**Abstract:**

Ants have a keen sense of smell that can be affected through the use of chemicals acting as repellents. My experiment focused on the use of common household organic materials to determine their overall effectiveness as ant repellents. My hypothesis was that the stronger smelling materials would affect the ant's conduct the most. The materials I decided to test were cumin, catnip, chalk, and cayenne pepper. I created a set up that allowed the ants to travel from their starting point to a food source through a section of tubing treated with the repellent substance. My experimental results showed that the stronger smelling materials, cumin and cayenne pepper, did work the best in that they repelled the most significant number of ants, cumin having repelled 64% of the ants and cayenne pepper 51%. However, none of the materials proved to be 100% effective as several ants reached the food source.

Scientific Disciplines Selected by Student: AS

**Scientific Disciplines**

**Fair Categories**

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- EA = Earth Science
- EB = Engineering: Materials & Bioengineering
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- ET = Energy & Transportation
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- ME = Medicine & Health Sciences
- MI = Microbiology
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- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2517

Word Count

228

Proj. Num

2517

Title: Measuring Air Pockets in Store-Bought vs. Farm Fresh Eggs

StudentName(s): I. Carpenter

**Abstract:**

The purpose of this experiment was to compare the air pockets of store bought and farm fresh eggs and to discover the dangers of larger air pockets. The procedure used involved removing the first egg, locating the air pocket and measuring it using a vernier caliper. Then, pictures of the pocket were taken and recorded. These steps were repeated with all of the remaining store bought and farm fresh eggs. My conclusion is that, when the store-bought eggs are brought home from the store, they have a larger air pocket than the farm fresh eggs start with. It can also be concluded that starting with a large air pocket affects the rate at which the pocket grows over time. Overall, it was noted that the air pockets of the store-bought eggs were first measured with a large air pocket and the pocket grew larger than the farm fresh eggs in the same amount of time. Throughout the project, I noticed that the data proved that the store-bought eggs arrived with a bigger air pocket, and that their pockets grew faster, as well. The research also indicated that, if eggs are washed too much, or the air pockets get too big, the risk of salmonella is increased greatly. Overall, buying farm fresh eggs will increase the amount of nutrients consumed and reduce the risk of salmonella.

Scientific Disciplines Selected by Student: AS ME

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2518

Word Count

249

Proj. Title: Giggle, Giggle

Proj. Num: 2518

StudentName(s): A. Greene

**Abstract:**

Have you ever noticed that people who are overweight tend to have high blood pressure? You should start to question, “Why?” and “If there’s a solution to high blood pressure, what is it?” In my project I test the problem, “How does laughter affect blood pressure?” Since every 1 in 3 Americans in the U.S.A. has high blood pressure or HBP, I thought it would be a good idea to test a possible cure for lowering blood pressure. I took people from the middle aged group (13-18), and senior citizens’ (above 40) “at rest” blood pressure and recorded the data. Then, I put on a comedy themed YouTube video. Next, waited until the tester stopped laughing then took their “after laughing” blood pressure and recorded the results. I compared the data for all three trials between the systolic readings, the numerator on the BP fraction and the BP when the heart beats while pumping blood, the diastolic readings, the denominator and the blood pressure when the heart is at rest between beats, and the tester’s pulse rate. My results showed that my hypothesis was not supported and people’s blood pressure rose. Even if the BP in Trial 1 did go down, I noticed that in Trials 2-3 the results differed severely. The thing in my experiment that I would change is the video that I used to compare the data. I learned that blood pressure is very important and that blood pressure relies a lot on how you eat.

Scientific Disciplines Selected by Student: PH

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2519

Word Count

138

Proj. Title: The Name Game: Boys vs. Girls

Proj. Num: 2519

StudentName(s): B. Hiatt

**Abstract:**

Abstract Purpose: The purpose for this experiment was to see which sex, male or female, had the better short term memory in regards to putting together the correct name and face.

Procedures Used: • Cut out 6 pictures (3 male and 3 female) and give them names. • Begin the experiment showing the participant each picture and name for 30 seconds. • Wait one hour and ask the participant to recite the names to the pictures shown. • Record the results. • Repeat this process with each participant.

Observation: The men's total time was less than the women's therefore the men won.

Conclusion: My hypothesis was incorrect because the women's total time was far less than the men's. I can extend my project by fluctuating the amount of time given to see the faces and the amount of time to remember the name.

Scientific Disciplines Selected by Student: BE

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2521

Word Count

274

Proj. Title: The Effect of Vitamin D on Bone Recalcification

Proj. Num: 2521

StudentName(s): V. Sarmiento

### Abstract:

Abstract It is hypothesized that if Calcium carbonate is put with Vitamin D, it will help the re-absorption of Calcium. This experiment was conducted to concluded what supplements would better help the recalcification of the bones during osteoporosis. Three chicken bones were used to test the purpose of the experiment and then were decalcified in vinegar. After having the bones for four days in vinegar, they were taken out and placed each individually in a different jar. Jar A was the control which meant the bone was put in just plain water. Jar B was calcium carbonate and was just put in 10 grams of TUMS, (calcium carbonate supplements), and lastly Jar C with calcium carbonate and vitamin D. As a key in the intestines to absorb the calcium needed in the bones, Vitamin D would work best for recalcification. Every two days the bones were weighed for their mass and every time their bone density had decreased. They were not recalcifying or gaining mass. A second experiment was conducted and at the end the difference was seen. The mass by which each decalcified bone had weighed in the beginning had changed. The total grams that the bones had lost during the experiment helped determine which supplements had worked best for the healing of osteoporosis. Finally when both experiments were completed the hypothesis was correct. Even though the bones had lost mass, Jar C Calcium carbonate with vitamin D had lost only 1.9 grams in total. Jar A lost 3.9 grams, and Jar B 2.2 grams. In conclusion taking supplements both with calcium carbonate and vitamin D would help the recalcification of calcium.

Scientific Disciplines Selected by Student: ME

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

Word Count

250

2522

Proj. Title: The Dirt on Worms

Proj. Num  
2522

StudentName(s): O. Morris

### Abstract:

The question is how does diet affect earthworms and the soil they enrich. The goal was to test which diet causes the worms to have the greatest mass increases and what pot had the greatest soil analysis improvements. The hypothesis was the mass of the worms will increase in the pots receiving diets and the soil analysis results will improve in all pots.

Each pot was given 50 worms and a different diet with one pot receiving no diet. The pots received food and water once a week. The soil was tested at the beginning and end and the results were compared. The worms were weighed at the beginning and end and the masses were compared.

Diet doesn't have an effect on worms' masses. The mass of the worms in each pot decreased except rising in the control pot. The soil became more enriched throughout the experiment. Nitrogen and phosphorus levels rose in every pot. Acid levels in each pot stayed the same except decreasing in the coffee grounds pot. Potash levels decreased in pots receiving egg shells, yard clippings, and the control pot and rose in pots receiving vegetable skins and coffee grounds.

It was found that diet doesn't have an effect on earthworms' masses; however, the soil analysis results improved during the experiment. The experiment is not reliable because the soil used in each pot was composed of 95% organic materials, meaning the worms in the control pot were eating during the experiment instead of only receiving water.

Scientific Disciplines Selected by Student: AS EA EV

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2523

Word Count

161

Proj. Title: Blood Pressure: Red Rising

Proj. Num  
2523

StudentName(s): O. Kilbourne

**Abstract:**

The purpose of my experiment was to prove that color has an effect on blood pressure. My hypothesis was that looking at the color red would increase blood pressure and looking at the color blue would decrease blood pressure. To conduct my experiment I had 10 males and 10 females sit in front of a red and then blue computer screen. I took their blood pressure before and after looking at the screen and compared results. I proved my first hypothesis that if human test subjects looked at a red computer screen, then their blood pressure would increase. After looking at the red computer screen, sixty-five percent of the human test subjects had their blood pressure increase. My second hypothesis, that if human test subjects looked at a blue computer screen, then their blood pressure would decrease, was proven incorrect. Only thirty-five percent of human test subjects had their blood pressure decrease after looking at a blue computer screen.

Scientific Disciplines Selected by Student: BE ME

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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EA = Earth Science	PH = Physics & Astronomy
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2524

Word Count

245

Proj. Num

2524

Title: The Effects of Symphytum on Bone Cell Growth

StudentName(s): E. Robison

### Abstract:

Symphytum (comfrey) is a plant that has been used as a homeopathic remedy to relieve bone/joint pain. In this experiment, we used symphytum to try to stimulate bone stem cell growth. We placed frozen mice bone stem cells into an incubator at 37.1°C. We measured an initial DNA count at 4 hours, then added symphytum in doses of 6x, 30c, and 200c and monitored GFP production for 10 days. Through a microscope, the doses with 6x appeared to have grown the most, followed by the control, then the 200c and the 30c. However, there was no statistically significant difference between any of the doses in DNA counts. A 6x dose of symphytum may produce more osteoblasts compared to 30c, 200c, or the control, although the differences were not statistically significant. My hypothesis that the 200c would be the most productive dose, followed by 30c, 6x, and control, was not supported. Two reasons may explain why the DNA counts were the same across doses. First, we used twice the amount of frozen cells as my mentor did when she had fresh cells because a previous batch had been incorrectly frozen. Our cells were frozen correctly, and we had twice as many cells as necessary which would cause them to grow faster anyway. Second, we may have stopped the experiment too early. This experiment is useful because it shows that symphytum may help bone regrowth such as dental repair, curing broken bones, or treating osteoporosis.

Scientific Disciplines Selected by Student: ME

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2525

Word Count

222

Proj. Title: How Does Size and Color Affect Memory

Proj. Num  
2525

StudentName(s): M. Shapiro

**Abstract:**

The purpose of my experiment this year was to understand if different sizes and colors affect how a person can remember artificial five-letter words. Before I did any testing, I created a permission form for parents and the test subjects to sign. I then showed my test subjects, students in grades 4-8, several word combinations to identify which ones were more easily remembered. To generate the random yet structured words such as RIMIN and FICEF, I wrote a program in BASIC which would do this. After generating the word lists, I put them all into a Powerpoint presentation, and altered the size and color of the randomly generated words. I created a scoring system to keep track of how the students did with the different fonts and colors. After compiling all my data, I concluded my hypothesis (that people would remember the normal sized, black colored words better), was false. I compared every score out of 110 (the highest possible score) and also put the scores in by grade. With this, I could tell who scored the highest, and where people scored the highest. I found that small letter words are harder to remember, and big, colored words are easier to remember. This could be used in advertising or even teaching to help improve retention of text or an advertising message.

Scientific Disciplines Selected by Student: AT AS BE CS ME

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2527

Word Count

250

Proj. Num

2527

Title: Manufacturing and Biodegrading Bioplastics: Observing the speed of biodegradation of potato, rice, tapioca and corn starch based plastics.

StudentName(s): M. Ali

### Abstract:

Plastic is one of the most durable materials used around the world every day in packaging and more. One major advantage of using plastic is convenience. Two disadvantages include depleting petroleum resources and slow decomposition rate. A solution for this is biodegradable bioplastic which can be made from plant-based starch. I made two batches of potato, corn, rice, and tapioca starch plastic. Using four identical plastic containers, I placed a 5"x5" piece of plastic in each container. Each plastic piece was buried in soil, observing their biodegradability for seven days. The plastics were weighed for biodegradability by weighing pre and post biodegradation and measuring loss in area. The percentages in weight loss were: 44 (potato), 22 (corn), 11 (rice), and 10 (tapioca). The final area measurements were: 3"x4" (potato), 3"x3" (corn), 4"x4" (rice), and 3"x4" (tapioca). The second batch was subjected to a series of quality test to test hardness, ability to hold up under extreme temperatures, and durability when submersed in water. On a scale of 1 (weakest) to 10 (hardest) for hardness, the scores were 9 (potato), 5 (corn), 3 (rice), and 7 (tapioca). All passed the temperature and water tests except for rice starch. The biodegradation test showed that potato starch decomposed the most while the quality tests showed that tapioca fared the best. Future studies can be done to determine if bioplastic made with a combination of potato and tapioca starches may display the optimal desired attributes of biodegradable plastic.

Scientific Disciplines Selected by Student: BI CH EA EM EV PS

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2529

Word Count

214

Proj. Title: Don't Drink And Drive

Proj. Num: 2529

StudentName(s): S. Lonergan

**Abstract:**

This project provides a comparison of human reaction times after social consumption of alcohol. The question the project was used to answer was, "Does casual alcohol consumption affect your reaction time?" My hypothesis was that casual alcohol consumption will reduce your reaction time. To determine how alcohol affects reaction time I conducted two basic reaction time tests on six subjects that were participating in casual alcohol consumption during a sporting event. The reaction times were measured by mechanical as well as electronic means. The level of alcohol was determined by the number of drinks as well as a Breath Analyzer device that was able to determine Blood Alcohol Content (B.A.C.) levels based on an individual's breath. The analyzer was used before each reaction time test was taken. The experiment found that alcohol consumption will reduce your reaction time. In addition it was determined that Blood Alcohol Content (B.A.C.) for individual people is affected differently by the person's weight, rate of alcohol consumption and mixture of food and alcohol consumption over the same period of time. In addition some data collected indicated a slight increase in reaction time with alcohol but it was not consistent. Possible reasons for these inconsistency reaction times such as learning and variations in the Breath Analyzer device is also discussed.

Scientific Disciplines Selected by Student: BE ME

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2531

Word Count

242

Proj. Title: Should a School Advertise more Sports or Academics Online?

Proj. Num  
2531

StudentName(s): A. Kostka

**Abstract:**

I enjoy making websites and I was curious if a school should advertise more Sports or Academics online so I decided to test it. First step to my experiment was to create two basic HTML school websites, one focusing on Sports and the other on Academics. Then you host your site on the web, to do this you need a hosting service to host it for you or your own server where you host it on, either way it works the same. After these two steps you wait for a week. When you finish waiting you go to google.com, search for three different search terms that match your school, for example my school's test name is Beisl Academy so I searched for: Beisl Academy, School Beisl, Beisl School. While searching the three individual terms, chart down the results, so for example if you search Beisl Academy you may find the Academics page on page 1 of the Google search page, but the sports page is on page 10, this means that in this fake example the academics page was more popular. I found at the end of my real experiment that the Sports page was more popular in all of my tests. I did three tests in total and it turned out that in every one of those tests the Sports page came before the Academics page in all three of the search terms. A school should advertise more Sports than Academics.

Scientific Disciplines Selected by Student: AT BE CS

**Scientific Disciplines**

**Fair Categories**

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
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2533

Word Count

236

Proj. Title: The Power of Suggestion: Flavor

Proj. Num: 2533

StudentName(s): A. Scaperotta

**Abstract:**

This is a study on how the power of suggestion (via color) affects the perceived flavor of a drink. The problem being researched is as follows: “Does the color of a drink effect the way people perceive its flavor?” The hypothesis is that “If people drink colored water, then they would think that it tastes like one of the characteristics of that color, because of the power of suggestion.” The independent variable is the color while the dependent variable is the participants response. Constants include composition and amount of drink. For this experiment, sugar water with various food dyes are used. Pour samples of each color drink into several cups. Find participants, and prior to their agreement to participate notify them of the risks and ask them to fill out a consent form. Do not reveal the true goal of the experiment. Have each participant fill out a form describing the flavor of each drink. Analyze data. 53% of people found a false flavor in the water. Of the 36 people tested: 73% of males, 38% of females, 39% of adults, and 67% of children showed a similar false positive. From this data, it can be concluded that the power of suggestion is a factor when flavor is involved. The hypothesis was supported. If the trends were to continue, it would be shown that a significant amount of people are susceptible to the power of suggestion.

Scientific Disciplines Selected by Student: BE

**Scientific Disciplines**

**Fair Categories**

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

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2534

Word Count

249

Proj. Title: Password Security

Proj. Num: 2534

StudentName(s): C. Provost

### Abstract:

Society relies on password security to protect us from having personal information stolen and misused by hackers. This experiment examines password security to determine methods to decrease how frequently this crime occurs. There were two parts to this experiment. Part I collected information about the average person's password to determine its composition of characters and analyze how easily it can be deciphered. Part II used a programming language called Scratch to create a program to categorize the contents of a password and assign a security rating based on the findings of Part I. Using a survey, password data was gathered from 120 people. The data was transformed into numerical form and graphed. The mean password length and mode amount of characters were calculated. A generic password was created based upon the data. Security testing websites were used to evaluate the generic password and then data was analyzed to determine the password's security rating. A Scratch program was created to analyze password security based on length, character set, and content. The program identified character types, repeated characters, character sequences, and assigned a security rating. The results showed that the average person's password contained one capital letter, three numerals, six lower case letters, one symbol, and no spaces. Males and females did not significantly differ in password content. Many password security testing websites consider only length and character type, not content. A program was developed that considers password content, length, size of character set, and identifies ways to improve your password.

Scientific Disciplines Selected by Student: AT BE CS MA

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

Word Count

235

2535

Proj. Title: GRAPEFRUIT JUICE OR GATORADE, WHICH HAS MORE  
Num ELECTROLYTES?  
2535

StudentName(s): R. Anderson

**Abstract:**

The question of this science project is “Which provides more electrolytes, a sports drink like Gatorade or grapefruit juice?” Electrolytes are minerals in the human body that have an electric charge. It is important for the body to keep the right balance of electrolytes. Electrolytes affect the amount of water in the body, the acidity of blood, the body’s muscle function, and other functions. Gatorade is made up of water, sugar (carbohydrates), and salts (electrolytes). The ads for Gatorade claim that Gatorade replenishes fluids and electrolytes that the body loses during strenuous exercise. In this experiment, an ammeter was used to measure the conductance or concentration of electrolytes in distilled water, tap water, Gatorade, and grapefruit juice. Electrolytes are charged particles that carry current in a solution. A 9 volt battery supplied the voltage to measure the current in the liquids. Conductance and the electrolyte concentration are proportional. An increase in the concentration of electrolytes should cause the conductance of the solution to increase. The conductance is measured in Siemens. The hypothesis of this science experiment is if the concentration of electrolytes is measured in Gatorade and grapefruit juice, then Gatorade will have the greater concentration of electrolytes. The conductance or electrolyte concentration of distilled water, tap water, Gatorade, and grapefruit juice were measured. The results did not prove the hypothesis. The conductance/electrolyte concentration in grapefruit juice was greater than the concentration in Gatorade.

Scientific Disciplines Selected by Student: ME

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2536

Word Count

233

Proj. Title: Facial Composure

Proj. Num: 2536

StudentName(s): J. Mohammed

**Abstract:**

Do we pre-judge a person by their face shape? My project is based on that question. I believe that we do judge someone partly because of the shape of their face. To test this, I took two front-view photos (one male and one female) for each face shape. I tested twelve people individually. They were required to fill out a survey on each face shape they are shown. Questions included what characteristics the person shown might have, with options for answers for them to circle, and rating the characteristics from a scale of 1-10. The last question asked how attractive they seemed on a scale of 1-10. To analyze the data, I put the results in a graph for each individual face shape and gender. I tallied all the characteristics each shape received, and rated the top three. I took the top three results from each gender and combined them, having then six top characteristics. I then created a composite number for each characteristic and how attractive they seemed. In conclusion, some shapes received great characteristics, some negative characteristics, and some whose answers were blurred. I could say my hypothesis was correct but yet wrong. I can conclude that different people have different views on people with face shapes, and that some face shapes do, in general, receive a group of characteristics that are alike, but others which are quite confusing.

Scientific Disciplines Selected by Student: BE

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2537

Word Count

239

Proj. Title: Make a Mummy Out of Me

Proj. Num  
2537

StudentName(s): G. Pittman

**Abstract:**

I chose mummification as my topic simply because it interested me and I wanted to do something unique. Mummification is a method of preservation, usually by drying out the organism with heat, cold, or salts. Any dead body that still has its skin is a mummy. I decided to use dead fish as my test subject. I took four fish per experiment: one being the control, another being placed in a mixture of table salt and baking soda, another in baking soda alone, and another in a mix of borax and table salt. I placed the fish with their mixtures into plastic bags. I then took the bags and put them inside a cooler to keep them under a regulated temperature. For a week I left the fish alone. Then, at the end of the week, I removed each fish from its bag, weighed and measured it, then gave it a new mixture and a clean bag. I repeated this procedure four times for a total of four weeks. I did this three times. In the end, the fish with baking soda and salt was the best preserved. It weighed the least, was very stiff, and didn't smell. The other fish had similar results, but not as great as the first. I concluded that an organism will be the best preserved in a mixture of table salt and baking soda than baking soda alone or borax and table salt.

Scientific Disciplines Selected by Student: BI CB

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2538

Word Count

252

Proj. Title: Are You Really Going to Eat That?

Proj. Num  
2538

StudentName(s): C. Tappenden

**Abstract:**

Ever hear of the Five-Second Rule? Well many people have and believe that their food item will be safe to eat even after five seconds of being exposed to, either floor or kitchen counter top. This issue has been a debate among people for a long time, is the Five-Second Rule true? Is it safe to eat food after it has been dropped? Well, I was interested and wanted to know for sure. The best way to prove or disprove this myth is to conduct an experiment. First, my hands were washed, gloves were worn and eye protection was used at all times. Then three pieces of deli meat was taken and placed on the floor one was placed for 2 seconds, one was placed for 5 seconds, and another for 5 seconds, but blown respectively on. The same procedure was done with deli meat that was dropped on a clean kitchen counter top. After, I swabbed each specimen and placed the samples of collected data onto an agar nutrient in sterile Petri dishes. The dishes were then sealed and placed in a warm, moist, and dark environment in the lab at my school. Over a one week period, growth occurred in several Petri dishes. Although I am not qualified to identify the growth, there was 'something'. This in itself leaves me to conclude that it is best not eat any food that has been dropped on the floor or counter, because you just don't know what you are eating.

Scientific Disciplines Selected by Student: BE MI

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2539

Word Count

335

Proj. Title: Pharmaceutical and Herbal Antibiotic Effectiveness on Bacteria from Multiple  
 Num Collection Sources  
 2539

StudentName(s): M. Borsari

**Abstract:**

This experiment was a combination of two questions that were developed as a process for growing, and then neutralizing bacterial growth. The first question, referred to as (Question A) was, "How does the collection source of bacteria affect the overall growth of bacterial colonies before the introduction of foreign materials such as antibiotics?" The second question, referred to as (Question B), investigated "How does the use of herbal antibiotics on bacterial cultures compare to the use of pharmaceutical antibiotics in affecting the growth of bacterial colonies?" My hypothesis for these questions were as follows; (A), If the sources of bacteria are changed from a cheek swab to dry swab of a garbage can, then the number of bacterial colonies will be greater from the cheek swab than the swab from the garbage can. And (B), If herbal antibiotics are used on a mature bacterial culture, then the amount of bacterial colonies will be higher than if pharmaceutical antibiotics are used. The bacteria was collected via sterile swab, from the inside of my cheek, and the inside rim of a garbage can. This was done to measure which source was more successful at generating bacteria and microorganisms. Then the bacteria was introduced to an agar dish, and allowed to incubate in my school's laboratory at 100 degrees Fahrenheit. Once the bacteria was fully grown, the samples were counted and antibiotics were introduced to the most successful source's samples. The following was noticed when bacteria was counted for Question A; Only samples from the garbage can grew bacteria or microorganisms. The mouth/cheek sample grew nothing. As was expected, the pharmaceutical antibiotic amoxicillin was more successful than the herbal antibiotic echinacea. These results were replicated a total of three times, and because of this, I found that the results were conclusive. However, due to lack of equipment there was no way of differentiating between bacterial growth, and growth of mold. However, due to my research and observations, I believe that the colonies grown were in fact bacterial.

Scientific Disciplines Selected by Student: CB ME MI

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2540

Word Count

253

Proj. Num Title: The Effects of De-icing Salts and Chemical Compounds on Adiantum pedatum

2540

StudentName(s): A. Gerstenfeld

### Abstract:

. This project was designed to determine if de-icing materials have a negative affect on plant life such as the maidenhair fern, Adiantum pedatum. The origin of this project began last winter and spring. Over the course of the harsh winter my father had used ice melt on our driveway and sidewalk. When spring began, I observed that there were many bushes and shrubs that had not survived. I decided to investigate if de-icers have an affect on plant life and if so, which were the most and least harmful. Four maidenhair ferns, plants commonly found in the forests and landscapes of the Northeast, were purchased to test. Research revealed that these plants grow low to the ground exposing the entire plant to de-icers. All variables were controlled with the exception of the manipulated variable, solutions of water and de-icers, (salt, eco/pet friendly ice melt, and eco friendly ice melt). One plant was given only water as the control. Quantitative, (growth in centimeters and numbers of fronds), and qualitative observations were made over the course of a month. Based on my observations, I concluded that the salt ice melt was the most detrimental to the health of the maidenhair fern while the eco/pet friendly material was the least detrimental. As an extension activity I then decided to test which material was the best at melting ice and to formulate a mixture that would be the most beneficial for that purpose and the least harmful to local plant life.

Scientific Disciplines Selected by Student: BI CH CS EA EN EM EV PS

### Scientific Disciplines

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EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

Word Count

242

2541

Proj. Title: Killing the invisible enemies on our hands: Do we use soap or hand sanitizer?

Proj. Num  
2541

StudentName(s): A. Visscher

### Abstract:

Everyone says that soap and warm water removes more microbial colonies than hand sanitizer. Microbial colonies accumulate on your hands as time goes on and can be removed in a few ways. The two main ways that are known to remove bacteria are warm water and soap or hand sanitizer. I tested to see which of the two removes more bacteria. I used homemade nutrient agar plates to imprint my untreated fingers, two fingers treated with warm water and soap, and two with hand sanitizer. I recorded what kinds of colonies developed over a time period of 155 hours. The hand sanitizer worked the best. It removed 89% of the microbial colonies. Soap only removed 59% of the microbial colonies. Some of the microbial colonies on your hands include pathogenic bacteria. Pathogenic bacteria are bacteria then can cause you to become very sick therefore, you should use the best technique to remove them. if you are at home, it is not as important to wash your hands frequently. If you are at work or at school or even at your local supermarket, there will be much more bacteria all around because there are more people therefore, you should wash your hands much more than you do at home. The less you do not wash your hands, the more likely it is that you are going to get sick. So, always keep in mind that it is important to wash your hands frequently.

Scientific Disciplines Selected by Student: ME MI

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2542

Word Count

258

Proj. Title: Stooped By Stroop

Proj. Num  
2542

StudentName(s): B. Todorovska

**Abstract:**

The topic of this experiment is to test the Stroop effect between genders. I was inspired to do this experiment when reading an article about the Stroop Effect, and was fascinated to see if gender would have an effect on this. My hypothesis was that females would take a less time to interpret the colors of the words. This is based on the notion that girls mature faster than boys. Their frontal lobe develops faster than those of boys. In this experiment I tested 10 males and 10 females. The test consisted three sheets: one sheet of color words written in their own color, one sheet with color words with some written in their own colors and some in other colors, and a final sheet with color words written in different colors. I measured the amount of it took to have complete verbal recognition. During this experiment the result I found was that males' average reading times were overall relativity faster than the females for about 2/3 of the this experiment. I found that for the females had a faster time when reading the words that were written in their color, which proved my hypothesis to be incorrect. Another experiment that I can conduct to further explore the topic of the Stroop effect is testing random students and test their reaction time to saying the colors of the color words which would be written in different angles. This could help see if colors are universal and whether or not what form they are written in affect the subject.

Scientific Disciplines Selected by Student: BE

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2543

Word Count

196

Proj. Num	Title:
2543	Phytoremediation: Removal of metal pollutants from contaminated soil and effect of chelators

StudentName(s): A. Russell

**Abstract:**

My experiment was to extract harmful metal pollutants, such as mercury, lead, and iron from local contaminated sites using Phytoremediation. My phytoremediators included hardy grasses of wheat, soy, rye and cilantro. Chelators were added to enhance contaminant extraction, including EDTA (chemical chelator) and cilantro (a phytoremediator and natural chelator). I also simulated soils adding mercury, lead, or iron compounds to potting soil for comparison and verification. Important discoveries include:

- The most effective phytoremediator is cilantro, absorbing highest level of metal contaminants from contaminated sites. (Rye is also effective)
- My three contaminated sites have high amounts of mercury and lead; iron is not as dominant (medium levels)
- After phytoremediation, all contaminated sites averaged low to medium amounts of mercury, iron and lead; plant extracts of rye, wheat, soy, and cilantro had absorbed medium to high levels of these contaminants.
- To thoroughly remove all pollutants from the contaminated soil would take several plantings
- Chelators improve contaminant extraction an average 25% to 50%
- Other nutrient tests of plant tissue and soil showed little change after phytoremediation. I have found a successful phytoremediators of contaminated soils; roots of natural, hardy grasses do absorb dangerous metals. So “Take Root and “Phyte”!

Scientific Disciplines Selected by Student: AT BI EM EV

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

L8

# Connecticut Science Fair Abstract

Project Number

2544

Word Count

251

Proj. Num

2544

Title: Relationship of Handwriting or Typing Notes and Recall of Memory in Eighth Grade Girls Within One and Twenty-Four Hours

StudentName(s): A. Beeson '16

### Abstract:

Alexa Beeson Greenwich, Connecticut Greenwich Academy The purpose of doing this experiment is to test the relationship between different styles of note taking and the amount of information that was recalled. The initial test was to find out whether handwriting notes or typing them was better at recalling what was written within one hour, and then twenty-four hours later. The two tests were taken and the results coincided with my hypothesis. The handwriting was better both tests. The data for recollection of information was found by a small quiz handed out to the students. The students were split into two groups, one group was asked to handwrite the terms and the other was to type. They were then handed the same quiz twice and the data was collected by a percentage by a fraction of how many of the five words they remembered. The handwriting group had an average of 60.0% for the one hour and an average of 67.3% for the twenty-four hour test. The typed notes group was actually very close in average to the handwriting group the first test, but was very different on the twenty-four hour test. The average for the first hour test was 57.0% and the twenty-four hour test averaged at a 49.1%. Clearly, the first test was pretty close, but the handwriting group could more easily recall the information. The second test was a clear winner to the handwriting group, which means that handwriting notes helps the long-term memory.

Scientific Disciplines Selected by Student: BE

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3001

Word Count

169

Proj. Title: Learning a new language and age

Proj. Num  
3001

StudentName(s): R. Yu

**Abstract:**

Learning a new language is difficult and needs a lot of practice and study. But is it easier for children or adults to learn a new language and is there a best period or age range to learn a new language? This project is to investigate the ease of learning a new language among different age groups by testing 4 groups of Americans participants in different age range learning Chinese. Each participant was required to watch one short video (about two and half minutes each) to learn Chinese words each day for two days. On the third day, they were required to take a 20 matching-question test which is based on the vocabularies they have learned. My hypothesis for the project is that children can learn a new language easier than adults, especially for the group of age of 12-18. The experimental results showed that children in the 12-18 years old group learned most easily, but that adults learned more easily than children in the age 6-12 group.

Scientific Disciplines Selected by Student: BE

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3002

Word Count

295

Proj. Num

3002

Title: Making Friends with a Long Island Sound Invasive; Novel Evaluation of Key Resources of Gracilaria vermiculophylla relative to native Gracilaria tikvahiae

StudentName(s): M. Cirino

### Abstract:

Gracilaria vermiculophylla (Gv), a red alga native to northwest Pacific, invaded the Northeast U.S. coastal region nearly a decade ago. This invasive species appears well-adapted for its new environment replacing the native species Gracilaria tikvahiae (Gt). Both species represent a valuable ecological and economical resource, however, researchers require a better understanding of their composition, specifically the concentrations of lipids, proteins, and carbohydrates contained within its structure. This study is centered on the evaluation of these components of the invasive Gv and the native Gt, as well as on the development of quick and efficient methods for the determination of said components. Gracilaria samples were grown at the University of Connecticut's Marine Biotechnology Laboratory (Stamford, CT) and at the Bridgeport Regional Aquaculture Science and Technology Center aquaculture laboratory (Bridgeport, CT) during the summer of 2011. For total sterols analysis, 5g of dried, powdered seaweed was soaked with 50 ml of a 1:1 v/v MeOH:CHCl<sub>3</sub> mixture. Following separation and washing, the extracts were analyzed via ATR-FTIR and GC/FID. FTIR spectra support the successful separation of cholesterol, while GC-FID results indicate that the provided samples of Gt contain 0.4% cholesterol, the main sterol in red algae; that of Gv contain 0.2%. For total protein analysis, 0.5g of dried powdered algae was soaked in 40 ml water and incubated for 6 hours at 4°C. After the addition of 10ml of 0.1M NaOH, and separation via centrifugation, analysis of the crude extract via a Bradford Protein Assay indicate protein content of Gt is 5.6%, while that of Gv is 5.0%. Sugar content of both Gt and Gv was determined via HPLC, with RI Detection. Gt was found to contain 5.66% mannose, 8.7% galactose, and 1.06% xylose, while Gv contained 1.4% xylose and 22.1% galactose.

Scientific Disciplines Selected by Student: BI CH EM EV PS

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3003

Word Count

221

Proj. Num	Title:
3003	Epimorphism in Varying Species of Planarians as Relation to Neoblasts (Stem Cells)

StudentName(s): L. Cirelli

**Abstract:**

Planarian are one of few multicellular organisms capable of regenerating their whole body after being cut into any size piece. The only cells capable of mitosis are the neoblasts, or stem cells in the planarian. The focus of this experiment was to determine if the species of planarian affects the rate of epimorphism demonstrated. Three different species of planarians, a brown, black, and white, were cut (decapitation, trisection, oblique plane), individually separated, and monitored for signs of regeneration over a three week period. The data suggested that the brown planarians were able to perform epimorphosis in an average of 7.14 days. The analysis for statistical significance using standard deviation and standard error of the mean (SE) along with the average regeneration day for brown planarians support my hypothesis. The SE for the brown planarians was 0.46. When running a t-test between the three samples, it was determined that there seems to be a significant difference in the mean number of days it takes for the brown planarian and the mean number of days it takes the black planarian to regenerate. In comparison to the other two species, the brown specimens also demonstrated the most movement, regenerated to their original shape, and even underwent fission in the time period. Future studies around formation of neoblasts (stem cells) might consider brown planarians.

Scientific Disciplines Selected by Student: AS CB

### Scientific Disciplines

### Fair Categories

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3004

Word Count

226

Proj. Title: Bioengineering: Microbial Properties of Shark Skin and Other Natural Surfaces

Proj. Num  
3004

StudentName(s): R. Weeks

**Abstract:**

In our society we are faced with the growing problem of bacteria and its ability to adapt and become immune to different treatments and medicines. In my experiment I ventured into the field of bioengineering and tested the capabilities of natural surfaces to inhibit bacterial growth. I was looking to discover a material that can prevent bacteria from growing; that way the bacteria are killed before they even live. I conducted my experiment by using a synthetic of shark skin called Sharklet; it is a thin plastic sheeting with a microscopic replication of the diamond pattern found on sharkskin. I tested its properties by growing cultures of Ecoli k12 on the Sharklet and on a control sample of plain plastic. I found that the Sharklet prevented bacterial growth and contained no colonies of bacteria, while the non-Sharklet patterned samples failed to prevent or inhibit bacterial growth, allowing colonies to grow. Ultimately, I concluded that Sharklet inhibits bacterial growth due to the specific diamond pattern which prevents bacteria from colonizing and reproducing. In addition, I discovered that microscopic patterns like Sharklet prevent bacterial growth due to the fact that they block the surface space needed for bacteria to colonize. This discovery 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.

Scientific Disciplines Selected by Student: AT CB EN MI

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3006

Word Count

247

Proj. Num

3006

Title: The effect of different protein sources on the growth and development of Tenebrio molitor

StudentName(s): J. Erdman III

**Abstract:**

The purpose of this experiment was to determine if different sources of protein affect the growth and rate of development of Tenebrio molitor, the common mealworm. It was hypothesized that the supplemental proteins would increase Tenebrio growth, with the supplemental whey protein increasing the growth the most. Tenebrio larvae, approximately in the same instar, were placed in four experimental groups of twelve larvae each. Three of the groups were placed in separate containers with 25g of bran meal supplemented with 10g of one of the following supplemental proteins: whey powder, egg white powder, and soy powder. The control group was placed in a container with 35g of bran meal. The experimental groups were massed collectively every other day for four weeks. The collective mass for each group peaked on Day 6 when all subjects were still in the larval stage. The mass then began to decrease as the subjects stopped eating and began to pupate. At the conclusion of the experiment, the original hypothesis was not supported as the growth and developmental rate of any one colony did not experience significantly larger growth than the others, nor did all of the colonies with supplemental protein experience significantly higher or lower levels of growth compared to the control group. The likely reason for the inconclusive data was that the larvae pupated before enough data could be collected. Future studies may include repeating the experiment using larva in earlier instars to allow for more data collection prior to pupation.

Scientific Disciplines Selected by Student: AS BI CB

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3007

Word Count

251

Proj. Num

3007

Title: Antibiotic inactivation at home: A Proposal for Disposal Can antibiotics be inactivated so that they may be disposed of down the drain?

StudentName(s): F. Lunt

### Abstract:

This experiment was to determine if there is a simple way to inactivate common household antibiotics so that they may be disposed of down the drain. Many people seem to take their unwanted medicines and dispose of them improperly. This is potentially harmful to the environment as well as to humans and wildlife. In addition, bacteria can become resistant to antibiotics after constant exposure, so simple removal of the antibiotics' potency may eliminate this problem. Panels that had been coated with different antibiotics at several concentrations were treated with six methods to possibly inactivate them. These were high and low pH, UV light exposure, heat, hydrogen peroxide and 100% ethanol, as well as a control panel. Each panel was then inoculated with colonies of E. coli bacteria and was put into an ambient incubator for 24 hours. If the E. coli was able to proliferate, then the antibiotic was possibly inactivated. There was no growth of E. coli after antibiotic treatment with low pH and peroxide. There was bacterial growth in a few antibiotic wells after being exposed to UV light, treated at a high pH, with ethanol or heat. The results were variable. Some of the methods may have not been successful because they were not treated long enough or the conditions were not extreme enough. Some antibiotics resist most methods of inactivation except for enzymatic breakdown; this is not feasible in a home environment. Future options would be longer heating, longer/harsher treatments or a combination of several treatments.

Scientific Disciplines Selected by Student: BI CH EV ME MI

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3008

Word Count

314

Proj. Num 3008	Title: Which Intestinal Bacteria is Best? A Study of the Effectiveness of Single and Multi-Strain Probiotics
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StudentName(s): A. Manokhin

**Abstract:**

“Probiotic” bacteria are believed to be beneficial for human health, but little is known about their functionality and/or performance at varying intestinal pH levels. Probiotic supplements are available as single-bacteria and multiple-bacteria, and both of these types are marketed to be of equal effectiveness, as both produce the lactic acid. The purpose of this research is to investigate the effectiveness of single and multi-strain probiotics by analyzing lactic acid levels at varying pH conditions. Prior to evaluation of probiotic performance, a novel High Pressure Liquid Chromatographic (HPLC) method was created to separate and quantitate lactic acid content. Serial dilutions of a 1000 ppm lactic acid standard in 0.1M of Na2SO4 were measured, and the peak areas at 2.1 minutes were used to create calibration data. Single strain probiotic bacteria, lactobacillus acidophilus, as well as multi-strains lactobacillus acidophilus and bifidobacterium lactic HN019, were separately cultured in bacterial broth at pH’s of 1, 3, 5 and 6 (using 6M HCl to adjust the H + content). Over a 5 day span, aliquots of the probiotic broth for each experiment were drawn and filtered, prior to HPLC analysis. For all pH levels tested, the multi-strain probiotic produced more lactic acid, with an average increment of 327.8 µg/ml. Performance of the multi-strain probiotic, relative to the single strain counterpart, was enhanced as the pH was lowered. At a pH of 5, multi-strain probiotic produced 694.2 µg/ml more lactic acid than single strain; at a pH of 3, the average margin was 1094.4 µg/ml, and at a pH of 1 the enhancement reached 1363.8 µg/ml. Lactic acid content for both single and multi-strain probiotics remained constant over the 5 day experiment, for each pH examined. This suggests that the majority of lactic acid produced by the probiotic occurred during the first day of digestion into the broth.

Scientific Disciplines Selected by Student: AT CH ME MI

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3009

Word Count

252

Proj. Title: The Effect of Dance on Mood and Mental Acuity

Proj. Num  
3009

StudentName(s): K. McCarthy

**Abstract:**

In 2007, German scientists evaluated the effects of dance and music on depression. After only one session, the patients who danced showed a greater decrease in depression than those who simply exercised. Building off their research, my experiment examined how dancing and exercise affected mood and mental acuity. I hypothesized that dancers would have a better mood and mental acuity than athletes and people who do neither. I used two methods to test my hypothesis: a Stroop test and a simple mood survey. For the Stroop test, participants were asked to complete a black and white control and a colored copy. The mood survey was seven questions long and asked questions concerning energy (current and after practicing), happiness (current and after practicing) and optimism. Participants were asked to classify themselves as dancers, athletes, or as neither. The statistical test ANOVA showed that out of 75 people tested on the Stroop test, dancers were better able to deal with the conflicting information presented in the color Stroop test. Further, on the mood survey there was a difference among the groups on four items; current happiness, current unhappiness, energy level after activity and happiness after activity. Further analysis of this test showed that the dancers were significantly happier and less unhappy than athletes and that the dancers were significantly happier than athletes following their activities. This data supported my hypothesis that dancers would have a better mood and a sharper mental acuity than athletes and those who do not dance or practice a sport.

Scientific Disciplines Selected by Student: BE

### Scientific Disciplines

### Fair Categories

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3010

Word Count

159

Proj. Title: How temperature affects the Peroxidase enzyme

Proj. Num  
3010

StudentName(s): N. Louis

**Abstract:**

This experiment was performed to determine the factors that negatively influence enzyme reaction rates in cellular activities since some enzymes seem to be more effective than others. In order to actually go through with the experiment I must obtain an enzyme which I will use potatoes which contains peroxidase enzyme. Peroxidase enzyme activity was measured through the number of bubbles that it produced. I compared the amount of bubbles produced in each cup with the different temperature categories. The temperature with the highest enzyme activity, production of bubbles, had bubbles reaching up to 14 and 17 compared to the temperature with the lowest production and activity of zero percent. This suggests that a higher the temperature of an enzymes environment leads to a less product production rate. Temperature 45 Fahrenheit had the most production compared to temperature 85 Fahrenheit which had no reaction what so ever. This suggests that Peroxidase is most effective in lower temperature than in higher.

Scientific Disciplines Selected by Student: ME

### Scientific Disciplines

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CS = Computer Science	MI = Microbiology
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3011

Word Count

247

**Proj. Num** 3011 **Title:** In Vitro 15-Lipoxygenase Inhibition of Polyphenolic Anti-inflammatory Agents from Malae Domestica

**StudentName(s):** S. Goldberg

**Abstract:**

Runners and dancers are often concerned about swollen joints and sore muscles. There are many types of topical anti-inflammatory products on the market, most of which contain high chemical content and ingredients such as methyl salicylate and menthol. However, there are few products without such chemicals. This prompted the idea of creating an organic or natural anti-inflammatory product. After researching it was found that apple polyphenols have been proven to be antioxidants, thus concluding that there is a chance they could have anti-inflammatory capabilities. To test whether this is true, a three-part experimental procedure was used. Extraction of the polyphenols from red delicious apple peels; total phenolic compounds in the extracts using Folin-Ciocalteu method, and lipoxygenase activity was determined from the conversion of unsaturated fatty acid to a conjugate diene spectrophotometrically. Extraction was confirmed using a Folin Ciocalteu Gallic Acid Standard Curve created to determine the polyphenol content of the apple extractions. The polyphenol extraction solution contains slightly less than 500 mg/L polyphenols. The conducted reactions suggested that the inhibition of the lipoxygenase enzymes by polyphenols has the potential to reduce inflammation by effecting by impacting the arachidonic acid cycle in mammals. since evidence suggests that polyphenols from red delicious apples have anti-inflammatory capabilities, further research should be conducted to determine if these polyphenols would be soluble in a gel or cream or as a patch. Although, the question arises, is it simply enough to eat an apple a day?

**Scientific Disciplines Selected by Student:** CH ME

**Scientific Disciplines**

**Fair Categories**

- AT = Applied Technology
- AS = Animal Science
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- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3012

Word Count

231

Proj. Num

3012

Title: Pseudoscience or Agriculturally Beneficial: The Effect of Magnetic Water on the Growth of Different Plant Species

StudentName(s): A. Ramachandran

### Abstract:

The purpose of the experiment was to investigate if magnetic water increased a plant's growth more than regular water. It was hypothesized that magnetizing the water would allow the water to be more easily absorbed by the plant, which would result in these plants' growth being greater than the un-magnetized watered plants. Two, 18-inch plant troughs, labeled 'Tap Water' and 'Magnetic Water,' were filled with approximately 6 inches of soil. Four beans were planted in each pot, one inch deep, and 4 inches apart with support stakes were inserted adjacent to the beans. Magnetic water was created by gluing five neodymium magnets on each side of a plastic wash bottle and left for 24 hours increments. The bean plants were watered and measured everyday for four weeks. The original hypothesis was not supported as the data did not indicate a significant difference in total growth between the magnetized and "unmagnetized" watered plants. The magnetic watered plants, however, did show many differences including: faster initial growth, significantly longer stems smaller in diameter, emergent location of true leaves relative to the cotyledons, and the size of the leaves. Futures experiments may include testing the effects of magnetized water on different species of plants, different soil types, growing plants hydroponically, or different methods of magnetizing the plants such as attaching the magnets directly to the containers in which the plants are grown.

Scientific Disciplines Selected by Student: BI CB ME PS

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3013

Word Count

237

Proj. Title: Is it Blood?

Proj. Num  
3013

StudentName(s): B. Mucci

**Abstract:**

This year for the science fair I decided to do a project that involves the Kastle-Meyer blood test. The Kastle-Meyer test is a test used by crime detective agencies that test substances to see if they are boold. Although, some other substances test positive with the Kastle-Meyer test that are not blood. My problem was: Will ketchup, juice from ginger root, juice from beets, juice from a fresh raw chicken, or the juice from fresh raw beef test positive when tested witht the Kastle-Meyer test? To test this I obtained each of the substnaces I was goin got use and tested them with the Kastle-Meyer kit that I bought online from a science organization. I conducted several tests on each of the substances so that I could get accuracy adn reliable results. After completing teh experiment, teh result was that the blood of both the cow adn chicken gave a falsely positive result when tested with the kit. The test relies on the iron in the hemoglobin which is in the red blood cells; accordingly it was deduced that the iron levels in the hemogobin in the blood of both animals was high enough ot produce a positive result compared to the other substances. In further continuation of this experiment I would like ot learn more about twhat other substances might give a false positive when tested with the Kastle-Meyer test.

Scientific Disciplines Selected by Student: BI

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3014

Word Count

254

Proj. Num

3014

Title: Dietary Effects of Sugar and Caffeine on Anxiety in Correspondence with PNES

StudentName(s): E. Wasserman

**Abstract:**

Non-Epileptic psychogenic seizures (PNES) is a disorder which recently was differentiated from epileptic seizures and associated with Conversion Disorder and Disassociation, which are psychological illnesses brought on to cope with stress and anxiety. The Basal Ganglia System of the brain holds responsibility for fear, anxiety, and panic attacks and is proven to be in check when blood pressure is kept constant throughout the day meaning that irregularity in this consistency, like a binge diet of Sugar and Caffeine, can throw your anxiety threshold off kilter and leave you in a whirlwind of unexpected anxiety. Piecing all of these facts together I hypothesized that if a person has a high diet of Caffeine and Sugar, then it will increase your anxiety levels and may affect PNES. To test my hypothesis, I used four mice split up into two experimental groups, my testing was accomplished through the Light/Dark Transitions Testing Method, in a Light/Dark chamber apparatus which uses video-capturing of a mouse's number of transitions for light chamber to dark chamber (the more transitions/the higher the anxiety). The first week of testing was at the highest dosages and the last week of testing was at the lowest dosages. My data showed a decreasing number of transitions for each mouse with each week of testing and decrease of dosage which was conclusive for my hypothesis and hopefully with this data I will be able to send a precautionary message out to those who deal with PNES to be watchful of their diets.

Scientific Disciplines Selected by Student: BE CB ME

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3015

Word Count

168

Proj. Num

3015

Title: An Analysis of Biotic and Abiotic Factors in Newtown Vernal Pools

StudentName(s): T. Horvath

**Abstract:**

The purpose of this project is to observe the biotic and a-biotic status of three vernal ponds in Newtown, CT. This needs to be observed so that in the future when potential developments begin to be built near the ponds, the impact can be monitored and compared to results from the past. The abiotic portion of the project consists of water samples being tested using the LaMotte Limnology kit with seven experiments. Three water samples have been tested and data will continue to be collected through the breeding season. The biotic portion incorporates going to the vernal ponds and filling out a field observation form which records the species and population. So far counts have been low due to hibernation and organisms being dormant for the duration of the cold. Once the breeding season comes around much more biotic data can be collected. With this information on record for future reference, the impact of human intrusion can then be monitored and regulated for the ecosystems' well-being.

Scientific Disciplines Selected by Student: EV

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
| 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             |
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3017

Word Count

230

Proj. Num

3017

Title: Determination of evolutionary relationships among coral species by comparison of nuclear DNA markers

StudentName(s): J. Burkhard

**Abstract:**

Evolutionary relationships among groups of corals are poorly studied and often only reflect relationships among higher order groups. This is, in part, due to the difficulty in identification of coral species based on morphological characteristics. DNA sequence data provides a potential solution to the problems of coral identification and determination of evolutionary relationships among the corals. For this project, DNA sequences, of a nuclear marker, were to be obtained for 12 coral species using PCR, DNA purification, and sequencing at the University of Connecticut Biotech Center. The corals represent a variety of both soft coral and stony coral species with one anemone for outgroup comparisons. These sequences will be analyzed and compared, using computer software, to determine differences between the bases and thereby, evolutionary relationships among the coral species investigated. During the project, sequence data proved difficult to obtain based on poor quality PCR product. Significant time was spent working to develop techniques that would yield a higher quality, more target specific PCR product. Techniques including optimization of PCR profiles, "band picking" from PCR products and so called "touchdown PCR" were used. The future of this project is to continue the project and obtain more DNA sequences that can be added to the data base of known coral species and used to elucidate evolutionary relationships. The research is supported by a Toyota Tapestry Grant and the E. O. Smith Foundation.

Scientific Disciplines Selected by Student: CB

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3018

Word Count

230

Proj. Title: Effect of Estradiol Beta on Development of Zebrafish Embryos

Proj. Num  
3018

StudentName(s): S. Ackerman

**Abstract:**

I pursued this project to discover the negative effects, if any, of the presence of a potentially dangerous hormone found (and not tested for) in many water supplies, Estradiol  $\beta$ . If zebra fish embryos are exposed to Estradiol  $\beta$  during their initial developmental period, deformations will occur. I conducted my experiment by putting my chemical into solution, diluting it to my tested for concentrations (0ppm-my control, 5ppm, 50ppm and 500ppm), and exposing the embryos to the solutions for 4 days into their development. I utilized an incubator to develop my embryos in. The data I collected was very clear and conclusive. In my control, all the embryos hatched, and had straight, developed spines. In my lowest concentration (5ppm), there were a few deformations, but not to the degree that the 50ppm and 500ppm embryos were deformed. In fact, in these two highest concentrations, about the same number of deformities occurred, as well as many of the embryos not hatching at all, proving that the hormone created an environment far too hostile for development. The reason that I believe that these last two groups had such similar results is directly influenced by the trouble I encountered putting the Estradiol into solution. My final overall conclusion is that Estradiol  $\beta$  is a potentially dangerous toxin to our aquatic ecosystems, and should be tested for in our waterways to protect our environment.

Scientific Disciplines Selected by Student: CB EV

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3019

Word Count

252

Proj. Title: The True Origins of River Foams

Proj. Num  
3019

StudentName(s): E. Kang

### Abstract:

The purpose for conducting this experiment is to answer the question if the foams found in various rivers are man-made; showing signs of pollution, or naturally made? If the foams contain large amounts of phosphorus they are most likely signs of pollution, because phosphorus is not abundant in nature, and natural foam is mainly caused by the fatty lipid acids that come from animal and plant remains. The methodology in this experiment is to collect samples of foam from three different locations, compare their qualities with one another, create man-made foam using river water from each location and detergent, compare them to the other foams, record how long it takes for the foams to reach a more concentrated state, use a liquid/liquid extraction technique to extract organic material from the liquid form of the foam, then take some the extracted sample and run it under an infrared spectrometer to see what the organic material consists of, take more of the extracted material and compare the masses of each specimen to one another. The average mass of the man-made foam was similar when compared to the foam's mass from Bull's Bridge; however, the masses of Macedonia's and Kent Falls were both denser. After running extracted samples through the Infrared Spectrometer, the graphs of the extractions when compared to potassium carbonate were extremely similar. Meaning, there may have been a flaw in conducting the experiment because the salt used in the extraction process may not have been as soluble thought.

Scientific Disciplines Selected by Student: AT BI CH CS EA EM EV

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3021

Word Count

44

Proj. Title: Is our water safe?

Proj. Num  
3021

StudentName(s): L. Knoedler

**Abstract:**

I tested the water quality of Long Island Sound, the Wepawaug River, and drinking water from my house. I tested the phosphate, nitrate and pH of the water samples. My project was to see, through these water tests, which water sample was more polluted.

Scientific Disciplines Selected by Student: BI EA EM EV

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3022

Word Count

176

Proj. Title: The Effect of Sodium Chloride on Heart Rate

Proj. Num  
3022

StudentName(s): L. Malinowski

**Abstract:**

Abstract The purpose of this experiment was to discover how sodium affects heart rate. If Daphnia magi are placed in solutions of varying salinity, then the Daphnia in the solutions of higher salinity will have a higher heart rate, because there is more blood circulating. The result of this experiment was that the hypothesis was proven true. This is proven by the data stating that at 5g/L above standard salt concentrations the heart rate was 252 bpm. In contrast, the standard heart rate I found was 171.6 bpm, and this was determined from data collected on daphnia in the control solution. This proves my hypothesis that salt increases heart rate.

Procedure

1. Take 5 Daphnia of similar size and check their heart rate
2. Keep the Daphnia with heart rates of 180bpm and if necessary take more so there are 5 with an average of 180 bpm
3. Place Daphnia in control solution
4. Wait ten min.
5. Place Daphnia on microscope and count their heart rate twice
6. Repeat steps 1-5 for each solution

Scientific Disciplines Selected by Student: ME MI

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3023

Word Count

239

Proj. Title: The Effect of Social Fear on Racial Stereotyping

Proj. Num: 3023

StudentName(s): L. Mannan

**Abstract:**

The purpose of this research is to explore the link between social fear and racial stereotyping. A study in 2010 from Current Biology studied people with Williams Syndrome (WS). WS people have abnormal activity in the part of the brain related to social fear (amygdala). Therefore, they are overly friendly. The study showed that people with Williams Syndrome are not racially stereotypical. However, research shows that they have gender stereotypes. This suggests racial stereotypes and social fear may be directly related since people with WS have no social fear or racial stereotypes. The independent variable of this study will be the amount of social fear children have. The dependent variable will be the degree of the children's racial stereotypes. As this is a correlation study, there is no control. The hypothesis is children who are more socially afraid will have a greater degree of racial stereotypes, while children who have less social phobia will have fewer racial stereotypes. To conduct the experiment, participants aged 13-18 were measured for social phobia using the Liebowitz Anxiety Scale (LSAS-SR). Then, the children were told a few simple stories with characters that are obviously good or obviously bad. Options of people with different racial features were given as options for the characters. Participants chose their image of each character. After all data was collected, it was evident that there was not a link between social fear and racial stereotypes, disproving the hypothesis.

Scientific Disciplines Selected by Student: BE

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3026

Word Count

250

Proj. Num

3026

Title: A Global Sustainable Approach to Renewable Energy: The Utilization of Local Water Resources for the Aquaculture of Algae for Biodiesel

StudentName(s): E. Petno

**Abstract:**

The identification of naturally occurring aquaculture media, that do not require the addition of nutrients for algal growth, provides a promising approach for the sustainable, energy efficient, and cost effective production of algal biodiesel. Growth of the micro algal species, *Tetraselmis chuii*, was studied in prepared, nutrient enriched saltwater media, as well as seawater and marsh water collected from sites along the local Long Island Sound ecosystem. Energy input was minimized by utilizing sunlight, ambient oxygenation, and, in the case of seawater and marsh water, naturally occurring nitrates, as the nutrient source. Nitrate and nitrite concentrations, pH, and salinity were determined for each of the media studied. Using absorbance colorimetry, the greatest algal concentrations after eleven weeks were observed in the media containing the highest concentration of nitrates, prepared saltwater medium (tank water) (absorbance of 1.060 units) and marsh water collected distal to the mouth of the Long Island Sound (absorbance of 0.337 units). There was no correlation between salinity (22.5 parts per thousand for tank water, and 0.0 parts per thousand for distally collected marsh water) or pH (8.2 for tank water, and 7.4 for marsh water) and algal growth. Oil was extracted from algae, cultivated in tank water and marsh water, using hexane extraction and oil yields will be analyzed and compared. While prepared, nutrient enriched saltwater provide the optimal conditions for micro algal growth, the utilization of naturally occurring marsh water offers a cost effective, energy efficient and abundant option for micro algal aquaculture for biodiesel production.

Scientific Disciplines Selected by Student: AT CH EN ET EM EV PS

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3027

Word Count

248

Proj. Title: The Effect of a Bacteria's Source on a Microbial Fuel Cell's Electrical Output

Proj. Num  
3027

StudentName(s): J. Williams

**Abstract:**

Microbial fuel cells (MFCs) have the potential to be an answer to the world’s growing necessity for a renewable, “green” energy source. They are versatile and can be cheaply made giving them the ability to be used across the globe and have a variety of potential applications. This experiment will help determine how sources of bacteria influence the electricity produced by a MFC. Three two-chambered MFCs, one for each bacteria source, were constructed. Both mud and water samples were collected from the Housatonic and Aspetuck Rivers. These samples were placed in two MFCs. The third MFC, the control, used rocks and tap water in place of the mud and water samples. During the experiment, the MFCs ran for 14 days and the voltage reading was recorded twice every day at the same time for each MFC. It was hypothesized the more electrochemically active bacteria from the Housatonic River, due to Housatonic’s lower dissolved oxygen content than the Aspetuck, would produce the most electricity. The results showed that the Aspetuck River mud, on average, produced about 250 millivolts, the Housatonic River mud 100 millivolts and the control only 1.6 millivolts of output voltage over three trials. This shows that the effectiveness of bacteria in a MFC is more complex than simply a bacteria’s electrochemical activity. Certain types of bacteria could contain special traits that make them superior or inferior to others in MFCs such as, creating biofilms around an electrode. This could be the basis of a future experiment.

Scientific Disciplines Selected by Student: EM EV MI

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3028

Word Count

221

Proj. Num

3028

Title: Testing the Method for the Creation of a Topical Gel Method toward the Removal of Tattoo Pigment in the Dermis Skin Layer

StudentName(s): A. Kennedy

### Abstract:

Metal Oxides are the main component of tattoo pigment and ultimately what gives tattoo dye its color. In order to properly remove a tattoo these metal oxides must be broken down so that they can be taken out of the body by the immune system. In this experiment the method of having hydrochloric acid used as a method to breaking down the tattoo pigment was tested on iron oxide. This was tested by creating a tattoo dye that is made up of iron oxide; a key metal oxide used in the creation of two primary colors, and then combining it with hydrochloric acid. The outcome will be a chemical reaction that creates iron chloride and water. These two products could then be passed through the body much easier than the original iron oxide, thus allowing the tattoo pigment to be “washed” away. This technique will be combined with dimethyl sulfoxide to create a topical gel that will carry the low molarity hydrochloric acid through the epidermis and into the dermis skin layer in future studies. The clarity or fade of the color of the tattoo dye will be measured using a color spectrum created specifically for this experiment. Expect results from this experiment will be to see the clarity of the tattoo pigment to decrease to approximately 70%, if not higher.

Scientific Disciplines Selected by Student: AT BI CB CH EN ME

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3029

Word Count

162

Proj. Title: Antibiotics on Zebrafish Embryos

Proj. Num  
3029

StudentName(s): I. Shusdock

**Abstract:**

The purpose of my experiment was to determine whether the antibiotics Trimethoprim and Benzylpenicillin caused abnormal development in zebrafish embryos (Danio Rerio). Zebrafish were maintained in 10 gallon tanks with treated water and maintained at a constant temperature, pH and a controlled day/night cycle. Breeding attempts were made as often as possible, though these times were limited. Embryos were collected and immersed in the embryo medium with and without antibiotics at a concentration of 100 parts per million for Benzylpenicillin. Embryos were monitored for growth over a period of 4 days and structural abnormalities were observed in addition to the termination of the embryos at the given concentration. This was a deliberate overdose in order to determine if the antibiotic had any effect on the embryos. I am currently testing the effects of Trimethoprim and Benzylpenicillin at lower concentrations so that I can determine the minimum amount of antibiotic required to create morphological abnormalities in the four day window of development.

Scientific Disciplines Selected by Student: AS CB ME

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3031

Word Count

153

Proj. Num	Title:
3031	Antiseptics in the Hospital: A Comparative Study of Soaps Used in our Health facilities

StudentName(s): T. Ball

**Abstract:**

In recent years, cases have occurred in hospitals, most notably in Britain, where Antiseptics used in the hospitals were ineffective in the killing of harmful bacteria, leading to the deaths of patients being treated there. What needs to be proven in this experiment is whether or not hospital used antiseptics facilitate the growth of harmful bacteria. Do the antiseptics used by hospitals allow for greater amounts of growth over time? This experiment was performed in order to find this out. I took several bacterial cultures and examined their growth when combined with several household antiseptics. With this data, the next step was to compare the growth of the bacteria that had been administered the household antiseptics to those that had been administered the hospital used antiseptic. When this step was completed, the conclusion was that a link between the growth of the bacteria and the usage of the hospital used softcide was found.

Scientific Disciplines Selected by Student: MI

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3032

Word Count

215

Proj. Title: EMDR:Successfully Treating PTSD

Proj. Num  
3032

StudentName(s): A. Breeze

**Abstract:**

Allison Breeze Guilford High School, Guilford, CT EMDR: Successfully Treating PTSD

Abstract: The purpose of this project was to test the efficacy of eye movement desensitization and reprocessing (EMDR) on post traumatic stress disorder (PTSD) versus cognitive behavioral therapy (CBT). The main point was to see if EMDR was the most successful treatment for PTSD. The data was collected from previously-completed studies. These studies tested the effectiveness of either EMDR or CBT on treating PTSD, and the results were recorded as percentages. The data collected from these studies was used to determine if the results were statistically significant. The data initially showed that EMDR was a more successful treatment than CBT for PTSD. This assumption was supported by the statistical analysis, which showed that EMDR was significantly more successful than CBT for treating PTSD at a level of 0.1, 0.05, and 0.01. It is conclusively shown in this report that EMDR is significantly more successful at treating PTSD than CBT. Further research of this topic could include other methods of treatment, such as medication. Also, a single study could be conducted to directly test the effects of EMDR and CBT on PTSD, instead of researching multiple studies on EMDR and CBT individually. This would be a way to make sure certain factors were constants.

Scientific Disciplines Selected by Student: ME

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3033

Word Count

205

Proj. Title: Chaotic Growth of Bacterial Cultures With Sinusoidal Temperature Change

Proj. Num  
3033

StudentName(s): M. Menz

**Abstract:**

The purpose of this experiment is to determine the effect of exposing bacteria to temperature cycles on the region of parameters where the bacteria's growth is chaotic. To simulate bacterial growth a differential equation with three terms - one for growth depending on temperature, one for death caused by extreme temperatures, and one for reduced growth as the bacterial population approaches its carrying capacity - was designed. A computer program was written to numerically integrate this equation and obtain data from it. At this point, the equation without temperature change is being examined, to find the original region of chaos, caused by certain parameters. After the region is thoroughly understood, the same process will be repeated with temperature cycles included. Numerical errors must be kept in check to prevent misleading results. The data indicates that chaos does not exist in the system until temperature cycles are applied. The period and amplitude of the sine curve have the greatest bearing on whether or not the system is chaotic. Currently, the results are still being analyzed to see if bifurcation occurs, meaning that the number of stable levels of the population splits as one parameter is varied. The results demonstrate that bacterial growth can become unpredictable under certain conditions.

Scientific Disciplines Selected by Student: CS MI

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3034

Word Count

269

Proj. Num

3034

Title: Graphene Oxide as a Novel Biosensor in Targeted Delivery of Water-Insoluble Cancer Drugs

StudentName(s): A. Zhang

### Abstract:

In recent years, graphene oxide (GO) has emerged as an exciting new material in the fields of engineering and biomedicine. Due to its high surface area and enhanced permeability and retention (EPR) effect, graphene oxide is a promising vehicle for delivery of water-insoluble cancer drugs to tumor sites. Previous research has demonstrated the feasibility of graphene oxide for this therapeutic application, however these investigations lacked a means to analytically detect the release of the anti-cancer agent. This research attempts to use the inherent fluorescent properties of functionalized graphene-oxide to demonstrate shifts in the visible luminescence of the drug-GO complex, relative to the original GO sheets. Graphene oxide sheets were synthesized through a modified Hummer's method and functionalized with polyethylene glycol-amine (PEG), in order to optimize water solubility and biocompatibility. Doxorubicin hydrochloride (DOX), a water-insoluble cancer drug, was then loaded onto the GO-PEG. The quality of the GO, GO-PEG, and GO-PEG/DOX was confirmed through Fourier Transform Infrared Spectroscopy (FTIR). Synthesis of uniform PEGylated GO sheets as well as successful loading of DOX on the sheets was verified using scanning electron microscopy (SEM). Using an excitation of 210 nm, fluorescence spectroscopy revealed a single emission at 420 nm for GO-PEG, and two emission peaks at 350 nm and 580 nm for the GO-PEG/DOX complex. Fluorescence microscopy of the GO, GO-PEG, and GO-PEG/DOX will confirm the visible shift in color upon loss of the DOX drug in solution, suggesting that this delivery system can simultaneously act as a viable biosensor in various scientific and biomedical applications.

Scientific Disciplines Selected by Student: AT EN ME

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3035

Word Count

261

Proj. Num	Title:
3035	Using New Approaches to Evaluate Polyvinylpyrrolidone's Effects on Renal Function

StudentName(s): Q. Yan

**Abstract:**

Polyvinylpyrrolidone(PVP) a polymer was first synthesized by Dr. Walter Reppe. It was initially used as a blood plasma expander in World War II and later applied food, beverage, and cosmetic industries A study done by Dr. Dunn at Chang Gung Memorial Hospital in Taiwan in the mid 1990's shows that excess use of PVP leads to a condition called PVP Storage Disease.. The purpose of this project is to find out if acute renal failure exists. If acute renal failure does occur, and then which part of the body would have the most damaged done to it. It's hypothesized that due to the properties of PVP, the proximal tubule would be the component affected by the PVP, and acute renal failure would occur there. Blood samples and urine samples from rats that have been infused with PVP must be obtained. Then using kits, the BUN, NAG, and Alpha-1 levels must be measured using a UV spectrometer. If the levels are higher than the standard levels, then the body part the kit represents is damaged. Primary results show that BUN concentration levels stayed at 17% during infusion, Therefore, PVP did not affect the functions of the kidney as a whole. Likewise, NAG levels stayed the same too. The alpha-1 levels did show an increase over 2 hours. The alpha-1 level during the control period was 0.15 (ng/min/100gbw) and increased to 1.8 (ng/min/100gbw) in 1 hour then increased to 2.8 (ng/min/100gbw). This shows that there is significant damage occurring the proximal tubule.

Scientific Disciplines Selected by Student: CB ME

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3036

Word Count

200

Proj. Num

3036

Title: Athletes Performance on Different Types of Drinks!

StudentName(s): A. Smith

**Abstract:**

This experiment is figuring out what type of drink effects an athlete's performance in a good way and in a bad way. I am trying to see whether or not an athlete's speed has a change when drinking certain types of drinks or not drinking any beverage at all. The volunteers had to drink different types of beverages and then sit for at least 20 minutes before they begin the process. After the 20 minutes has been up, the athlete had to run down a length hallway while being timed. Each athlete had to drink the same amount of the beverage and they had to run down the same length of the hallway on each day. There were 6 days of doing this experiment. Throughout this experiment I had came across the conclusion that Gatorade is the best beverage for an athlete's performance because the beverage does not affect the athletes running speed, it makes an athlete run faster. Another fact is that soda is the worst beverage to drink for an athlete when they perform because soda can slow the athletes running speed and make them slow. My data proves that gatorade is the best choice for any athlete.

Scientific Disciplines Selected by Student: BI ME

### Scientific Disciplines

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3037

Word Count

151

Proj. Title: The Application of Photosynthetic Hydrogen Production Using *C. reinhardtii*  
 Num Algae in Hydrogen Fuel Cells

3037

StudentName(s): J. Tsai

**Abstract:**

Hydrogen has potential as an eco-friendly renewable fuel. Scientists have produced hydrogen biologically using the hydrogenase enzyme in *C. reinhardtii* algae, which causes hydrogen to be produced during photosynthesis instead of oxygen. To date, research has been mainly focused on bulk hydrogen production for later use. However, storage becomes a problem, as hydrogen is a highly flammable and explosive gas. Instead, this project used hydrogen produced biologically by *C. reinhardtii* algae in situ in the function of a hydrogen fuel cell. A fuel cell was created from a photobioreactor, a translucent container holding the algae and a liquid growth medium. Platinum wire cathodes were placed in the medium and connected to a voltage meter. Using this method, the fuel cell was able to produce 2.5 volts of electricity, and it is predicted that previously developed methods of increasing hydrogen yield in bulk will drastically increase the amount of electricity produced.

Scientific Disciplines Selected by Student: BI EN ET

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
BE = Behavioral & Social Sciences	EV = Environmental Analysis
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EA = Earth Science	PH = Physics & Astronomy
EB = Engineering: Materials & Bioengineering	PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3038

Word Count

243

Proj. Title: Growth Rates of the Sarcophyton leather, Leather Coral

Proj. Num  
3038

StudentName(s): T. Nolan

**Abstract:**

In this case it is important to know just how Sarcophyton leather gains mass from week to week as well as over an extended period of time (in this case, three months). This experiment is important in knowledge pertaining to leather corals and their growth over a period of time. The question is the following: How exactly do leather corals grow (gain mass) during a three month time frame, as well as week to week? Does the starting size effect the growth in that time period? I went about the problem by propagating 60 pieces of leather coral from a larger colony of coral. Note that this is possible because the corals are individual organisms formed in one structure to more successfully thrive; therefore cutting the coral does nothing to the individual organisms. The specific gravity, temperature of the tank, and mass of each coral were recorded. Data was collected for a three month period. The results, as hypothesized, showed a week by week fluctuation in mass, yet over the three month period, showed positive mass change for all sizes of coral. The results are a benefit to the science of aquaculture for corals. It shows an average linear growth rate over time for the coral which can be used to determine how long it will take a coral colony to grow to a particular size. This can be applied to environmental uses of leather coral as estimation for growth of wild specimen.

Scientific Disciplines Selected by Student: AS

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3039

Word Count

138

Proj. Title: The Physical Relationship of NOTCH4 and MKL1

Proj. Num  
3039

StudentName(s): I. Baker

**Abstract:**

The decision of a hematopoietic precursor cell to become a Megakaryocyte is still not well understood. The objective of the proposal is to determine how the protein NOTCH4 affects Megakaryocyte differentiation. Also, the physical and mechanical relationship of NOTCH4 (N4) and MKL1 was investigated. Preliminary data has demonstrated that Acute Megakaryoblastic Leukemia (AMKL) induced by OTT-MKL requires notch signaling. A Tet-off system was utilized to either activate or inactivate N4 production in developing Megakaryocytes. Then, the relationship of N4 and MKL1 was identified through reversible cross-linking and Immunoprecipitation. The effect on Megakaryocytes was measured by the impact on polyploidization. N4 and MKL1 are predicted to have a physical relationship and interact in Megakaryocyte differentiation and maturation. Understanding the role of N4 in Hematopoietic progenitors provides promise for a better understanding of AMKL, and potential treatments.

Scientific Disciplines Selected by Student: BI CB ME MI

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3040

Word Count

440

Proj. Num	Title:
3040	The Correlation Between Acute Stress Level and Executive Function in High School Students

StudentName(s): I. Banka

**Abstract:**

Stress is the psychological reaction when one is forced to adapt to a new situation that is perceived as difficult to cope with. The physiological and psychological affects of stress compound, creating even more stress. Chronic stress causes serious symptoms such as weakened immune system and heart. Scientists have recently discovered that chronic stress decreases overall cognitive ability, especially in males. Acute stress, resulting from the issues that a person deals with on a daily basis, does cause small-scale symptoms, yet it is unknown whether or not it causes a decline in frontal lobe activity. The frontal lobe deals with higher-order thinking, planning, judgement, memory, and motor skills. The researcher is investigating how high school student's acute stress level correlate with their executive function. It is hypothesized there is a correlation between high acute stress level and high executive function performance. Senior students enrolled in AP courses will be asked to take the Self-Evaluation Scale (SES; Speilberger et.al). The SES is a reputable psychological test quantifying acute stress levels. Once complete, data will be analyzed to examine the participants frontal lobe function though the Wechsler Test Of Adult Reading (WTAR), a standardized reading test, and the Wisconsin Card Sorting Test (WCST), a reputable test used to quantify executive function. This test is generally given on a one on one basis, utilizing actual cards. Of this will be used a computerized version. Proceeding the tests, data will be analyzed with mentor Dr. Richard Kaplan, a neuropsychologist at the University of Connecticut, for a possible correlation between students who had high cognitive performance along with a high acute stress level. Data will continue to be collected from high school students, not only seniors enrolled in AP. There will be no student's names in the final data presentation, such information is strictly between the researcher and the participants. Anticipated results may suggest students with high levels of acute stress have an increased activity in their frontal lobe. This is based on a study done at the LSU Health Sciences Center in New Orleans, which alluded to emotional stress actually changing brain function. If there is a correlation between the two variables, the implications

Scientific Disciplines Selected by Student: BE

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
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- |                | Life Sciences | Physical Sciences |
|----------------|---------------|-------------------|
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3041

Word Count

221

Proj. Num

3041

Title: The Effect of Ocean Surface Temperature and Overfishing of Carcharhiniformes on Human Attacks

StudentName(s): P. Gombos

**Abstract:**

Shark Attacks Teen off Texas Coast by CNN, Sharks attack two people off Russia's Pacific coast by Reuters, and Boy dies after shark attack by CNN. Shark attacks are constantly appearing in the news. The focus of this experiment was to determine if there is a correlation between the increase in surface ocean water temperature, overfishing and increased shark attacks in various global areas. The data was collected for (1) the ocean water surface temperatures, (2) overfishing, and (3) number of shark attacks that have occurred in various global areas. Statistical analyses was run on the data using chi-square test for independence and regression slope t-test for this experiment. The chi-square test for independence was used to see the correlation between overfishing and shark attacks. The results for the chi-square test for independence were that there is no correlation between shark attacks and overfishing. The regression slope t-test was used to see if there is a correlation between sea surface temperatures and shark attacks. In this test the results were that there is no correlation between the ocean water surface temperatures and shark attacks. While the statistical analysis did not support the hypothesis, it was found that there was insufficient data points to have statistical significance. More research with more data could possibly support this hypothesis.

Scientific Disciplines Selected by Student: AS EV MA

### Scientific Disciplines

- |  |   |
|--|---|
| AT = Applied Technology                      | EE = Engineering: Electrical & Mechanical |
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3042

Word Count

303

Proj. Num

3042

Title: Mycoremediation of PCB Soil Contaminants with Pleurotus Ostreatus

StudentName(s): M. Madfes

### Abstract:

Polychlorinated Biphenyls (PCBs) are remarkably stable compounds. Their prolonged resilience in the environment is of major concern, as PCBs are known to have a damaging effect on humans. Current cases of PCB contamination in soil require one of three costly methods of remediation, where the soil is unearthed to an off-site location; incineration at high temperatures, microbial degradation through reductive dechlorination of the biphenyl skeleton, and chemical degradation via electron transfer to form PCB anions. Mycoremediation may offer a cheap, thorough, and uninvasive alternative to these methods. Previous studies have investigated the effects of Pleurotus ostreatus, the oyster mushroom, in the remediation of PCB contaminated liquids, with some success for low and moderate contamination. This research instead focuses on use of the same fungus in the mycoremediation of PCB's in a controlled soil-like environment. 1000 ppm Aroclor 1016 was added to 4 grams of pre-cultivated PO in pine sawdust, which contained 2.4% fungus, 69.8% water, and the remaining sawdust. An extraction method was created to repeatedly and reliably recover PCB content from the sawdust mixture; 0.2 grams of contaminated fungal sawdust was mixed with 0.5 ml of hexane for 10 minutes, followed by filtration. Gas chromatography, with Flame Ionization Detection, was used to measure the PCB content of soil with PO fungus. Results indicate that the PCB concentration in untreated sawdust remained constant over time, while those chambers with a thriving PO colony showed as ~ 60% reduction in PCB content in 1 day. In five days of PO treatment, as much as 96% of the original load of 1000 ppm Aroclor 1016 was remediated, with only 4 ppm remaining. The rate of remediation per load of PO in the soil-like medium was determined to be 24.4 ppm PCB per day, per gram of PO, within 1 kg of soil.

Scientific Disciplines Selected by Student: CH EN EM EV

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3046

Word Count

264

<b>Proj. Num</b> 3046	<b>Title:</b> Optogenetic Interrogation of Prefrontal Cortex Dopamine D1 Receptor-Containing Neurons as a Technique to Restore Timing: A Novel Approach to Treat Prefrontal Disorders
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**StudentName(s):** J. Solder

**Abstract:**

Millions suffer debilitating prefrontal cortex (PFC) impairments. Current treatments are limited; medications affect molecular mechanisms systemically and deep brain stimulation is region-specific but not mechanism-specific. This project investigated optogenetic interrogation as a mechanism- and region-specific approach to treat PFC impairment, here, in response timing. Fixed interval timing task (FITT) performance was compared between control rats and rats administered 6-hydroxydopamine to block dopamine release from ventral tegmental area (VTA) neurons or rats administered D1 receptor blocker SCH23390 to the PFC. Changes in FITT performance were then investigated when light was delivered via lasers and fiberoptics to the PFC of mice expressing 473nm blue laser light-sensitive activating channels, channelrhodopsin-2, specifically in dopamine D1 receptor-containing neurons. Finally, viral constructs were developed to induce expression of unfloxed 590nm yellow light-sensitive inhibitory channels, halorhodopsin, to test the hypothesis that optogenetic stimulation of postsynaptic PFC D1 receptor-containing neurons is sufficient to compensate for loss of VTA dopamine signaling in mice expressing the halorhodopsin construct in VTA neurons. Results included demonstration that FITT performance decreased after dopaminergic blockade in the VTA and at PFC D1 receptors. FITT performance improved after optogenetic stimulation of PFC D1 receptor-containing neurons. Halorhodopsin viral constructs were successfully developed. The findings demonstrate the importance of the VTA-PFC dopamine system, and specifically of PFC D1 receptor-containing neurons, in adaptive control of timing responses. Optogenetic stimulation of PFC D1 receptor-containing neurons was demonstrated to improve PFC-related timing performance. The project provides a novel optogenetic treatment model for PFC disorders, including those arising from impairments upstream.

**Scientific Disciplines Selected by Student:** CB EN ME

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
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- |                | Life Sciences | Physical Sciences |
|----------------|---------------|-------------------|
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3047

Word Count

247

Proj. Title: Biochemistry of Antibiotics in Dentistry

Proj. Num 3047

StudentName(s): J. Kim

**Abstract:**

Over 100 million bacteria in every milliliter of saliva ranging from more than 500 different species live in our mouths, and dentists recommend we brush our teeth around two to three times a day. Toothpaste companies have developed safe rinses and pastes to prevent tooth decay and gum diseases. The purpose of this experiment was to observe the effects of different toothpastes or rinses on growth of bacteria. We hypothesized that if toothpaste with antibiotics were used to brush teeth, then there would be a decrease in population of bacteria. The hypothesis was tested by two experiments. The objective of the experiment was in order to determine the effectiveness of over the counter toothpastes and mouthwashes in preventing dental or gum diseases. Human subjects either brushed their teeth or rinsed their mouths with different toothpastes or rinses for around two minutes. Then, they will put their swab on the Petri dish. Contrary to our hypothesis, the majority of the post-brush Petri dishes had more bacteria colonies than pre-brush dishes. Toothpastes and rinses, with antibiotic and antiseptic properties, did reduce growth; however, numerous variables of eating before the experiment, the time of the day, various bacteria in different people's mouth, and the age of the person, contributed to errors in our experiment. Working with human subjects complicates these studies. In the future, it would be useful to test the effectiveness of these agents or bacteria in isolated culture, outside the complicated environment of a human mouth.

Scientific Disciplines Selected by Student: BI CB CH ME MI

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3048

Word Count

166

Proj. Title: Analysis of Angent X and Methylgloxal in Honey Variance

Proj. Num  
3048

StudentName(s): J. Thomas

**Abstract:**

Alternative medicine is becoming progressively more popular due to the increasing number of antibiotic-resistant bacterial strains. An example of such alternative medicine is Manuka Honey; which many believe has antimicrobial characteristics due to the presence of methylglyoxal (MGO) and an unknown compound, Agent X. Manuka honey and other honey variants were tested for their antimicrobial characteristics and the relative abundance of MGO. Additionally, the overall chemical compositions were compared. The honeys used in this experiment are clover, orange blossom, mixed, and Manuka. To asses antimicrobial characteristics the Kirby-Bauer method with E. coli was used. Full strength honey was used as well as 1:5 , 1:50, and 1:500 dilutions. Finally a derivatization method by Fooyin University was used to compare chemical compositions using a gas chromatograph. All honey showed anti-microbial activity with the Manuka honey having the strongest affect. Results suggest the anti-microbial activity is due to the combination of MGO content and the presence of hydrogen peroxide from the action of glucose oxidase.

Scientific Disciplines Selected by Student: MI

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3049

Word Count

234

Proj. Title: The Effects of Water Temperature on Tornadoes

Proj. Num  
3049

StudentName(s): B. Schlemmer

**Abstract:**

The purpose of this experiment was to see which water temperature causes the largest diameter for a tornado. It is hypothesized that the warmer the water temperature is the larger the tornado will be. Two 12 inch x12 inch wooden boards had four slits of 6 inches carved into the wood so the Plexiglas walls would fit in place. Four 12 inch x 8 inch Plexiglas sheets were slid into the slits so that there was a gap of 2 inches between each wall and three of the four walls were glued into place leaving one wall as a door. A hole was cut out of one of the boards and an exhaust fan was inserted. Then 16 ounces of water was cooled to 32° F and placed in a metal pan. The pan was then placed in the middle of the box and 5 pieces of dry ice were placed in the water. The wall was slid back into place and the exhaust fan was turned on and the diameter of the tornado was measured. The results were recorded and the process was repeated seven times. The temperature that produced the largest tornado was 140° F, with an average diameter of 4.33 inches and the smallest was 32° F, with an average diameter of .583 inches. In conclusion my hypothesis was found to be correct; the warmest water did produce the largest tornado.

Scientific Disciplines Selected by Student: EV

**Scientific Disciplines**

**Fair Categories**

- AT = Applied Technology
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3050

Word Count

214

Proj. Title: Chromosome Segregation and Localization Patterns in FtsZ Mutant Strains

Proj. Num  
3050

StudentName(s): K. Chowdhary

**Abstract:**

FtsZ, a component of the prokaryotic cytoskeleton, is an essential cell division protein in bacteria that is responsible for partitioning the cell into two daughter cells during cytokinesis. However, its role in chromosome segregation is not yet known. The purpose of this study was to observe chromosome localization patterns in bacterial strains containing plasmids with a mutation in the essential cell division protein, FtsZ, with the aim to determine the exact amino acid residues, if any, that are directly involved in altering chromosome segregation. The studied mutants had an abnormal “Y”-shaped morphology, which was found to be due to mutation of amino acids 93 and 96 to Alanine. Two different plasmids were constructed: one control, containing wild type FtsZ; and one test plasmid, containing the mutated FtsZ, under the same promoter (tetracycline). The cells were first depleted of FtsZ and then induced to express the mutant phenotype. DAPI nucleic acid staining was performed to observe chromosomal localization and segregation patterns. Results indicate normal segregation into both “Y” branches, thus discrediting existing hypotheses of alternative mechanisms of abnormal segregation. Future work will be directed towards studying the effect of this FtsZ mutation in other strains lacking genes involved in peptidoglycan synthetic machinery (Penicillin Binding Proteins, PBPs), and in conducting more specific time-lapse studies.

Scientific Disciplines Selected by Student: BI CB ME MI

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3051

Word Count

249

Proj. Title: Saving the Planet by Decomposing Ink

Proj. Num  
3051

StudentName(s): A. Johnson

**Abstract:**

Pollution from recycling printed paper causes the hazardous chemicals in the inks to pollute the air, creating hazards to biotic factors worldwide. The purpose of this experiment was to find factors that successfully decomposed printed ink, without causing pollution. The first lab tested the effect of water from bacteria organic soil on the paper samples, where there was little change in the amount of ink on the paper. In the second lab, the paper samples were placed in the bacteria organic soil, causing visible decomposition of the ink. In the third lab, the paper samples were placed in pineapple juice, which replicated enzymes used to quicken the allotted time it took for the bacteria to produce enzymes and decompose the ink; there was a small amount of decomposition visible afterwards. The paper samples were viewed under a microscope in order to visibly see the fibers and a significant amount of ink left on the paper. The fourth experiment tests liquid ink in a soil water solution and a solution where the liquid ink is poured into a solution of calcium chloride and water. Precipitate forms, confirming that some of the liquid ink had decomposed in the solutions. Thus, there was an varying amount of ink that had been decomposed in each of the samples. If the samples had been watched for longer periods of time, then more significant results could have be derived from this experiment, proving that these factors accurately decompose ink from printed paper, and prevent pollution.

Scientific Disciplines Selected by Student: BI EM EV

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3052

Word Count

253

Proj. Num

3052

Title: The Effectiveness of Mycorrhizal Fungi Inoculated *Panicum virgatum* at Remediating Varying Concentrations of Formaldehyde in Contaminated Soil

StudentName(s): M. Qureshi

**Abstract:**

Industrial and mining activities continue to produce substantial amounts of toxic waste that pollute the biosphere. The EPA states there are over 40,000 contaminated sites in the United States alone. The search for alternative methods for detoxifying polluted sites has led to the application of phytoremediation. The purpose of this investigation was to examine the effectiveness of *Panicum virgatum* (switchgrass) inoculated with mycorrhizal fungi at remediate formaldehyde, a well known volatile organic compound and human carcinogen, in contaminated soil. The study was composed of two parts. The first part compared germination, plant height and overall health of inoculated and non-inoculated *P. virgatum* for a period of six weeks. The second part examined the effectiveness of both types of *P. virgatum* in remediate varying concentrations of formalin, a by-product of formaldehyde, over the course of one week. The soil samples from each group were sent to a lab to determine the VOC concentration in the soil. The addition of mycorrhizal fungi significantly increased the growth rate, health and overall biomass of *P. virgatum* seedlings; however, it did not appear to have a significant effect on germination. The result from the soil test will provide data on the ability of inoculated and non-inoculated *P. virgatum* to remediate varying concentration of formalin. *P. virgatum* has previously been demonstrated to be an effective remediator of contaminated soil. Given the results, it seems likely that inoculated *P. virgatum* will be more effective at remediate formalin; however these results are still being processed at the lab.

Scientific Disciplines Selected by Student: PS

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3054

Word Count

278

Proj. Title: Photodynamic Therapy Accelerated Wound Healing

Proj. Num: 3054

StudentName(s): S. Zhuang

### Abstract:

Introduction: Photodynamic therapy (PDT) is the use of a photosensitize drug activated by low intensity light. PDT stands out as a novel treatment independent of antibiotic resistance. It is hypothesized that PDT would accelerate physiological wound healing by promotion of angiogenesis and pathological wound healing by inhibition of bacterial growth. Methods: To test this hypothesis, punctures were made on the mid-back of 8 mice. Randomized applications of 50ul Rose Bengal (10mg/ml, photosensitizer), 2 minutes green light, combination, or nothing were applied to these wounds (n=4). Blood flow was assessed by laser Doppler Imaging, which indicated angiogenic levels. To determine pathological wound effects, a 96 well counter was used; three different concentrations of rose Bengal (0.1, 1.0, 10mg/ml), three periods of light exposure (2, 4, 6 minutes), and their combination were applied to E.Coli bacteria. Treated cells were spread and cultured. Bacteria colonies were counted to determine optimal concentrations, exposure time, and their efficacy killing bacteria. Result: Blood flow recovery for wounds that received PDT was fastest ( $269 \pm 35$  in PDT vs.  $191 \pm 35$  in nothing vs.  $195 \pm 22$  in light vs.  $182 \pm 36$  in photosensitizer,  $p < 0.05$ ); angiogenic response extended until day 14. Furthermore, wound size was smaller in PDT group. In vitro experiment showed 10mg/mL photosensitizer with 6 minute illumination was the optimal parameters for inhibiting bacterial growth. Conclusion: PDT promoted angiogenesis and accelerated physiological wound healing with smaller scarring. Also, PDT was shown to kill bacteria by preventing the growth of colonies after exposure to a proper concentration of photosensitizer and light period. Applicability of this study can aid soldiers with wound treatment on the battlefield and reduce chances of infection.

Scientific Disciplines Selected by Student: ME

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3056

Word Count

174

Proj. Title: Autism In Connecticut Schools

Proj. Num  
3056

StudentName(s): A. Kennedy

**Abstract:**

Fundamentally, my experiment was about autism. Surveys were sent out to several Connecticut school districts asking each teacher to fill out the survey online, and submit the results. A total of 24 school districts received surveys. What is different about this year was the surveys were done online instead of on paper. My hope is most teachers know what autism is and know someone with autism. For the second piece of the project which consist of observations of each public school in our district, observing how the students act in a school environment, what they are learning and the Para professional to student ratio. In my observations this year I got to take a whole day from my own classes and observe all the special education classes my high school has to offer. I also got to see students receive ABA therapy and speech therapy at the lower grade levels. The hopes for this project are to educate people about autism as well as see what people's thoughts are towards the subject at state.

Scientific Disciplines Selected by Student: BE

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3059

Word Count

237

Proj. Title: The Effect of Northern Catalpa Bark Chemicals on Pogonomyrmex barbactus

Proj. Num 3059

StudentName(s): B. Liang

**Abstract:**

The objective of the project is to identify chemicals that can be used to attract tree friendly ants to trees, leading to increased tree longevity and germination thus creating more healthy living trees to absorb excess carbon dioxide and produce oxygen. The purpose of this year's research project is to investigate if Northern Catalpa (A Myrmecophyte, a type of plant that has a symbiotic relationship with ants) bark chemicals attract red harvester ants, or Pogonomyrmex barbactus. It is hypothesized that specific chemicals attract ants to the Northern Catalpa bark. The bark chemicals were extracted with a Soxhlett Extractor apparatus with five different solvents. A filter paper containing an extract was inserted in the middle of a Petri Dish containing one ant. Each time the ant touched the filter paper with its antennae one interaction was documented. This procedure was repeated for five filter papers with each containing a different extract, five filter papers each containing one of the extraction solvents and a blank filter paper (control). The independent variable is the chemical extracts. The dependent variable is the number of ant interactions the extract experiences in three two- minute time periods. The filter paper that contained Hexane extract experienced the most ant interactions. Thus, the results show that specific chemicals of the Northern Catalpa bark are the chemical ant-attractors and that the hypothesis is proven. For future research, the extracts need to be separated for identification.

Scientific Disciplines Selected by Student: BI CH EV PS

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
| AT = Applied Technology                      | EE = Engineering: Electrical & Mechanical |
| AS = Animal Science                          | ET = Energy & Transportation              |
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| BI = Biochemistry                            | EM = Environmental Management             |
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| CS = Computer Science                        | MI = Microbiology                         |
| EA = Earth Science                           | PH = Physics & Astronomy                  |
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3060

Word Count

293

Proj. Title: The Factors Of Life

Proj. Num: 3060

StudentName(s): J. Martin

**Abstract:**

Abstract: My purpose for conducting this experiment on wolves was to observe different wolves in the superior national forest in Minnesota and plot there locations over time on a map and see what I can observe about their lives and different factors like: season, region, and human activity. Procedures for this experiment was to look threw the data files online and find the best wolves for this study. I chose a few wolves from each section. The sections I'm referring to are how the wolf dies whether it is hit by a car, extreme mange exposure, starvation, trapped or snared, or shot/hunted. Once I selected my wolves I went into each wolves radio telemetry data history and plot each separate wolves locations on the map with a pin, and each wolf has a separate pin. The observations I made during this experiment were that more than half the wolves in the study died in the harsh winter months. Also that the wolves that contracted mange were all located near a specific area. My conclusion for the data collected was that the wolves that were shot by humans were all killed in the months of April, May, and June. In these months its typical for the wolf to stay in its territory because the wolf has no reason to leave because the prey is returning. My conclusion for the wolves that died of extreme mange exposure, hit by car, and starvation is that these fatalities all happened either in the begging's of winter or in the dead of winter. To me this is evidence that the wolves are more susceptible to contracting diseases and since prey is more scarce the wolves are traveling out of boundaries which lead to them getting hit by cars.

Scientific Disciplines Selected by Student: CS

**Scientific Disciplines**

**Fair Categories**

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- EA = Earth Science
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- ET = Energy & Transportation
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- EM = Environmental Management
- MA = Mathematical Sciences
- ME = Medicine & Health Sciences
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- PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3061

Word Count

216

Proj. Title: Role of MyD88 in DNA Damage Response

Proj. Num  
3061

StudentName(s): Y. Hu

**Abstract:**

The myeloid differentiation primary response factor-88 (MyD88) is a critical adaptor protein in the signaling of the innate immune system through Toll-like receptors (TLRs). Evidence from this laboratory indicated that expression of DNA damage repair genes was induced by TLR stimulation while previous studies have suggested a protective role for MyD88 in diseases well characterized by high levels of reactive oxygen species (ROS). We evaluated MyD88's role in the DNA damage response (DDR) and ROS production using murine embryonic fibroblasts (MEFs) derived from MyD88 wild type and MyD88-deficient (knockout) mouse embryos. MyD88 knockout MEFs had less growth when compared to that of wild-type MEFs and were more sensitive to ionizing and ultraviolet radiation than wild-type cells as defined by cell survival seven days following irradiation. Knockout cells also exhibited delayed reentry into mitosis following irradiation. Notably, we show that induction of critical DDR proteins such as P53, phosphorylated P53, and Chk2 is decreased in MyD88-deficient cells. Our results suggest that MyD88 is a protector against mitochondrial ROS. Preliminary data also imply the nuclear localization of MyD88 and the possibility of direct binding with a critical DDR protein kinase. Taken together, these results suggest an unexpected and novel role for MyD88 in the cellular response and repair of DNA damage.

Scientific Disciplines Selected by Student: BI CB ME

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3062

Word Count

169

<b>Proj. Num</b> 3062	<b>Title:</b> From Shape Recognition to Multivariable Calculus Thinking: Study of Geometric Perception and Visuospatial Cognition in Early Alzheimer's Disease Patients
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StudentName(s): X. Zheng

**Abstract:**

Alzheimer's disease can cause severe memory and cognitive loss, including a decrease in computational ability and visuospatial perception. Here I test the geometric cognition and spatial perception in individuals diagnosed with varying degrees of Alzheimer's Disease, utilizing a mathematical questionnaire. The questionnaire which includes 15 problems of basic plane geometry and spatial geometry was administered to 20 mild Alzheimer's Disease Patients (AD) and 20 elderly individuals without AD. The results show that the early AD patients exhibited a significant difference in performance on solving problems of both basic plane geometry and spatial geometry than those who did not have AD. Additionally, there were clear AD-related deficits in all 10 particular abilities revealed in the test, such as counting, association, and calculation. In addition, a correlation was shown in both groups between the performance and the participant's educational levels. The questionnaire developed in this study could serve itself or as a model for testing tools to aid in the prediagnosis of Alzheimer's Disease in similarly aged and educated individuals.

Scientific Disciplines Selected by Student: BE MA ME

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
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- |                | Life Sciences | Physical Sciences |
|----------------|---------------|-------------------|
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3066

Word Count

234

Proj. Num	Title:
3066	What is This About Again? A Study of the Correlation Between Age and Short Term Memory

StudentName(s): T. Bonagura

**Abstract:**

Have you ever walked into a room and forgot your purpose? How about not being able to find an object you just put down? These situations are effects of short term memory lapses. Though some may associate short term memory loss with the older population, it is a fact that the brain goes through stages where its memory is stronger than at other points in a person's life. This experiment is devoted to determining the correlation between age and short term memory. Just as bodies develop, brains do as well. There tends to be a certain point in ones life where they reach their full potential in strength, agility, ex cetera. After this comes a point where it begins to not work as well. In the body this is called aging, in the head it is called degeneration. Scientists have discovered cognitive stages of the brain, so I decided to design a test based around this development and it's relevance to short term memory. By presenting 6 slides, each with increasing amounts of random letters then asking the subjects to record them I gathered enough data to determine an average percentage of memory per slide on each age group. In the end, it was determined that overall, the strongest short term memory in the tested age groups were the 20-30 year olds, closely followed by the cognitive stage known as formal operations (15-17 years).

Scientific Disciplines Selected by Student: BE

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3067

Word Count

255

Proj. Title: Hydrogels as a novel drug delivery system

Proj. Num  
3067

StudentName(s): A. Garcia

**Abstract:**

Hydrogels are tiny marbles made up of polymers which absorb water. Their compatibility with human tissue offers the exciting possibility of using hydrogels in drug delivery systems. The advantage of using hydrogels as a drug delivery tool is that the need for fillers and encapsulation methods would be eliminated. They were tested using liquid solutions to see whether or not they would be a viable drug delivery system. Because of this trait, it seemed likely that they would indeed be quite useful in this role. In this experiment, they will be dissolved, and the time will be recorded and compared to those of 4 over the counter (OTC) medications. The 4 medications were: Advil Liqui-gels, Tylenol Rapid Releases, Advil Tablets, and Advil Gel-caps. These were dissolved in simulated gastric juice. The hydrogels themselves were filled with the liquid medication from within the Advil Liqui-gels, but when that didn't work; the ones filled with water were used. After they had been placed within the simulated gastric juice, they broke into chunks. However, fully dissolving was not occurring due to the water content of the gastric juice. When the pills were dissolved, the tablets dissolved fastest, and the liqui-gels the slowest. The other two finished in order of rapid release, then gel-caps, then liqui-gels. The hydrogels finished in between the rapid releases and the gel-caps at 20 minutes. At the end of all this, the hypothesis was proved correct. The performance of the hydrogels was comparable to the OTC medications.

Scientific Disciplines Selected by Student: BI CH EN ME

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3068

Word Count

255

Proj. Num

3068

Title: The Correlation Between Lucid Dreaming and Ventromedial versus Dorsolateral Task Performance in Adultts

StudentName(s): E. Abbasi

### Abstract:

This study determined the correlation between lucid dreaming and the Ventromedial and Dorsolateral Prefrontal task performance. In a study done at Yale in 2010, 28 high school students completed baseline assessments, performed two cognitive tasks, the Iowa Gambling Task, IGT, and the Wisconsin Card Sort Task, WCST, then completed 7 days lucid training with daily sleep-related assessments. The Iowa Gambling Task exercised the Ventromedial Prefrontal cortex (VMF), while the Wisconsin Card Sort Task exercised the Dorsolateral Prefrontal cortex (DPC). The VMF is involved in decision making, while the DPC with memory and emotion regulation. This study used adults, not kids. It is hypothesized that lucid dreamers will perform better than regular dreamers in tasks, such as the IGT, that engaged the VMF; but they will perform no better than regular dreamers in tasks, like the WCST, which exercised the DPC, will be made with the data from the study with adults, as with the teenagers. Participants completed assessments determining BLA, Base Lucidity Assessment, was surveyed. Using BLA, data was group into three Bins. Bin 1 was the ALD, accomplished lucid dreamers; Bin 2 was the control, average dreamers, and Bin 3 was the LDA, low lucid dreamers. For IGT data, participants' BLA was compared to IGT performance, raw scores, improvement, total and over five quintiles. With the data, using t-tests and ANOVAs, there is no correlation between BLA and performance, raw scores, and improvement, trials, total/perseverative/nonperseverative errors. The reason why no significant data has been found is because of participant numbers.

Scientific Disciplines Selected by Student: BE ME

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3069

Word Count

248

Proj. Title: Microstructured Hydrogels for Drug Delivery

Proj. Num: 3069

StudentName(s): M. Adler

**Abstract:**

The hydrogels were synthesized through microencapsulation. A microencapsulator, the PicoPlus by Harvard Apparatus, was used to pump alginate solution into a basin filled with 0.1 M solution of calcium chloride. A 1% alginate solution was mixed with brilliant blue until the alginate completely dissolved. This mixture was then loaded into a syringe and attached to the pump on the microencapsulator. The alginate solution was pumped through the tube at a rate of 0.03 mL/min. A current of 5 kV was in the needle at the end of the tube and the needle was 5 cm above the surface of the calcium chloride solution. The hydrogels were analyzed for size (the distance between the farthest two points that existed on each hydrogel) by using a microscope connected to a program that converts pixels to micrometers. I developed models from this information that show the trends between the parameters listed above and resulting particle sizes. I chose to use current to create particles of specific sizes because the trend between this and particle size was the strongest with this parameter. These hydrogels of different sizes were synthesized, removed from the calcium chloride solution, and placed in a solution of sodium citrate. The calcium ions bonded to the citrate ions in solution, thus destroying the chemical composition of the hydrogels and releasing the encapsulated brilliant blue. Images were taken every 30 seconds for 5 minutes of each hydrogel during the sustained release process to determine which size hydrogel dissociated first.

Scientific Disciplines Selected by Student: AT BI

**Scientific Disciplines**

**Fair Categories**

- AT = Applied Technology
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- MI = Microbiology
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- PS = Plant Science

- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3070

Word Count

295

Proj. Title: Non-Invasive Dissipation of 2,4-D in Standing Water Using Iris versicolor

Proj. Num  
3070

StudentName(s): A. Merrill

**Abstract:**

Without government regulation of the quantities of herbicides applied by any individual or business, the amount of pesticides being released into the environment is significant. After application, chemical residue enters the surrounding area, and eventually the surrounding ground water. The U.S. Dept. of the Interior studied the quality of water in the United States and determined that samples from streams in areas with substantial agricultural or urban land use almost always contain mixtures of multiple pesticides and degradates. One popular component of weed killers in Connecticut is 2,4-Dichlorophenoxyacetic acid (2,4-D), which is listed as safe, but has been linked to cancer, eye damage, and reproductive risks. Iris versicolor (Iv) has been demonstrated to be particularly successful in reducing amounts of pesticides in groundwater when planted in soil. Since Iv is capable of thriving in an aquatic environment, it is particularly interesting to study in standing water. This research looks at the ability of Iv to metabolize 2,4-D in standing water. 50-100 ppm of 2,4-D was introduced to 11 individual Iv growth tanks, and the pesticide concentration was measured each day, for 10 days, using a novel High Pressure Liquid Chromatographic (HPLC) method. Results indicate that 50% of the 2,4-D contained in the plant tank was remediated in as little as 3 days. After 10 days, the concentration of 2,4-D was reduced to 1% of the original amount, independent of starting amount. Iv was able to remediate up to 20 ppm/day of 2,4-D in an ecosystem of 280g of biomass per liter of water. Similar HPLC analysis of control tanks show no measureable interference in HPLC analysis from tank/plant leachants, as well as stability of the 2,4-D molecule (in water) over the duration of the research.

Scientific Disciplines Selected by Student: CH EM EV PS

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3071

Word Count

231

Proj. Title: The Effect of Using Gracilaria tikvahiae as a Soil Conditioner in Clay Soil

Proj. Num  
3071

StudentName(s): C. Jones

**Abstract:**

Clay soil has high compaction, low porosity and a poor nutrient holding capacity. Farmers amend soil with industrial fertilizers to grow crops. If soil can be made fertile in a less harmful way, this will keep farmers from over paying for harsh fertilizers and stop the introduction of hazardous chemicals into the environment. The purpose of this experiment was to discover the effects of using red seaweed, Gracilaria tikvahiae, to improve infertile clay soil. Three pinto beans were grown in pots of clay soil with 40 grams of roughly ground seaweed mixed into the first five centimeters of soil, and three pinto beans were grown in pots of clay soil with 40 grams of roughly ground seaweed layered under five centimeters of soil. Two controls were grown in pots of clay soil with no seaweed. It was hypothesized that the plants grown with G. tikvahiae mixed into the soil will yield the best results because the soil will have a lower compaction and a higher porosity. All of the plants with Gracilaria showed superior growth in comparison to the control. Based on the results, it can be concluded that Gracilaria tikvahiae improves the compaction, porosity and fertility of clay soil. The seeds grown in clay soil without seaweed took longer to sprout. It cannot be said if either method of applying the seaweed is more effective because the results were inconclusive.

Scientific Disciplines Selected by Student: EA EM PS

### Scientific Disciplines

### Fair Categories

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3072

Word Count

250

Proj. Num

3072

Title: Assessment of Lepidoptera Host Plant Preference at Felix Neck Wildlife Sanctuary

StudentName(s): E. Wolf, . 1

### Abstract:

This study examines host plant preference trends in Lepidopteran species. I looked at three questions, a) Do preferences exist between Lepidoptera and plants? b) What are these preferences and are they measurable? and c) Are there abiotic factors that influence preference? My hypotheses are as follows a) there are preferences among Lepidoptera species b) I will be able to determine these preferences through experimental research conducted in the field and c) that abiotic factors influence host plant selection. I observed Lepidopteran species in the same area for 15 minutes in the morning from 8:30-8:45am. I recorded their behavior, number of times landed, duration of landing, temperature, precipitation, cloud cover, wind speed, noise level, and predator and competition presence. My data suggests that there are preferences for host plant selection, and I was able to group Lepidoptera species into monophagous, oligophagous, or polyphagous selection. Species exhibiting each behavior include the monophagous *Danaus plexippus*, which preferred *Buddleia davidii*, 3:1, the oligophagous *Limenitis arthemis* with 33% preference for two plants, and the polyphagous *Epargyreus clarus* exhibiting preference towards each species 27% of the time. I concluded that host plant selection is based on abiotic factors as well, including wind speed and temperature. Wind speed and individual presence had an inverse relationship, and temperature had a direct correlation to individual presence, exhibiting a bell curve. Other factors play into host plant selection including bird and bee presence. I concluded from my research that trends of host plant preferences do exist, both abiotic and biotic.

Scientific Disciplines Selected by Student: EV PS

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3073

Word Count

251

Proj. Num

3073

Title: The Effects of the Tobacco Mosaic Virus on Tomato and Pepper Plants

StudentName(s): R. Backhaus

**Abstract:**

The objective of this two-month project was to determine the effects of the Tobacco Mosaic Virus (TMV) on cherry tomato plants and pepper plants. My methods were first, I planted seed in a cardboard carton, watered them and gave them five weeks to germinate and grow. Second, I created a green house of cardboard and clear saran wrap to help speed up the process. Third, I placed my plants in a well-lit environment. Ten pepper plants and ten cherry tomato plants were grown. Once my plants were grown, I infected them with the solution of 5ml of dibasic potassium buffer and a pinch of cigarette tobacco. I put the solution on an emery board and slowly scratched the leaf to infect my plants. I allowed two and a half weeks for the virus to take effect. My conclusion is the virus spread throughout the plant at a rapid rate. My experiment also shows that the virus was only spread when it came directly into contact with the plants. The first signs of the virus were the immediate discoloration of the leaves, followed by the stunting of the plants growth. This was consistent with my data, showing an average growth of .15cm (healthy pepper) and .12cm (healthy cherry tomato) a day; compared to an average growth of .06cm (infected pepper) and .07cm (infected cherry tomato) a day. In conclusion the overall experiment turned out to be a success. The plants expressed all of the physical signs that my hypothesis stated.

Scientific Disciplines Selected by Student: PS

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
| AT = Applied Technology                      | EE = Engineering: Electrical & Mechanical |
| AS = Animal Science                          | ET = Energy & Transportation              |
| BE = Behavioral & Social Sciences            | EV = Environmental Analysis               |
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| CS = Computer Science                        | MI = Microbiology                         |
| EA = Earth Science                           | PH = Physics & Astronomy                  |
| EB = Engineering: Materials & Bioengineering | PS = Plant Science                        |

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3074

Word Count

310

**Proj. Num** 3074 **Title:** Novel Removal of Escherichia coli O157:H7 from Fresh Water Sources using Amino Acid Attractants

**StudentName(s):** S. Rieke

**Abstract:**

Contamination of bodies of water by Escherichia Coli O157:H7, the most common strain of pathogenic E. coli, has been linked more than 73,500 illnesses and 60 deaths each year in the United States. Although the issue is widespread, the most common methods of Enterohemorrhagic Escherichia Coli (EHEC) remediation are harmful to the ecosystem, or are directed at the consumer immediately prior to consumption of the infected water. This research investigates an inexpensive, effective, and noninvasive method of removing EHEC directly from the bodies of water using amino acids as attractants. Initial experiments to verify the attraction of k12 E. coli (a nonpathogenic model) to amino acids were completed using custom testing chambers with a flat layer of nutrient agar across the pre-sterilized tube. A 5x10<sup>-2</sup> gm/ml L-serine solution was loaded on one end of the agar layer, while k12 E. coli in nutrient broth was loaded onto the opposite end. Results over five days reveal an average rate of growth of 3 cm/day, relative to 1.4 cm/day growth for those tubes that did not contain amino acids. Positive, initial results lead to the development of amino acid attractant sticks, which can be used to attract E. coli in large bodies of water. L-serine was loaded onto the inner-filter portion of a sterilized flash chromatography column, and a flat layer of nutrient agar was then distributed horizontally in the tube above, so that air was also present. The attractant tube was placed in an E. coli broth culture for five days. Those tubes with amino acids exhibited bacterial growth of up to 19.5 cm (from the bottom), relative to those without L-serine, which exhibited zero growth, confirming the functionality of the device. Future experiments will be conducted using those strains of E. coli that closely mirror the behavior of pathogenic O157:H7.

**Scientific Disciplines Selected by Student:** AT CH EM EV MI

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3075

Word Count

254

Proj. Num

3075

Title: A Comparative Study Of The Effectiveness Of An “ebb And Flo” Style Aquaponic System, A Hydroponic System, And An Organic, Soil-based System In Producing A Healthy, High Nitrate/low Ammonia Water Supply For The

StudentName(s): O. Kelly

### Abstract:

Aquaponics (integration of aquaculture and hydroponics) is of great significance because fish and plants support each other’s growth in a sustainable, environmentally-friendly manner. This experiment’s purpose was to discover if romaine lettuce can be grown using only goldfish waste as nourishment via a home-made “Ebb and Flo” aquaponic system. The hypothesis was that if romaine lettuce is planted at home in an aquaponic, hydroponic, and organic soil system, then the aquaponic system will provide a healthier (higher nitrate/lower ammonia) water supply, lettuce that grows more quickly and fully, and lettuce with a higher mineral content. An aquarium with ten goldfish was established well before experimentation. Four pods of romaine lettuce were placed in each of the three systems and grown for seven weeks. In each, the aqueous nitrate concentration was measured using a conductivity meter, growth was measured by weekly height and final mass, and the leaf mineral content was determined via spectrometry. Both the hydroponic and aquaponic systems maintained 100 ppm aqueous nitrate and the aquaponic system had less harmful aqueous ammonia (organic untested), so overall the aquaponic system provided the healthiest water supply, proving Hypothesis, Part 1. The hydroponic system grew lettuce much more abundantly vs. the organic and aquaponic systems (final mass of 296, 7, and 4 grams respectively), disproving Hypothesis, Part 2. Although the hydroponic lettuce contained the most nutrients in range (6 of 9), the aquaponically-grown lettuce contained sufficient Boron and more Calcium, Phosphorus, and Zinc than the other systems, partially proving Hypothesis, Part 3.

Scientific Disciplines Selected by Student: BI CH MI PS

### Scientific Disciplines

### Fair Categories

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3076

Word Count

257

Proj. Num

3076

Title: The Effect of the Overexpression of HDAC5 in N2a Cells in PGC-1 $\alpha$  and Glucose Transporters

StudentName(s): P. Arora

### Abstract:

It is known that nerve cells from Alzheimer's patients as well as individuals with diabetes show increased blood sugar concentrations. Patients with diabetes are also more likely to develop Alzheimer's disease. Both of these diseases result in decreased mitochondrial function; the cells lose their ability to respond to insulin and consequently, the neurons have to cope with less glucose. The protein Histone Deacetylase (HDAC5) restricts the transcription of peroxisome proliferator-activated receptor gamma coactivator (PGC)-1 $\alpha$  and glucose transporters, biological components that regulate mitochondrial function. This leads us to consider if the manipulation of HDAC5 could serve as a potential treatment for diabetes and Alzheimer's where there is an increase in blood sugar concentration. The purpose of this experiment was to determine how HDAC5 overexpression affected the expression of glucose transporters and PGC-1 $\alpha$  in neuroblastoma (N2a) cells. In order to investigate this, we transfected N2a cells (Catalog number: CCL-131) with HDAC5, the experimental group, along with green fluorescent protein (GFP), the control group. After HDAC5 was successfully transfected into the N2a cells, Real-Time PCR was conducted to measure glucose transporters and PGC-1 $\alpha$  presence. Results show that overexpression of HDAC5 expression caused a decrease in PGC-1 $\alpha$ , a decrease in GLUT1, and an increase in GLUT3 in comparison to GFP transfected cells. This signifies that the overexpression of HDAC5 ultimately decreases mitochondrial energy metabolism. Based on this information, the regulation of HDAC5 expression can be explored as a possible treatment of diseases such as Alzheimer's that show decreased mitochondrial function and increased glucose concentration.

Scientific Disciplines Selected by Student: CB

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3078

Word Count

266

Proj. Num

3078

Title: THE PREVALENCE OF FAMILY HISTORY OF PSYCHIATRIC CONDITIONS AMONG INDIVIDUALS WITH OPTIMAL OUTCOMES AND INDIVIDUALS WHO HAVE RETAINED THEIR AUTISM SPECTRUM

StudentName(s): A. Chen

**Abstract:**

New research has shown that Autism Spectrum Disorders (ASD) can be treated and children with ASDs can actually “recover” to the point where their social abilities and IQ no longer meet diagnostic criteria for ASDs. The children who lose their ASD diagnoses are considered to have achieved “Optimal Outcome” (OO). Many studies have shown that children are less likely to achieve OO if their ASD symptom severities are greater. Studies have also shown that children who have a relative with major mood disorders, anxiety disorders, ASDs, ADHD, learning disabilities or psychotic disorders, have a higher prevalence and a higher symptom severity of ASDs. Based on these findings, is there a difference in the prevalence of family history of psychiatric conditions listed above among OO individuals, individuals who have retained their ASD diagnoses (High Functioning Autism or HFA) and typically developing (TD) peers? It is hypothesized that since there are increased symptom severities among individuals with a family history of the above psychiatric conditions, then OO individuals will have a decreased prevalence of the above disorders within their family histories than individuals with HFA and TD peers. The results of this study revealed that the HFA and OO groups both had a significantly greater prevalence of ADHD in family history than the TD group. Additionally the HFA group had a significantly greater prevalence of bipolar disorders in family history than the other two groups. However in total, there were no results where the OO group was significantly different itself from the other two groups. These results indicate that family history is not a good indicator of OO.

Scientific Disciplines Selected by Student: BE ME

**Scientific Disciplines**

**Fair Categories**

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- PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3079

Word Count

173

**Proj. Num** 3079 **Title:** Pigeon Talk: A Bioacoustical Analysis of Variation in Male Fantail Pigeon Display Calls

**StudentName(s):** A. Ford

**Abstract:**

Bioacoustical studies on the vocalizations of common pigeons (*Columba livia*) have shown that male fantail pigeons voice a complex display call made up of two structural sections - the trill and the coo, during courtship or territorial display. In other bird species, including oscine songbirds and penguins, this display call is individually unique and enables individual recognition among birds. This experiment sought to determine if the display calls, specifically the coo notes, of male fantail pigeons remain consistent, in terms of quantitative and structural similarities, over the various categorical groups of call structure, age, and genetic similarity – in the form of father/son pairs. After analyzing the data through spectrographic representations and a series of T-tests, ANOVA tests, and Tukey tests, it was determined that each male fantail pigeon possesses a coo note that is statistically significantly different from those of other males, regardless of shared structural similarity, age, or genetic similarity. Thus, he has a unique identifying note that could allow for individual recognition among the males in their dark, crowded colonies.

**Scientific Disciplines Selected by Student:** AS

**Scientific Disciplines**

**Fair Categories**

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- ME = Medicine & Health Sciences
- MI = Microbiology
- PH = Physics & Astronomy
- PS = Plant Science

- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3080

Word Count

246

Proj. Title: Expression Patterns of MicroRNA-228 in C. Elegans

Proj. Num  
3080

StudentName(s): M. Shlomchik

**Abstract:**

MicroRNA is a type of small RNA that regulates the translation of other coding mRNA and therefore the concentration of proteins within cells. It was thought that mir-228, a specific microRNA in C. elegans, might have an affect on the lifespan of worms. Mir-228 was predicted to be expressed in neurons in the head, tail and vulva of the worm and would increase over time. My goal was to determine which cells expressed mir-228 and its impact on the aging process. Lifespan assays showed that knock-out mir-228 worms had a shorter lifespan than wild type worms. I imaged mir-228::GFP worms that express GFP at the same levels and in the same cells as mir-228. I determined the expression levels of GFP in the tail, vulva and head region, as well as the whole worm, through image analysis. The results indicated that mir-228 was highly expressed in the head, vulva and tail. There was an overall increase of GFP expression over time that peaked and then decreased with age. After consulting additional resources, I concluded that mir-228 was not expressed in neurons, but instead expressed by excretory glands in the head, and excretory canals and glands in the tail. These excretory glands are thought to play a role in osmoregulation. To determine if mir-228 influences osmoregulation in C.elegans, future directions could include a comparison of the excretory systems of wild type and mutant mir-228 worms.

Scientific Disciplines Selected by Student: CB

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3081

Word Count

405

Proj. Num

3081

Title: Assessment of the Accuracy of the Euroscore and STS risk predicting algorithms for patients undergoing Aortic Valve Replacement and its application to Trans-catheter Aortic Valve Replacement (TAVR)

StudentName(s): O. Allam

### Abstract:

Background. The recent approval of Trans-catheter Aortic Valve Replacement (TAVR) has focused attention on the accuracy of pre-operative risk evaluation algorithms for high risk patients undergoing aortic valve replacement (AVR). There are three widely used standardized risk scoring algorithms for preoperative stratification, the additive European System for Cardiac Operative Risk Evaluation score (EuroSCORE), the logistic EuroSCORE, and the Society of Thoracic Surgeons Predicted Risk Of Mortality (STS-PROM) score. This study analyzes the efficacy of these three algorithms in determining the risk for all patients undergoing isolated AVR at Hartford Hospital. Methods. Three hundred and thirty three patients under went isolated AVR at Hartford Hospital from January 1st 2000 until June 30 2011 and were entered into the STS Cardiac Surgery database. A retrospective review of prospectively acquired data was performed. Patients were divided into quartiles based on their Logistic EuroSCORE (LES), Additive EuroSCORE (AES), and STS-PROM (STS) score. Gross mortality, average age, average risk score, percentage of renal failure, cerebral vascular accidents (CVA), and prolonged pulmonary ventilation were calculated for each of the quartiles. A threshold risk score was calculated for each algorithm at Hartford Hospital. Results. The overall mortality rate for this study was 15 patients of 333 for 4.5%. Patients were divided into quartiles for each risk algorithm (STS, AES, &LES) from the highest risk to the lowest risk. The predicted versus expected mortality rates by quartile for the STS algorithm were 6.6% vs 13%, 3.3% vs 4.8%, 2.2% vs 1.2%, and 1.3% vs 0% from the highest risk quartile to the lowest risk quartile, respectively. For the Logistic EuroSCORE the predicted versus expected mortality rates by quartile were 14.76% vs 13.25%, 6.3% vs 0%, 3.56% vs 3.614%, and 2.03% vs 1.2%. The Additive EuroSCORE results were 9.25 vs. 13.2%, 6.6% vs 0%, 4.9% vs 4.8%, and 3.2% vs 0%. Conclusion. At the present time my raw data has showed some equivocal findings, on first evaluation it appears that the logistic EuroSCORE maybe the best risk algorithm for high risk patients undergoing isolated AVR at Hartford Hospital.

Scientific Disciplines Selected by Student: MA ME

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3082

Word Count

266

**Proj. Num** 3082 **Title:** The Regulation of DcR3 and TL1A by Pro-inflammatory Cytokines in First Trimester Decidual Cells

**StudentName(s):** J. Pecoriello

**Abstract:**

Preeclampsia, a major obstetric problem leading to substantial maternal and perinatal morbidity and mortality worldwide, arises from poor development of the early placenta and its maternal blood supply, called poor placentation- a result of shallow trophoblast invasion of the maternal spiral arteries. Many studies have implicated excessive apoptosis to be a cause of the shallow invasion. A major impediment in the development of an early diagnosis and effective treatment for the disorder, both of which there are none currently, is our poor understanding of the various pathological mechanisms that lead to preeclampsia. This study focuses on the abnormal expression of molecules involved in trophoblast apoptosis, which important in providing new insight into some of the molecular mechanisms leading to abnormal placentation and the development of preeclampsia. It was hypothesized that there would be an increase in expression levels of TL1A, a death receptor ligand that induces apoptosis, and a decrease in expression of DcR3, a molecule that suppresses receptor-induced apoptosis. It was found that cells associated with preeclampsia increased expression levels of TL1A to a higher level than it increased levels of DcR3. Through increasing DcR3 expression, an observation that refutes the hypothesis, extrapolation of these results to the milieu of implantation site suggests a mechanism whereby preeclamptic cells could mediate excessive TL1A expression in the decidua, thus mediating excessive apoptosis of the trophoblast. This suggests that part of the reason for shallow trophoblast invasion may be due to an imbalance between expressions of the opposing apoptotic molecules. This information is essential in developing an earlier diagnosis and a more effective treatment for the disorder.

**Scientific Disciplines Selected by Student:** ME

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3084

Word Count

258

Proj. Num

3084

Title: Biological Control of Zebra Mussels Using the Marine Natural Product Aaptamine

StudentName(s): J. Kerr

**Abstract:**

The invasion of Zebra mussels into our country's waterways has become an increasingly significant environmental problem. They foul pipes, grow on ship hulls, cost millions to remove, and cause major disruption to the ecosystem. Presently, the only way to control zebra mussels is through environmentally hazardous molluscicides. In order to see if Zebra mussel infestation could be halted or reversed in an environmentally safe manner, I set out to identify a safe biological control agent. Aaptamine, a marine natural product taken from Indonesian sponges, was tested for its effectiveness at controlling zebra mussel attachment and mortality in test chambers and compared to the molluscicide metaldehyde. Aaptamine had an EC50 between 2-3 µg/ml in both the attachment and mortality assays. This was similar to the EC50 for molluscicide. Aaptamine was demonstrated to be environmentally safe in a toxicity assay with the aquatic invertebrate Daphnia, and in a phytotoxicity assay with the aquatic plant duckweed. Unlike Aaptamine, molluscicide treatment proved to be toxic to both aquatic invertebrates and plants at concentrations below .01 µg/ml. Therefore, molluscicide was determined to be ecologically harmful for use to control zebra mussels. Conversely, Aaptamine was shown to be both safe and effective at controlling zebra mussel growth and attachment. Its effect on zebra mussel attachment makes it a potential anti-fouling agent, which could prevent the need for costly mussel removal. Furthermore, its effectiveness on zebra mussel mortality suggests it could be used as an ecologically friendly biological control agent to prevent and even reverse the ecological damage done by zebra mussels.

Scientific Disciplines Selected by Student: AT AS EA EM EV PS

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3085

Word Count

242

**Proj. Num** 3085 **Title:** The Effect of Water Level Changes on the Elevation of Salt Marshes on Long Island, NY

**StudentName(s):** A. Sommi

**Abstract:**

Salt marshes are integral to costal ecosystems and play a large role in filtering water, lessening the impact of storm surges, and providing vital habitat for wild life. Recently, they have been put greatly at risk through development and pollution, which damage their vital areas. Salt marshes can grow vertically in two ways, through the collection of surface sediment, known as surface accretion, and the buildup of belowground biomass. In this experiment primarily done by The Nature Conservancy, locations throughout Long Island, NY were monitored for elevation changes. This is done through the use of Surface Elevation Tables (SET) and feldspar plots. These techniques measure the overall marsh growth, and the amount that is caused by surface accretion, respectively. Preliminary results show that during this study marshes at locations on the eastern end of Long Island have increased in elevation faster than the historic rate of sea level rise measured by the tide gauge at Montauk Point, NY. However, most of these marshes initially appear to be increasing in elevation more slowly than the short-term rate of water level change. This study has been continuing for the past three years, and remains too short of a period of study to make conclusions, and thus it must continue into the future. The results of this study will have large effects on the total marine ecosystems of the salt marshes, which are integral to a costal zone, and their preservation for the future.

**Scientific Disciplines Selected by Student:** EM EV

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
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| EB = Engineering: Materials & Bioengineering | PS = Plant Science                        |

- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3086

Word Count

260

Proj. Title: The application of LT and 5-HTP

Proj. Num 3086

StudentName(s): A. Marini

**Abstract:**

This project is composed of data from clinical trials and research involving the effectiveness of amino acids L-tryptophan (LT) and 5-Hydroxytryptophan (5-HTP) in promoting serotonin production in clinically depressed patients as opposed to popular antidepressants to produce equal, if not more effective, results. While current antidepressants only recycle whatever serotonin in the brain, 5-HTP and LT, both precursors to serotonin, instead promote serotonin production. Through the project, it was shown that between the two, 5-HTP proved to be the more effective because unlike LT, it does not rely on biosynthesizing enzymes and overall, is less likely to be influenced by factors such as stress and diet. The majority of studies involving 5-HTP were done in the 1970s and early 1980s. One test found reduced depressive symptoms in 60 percent of patients given 5-HTP (200-3,000 mg/day), while a placebo group showed no improvement (van Praag et. All, 1972). A double-blind study with four groups of 10 patients found 5-HTP (200 mg/day) was more effective than placebo and almost as effective as Clomipramine (a tricyclic antidepressant) (van Praag HM, 1980). Though, Several double-blind placebo-controlled trials have been done to show its effectiveness in treating clinical depression, there is still a lack of high quality studies more larger clinical trials would be need to be done in the future to promote 5-HTP's true potential in treating clinical depression. With the reemergence of this data, it will hopefully spark more research on this potential alternative for treating major depressive disorder.

Scientific Disciplines Selected by Student: BI ME

### Scientific Disciplines

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3087

Word Count

143

Proj. Num

3087

Title: Investigation and Remediation of Biological Health of New Creek Salt Marsh through the Study of Benthic Invertebrates

StudentName(s): S. Acharya

**Abstract:**

This study inspected the health of New Creek Salt Marsh through the examination of Benthic Invertebrates, important indicators of environmental disturbance, found. In the project, soil samples were collected from four sites, and the organisms found were studied under the microscope. Current and past benthic invertebrate data were used to determine the health of the salt marsh. The organisms found were pollutant tolerant (*Capitella*, *Nereis*) which indicated a disturbed system. Using the data, a guidebook specific to New Creek Salt Marsh was designed which includes sketches and appropriate anatomical descriptions of benthic organisms found. A map of the New Creek Salt Marsh was designed using Google Earth technology; this contains the physical features of the marsh, including vegetation, ditches, slope, as well as the exact sampling locations (2009 and 2011). It also includes specific suggestions to ameliorate the health of the biological system.

Scientific Disciplines Selected by Student: EM EV PS

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3088

Word Count

167

Proj. Num	Title:
3088	MCF7 Breast Cancer Cell Inhibition Using Linum Usitatissimum Oil and Cottage Cheese

StudentName(s): E. Kaushik

**Abstract:**

Breast cancer, makes up around 22.9% of all cancers, and is the cause of 13.7% of cancer deaths in women. MCF7 breast cancer epithelial cells were found to be completely inhibited by linum usitatissimum oil. Linum usitatissimum oil has many key components known to be cancer preventative such as: linol-acids, lignans, and omega-3 fatty acids. The key component in cottage cheese is the rich amounts of protein, and the sulfur in the protein is crucial for the linol-acids in the flaxseed to work. After treating the MCF7 breast cancer cells in wells with the linum usitatissimum oil, a MTT assay was conducted for cell visibility, the samples were then read using an ELISA plate reader at an absorbance of 540 wavelength. As the concentration of the linum usitatissimum oil increased the absorbance reading of the treated wells decreased significantly, meaning that the treatment inhibited many of the cancer cells. The cottage cheese combination did not produce expected results due to contamination in the cheese.

Scientific Disciplines Selected by Student: BI CB MI

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3089

Word Count

254

Proj. Title: Cleaning Worms

Proj. Num  
3089

StudentName(s): C. Vu

**Abstract:**

This project was chosen because pollution is becoming a problem in our society. There are laundry detergents runoff and it can be very harmful to the environment. By testing which detergent is Eco-friendly can change which detergent people use, thus making the runoff less harmful. Is “green” detergent better for the environment? The independent variable is the type of detergent used. The dependent variable is the number of worms dead. The detergents used were regular, Eco-friendly, water; water was used for the controlled test. Five worms was placed in each cup and was filled with soil and lettuce. Then the detergents were placed in the cups and after a five day period, the number of worms dead was recorded. In the regular detergent trials, on average, almost all the worms were dead. While the Eco-friendly detergent barely killed any worms. The Eco-friendly detergent claims it is free of many harmful chemicals. In the end, their claim and the hypothesis was supported. Eco-friendly detergent really is better for the environment. The process went very well, there was mistakes here and there though. The cups were suppose to have holes poked in the bottom of them, but they were forgotten. The lettuce was food for the worms, but it was at the top where it made no difference. Next time, the lettuce will place in the middle of the soil so the worms can have access to it. Both of these factors could have made a difference in the final results.

Scientific Disciplines Selected by Student: BI CH EM EV

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3089

Word Count

252

Proj. Title: Nut Job

Proj. Num  
3089

StudentName(s): C. Vu

**Abstract:**

In my project I wanted to find out which nut gives you the most energy by measuring it in calories. Calories are a measure of energy. I tested 3 types of nut: pistachios, walnuts, and cashews. My hypothesis was that walnuts would give you the most energy because walnuts contain omega 3 and omega 3 is found in foods that contain oil. I predicted that the walnut would burn longer because of the omega 3. I would measure the nut until each nut weighed the same for each trial, so it would be fair. Then I burned each nut and placed my homemade calorimeter over the nut. The calorimeter includes a can that holds 100 ml of water right over the burning nut. I measure the water in Celsius degrees before and after the burning. Then I measured the remains of the nut in grams. For the first trial each nut weighed 1.4 grams. The pistachios weighed .8 grams after it burned and was 1.5 kilocalories. The walnut weighed .1 grams after it was burned and was 4.8 kilocalories. The cashews weighed .2 after it was burned and was 3.9 kilocalories. I can conclude that my hypothesis agreed with my conclusion because in all the trials the average of kilocalories for pistachios were 1.43, cashews-4.27, and walnuts-4.67. 1000 calories equal 1 kilocalorie. Kilocalories are what you normally see on food labels. I actually measured the amount of calories first and then converted the calories into kilocalories by dividing by 1000.

Scientific Disciplines Selected by Student: BI CH EM EV

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3090

Word Count

241

<b>Proj. Num</b> 3090	<b>Title:</b> Exploring the Levels of Environmental Chitin and Chitinases in House Dust and their association with Asthma: A Pilot Study
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StudentName(s): E. Fox

**Abstract:**

The long term purpose of this study is to try to find out whether asthma is caused by environmental factors or if it is instead a genotypical disease. To attempt this, a pilot study must be done to find out if chitinases can, in fact, be measured accurately. It was hypothesized that a photosensitive chitinase assay would produce the most consistent results of chitinase activity as it controls many outside variables and uses an easily calculable reactive enzyme. Multiple samples of dust, all taken from the same location to maintain similar chitinase activities, were obtained for testing different procedures. The independent variable was the procedure used to test for chitinase activity, the dependent variable was the result given by the test, and the control was a test that added noenzyme. After testing, results show that using a photoreactive substrate 22M triacetylchitotriose (TAC) in an assay with a stop buffer and incubator yielded the best results. The test works through calculating the fluorescence made from a reaction between chitinase and an enzyme. The results of this study show that this specific chitinase assay is, so far, the most reliable and consistent way to calculate chitinase activity. This also supports that chitinase activity is calculable in the first place, a novel approach in this field. The results of this test support the use of the assay method which will be used to attempt to isolate the specific cause of asthma, environmental or genetic.

Scientific Disciplines Selected by Student: EV ME MI

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3091

Word Count

243

Proj. Title: Musical Memories

Proj. Num: 3091

StudentName(s): S. Grader

**Abstract:**

The purpose of my experiment was to determine if listening to certain types of music can help improve a person's memory. My hypothesis was that those who listened to classical music would have the best scores because research shows that listening to classical music lets people clear their minds and focus. To test this theory I found 115 test subjects and gave them a picture to memorize. While they looked at the picture for five minutes they listened to classical, country, rap, or no music. After the five minutes was up, I took the picture away and gave them a questionnaire to fill out. The questionnaire quizzed them on details they remembered about the picture, like the color of the boy's jacket or what the little girl was holding. After I scored all of the tests, I found the average of correct answers for each type of music and no music. The average score for rap music was 57, the average score for no music was 76, the average score for country music was 79, and the average score for classical music was 92. The conclusions I drew from this are that my report did concur with past research, classical music can in fact improve short-term memory. This is important because it could change education for the future. In the future when children are learning they could listen to classical music to improve how much they remember, and get better test scores.

Scientific Disciplines Selected by Student: BE

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3092

Word Count

196

Proj. Num	Title:
3092	Creating a Cre/Lox Barcoding System: A Potential Breakthrough in Tracking the Heterogeneity of Glioblastoma Multiforme

StudentName(s): C. Colford

**Abstract:**

Glioblastoma multiforme (GBM) is the most common and malignant form of primary intracranial tumor. It is characterized by its genetic heterogeneity, which has consistently thwarted attempts at understanding its behavior. This study addresses this issue and presents a potential breakthrough in the analysis of GBM cells in in vitro experiments through the use of the Cre/Lox system. This system capitalizes on the relationship between Cre recombinase and a concatemer containing LE/RE mutant lox sites. When induced by the drug tamoxifen, Cre randomly binds to lox sites, which are then genetically rearranged through excisions and inversions depending on their position, orientation, and specially designated point mutations. This recombination could potentially create a unique “barcode” in each individual cell in a GBM tumor sphere line. This study specifically focused on engineering a construct containing Cre and green fluorescent protein (GFP), which would allow for the tracking of the cells’ uptake of the construct, and on analyzing simulations of the system’s theoretical performance. The success of the Cre—GFP construction and of the simulations is a very strong indicator of the system’s potential success in culture and could provide an essential platform for future research of GBM.

Scientific Disciplines Selected by Student: ME

### Scientific Disciplines

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3093

Word Count

246

Proj. Num

3093

Title: Does participating in a high school concert band put students at risk for permanent hearing damage?

StudentName(s): J. Zavatone-Veth

### Abstract:

Participation in concert bands exposes high school students to the arts and exercises areas of their minds that are untouched by standard school curricula. This project examined the risk of hearing loss faced by high school concert bands and attempted to establish in what frequency bands noise attenuation could be needed. To establish the risk of hearing damage, the sound produced by a high school concert band was measured and calculated as to whether it exceeded standards set by OSHA for noise exposure and thresholds of hearing loss. Measurements were taken at ear level in the front three rows of the band. As brass instruments have been established as the loudest source of projected noise in bands, the sound pressure level produced by a single trumpet playing at typical volume was measured at distances similar to the spacing between the trumpets and the front three rows of the band. The data collected were processed using OSHA's equations for noise exposure. The OSHA standard (85 dB for 8 hours) was used in calculation, as well as the sound levels estimated to be the actual thresholds for hearing loss (78-80 dB for 8 hours). Results indicated that band members in the second row from the front of the band are exposed to sound levels that could potentially lead to hearing loss. The greatest decibel level produced by the trumpet is between 1 and 2 kHz, meaning that attenuation in that range could be used to help reduce risk.

Scientific Disciplines Selected by Student: ME PH

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3094

Word Count

216

Proj. Num

3094

Title: Natural Fruit-Based Drinks vs. Sports Drinks: Is one "electro-light?"

StudentName(s): L. Geary

### Abstract:

The purpose of this project was to discover whether or not specially designed sports drinks had higher conductivity levels than natural fruit-based drinks. It was hypothesized that the sports drinks would yield a higher conductivity since they are purposefully made to replenish electrolytes. The investigation of this experiment was carried out by testing six beverages, a total of seven solutions with the added control of distilled water. Half of the beverages was classified as sports drinks, while the other half was classified as natural drinks. All beverages were tested a total of four times in order to find an average conductivity level for each group. After testing each beverage, the data points for each group (control, natural, sport) were averaged. The mean conductivity of the natural beverages (154.56 ppm) proved to be higher than the mean conductivity of the sports beverages (151.23 ppm). Both proved to have significantly higher levels than the control (.625 ppm). Data from this experiment is beneficial for athletes, for it has been proven that one does not need to rely on specially manufactured sports drinks any longer. The data also encourages people, athletes or not, to consume more wholesome beverages that have not been highly processed and may have more nutritional benefits to them such as vitamins and other nutrients.

Scientific Disciplines Selected by Student: ME

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3095

Word Count

253

Proj. Title: The Effects of Pool Disinfectant Byproducts in Relation to Allergic Asthma

Proj. Num  
3095

StudentName(s): M. Karetnick

### Abstract:

Swimmers are constantly ingesting small portions of disinfected pool water, and inhaling the headspace gases immediately above the pool surface. Most pools are disinfected by chlorine products, which when combined with sweat, urine, and other human byproducts, are converted to “disinfectant byproducts” (DBPs), such as nitrogen trichloride, monochloramine, dichloramine, and free chlorine. These chlorine-based DBP’s are hazardous to humans, having been linked to lung tissue damage and eight different types of cancer. This research investigates the relationship between DBPs and allergic asthma in swimmers in a competitive swimming pool. Using a modified spectrophotometric Total Residual Chlorine method established by the NPDES, chlorine content was established by measuring the 515 nm absorbance of serial dilutions of potassium permanganate. Specific DBP content was determined by adding N,N-Diethyl-p-phenylenediamine (DPD) indicator and Phosphate Buffer to pool water samples, collected periodically over the term of the research. Swimmers lung capacity, before and after exposure to swimming pool water, was measured via spirometry. Results suggest that subject’s lung capacity decreased by as much as 30% within two hours following initial exposure to pool water and measured DBP’s. Spirometry tests of the same subjects were performed before and after a running exercise of similar cardiovascular exertion relative to swimming, based on increase in pulse rate. In these cases, the reduction in lung capacity was reduced by an average of 3.75%, suggesting that the additional reduction in pulmonary function associated with swimming can be attributed to DBP irritation of lung tissue and onset of asthmatic symptoms.

Scientific Disciplines Selected by Student: CH ME

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3096

Word Count

253

Proj. Title: An Investigation of the Effects of Distraction on Concentration

Proj. Num  
3096

StudentName(s): T. Tranfo

**Abstract:**

The purpose of this experiment was to test the concentration of sophomore boys under various conditions. In the first of four trials, each of the fourteen participants completed a task under no special conditions. In the next three trials the task was completed while listening to dub-step music, classical music, and then after completion of a reading passage with questions. The task or instrument used to measure concentration during the trials was Mattel’s Mind-Flex game. Mind-Flex uses basic EEG technology that allowed the participant to control the speed of a fan which raised or lowered a foam ball based on intensity of concentration. Using concentration and a button to move the fan plate forward or back, participants were asked to move the ball through an obstacle course. Time to complete each trial was recorded. It was hypothesized that both music types would decrease the time required to complete the task indicating an increased level of concentration, while the completion of the reading passage and questions would increase the time required, indicating a decreased level of concentration. The original hypothesis was partly supported as time for trial completion while music played was shorter compared to the control and the trial that followed the reading and questions passage, however, the latter two data sets showed large fluctuations affecting significance. Future studies may include altering conditions by changing obstacle course, age, or gender of the participants. Information gleaned from these experiments may be used to help customize individual studying conditions that optimize concentration.

Scientific Disciplines Selected by Student: BE

**Scientific Disciplines**

**Fair Categories**

- AT = Applied Technology
- AS = Animal Science
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3097

Word Count

239

Proj. Title: The Effect of Diazofluorenes on Ovarian Cancer Cells

Proj. Num  
3097

StudentName(s): T. DeRosa

### Abstract:

Epithelial ovarian cancer tumors are comprised of both mature ovarian cancer cells and ovarian cancer stem cells. The mature cells can be killed by chemotherapy treatments. The cancer stem cells on the other hand cannot be killed with common chemotherapy treatments and can differentiate into mature ovarian cancer cells. Years after chemotherapy treatments, the cancer stem cells regenerate the tumor and ovarian cancer reoccurs. Recently, antitumor antibiotics have been isolated as cytotoxic agents that will potentially target the ovarian cancer stem cells. Antitumor antibiotics are derived from microorganisms that interact with DNA as their primary mode of cytotoxicity. Since each antitumor antibiotic contains a diazofluorene scaffold, this project was designed to examine its cytotoxicity on ovarian cancer cells. A synthesized analog of diazofluorene, CW12, was used to treat mature ovarian cancer cells and determine if its scaffold is the pharmacophore, the portion of the drug responsible for the cytotoxicity of antitumor antibiotics, and therefore, potentially useful as a cancer treatment. When the growth and viability of ovarian cancer cells was measured after treatment with CW12 it was found that a 10uM concentration of CW12 was cytotoxic to the cells. A biotinylated, immunofluorescent version of the cytotoxic CW12 analog was then utilized in an attempt to visualize the cellular target after treatment. The results of this project confirm that the diazofluorene scaffold is cytotoxic to mature ovarian cancer cells, and therefore is the pharmacophore behind the cytotoxicity of antitumor antibiotics.

Scientific Disciplines Selected by Student: CB ME

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3099

Word Count

321

Proj. Num	Title:
3099	In Vivo Regeneration of Tooth Enamel using an Innovative Hydrophilic Polymer-Coated Mouth Retainer

StudentName(s): S. Le Breton

**Abstract:**

Tooth enamel is the outer most layer of the tooth, covering the dentine layer, and is the hardest tissue in the human body. Unlike bone and other biomineralized hard tissue, there are no living cells in mature enamel. Ameloblasts, which are cells that make tooth enamel, are no longer present after the enamel is formed. Enamel erosion caused by ingestion of acidic foods cannot be repaired, leaving the dentine layer permanently exposed. So far, there are no methods to reform the enamel layer once it is damaged. This research focuses on the creation of an innovative, safe method of recreating the enamel layer, in vivo, using a gel-coated retainer. Teeth used in this research were etched with 6M HNO<sub>3</sub> for 30 min, to remove all natural enamel. Preliminary studies investigated the use of a novel combination of Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>, KF, and HEDTA to recoat etched teeth in solution. ATR-FTIR, SEM, and EDS analysis of the recoated teeth indicate that 20µm of artificial enamel was successfully coated onto etched teeth with only 20 min of immersion. A similar concentration of Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>/KF/HEDTA was loaded into a Hydromed-G polymer that is able to time-release nontoxic concentrations of reagents onto an etched tooth, in vitro, under “mouth” moisture and temperature conditions. SEM, FTIR, and EDS data suggests that artificial enamel was successfully deposited on the pre-etch tooth, after 1 hour of contact. Finally, a 50µm layer of artificial enamel-loaded Hydromed-G polymer was molded to the inner portion of an Invisalign retainer, and a pre-etched tooth was inserted into the retainer for 1 hour, at 37oC, with minimal moisture. SEM, EDS, and FTIR analysis of the tooth reveal that artificial tooth enamel was once again reformed, suggesting that this new formulation of chemistries, embedded into a hydrophilic polymer and plastic retainer, may act to regenerate tooth enamel, in vivo, in a reasonable time.

Scientific Disciplines Selected by Student: ME

### Scientific Disciplines

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3100

Word Count

248

Proj. Title: Color Appeal and Ages

Proj. Num: 3100

StudentName(s): A. Williams

**Abstract:**

Does Age affect color preference? That is what I designed my experiment to find out. When I ask does age affect color preference I mean does age play a factor in the colors we (humans) like. After an observation of televised commercials I realized dull cool colors (like purple & blue) were used in commercials targeting the elderly, while bright warm colors (like red & yellow) were used in commercials targeting the younger generation. I wondered if the elderly preferred cool colors over warm. I created a color test where volunteers were asked to choose the pictures that appealed to them the most (age and favorite color were asked too). The pictures the volunteers looked at were identical, only one contained only cool colors while the other contained only warm colors. 100 were originally asked, only 84 answer sheets were filled out correctly and useable. I tallied, organized then graphed my data. I realized that my hypothesis that I had articulated in the beginning was incorrect. I hypothesized that most of the older generation would choose the cool colored pictures over the warm, but the opposite occurred. The older generation choose the pictures containing the warm based colors. In the end I concluded that age does play a factor in the colors we like, but there are many other factors as well that affect color preference (like culture, race, and gender). I also learned not to underestimate the older generation, they like bright colors just as much as someone younger.

Scientific Disciplines Selected by Student: BE

### Scientific Disciplines

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### Fair Categories

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7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3101

Word Count

242

Proj. Num

3101

Title: THE EFFECT OF INTRAUTERINE GROWTH RETARDATION ON GENE EXPRESSION IN MUSCLE TISSUE OF NEWBORN LAMBS

StudentName(s): A. Galinsky

**Abstract:**

Intrauterine growth retardation (IUGR) in sheep is often due to poor maternal nutrition or illness during pregnancy and has negative effects on growth and health of newborn lambs. One of the negative effects of IUGR is the inability to utilize feed efficiently which has an impact on the entire body composition by decreasing meat quality, long-term health, and physical performance. The sheep and cattle industries rely heavily on high quality forage diets, which makes identifying new methods to optimize nutrient intake in pregnant animals essential. We hypothesized that IUGR will result in a decrease in overall gene expression of key genes involved in muscle development in tissue of newborn lambs. To obtain the gene expression 15 frozen muscle tissue samples were homogenized, and ribonucleic acid, RNA, was extracted. The RNA was quality checked and reverse transcribed into coding deoxyribonucleic acid, cDNA. A Real-Time Polymerase Chain Reaction, PCR, was performed to determine the amount of gene expression of a known house keeping gene, glyceraldehyde-3- phosphate dehydrogenase (GAPDH). Through a Real-Time PCR messenger RNA (mRNA) of GAPDH (housekeeping gene) was detected in all samples, however there were some inconsistencies in expression between samples. Because all RNA samples had the same concentration, the findings from the Real-Time PCR were unexpected. To improve the inconsistencies collected from the PCR the next steps will be to finalize RNA quality and rerun a Real-Time PCR in hope of obtaining more reliable data.

Scientific Disciplines Selected by Student: AS

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
| 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                  |
| EB = Engineering: Materials & Bioengineering | PS = Plant Science                        |

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|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3102

Word Count

146

Proj. Num

3102

Title: The Effect of Buffer Zone Composition on Water Pollution

StudentName(s): K. Pullen

**Abstract:**

Contamination of our water sources has been a prominent issue all across the globe. The purpose of this experiment is to determine the effect of the composition of a vegetative buffer zone on its ability to prevent water pollution. If the buffer's composition is more diverse, then it will be more effective at reducing water pollution because with more diversity, more pollutants will be absorbed before entering the water systems. After buffer classification, nitrates and bacteria test were performed to determine the effectiveness of each buffer zone. The results do not show significant enough differences between upstream and downstream bacteria and nitrate levels to form a correlation between buffer zone composition and contamination levels. Future studies with wider testing periods, which would encompass likely peak times of pollution generation, and sample collections planned in accordance with precipitation patterns might make it possibly to form such correlations.

Scientific Disciplines Selected by Student: EM EV

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3103

Word Count

231

Proj. Title: Can Grass be used to Remove Oil from Soil

Proj. Num  
3103

StudentName(s): S. Rudolph

**Abstract:**

The transportation of large amounts of fuel by road means that spillage is a common occurrence, whether in small amounts or entire tankers full of fuel. The impact on the environment can be severe and a low cost yet efficient way of remediating the contaminated soil is vital. Current methods utilize full mechanical removal of soil followed by replacement with fresh soil. This project investigates whether planting common grass seed can be used for cleaning diesel spills through uptake of the fuel by the grass plants. A comparison of two different brands of grass seed, Vigoro and Scotts, composed of different varieties of grass was undertaken to see if a difference in effect was observed in different types of grass. The effect of the diesel on the grass was observed visually and diesel uptake was measured by the use of gas chromatography mass spectroscopy on extracts of the grass roots using dichloromethane. Comparison of the results using grass in contaminated and non-contaminated soil showed that diesel was taken up by both brands of grass seed although visual observation determined that diesel had a less detrimental effect on the growth of Vigoro grass than Scotts grass. Overall it is clear that grass can have role in the remediation of soil contaminated by diesel fuel and shows potential for use as a non-invasive way of cleaning land after a fuel spill.

Scientific Disciplines Selected by Student: EM EV PS

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
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- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

LS

# Connecticut Science Fair Abstract

Project Number

3105

Word Count

252

Proj. Title: The Effect of Turmeric on Mice Cognition and Development

Proj. Num  
3105

StudentName(s): C. Chacko

### Abstract:

I have tested the effect of turmeric on mice to determine whether there was memory improvement. During the experiment, female mice with normal health conditions were used. Four mice were part of the experimental group, and five were in the control group. The experimental group was given five grams of 0.5% curcumin on three consecutive days each week. The control group had the exact same conditions as the experimental, minus the turmeric distribution. For seven weeks, both groups had their memories tested by venturing through a maze on one day per week, with two trials given per mouse. After the seven week period, the overall results showed the experimental group preformed quickly and more efficiently in the mazes compared to the control. While the completion times fluctuated in both groups, the experimental performance was more consistent than the control. During the last week of testing, an experimental mouse completed the maze in twenty three seconds during trial 1 and in only six seconds in trial 2, whereas a control mouse completed the maze in fifty-two seconds for trial 1 and twenty-four seconds for trial 2, which shows significant improvement. In conclusion, the experimental group demonstrated more of an improvement in memory in comparison to mice under regular conditions. In places where turmeric is commonly used, diseases which degrade the brain are the least prevalent. The fact that young mice sufficiently completed the maze in less time than the average mouse supports the fact that turmeric helps develop memory and cognition.

Scientific Disciplines Selected by Student: AS BE CB ME

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LST

# Connecticut Science Fair Abstract

Project Number

Word Count

176

3501

Proj. Title: Beluga Behavior Study

Proj. Num  
3501

StudentName(s): D. Parker, F. Frez-Albrecht, L. Saucier

### Abstract:

Abstract: Beluga Behavior Study The purpose of the Beluga Behavior Study was to observe how Beluga whale behaviors changed as feeding time approached. Specifically, the study examined trained whales' behavior at Mystic Aquarium. Aquarium feeding is dependent on conditioning and training. This is different than Beluga whales' natural feeding in the ocean. Whale behaviors at the aquarium were observed prior to feeding and after feeding in ten minute intervals. Observations occurred starting 30 minutes prior to scheduled feeding times and up to 20 minutes after feeding. The observed behaviors include the number of times the whales' heads came up above the water near the feeding station; swam closely by the feeding station; and stopped near the feeding station. The results of the study showed that the specific behaviors mentioned increased in number of occurrences as the time for feeding approached and decreased after feeding. The results supported the researchers' hypothesis that whales anticipate their feeding time and respond with behaviors displaying anticipation. Operant conditioning and a reward system used at the aquarium, could promote such behavior.

Scientific Disciplines Selected by Student: AS BE BI CH

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LST

# Connecticut Science Fair Abstract

Project Number

3502

Word Count

159

Proj. Title: The Heart of Gameing

Proj. Num 3502

StudentName(s): L. Sinbandith, J. Zentle

**Abstract:**

Have you ever wondered if your heart rate fluctuates when you play a video game? Most of the adolescent population plays video games; Most of those games are intense so we decided to investigate the affect of heart rate on games. We decided on a procedure: We and six unnamed friends play games. Our hypothesis was that the action shooter has the fastest heart rate. Before the game we recorded everyone’s resting heart rate. Then we played the game for an hour, and we took their heart rate immediately after that first game. We repeated this procedure five times, not all the same day. We repeated the procedure the same for each hour of play. We recorded all data from all game sessions. Our conclusion was surprising, we thought the more intense game would the raise the rate higher but in fact the game involving puzzles raised the heart rate more. Playing video games can affect our heart rates.

Scientific Disciplines Selected by Student: ME

**Scientific Disciplines**

**Fair Categories**

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CB = Cellular & Molecular Biology	MA = Mathematical Sciences
CH = Chemistry	ME = Medicine & Health Sciences
CS = Computer Science	MI = Microbiology
EA = Earth Science	PH = Physics & Astronomy
EB = Engineering: Materials & Bioengineering	PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LST

# Connecticut Science Fair Abstract

Project Number

Word Count

257

3503

Proj. Title: Ethylene Production

Proj. Num  
3503

StudentName(s): V. Ramesh, D. Thomson

### Abstract:

The purpose of this experiment is to understand the effect of temperature on the rate of ethylene production. Ethylene is a chemical secreted by many fruits including bananas. In the case of bananas, ethylene production directly influences the rate of chlorophyllase degradation. Ripening can be recorded through loss of weight and chlorophyllase degradation. As more ethylene accumulates, the faster the process. Thus, the rate of Chlorophyllase Degradation and weight loss can be an effective way in measuring Ethylene Production. Our problem statement is: how will temperature affect the rate of ethylene production? Our hypothesis is: if we increase the temperature, then ethylene production will increase, because chemical reactions occur at a faster rate at higher temperatures. Our procedure consists of placing three groups of bananas in three different temperature settings and then recording their ripening. We set the temperatures at 19°, 30°, and 4° degrees Celsius. At 19°C the chlorophyll degraded at a 3.63 times higher rate than those at 4°C, and at 30°C chlorophyll degraded at a 1.61 times faster rate than at 19°C. According to weight loss, the bananas set at 30°C was 27.8% lighter than the ones at 19°C, and the ones set at 19°C was 13.9% lighter than the bananas at 4°C. Our hypothesis was right. The higher the temperature is the faster the ripening. In addition to our current findings, we would test this on other ethylene producing fruits. This would allow us to figure out if this property was just unique to bananas.

Scientific Disciplines Selected by Student: BI CH EV PS

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LST

# Connecticut Science Fair Abstract

Project Number

3504

Word Count

217

Proj. Title: Effects of Watershed Pollution on the "Ivy Royal Hustler" Plant

Proj. Num  
3504

StudentName(s): M. Karaduman, M. Eygoren, H. Catalb

### Abstract:

Putnam Science Academy Mehmet Karaduman, Mehmet Eygoren, Hacibey Catalbasoglu Effects of Watershed Pollution on the "Ivy Royal Hustler" Plant

**Purpose** The purpose of the project is to show how much oxygen an Ivy Royal Hustler gives after they are polluted so the potential dangers of pollution are better recognized by society. An Ivy Hustler polluted with oil is more likely to give less oxygen than an Ivy Hustler that is bred healthily. Therefore when a lake is polluted, the atmosphere also is affected.

**Procedure** The plants, which are being regularly injected with doses of each chemical, have their carbon dioxide and oxygen levels measured three times a day for two weeks. Results are recorded, put into graphs and observed. Specially designed transparent chambers with holes on top are used in order to take the measurements of oxygen and carbon dioxide levels.

**Result** The data shows that the plants with chemicals were releasing more carbon dioxide and producing less oxygen than the plants without chemicals. Also the plant's leaves with the chemicals start to wither, blacken, and sag.

**Conclusion** As a result, the plants with the chemicals developed less and produced less oxygen compared to the plants without the chemicals. The plants with Pepsi were the most negatively affected of them all, followed by oil and bug spray.

Scientific Disciplines Selected by Student: EM EV PS

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LST

# Connecticut Science Fair Abstract

Project Number

3505

Word Count

246

Proj. Title: Which antibacterial soap removes the most bacteria?

Proj. Num  
3505

StudentName(s): S. Tyndell, A. Vicioso

### Abstract:

There are several things about the media that wander the curious mind but the one that always lingers is whether antibacterial soap is truly antibacterial; and if it is, how effective is it against its competitors. This project is an experimentation of the effects of antibacterial hand soap on the bacteria found on a doorknob. My partner and I needed a location for collection and a growth medium (agar). The location would be important to control because we wanted to make sure that it was the same bacteria that we were analyzing throughout the whole experiment. To begin, we collected the bacteria off of a doorknob and put it on an agar plate to grow the “raw” bacteria on the doorknob. Next, my partner and I made two separate soap baths with the two hand soaps. Separating the doorknob allows us to analyze the same bacteria with 2 types of soap. To measure which soap removed the most bacteria, Angel and I would could the colonies on each agar plate after a few days. The less colonies that were grown, would aid us in drawing conclusions about the hand soaps. Our experimentation concluded that Dial was, in fact, the prevailing hand soap that removed the most bacteria. After 5 days, the plates with bacteria from the Dial wash showed to have fewer colonies than Equate. Dial is a better choice of hand soap than Equate and should be bought when considering which soap is more “antibacterial”.

Scientific Disciplines Selected by Student: CH MI

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LST

# Connecticut Science Fair Abstract

Project Number

3506

Word Count

243

Proj. Title: Rate of Regeneration of Planaria with turmeric

Proj. Num  
3506

StudentName(s): S. Becirovic, J. Comulada

### Abstract:

Alzheimer's disease, a common form of dementia, is a neurodegenerative disease in which the cause of it is not yet known besides in meager genetic differences. My partner and I researched regeneration and came upon experiments with planaria and stem cell research. Stem cells are undifferentiated cells that can serve any purpose in the body and are currently being used in experiments to recover the cells lost from diseases like Alzheimer's. Planaria are non-parasitic flatworms well-known for their efficient regenerative abilities with stem cells. In humans, stem cells only exist as we develop in our early stages of life before we are born. However, planaria can regenerate whole organisms from the smallest amputated segment in ideal conditions. Also, we researched the healing abilities of turmeric, a spice from the ginger family. Studies have shown that people, whose diets contain turmeric, had improved regeneration rates from minor injuries due to improved resistance from infection and have shown to prevent tumors. In our experiment, we conducted a test on 10 planaria in which we severed them in equal halves and placed each planaria in different concentrations of turmeric to inhabit for two weeks as they regenerated. Results concluded that turmeric indeed did help the planaria and the most noticeable result was the head half of the planaria in 40microliters in our stock solution. These results may be used to aid progress in stem cell research and also add turmeric as a possible factor.

Scientific Disciplines Selected by Student: AS CB

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

LST

# Connecticut Science Fair Abstract

Project Number

Word Count

210

3507

Proj. Num

3507

Title: Which Species of Earthworm Decompose Waste in Landfills Most Efficiently?

StudentName(s): Y. Sefik, B. Suleyman, M. Bursal

### Abstract:

Our project idea is to test different species of worms and observe the speed of decomposition in each species. We think that the worms will be able to decompose some of the different types of waste found in landfills, such as paper, plastic, and organic waste. The two different species of worms used were European nightcrawlers (*Eisenia hortensis*) and red wigglers (*Eisenia fetida*). We started by digging up dirt from outside and placing an equal amount into 9 different bins (3 for red wigglers, 3 for European nightcrawlers, and 3 control bins). Each species of worm were placed in a bin. Each bin had one of the following: paper strips, plastic, and organic material (lettuce). We also made sure that the soil was wet enough for the worms to be comfortable in. At the end of 15 days of observations, we saw that organic material was being decomposed at a fast rate, paper was starting to decompose, and that plastic had little to no changes. We also observed that the European nightcrawlers had decomposed a larger volume of waste than the red wiggler worms. In conclusion, our project turned out to be similar to our hypothesis, and that the more effective composting worm of the two is the European nightcrawler.

Scientific Disciplines Selected by Student: AS EM

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LST

# Connecticut Science Fair Abstract

Project Number

3508

Word Count

253

Proj. Num

3508

Title: The Effect of Drugs and Herbal Remedies on Propionibacterium Acnes

StudentName(s): K. Desai, R. Shah, J. Wilson

### Abstract:

Our goal in this experiment was to investigate which treatment inhibits the growth of acne-causing bacteria known as Propionibacterium acnes the best. Acne is caused by the blockages of a pore where these acne bacteria thrive, which work to break down the walls of a pore. We decided to test herbal remedies, over-the-counter drugs, and solely the active ingredients found in these drugs on the acne bacterium. The purpose is to see which type of the three works the best in fighting this bacterium consistently. We hypothesize that the store drugs found over the counter will be the most effective, specifically the one containing benzoyl peroxide because this ingredient produces oxygen, stopping the growth of the anaerobic P. acnes. Furthermore, we believe that the herbal remedies will be least effective because they are just naturally fighting the bacteria, thus causing this to be at a mild level. Our procedure included adding P. acnes grown in an incubator to media, and using carbon dioxide cartridges and the pump to displace the oxygen in the test tubes and Petri dishes. Then, growth was allowed for five to seven days, with a control set. Thus far, there has been diminished growth for our tested herbal remedies on the P. acnes, while there was growth on the control plates. We concluded based off the data the herbal remedies were surprisingly effective against the bacteria, but the prescription drugs were the strongest by far since they contain other elements specifically made to fight P. acnes.

Scientific Disciplines Selected by Student: BI CB ME MI

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LST

# Connecticut Science Fair Abstract

Project Number

3509

Word Count

263

Proj. Title: PulseRate and Lie detection

Proj. Num  
3509

StudentName(s): L. James, C. Parker, R. Kumar

### Abstract:

Abstract: The purpose of this experiment is to discover if there is a possible way to detect lies through pulse rate. Our problem statement is a series of questions that consist of: is there a connection between pulse rate and lying? Will a person's pulse rate increase when they lie? Lastly, is heart rate a reliable way of knowing if someone is lying? We predicted that the pulse rate will increase because people become nervous or uncomfortable when lying and pulse rate is directly related to lying. The experiment tested 50 people with the same procedure and yes or no questions each person. Each test subject was asked four questions and asked to lie on two of them. The graphs and data tables on the computer told us if the pulse rate increased or not. Some of the subjects heart rate increased slightly, but not dramatic. There was about 2-3 text subjects that proved our hypothesis and their heart rate went up enough to prove that the heart rate does increase. Overall, the data didn't show a sufficient amount of evidence that the heart rate does increase when a person is lying, therefore, our conclusion is inconclusive. Future plans that will assist with coming to a conclusion are to conduct more tests and find a better way to remember which questions the test subjects lie on, such as recording the process of asking the questions. Lastly, this experiment is a good way to prove if your heart rate really does tell well you're lying. This can help with society and catching criminals lying.

Scientific Disciplines Selected by Student: BE

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LST

# Connecticut Science Fair Abstract

Project Number

3510

Word Count

250

Proj. Title: Effective Dye-Sensitized Solar Cells

Proj. Num  
3510

StudentName(s): M. Haddad

### Abstract:

Dye-sensitized solar cells are safe, green and cost-effective technology to harvest the sun's energy. This project tested the performance of dye-sensitized solar cells under different types of light and the effectiveness of dyes on the performance of the photocells. Higher intensity, yellow wavelength, and sunlight at 12:00 noon were found to produce the most current. The blackberry dye cell proved the most effective. An improved procedure was developed to build 2x2cm dye-sensitized solar cells. Dyes extracted from beet, raspberries, blackberries, and chlorophyll were tested. The cells efficiency was determined by quantitative measurement of the produced current in mv. The effect of light intensity was tested under sunlight and with 40w, 75w, and 100w white light bulbs. Daylight produced most current in all cells. A linear relationship between the light intensity and the produced current was found. The blackberry dye had the darkest color due to high concentration and/or high absorption of anthocyanin pigments; it proved most effective, producing 378.1 mv at strong or low intensity of light. Its dark red color indicates strong absorption of the yellow light. This was found consistent with the UV spectrum of the anthocyanin. On the other hand, the green color of the chlorophyll indicates strong absorption of the red and blue wavelengths. It produced about 300 mv in daylight. Combining blackberry and chlorophyll in the same cell covers the full spectrum of visible light to produce effective cells. The UV spectrum of dyes helps in searching for effective dyes.

Scientific Disciplines Selected by Student: AT BI CH EA EE ET EM MI PS

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LST

# Connecticut Science Fair Abstract

Project Number

3512

Word Count

253

Proj. Num

3512

Title: Brachypodium Distachyon: Survival of the Fittest

StudentName(s): T. Hitt, A. Hogan

### Abstract:

In a world where Global Warming is increasingly evident and biofuels are becoming a greater necessity, it seemed fitting to frame our project around something that's socially and environmentally relevant. Panicum virgatum or, colloquially 'switchgrass,' is a versatile plant, and has proven to be considerably more cost efficient than corn and produce more biomass energy per hectare. As a result, many experiments are being done world wide to improve switchgrass' energy production, growth rate, stability, and general efficacy. Scientists have found brachypodium distachyon to be a nearly perfect genetic model for switchgrass. Given switchgrass can take up to three years to reach full maturity, brachypodium's eight week life cycle makes it an ideal model for experimentation. Over the course of eight weeks we grew nine different strains of brachypodium with twelve seeds of each in four separate sample climates; control, moist, dry, and sandy soil. Any minute difference in productivity of brachypodium could almost certainly be applied to switchgrass. As the growth period came to a close we were able to see the majority of the strains phenotypic improvement over the Wildtype in height, number of branches, and even survival rate. Still some plants performed significantly better under certain conditions than others. The diverse set of improvements many of the strains developed led us to conclude that improvement of switchgrass could be attained in a variety of realistic ways. In an ideal world, one could even select the best fit strain for their climate, and thus growing the ideal strain for biofuel production.

Scientific Disciplines Selected by Student: EN

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LST

# Connecticut Science Fair Abstract

Project Number

3513

Word Count

246

**Proj. Num** 3513 **Title:** Agave: The Future of Biofuels A Comparison of the Biofuel Potential of Agave Americana Grown with Different Amounts of Water

**StudentName(s):** A. Ahmed, U. Qureshi

**Abstract:**

The depletion of fossil fuels and dependence on foreign resources are driving the search for new sources of renewable energy. Biofuels are one such form. They are fuels derived from biomass, such as plants and animals. Recently, the potential for agave, a succulent plant found in warm climates, as a source of cellulosic ethanol has been explored. The purpose of this experiment was to grow agave plants under different water conditions to see if it affects the sugar content and ethanol quality. Nine agave plants were obtained and grown for 7 weeks under 3 different watering regimens. The experiment was carried out in triplicate, with the first group receiving no water, the second receiving 1,500 mL water, and the third receiving 3,000 mL water every 4 days. Initial and final weights of the plants as well as qualitative observations were noted. After 7 weeks, the plants were chopped, and sap was extracted. Several glucose concentration analyses were performed. Agave saps were allowed to ferment for 8 days for ethanol production and distillation. This initial distillation proved unsuccessful, so the sap samples were baked and yeast was added to aid in the fermentation process. The distillation was once again unsuccessful. Additional yeast has been added and the saps are currently fermenting. Our results showed that, qualitatively, the agave which received no water grew best. The glucose analyses showed an increase in glucose content as plants received more water. The quality of the ethanols are still to be determined.

**Scientific Disciplines Selected by Student:** AT BI EM EV PS

**Scientific Disciplines**

**Fair Categories**

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
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EA = Earth Science	PH = Physics & Astronomy
EB = Engineering: Materials & Bioengineering	PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LST

# Connecticut Science Fair Abstract

Project Number

3515

Word Count

246

<b>Proj. Num</b> 3515	<b>Title:</b> Environmentally Friendly Photodegradation of Aliphatic Pollutants in Water via Reactive Oxygen Species (ROS) Generated by Visible Light Activated Chlorophyll
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**StudentName(s):** A. Myrzatay, S. Avci, M. Kose

**Abstract:**

Tetrahydrofuran (THF) and Cyclohexane (CX), both toxic chemicals that are harmful and can be lethal, are polluting our earth and the surface-water near chemical factories. Federal regulations require Tetrahydrofuran and Cyclohexane surface-water limits to be less than 1.3 mg/L. Current methods for removing these pollutants include using activated carbon, an expensive method or activating titanium dioxide, a known carcinogen, by UV light, which is another carcinogenic form of light. As an alternative to such harmful and expensive methods, a visible-light-activated chlorophyll method was tested. Chlorophyll is a natural non-toxic pigment extracted from plant leaves that absorbs light energy to perform photosynthesis. When chlorophyll is subject to excessive light, it is capable of producing reactive singlet oxygen radicals that can degrade organic compounds. To do this, sets of 10 g/L THF and CX solutions with varying amounts of chlorophyll (0.3% & 0.6%) were prepared. Those solutions were exposed to different intensities of light (No fluorescent bulbs, 2 bulbs, and 4 bulbs) and samples were withdrawn from the reaction chamber at regular time intervals (0-30-60-90-120). Collected samples were analyzed by a Gas Chromatography to determine pollutant concentrations. As a result, significant decreases in THF and CX concentrations were observed. The decrease was directly proportional to the intensity of light and more decrease in pollutant concentrations were observed as the concentration of chlorophyll increased. Our observations indicated that visible-light-activated chlorophyll is harmless yet an effective catalyst for degrading THF and CX.

**Scientific Disciplines Selected by Student:** AT BI CH EE EN EM EV ME

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LST

# Connecticut Science Fair Abstract

Project Number

Word Count

286

3517

Proj. Title: How Temperature Change Affects The Pulsation Rate of Moon Jellyfish

Proj. Num  
3517

StudentName(s): S. Chatlos, A. Lake

### Abstract:

Biological indicators are used to monitor the health of an environment or ecosystem. The moon jellyfish is an excellent candidate for use as a bio indicator of ocean temperature change. The optimum temperature range for moon jellies is 9 to 19°C. Although they can tolerate temperatures as low as -6 ° and as high as 31°C it is believed that it is difficult for the jellies to pulsate as the temperature rises. This behavior will lead to changes in the environmental ocean dynamics as the jellies migrate to seek optimum temperature ranges. The hypothesis is whether temperature change does in fact affect the number of pulsations jellies produce per minute. To determine the behavioral response of the jellies to ocean temperature change, three systems with different temperatures (13, 15, 17 °C) were set up and behavioral observations of pulsations were made. The data show that temperature changes do have an effect on the pulsation rate of the jellies. By raising the temperature of the water that the jellyfish are in, the number of pulsations they produced per minute was reduced when compared to the control. Ergo by lowering the temperature of the water that the jellyfish are in, the number of pulsations that were produced per minute was elevated when compared to the control. This observation is related to the global ocean temperature rise. Based on the project data sets the moon jelly is an excellent bio indicator candidate for interpreting ocean temperature change. A secondary effect of their migration is traveling towards shores and potentially causing conflict for fishermen by getting trapped in nets and killing their catch, for power-plants by getting caught in their coolers, and humans by stinging them on the beaches.

Scientific Disciplines Selected by Student: EM EV

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

LST

# Connecticut Science Fair Abstract

Project Number

3519

Word Count

248

Proj. Title: Target Practice: Effects of Pesticides & Herbicides on Unintended Targets

Proj. Num  
3519

StudentName(s): M. Kumm, E. Walicki

### Abstract:

In an effort to control nature, people use pesticides to get rid of unwanted weeds and pests. Unfortunately, we can't control what organisms the pesticides or herbicides come in contact with. Pesticides and herbicides can travel through water as surface run-off or in the groundwater thus reacting with "unintended targets." Our experiment was to find out if pesticides and herbicides affect unintended targets. To do this we tested our experiment by spraying pesticides on three types of beans, which represented our unintended target. We conducted several trials for each pesticide for each bean, 10 petri dishes for each pesticide for each type of bean totaling 120 petri dishes. We attempted to spray and germinate 1,800 beans for our experiment. Our hypothesis was that Malathion would inhibit the germination rate of beans the most because its effects were most damaging to living cells. Our hypothesis was not supported by our data, Malathion did inhibit the germination of the beans exposed to this pesticide because only 2% of the beans germinated. However, Natria allowed 1% of the beans to germinate and beans treated with RoundUp never germinated. Nevertheless, all of these pesticides/herbicides drastically inhibited bean germination. Furthermore, the safest pesticide/herbicide was Bayer Rose and Flower Weed Killer, the bean germination rate was 82% meaning that beans successfully germinated in the presence of this herbicide. We concluded that the majority of these pesticides should not be used on plants and insects because they will negatively affect unintended targets.

Scientific Disciplines Selected by Student: CB EM EV PS

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LST

# Connecticut Science Fair Abstract

Project Number

3520

Word Count

250

Proj. Num

3520

Title: The Application of Sufi Music as a Communication Method with Plants to Stimulate O<sub>2</sub> and CO<sub>2</sub> Production during Photosynthesis and Aerobic Respiration

StudentName(s): S. Ozkan, A. Erguder

### Abstract:

Global warming due to the consumption of fossil fuels and amount of O<sub>2</sub> decline caused by again consumption of fossil fuels and decline in phytoplankton number in the oceans are one of the main problems science deals with. This experiment is a result of a search to find a way both to increase the amount of O<sub>2</sub> and to decrease the amount of CO<sub>2</sub>. Plants proposed to be the solution for both of these problems when they listen to Sufi music, which said to be a healing effect on humans. Five same types of plants were bought and put in different chambers, which all have two holes for O<sub>2</sub> and CO<sub>2</sub> Sensors' entries. In the first part of the experiment, O<sub>2</sub> and CO<sub>2</sub> data were collected from the plants twice a day (day and night) for a month to get a base data. In the second part of the experiment, the same kind of data again were collected from the same plants but with the addition of making each one of them listen to a different kinds of music, including Sufi music, classical music, pop music, rap music, and heavy metal. Changes in the records were calculated. As a result, it is found that during the day plants which listened to classical music gave the best results by releasing 50,500,000 cm<sup>3</sup>-s more O<sub>2</sub>. Also, it is noticed plants shouldn't listen to music at night since it increases CO<sub>2</sub> release. In conclusion, plants could be used to solve both problems.

Scientific Disciplines Selected by Student: BE BI CH EA EM EV PS

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

LST

# Connecticut Science Fair Abstract

Project Number

Word Count

317

3523

Proj. Title: Acetaminophen's effect on Zebra fish embryo development

Proj. Num  
3523

StudentName(s): P. Shah, H. Aroian

**Abstract:**

The zebra fish are an excellent example of an aquatic organism that may have the reproduction of its species altered or harmed with acetaminophen in the water supply. The chemicals would get in the water supply by chemical dumping or regular sewage systems. Any thing downstream of a sewage drainage pipe is a threatening habitat for animals to live in. Since Tylenol is such a common house hold drug that many people take, it is easy for the remnants of it to enter into our waste and travel through the sewer into a water ecosystem like a stream or brook or pond eventually. I will take Tylenol (Acetaminophen) and mix it in a solution that the Zebra Fish embryos to determine the effect on embryo development. The embryo in the control group developed normally as expected. The embryo in the second well plate that had 5um/ml acetaminophen solution in it, died. From the looks of the decay in the fish it is assumed that the fish died some two days prior to the data collection. It was severely under formed but it had developed eyes which leads to the assumption that it id survive two days or so. This suggests a fault relating to the breaking of the embryonic shell done previous to data collection. The culture plate with 10 um/ml acetaminophen remained normal and a mistake in embryo placement caused the plate with 50um/ml to not be placed. The embryo in the 100um/ml solution was however, very indicative of the results that were expected. It had developed eyes, which leads to the assumption that the first few days of development remains normal under the solution's effect, due to the fact that the dead embryo in the 5um/ml solution plate also formed eyes before succumbing to the poisonous effects of the drug. The last test also exhibited a twisted spine and tail malformation

Scientific Disciplines Selected by Student: AS CB

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

249

4001

Proj. Num	Title:
4001	The Effect of Different Angles of Impact on the Area of a Simulated Blood Spatter

StudentName(s): K. Tran, J. Bian, F. Kleine

**Abstract:**

We conducted this experiment to learn how bloodstain pattern analysis works. The purpose of our experiment was to find the relationship between different angles of impact on a water balloon's splatter area. We also wanted to simulate a human's blood splatters when they are hit with a 22-gram steel core dart. Our hypothesis for this experiment was the smaller the angle, the bigger the "blood spatter" because the water that bursts out of the balloon will follow the dart's trajectory. Our independent variable was the angle of impact and our dependent variable was the area of the water splatter. To conduct our experiment, we threw the dart from two meters away at a water balloon held up by a support system against a wall. We conducted three trials at 90°, 60°, and 30° to a wall. We then measured the area of the water splatters, which were preserved on papers taped to the wall. We concluded from the results of our experiment that the bigger the angle in relation to the "human" (up to 90°), the bigger the "blood spatter" will be. Although this disproves our hypothesis, it coincides with data from various universities. Our experiment relates to the world because our conclusion is expected in real life. It is also used as a standard procedure during crime-scene investigations. Finally, forensic scientists utilize it to understand a crime's circumstances. Our experiment was a success because we accomplished our purpose and acquired accurate results based on published information.

Scientific Disciplines Selected by Student: ME PH

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

4002

Word Count

251

**Proj. Num** 4002 **Title:** Determining Amount of Sugar, Salt, and Alcohol in a Water Solution With a Laser Pointer.

**StudentName(s):** M. Herlihy, B. Donnelly

**Abstract:**

Our Problem was “Is it possible to measure the percentage of sugar in water, salt in water, and alcohol in water, using a laser pointer.” We thought this would be possible, if we used a formula based on Snell’s law (Figure A). This formula would provide us with a solution’s index of refraction, or how much a light refracts. So for our experiment, we used a laser pointer (because of it’s concentrated beam) and fixed it in a lump of play-dough, so the beam would shine in a consistent direction. We then built a prism to hold the solutions out of microscope slides (Figures B, C, and D). This prism was placed in a consistent position. First, we filled this prism with our control, water. Several measurements later, we discovered the angle of minimum deviation, or  $0\text{md}$ , was  $25^\circ$ . We then did the same for the sugar, salt, and alcohol solutions. These three all contained 50% water. They had  $0\text{mds}$  of 28, 29, and 30. After finding these numbers, we added another set of trials with the same three substances. This set had 75% water in them. They got  $0\text{mds}$  of 27, 27, and 28. We plugged all of these numbers into Snell’s formula, getting the numbers shown in the data table. It was then when we came up with another formula (Figure E). These new results (Figure F) at the worst were off by merely 15%. The variation was caused by slightly inconsistent solutions. This proves our Hypothesis correct.

**Scientific Disciplines Selected by Student:** AT CH MA PH

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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BI = Biochemistry	EM = Environmental Management
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CS = Computer Science	MI = Microbiology
EA = Earth Science	PH = Physics & Astronomy
EB = Engineering: Materials & Bioengineering	PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

249

4004

Proj. Title: Disappearing Act

Proj. Num  
4004

StudentName(s): C. Bechtold, C. Gagliano

**Abstract:**

Prompted by our exploration of Long Island Sound in school, we began looking into problems the Sound has because of pollution. Acids dumped into the watershed of the Sound can have an effect on rocks. We decided that if limestone is exposed to acids with low pHs then those acids with the lower pHs will cause the most erosion because they are more acidic. Using a hammer we broke a limestone tile into pieces of similar weight, which was about six grams, then, we massed and recorded each rock. We put 100mL of lemon juice, vinegar, Rust Stain Remover, Coke, water, and diluted 1:50 muriatic acid into empty jars. Then we placed one of the limestone pieces into each labeled jar and placed the lid on. After sitting for one week, we put the pieces in a low temperature oven to evaporate liquid that might affect the results. When the rocks were dry, we took them out, remassed them, and recorded results. Lastly we calculated the remaining limestone after the week of testing. We repeated this process to confirm that our results were reproducible. After testing for three weeks, our results showed that the vinegar eroded the limestone faster. The next fastest eroding acid was lemon juice followed by muriatic acid, Rust Stain Remover, Coke, and water. We concluded our hypothesis was incorrect. We expected the muriatic acid to erode faster because its pH was lower. If we did the experiment again, we would try again with different rocks.

Scientific Disciplines Selected by Student: CH EA EM EV

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

4005

Word Count

264

Proj. Title: Egg-Ceptional Packaging Material

Proj. Num: 4005

StudentName(s): M. Muller, B. Muller

**Abstract:**

Did you ever send something fragile through the mail? Were you worried about protecting it so that it would arrive at its destination without damage? Our goal was to find and test the safest, and cost-effective packaging material used in mailing. There were many materials to choose from that would provide package protection. As prices vary, so does the quality of protection provided. We started our quest by gathering a variety of materials: bubble wrap, styrofoam, air pouches, newspaper, and urethane foam. A raw egg was chosen to represent the fragile item. Experiments included elevation tests (at two different levels -6 and 10 feet,) velocity tests (low and high speed,) and tumbling (down a flight of stairs.) We predicted that air pouches would provide the best protection for height tests, styrofoam for motion tests, and urethane foam for tumbling tests. Some of our theories proved correct while others surprised us. Elevation results revealed that air pouches protected the package from any damage. During the velocity tests, all materials provided package protection except for the air pouches! Lastly, tumbling test results showed that urethane foam was the ONLY material to fail when providing package protection. Obviously, the type of material used to provide package protection makes a difference during a variety of tests. What worked well for one experiment (air pouches-elevation) failed for another (air pouches -velocity.) Before choosing packaging material, consumers need to research its cost-effectiveness and efficiency. Most importantly, the method of transportation or delivery must be considered as it makes all the difference in choosing the best packaging material.

Scientific Disciplines Selected by Student: AT BE CS EA EN ET EM EV MA ME

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

366

4006

Proj. Title: Are You Safe This Winter?

Proj. Num  
4006

StudentName(s): K. Tsangarides, R. Caisse

### Abstract:

The problem we investigated was to see which style roof, Cape Cod, Ranch, or flat, would hold the most weight after we collapsed them with bags of sand. The reason we decided to perform the experiment was because of the winter of 2011. Hundreds of roofs caved in, leaving many families homeless. People felt that they were in danger of collapsing roofs because of the excessive weight of the snow. We wanted to determine the strongest roof structure. We assumed that the Cape Cod style roof would hold the most weight. This was expected, because Cape Cod style roofs are made at a 10/12 pitch, which means that they are built at a steeper angle than the rest. New England gets over 16.8 inches of snow a year, so the Cape Cod style roof was built particularly for the snow to slide off. It was also thought that the flat roof would cave in first because none of the snow can fall off so it will all build up. We gathered our materials. Then we built our roof styles out of balsa wood and wood glue. After the roofs dried, we collapsed them with weighed bags of sand. We recorded how many bags of sand it took to collapse each one. This experiment concluded that our hypothesis was partially correct. The Cape Cod style roof held 23 bags of sand, therefore making it the strongest, like we predicted. This turned out to be true, because the cape cod style roof spreads the weight off the peak of the roof, allowing it to hold more than the other styles. The second part of our hypothesis however was incorrect. The Ranch style roof collapsed first holding only 14 bags of sand, followed by the flat roof style with 15 bags of sand. This occurred, because only the center beam and rafters were holding the weight on the Ranch style roof. This means that the roof's pitch was not steep enough to push the weight away from the peak. The flat roof style, however, had the rafters, center beam, and the frame to support the weight, so it was spread out evenly among the whole area of the roof.

Scientific Disciplines Selected by Student: EN

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

248

4007

Proj. Title: Soap Mania

Proj. Num  
4007

StudentName(s): S. Battipaglia, E. Jonas

**Abstract:**

Our project was based on the ph level, suds level, and longevity of soap. We tested this on six different types of soap; 100% olive oil, 100% coconut oil, 100% lard, 100% Crisco. After we did the 100% soaps we tested 50% mixes of the soaps we combined olive oil and coconut oil then we combined Crisco and lard. After we made the soaps and let them harden over a three-week process we tested based on the ph level, suds level and longevity. This was important to take note of because now a day many people are using bars of soap on a regular basis. These three categories are the main things people look for in their soaps. Longevity is how long the type of soap lasts for by this we mean if the soap will dissolve after one use or with stand multiple uses. The suds level is something that many people look for many people want to be able to see their soap working and creating suds in their hands there for we felt it was an important element to test for. Finally we tested the ph level of the soaps. The average ph level that you want is seven. There for we looked for the level closet to seven. This is important because anything below or above seven is to strong and will dry out your skin. In the end of our testing we concluded that the lard and Crisco combination is the best.

Scientific Disciplines Selected by Student: CH

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

252

4008

Proj. Title: Hydropower

Proj. Num  
4008

StudentName(s): Z. Ahmed, A. Baghel

**Abstract:**

The purpose of the experiment was to use hydro-power to light a light bulb. Our hypothesis was “If you put in one gallon of water into the contraption, then the light bulb will light for three minutes.” We conducted the building experiments, one that tested the rotation of the gears, and one that saw how much water was needed to test how long the light bulb was lit. To build the contraption we followed the pictures in Hydropower-Renewable Energy Science Kit, which came with the Thames & Kosmos kit. To test the rotation of the gears we put a Band-Aid on the turbine and counted how many times it rotated and multiplied or divided to find the other two values. We could conclude that the gears turning per second were all related. The turbine rotated once in about 0.67 seconds, the large gear spun once in about .67 seconds, and the small gear spun once in .02 seconds. In the second experiment we tested how much water was needed to light the bulb by lighting the light bulb for ten seconds, saw how much water was needed, and then multiplied for other data. We could conclude that 25.98 cups of water was needed to light the light bulb for a minute. Thus, we could conclude that we were semi-successful with our experiments. We lit the light bulb using only hydropower, but we didn’t light the light bulb using one gallon or less. This is how our experiment turned out.

Scientific Disciplines Selected by Student: EA EE

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

257

4009

Proj. Title: Fading Away

Proj. Num  
4009

StudentName(s): M. Lowden, W. Gutierrez

**Abstract:**

Wendy Gutierrez Mackenzie Lowden 'Fading Away' Our project, Fading Away, was about M&M's and how we can fade their color in four different liquids. We also had three different variables (the controlled variable, the dependent variable, and the independent variable). Our hypothesis was completely wrong. Our results were really surprising. In each trial, we used the same liquids and the same amount of each. The liquids we used were sprite, vinegar, apple juice, and water. We kept the M&M's soaking for exactly four minutes in each trial. For each clear cup, we measured 2 ounces of the liquid then put the M&M in. Half way through the four minutes, we flipped the M&M's over to see what the other side looked like, when the four minutes were up in each trial, we took the M&M's out and observed which M&M's lost their color the most and which lost it the least. Our hypothesis was that yellow would lose its color more than any other color because it is the lightest color. So no matter what liquid, yellow would always win. However we were surprised to see that yellow kept its color more than any other; we had different results for different liquids. We believe that the lighter the color, the more dye they put on the M&M. As you can see, our experiment took time and patience. The outcomes in the three trials were not even close to our hypothesis. Yellow never lost its color like the other colors did.

Scientific Disciplines Selected by Student: CH

**Scientific Disciplines**

**Fair Categories**

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
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EB = Engineering: Materials & Bioengineering	PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

152

4010

Proj. Num

4010

Title: Analysis and Bioavailability of Natural Dyes vs. Artificial Dyes with their Antioxidant enefits.

StudentName(s): C. Piekarski, E. Caroline

### Abstract:

The goal of our project was to find a natural source of food dyes to replace harmful artificial dyes. We analyzed fruits and vegetables for color intensity, color duration, antioxidant benefits, and “cell” bioavailability of each when mixed with vital minerals. The following show results and correlations.

- All artificial dyes block “cell” absorption of nutritional minerals (Fe, Zn, Ca) including red, blue, yellow, and green.
- All natural dyes increased “cell” absorption of nutritional minerals by over 500%, especially Anthocyanins, Beta-Carotene, Beta-Vulgaris, and Lycopene.
- There is a positive correlation between “cell” absorption, color intensity, and antioxidant levels.
- Natural dyes can provide strong color duration and intensity including phytochemicals: Anthocyanins, Lycopene, and Isoflavones
- All natural dyes provide antioxidant benefits (average 50-70%)

High Ueq values are: Limonene, Anthocyanins, Isoflavons, and Lycopene. Natural dyes can provide both intense color and several nutritional benefits. We think we may have found a “Diet to Dye For”!

Scientific Disciplines Selected by Student: AT CH ME

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

4011

Word Count

201

Proj. Title: The Negative Effects of Teeth Whiteners

Proj. Num  
4011

StudentName(s): S. Loughran, A. Donnelly

**Abstract:**

The Negative Effects of Teeth Whitening Systems This project was about the negative effects that teeth whitening systems have on teeth, using shark teeth. We found that there are negative effects that not only include creating porosity, but also that “scum” from the toothpaste and whitening gel stay on the teeth. There was also evidence of increase in porosity and decay in enamel. Increase in porosity was shown by measuring the shark teeth both before and after the whitening products were applied. The whitening toothpaste showed the most change in porosity overall. The teeth lost 0.1 grams after being exposed to the whitening products. The decay in enamel was shown by looking at the teeth under a microscope both before and after the teeth were exposed to the whitening products. We took notes each time, and compared the notes after the teeth were looked at both times. All of the whitening products about equally created the same amount of enamel decay. To see the enamel decay, it was shown that there were more chips and dents in the teeth after the whitening products were applied. Overall, our project showed that when teeth whitening products are applied, negative effects will usually follow.

Scientific Disciplines Selected by Student: ME

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

4012

Word Count

131

Proj. Title: Rubber Bands For Energy

Proj. Num  
4012

StudentName(s): D. Gilling, J. Defrancisco

**Abstract:**

Have you ever been shot with a rubber band and felt the sting when it hits your skin? It is because it has energy! How can the energy of a rubber band be put to work? In this experiment you will find out how the stretching of a rubber band affects the amount of energy that comes out of it. Our hypothesis is that if we pull back the rubber band increasing the potential energy, then the kinetic energy will be greater. In our experiment we increase the distance that we pulled back the rubber band and recorded the distance that the rubber traveled. When you pull the rubber band back, the potential energy was increased and the rubber band went farther after each time we increased the potential energy.

Scientific Disciplines Selected by Student: ET PH

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

4015

Word Count

258

Proj. Num

4015

Title: The Windy 500: The Test of Down-Force and Drag on Rear Spoilers

StudentName(s): E. Maciejewski, L. Koba

### Abstract:

Racecars need significant down-force with the least amount of drag to go their fastest. Much of the down-force comes from the rear spoiler, which also produces drag. We experimented with which angle of spoiler (0, 15, 30, and 45°) would efficiently produce significant down-force with minimal drag. A high velocity, non-turbulent wind tunnel with a settling, testing, and exhaust chamber was built to perform down-force and drag measurements. Down-force readings were performed by mounting the spoiler in the center of the testing chamber, which was connected to a digital scale underneath, and measuring the increase in down-force as wind was applied. Drag was measured by mounting the spoilers to a test car which, with a pulley system, was connected to a spring scale that measured the drag as wind was applied. Comparison of down-force and drag between a racecar and dump truck were also examined and, as expected, the racecar was more aerodynamic. For the spoilers, drag increased slowly at lower angles and more significantly at higher angles, while down-force increased significantly at lower angles and tapered off between 30 and 45°. A control experiment showed that wind force increased linearly with exposed surface area. Based on that observation and our data we predicted the total force, down-force, and drag for all angles. We conclude that the optimum spoiler angle is near 30° as it has near maximum down-force with reduced drag. We can continue this experiment by testing other spoiler variables such as size and shape.

Scientific Disciplines Selected by Student: AT ET

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

245

4016

Proj. Title: Linear Accelerator

Proj. Num: 4016

StudentName(s): C. Kovach, D. Chagi

**Abstract:**

Linear Accelerator Our science fair project was to find out how the varied mass of metal affects the distance objects travel using an electric coil to put them in motion. We believe this idea would aid in the launching of spacecraft in the space program and other applications. To test our theory we first soldered capacitors to a bread board with positive and negative leads going to a circuit board also connected to a battery and switch to charge them. At the other end of the capacitors there are leads going to a switch and a volt meter to monitor and release the energy so it can travel to the copper coil which is made by wrapping a one pound spool of enameled 20 gauge copper wire tightly around a spool. We built a mount for the coil with a 20 degree angle. Our data showed that as you increase the mass of metal in each object the distance obtained by the object also increased which contradicted our hypothesis. Our hypothesis was, if we increase the mass of metal in each object then it will go a shorter distance because it weighs more. The data showed with metal mass difference of 9(g) the distance had a difference of 94 (in). We concluded that as the metal increased so did the distance obtained by each object as seen in our data. Although our experiment was not completely valid we believe we obtained an acceptable result.

Scientific Disciplines Selected by Student: EE

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

251

4017

Proj. Title: Block That Sound!

Proj. Num: 4017

StudentName(s): S. Hillegass, K. Peglow

**Abstract:**

The main purpose for our experiment is to use our test findings to make a sound reducing headphone that is similar to the ones being sold by large companies such as BOSE. We want to see which everyday materials will block the sound the best allowing us to create our own headphones. Through research we found many materials that block sound, by purchasing these materials we were able to test them and make them candidates for our headphones. We learned ways to deaden the sound and what sound deadening really is so that our project could be as accurate as possible. To test the materials, we built a box that hopefully gave us the most accurate data. Using a sound detector, we projected a constant sound six inches away from our open box and 24 inches away from the sound detector. We tested all the materials and they are listed from the best to worst; Rubber Mats, pillow, Styrofoam, bubble-wrap, fiberglass insulation and foam, coming to the conclusion that the rubber floor mats let the constant sound travel through the least with 68.9DB, when we first hypothesized the pillow to work the best. Using this material, we constructed our own unique headphones using only rubber mats (the material from the first testing), a headband, crazy glue, and felt. These headphones didn't work as well as we hoped due to the lack of efficient equipment, so they are mainly used for a display of what the real ones could look like.

Scientific Disciplines Selected by Student: AT

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
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| AS = Animal Science                          | ET = Energy & Transportation              |
| BE = Behavioral & Social Sciences            | EV = Environmental Analysis               |
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| CS = Computer Science                        | MI = Microbiology                         |
| EA = Earth Science                           | PH = Physics & Astronomy                  |
| EB = Engineering: Materials & Bioengineering | PS = Plant Science                        |

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

164

4018

Proj. Title: can you hear me now?

Proj. Num  
4018

StudentName(s): T. Michaelsen, S. Alves

**Abstract:**

Abstract: Throughout this project we have learned that simple household materials can disconnect cell phone service. We have learned that aluminum foil, sand and the refrigerator can disconnect the service of cellular phones. We have seen that most materials do not disturb the connection, example - ( oil, plastic bags, clothes and sponges.) It was exciting to do this project because it increased our knowledge on electronics and engineering. When we started this project we made an estimate guess that the oil and the sponges would block the calls. Once the experiment ended, we had found that the materials that made the test phone and the control phone loose service were not the materials that we had thought would work. If we were to repeat this project we would use different materials. Some examples are: We would like to use more advance materials and we would like to use a different oil because there may be a thicker substance in it than the oil we used.

Scientific Disciplines Selected by Student: EE

**Scientific Disciplines**

**Fair Categories**

- AT = Applied Technology
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

4019

Word Count

260

Proj. Num

4019

Title: Hills and Valleys: How driving on a flat surface can save you money

StudentName(s): K. Dionne-Jee, A. Ruth

**Abstract:**

In our experiment, we tested how much energy was saved by running an electric train on a flat surface compared to the train running on a sloped surface. This is important for drivers who want to save money on their fuel, since driving up hills is a way to dramatically decrease you fuel efficiency. A few cents might not seem like a lot, but if you add up all those hills that you drive over, eventually, the number gets bigger and bigger. In the end, we noticed that the train did considerably less turns around the track on the sloped surface (10 deg.) than on the flat surface. The hypothesis we solved is how fuel efficiency ( i.e. electrical energy ) is affected by driving up hills (or, in this case, a slanted surface). We predicted that it would be reduced, since our train would in a sense, be trying to defy gravity. During our testing, we used a wooden board with tracks attached to it, and we simply raised one side of the board to simulate a hill. We also used a counter, to ensure accurate information. We set up the counter at a point on the track, and we tested each angle five times, going slanted, flat, slanted, flat, etc. After our testing, we discovered that our hypothesis was correct. The train did an average of 520 turns on the flat surface and an average of 500 turns on the angled surface. Our experiment will convince highway builders to try and make highways on flat surfaces, for better fuel efficiency.

Scientific Disciplines Selected by Student: AT EE ET MA PH

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

180

4021

Proj. Title: Lyrics or Physics

Proj. Num  
4021

StudentName(s): E. Chinyumba, J. Ruiz

**Abstract:**

We did a project called “Lyrics or Physics”. The purpose of this experiment was to test whether students would be able to study while listening to music. We wanted to know if studying with the music would help boost their test scores or if their test scores would drop. Also if the students would memorize the song they listened instead of the study guide. We gave the students a study guide that corresponds with a test they would perform the next day. The students were handed the study guide and used various study techniques while listening to music. We did two trials, one with music one without. Our hypothesis was, if students listen to music while studying they will be distracted and it will reduce their test scores. Our results was that the students cannot listen to music while studying because most of the students test scores were lower with music while when they didn’t listen to music their test scores increased. Our conclusion was that students are most likely to pass if they study without music than with it.

Scientific Disciplines Selected by Student: BE

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

208

4022

Proj. Title: How do acids effect cupcake size?

Proj. Num  
4022

StudentName(s): L. Augustin, J. Bentlage

**Abstract:**

A problem that some baking companies may have is the mass production of cupcakes. One theory that we ponder about is how can the companies save and satisfy customers at the same time. Well, it is hypothesized that if baking acids are varied different height and masses of cupcakes will occur. To test our hypothesis we made cupcake batter from scratch so we can accurately track the amount of what ingredients were added to the solution, so that the experiment can be valid; making sure that each time using the same amount of acid substitute. Then after baking the cupcakes for 15 minutes at the temperature of 375 degrees F, we measured the height and weight of each cupcake. We observed that the cupcakes with fast acting, leavening acids such as the baking powder and soda, had more height and color. They also baked evenly threw compared to the dense lime and lemon cupcakes. This can help change the mass production of cupcakes because companies can experiment with these acids and even combine them with each other to make the perfect cupcake by its mass, volume, and taste while using fewer ingredients. We found that the different types of acids do affect the overall outcome of the cupcake.

Scientific Disciplines Selected by Student: CH

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

250

4023

Proj. Title: The Improved Refrigeration Unit

Proj. Num  
4023

StudentName(s): M. Pompa, E. O'Hara

**Abstract:**

The project deals with the problem of lunch boxes not keeping food at the appropriate temperature, 40 degrees Fahrenheit. When food that is not refrigerated properly it can grow bacteria and harm the person that is going to eat it. The Center for Disease Control estimates that each year roughly 1 in 6 Americans get sick because of food borne illnesses, 128,000 are hospitalized, and 3,000 die because of food borne illnesses. With an improved refrigeration unit, a fraction of those sicknesses, hospitalizations, and deaths could be prevented. There were many methods that were used in the making of the project. The first thing is to use the ice packs that are already in the lunchbox, they were able to be velcroed onto the interior's sides. The second step is to cut a hole into the top of our lunchbox. This was the hole where the solar vent fan is placed. The other side is facing outwards so it can absorb the sun's rays to produce enough energy to work the fan. The last step to the project was to fasten the fan to the lunchbox. The fan is mended with super glue that is strong enough to hold the fan in the right position. The improved refrigeration unit is a success. It is able to keep food under 40 degrees so harmful bacteria's will not grow on the contents of the unit. The unit will become the lunchbox of the future because it will keep food fresh and safe.

Scientific Disciplines Selected by Student: AT EN

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

298

4024

Proj. Title: Increasing Solar Panel Efficiency

Proj. Num  
4024

StudentName(s): J. Levine-Ritterman, F. Hall

### Abstract:

Science Fair Project Abstract Foster Hall and Josh Levine-Ritterman Our hypothesis is: If the sun is focused on a solar panel through a Fresnel lens will the power output and efficiency increase? Independent Variable: The distance of the lens from the solar panel Dependent Variable: The power output measured by the multi-meter Procedure: On a clear day, take a solar panel outside in the sun and attach it to an multi-meter. Set the solar panel at an 80-degree angle towards the sun. Set the multi-meter to mA DC setting. As a control, hold a plain piece of glass at 2,4,6,8,10,12,14, and 16 cm away from the solar panel and record the output reading on the multi-meter. Then, to test the hypothesis, take a fresnel lens and hold it at 2,4,6,8,10,12,14, and 16 cm away from the solar panel and record the output reading on the multi-meter. Record the data into a table. Results: As we did our experiment we found that the glass it didn't significantly increase or decrease the output of the solar panel. When we put the fresnel lens on it, the output went up as we moved it farther away and it eventually doubled the output at 16cm. Conclusions: The Fresnel lens greatly increased the panel's output. The farther away we moved the lens, the greater the power output. This was because the lens was coming into focus and concentrating more light on the panel. Discussion: Solar panels are not that popular because they are expensive to make. Fresnel lenses can be used to increase the efficiency of solar panels by increasing the amount of the sun's energy that hits the panel. This could mean that you could get much more energy from a smaller, less expensive panel.

Scientific Disciplines Selected by Student: EE ET

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

243

4026

Proj. Title: ND-9, No Dirt 9 Innings

Proj. Num  
4026

StudentName(s): C. Mascolo, C. Kral, A. Golden

**Abstract:**

Our project area of study and research was “how to prevent build up of dirt on the bottom of the players cleats.” The purpose is to prevent the build up of dirt on the bottom of the player’s cleats by using everyday household products to be applied to the sole of the shoe to prevent and eliminate the build up of dirt. The problem is dirt builds up on the bottom of your baseball cleats, and limits your traction in fielding, running, and pitching. Our hypothesis is to use an everyday household oil base substance to prevent and or eliminate dirt from adhering to the sole of an athletic baseball cleat. Our engineering goal is to try various household products on actual cleats to see the best results. The goal is to create a “green environmental product” that is simple to use and gets results. We constantly noticed the loss of traction because of dirt build up on our cleats. The loss of traction we had experienced in the games prevented us from greater traction while pitching, fielding, and running. Our discussion as a science project team lead us to be inspired to create our own solution product; ND-9. We hope to achieve finding an everyday substance that can also be used in the purpose of inhibiting the formation of dirt buildup on baseball cleats. If we are successful, this can promote better running, pitching, and fielding in the game of baseball.

Scientific Disciplines Selected by Student: AT EN

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

199

4027

Proj. Title: Solar panel in greenhouse

Proj. Num  
4027

StudentName(s): N. Vora, S. Kale

**Abstract:**

The purpose of this experiment was to find whether or not putting a solar panel inside of different types of greenhouses will affect the output of the solar panels. This idea originated from the idea of using a solar panel to power cell phones, which was inspired by snow storm Alfred knocking out the power in some areas up to a week. The precise problem that was tested was: Will putting a solar panel inside of a greenhouse affect the output given by the solar panel? Then two solar panels were put inside a glass greenhouse and an acrylic glass greenhouse. Over the course of three hours, the output of the three solar panels (one extra for a control) was measured. The measurements were taken on a slightly cloudy day with temperatures around freezing. The results were disappointing, the difference between the three solar panels' output was minuscule, differing up to .09 volts over the course of three hours. The conclusion was that glass (acrylic or regular) does not have an effect on the output of solar panels at all. It was also understood that it is very plausible to charge a solar panel using only a solar panel.

Scientific Disciplines Selected by Student: ET

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

227

4029

Proj. Num

4029

Title: Rust Me Not?- How Combining Different Types of Metals Affects Rust Development

StudentName(s): J. MacIntyre, K. Hook

### Abstract:

Our project is about how combining different metals to steel affects rust development. Our data may present itself confusing but what we did was we took three of each metal for trial one, three of each for trial 2, etc. We then took the averages of the five and used that for our chart. We recorded the rust development on the top piece of metal by using the rust's height. We measured each piece of metal's rust every three days and considered that one "recording day". We would spray the metals 3 times on each side, two times a day (morning and night) with a table salt and water substance. Our data proved successful, for the rust height did vary. Aluminum and galvanized sheet metal formed no rust, while some like plain cold steel, stainless steel, and zinc did produce some rust. Before we even started the experiment we researched how rust formed. The process is also called oxidation. Small electric waves are sent through the two connected metals, and that's what starts the whole oxidation process. Its like a battery, they have different metals, electric currents, and salt. We chose this project because we both have known people who have experienced major rust problems in their piping, we want to try and find a solution to this money wasting problem. We hope you enjoy our project.

Scientific Disciplines Selected by Student: CH EA

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

4030

Word Count

274

Proj. Title: Floating in Density

Proj. Num  
4030

StudentName(s): A. Ghajar, P. Haggerty

**Abstract:**

We conveyed our experiment, Floating in Density, to find out how the density of liquids compare to other liquids. This experiment will inform people about how liquids float or sink when mixed. The problem we were trying to investigate was how does the density of various liquids affect where it floats/sinks in a cylinder vase. We predicted that as the density of liquids increases the more it would sink in the vase. We conveyed the experiment by doing the following: first we measured the weight of a graduated cylinder with a triple beam balance, then we poured 100mL of each of our liquids (Vegetable oil, light corn syrup, vinegar, chocolate syrup. Coca Cola®, water, 100% maple syrup, honey, Rubbing alcohol, Dawn® dish soap, and milk) into the graduated cylinder and weighed them, after calculating the mass we subtracted the weight of the graduated cylinder to find the weight of the liquids and divided that number by 100(amount of mL) to get the density, after finding the density we carefully poured them into the vase to find where they would float. This is the order from top to bottom of the liquids in the vase: rubbing alcohol-.79g/mL, Coca Cola®-.87g/mL, vegetable oil-.92g/mL, Dawn® dish soap-.93g/mL water-1g/mL, vinegar-1.01g/mL milk-1.03 g/mL chocolate syrup-1.25g/mL, 100% maple syrup -1.32g/mL, corn syrup-1.33g/mL, honey-1g/mL. We can conclude that as the density of the liquids goes up the farther it sank in the vase. The liquids with less density floated while the opposite happened to the liquids with more density.

Scientific Disciplines Selected by Student: BE CH EA

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

4031

Word Count

251

Proj. Title: Swish! The Physics of a Basketball Shot Part 2

Proj. Num  
4031

StudentName(s): M. Giannotta, T. Dillon

**Abstract:**

Key to Perfect Shot Optimization- maximizing the chance of making the shot Release: aim for the back of the rim, with the maximum height of the shot similar to top of the backboard Arch: different for each release point (different shooter heights), for a 5'8" person, the ideal shot angle is 55 degrees Backspin: 3 hertz of backspin, or 3 rotations before reaching the hoop Hypothesis In this experiment, we will try to see if the "Key to the Perfect Shot" will actually work based on my research. I believe that I will make between 40 to 60 percent of the "perfect shots" that I will attempt. I also believe that I will make between 60 and 80 percent of my free throws. Our way of shooting free throws One trick we learned was that if you shoot from your tippy toes and shoot normally, you will make most of your free throws. We will compare this with the perfect shot in our experiment. Results Normal Free Throw- 14 out of 20- 70% "Perfect Free Throw"- 5 out of 20- 25% 3 out of the 5 perfect shots also had over three hertz, so that may have affected the shot's outcome Conclusions My hypothesis was both right and wrong. The perfect shot was not "perfect" according to my research. On the other hand, my normal free throw did exceptionally well. I made almost 75% of the normal shots. Sticking with my original shot did much better than the perfect shot.

Scientific Disciplines Selected by Student:

[Empty box for scientific disciplines selected]

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

167

4032

Proj. Title: Riding On Air

Proj. Num  
4032

StudentName(s): J. Moura, A. Reyes

**Abstract:**

The reason for creating this project was to figure out whether the hovercraft would hover higher with four holes or six holes. If this experiment gets improved by commercial companies it could one day be used for development of different types of transportation. The variables were the amount of holes we used in the plastic skirt (4 & 6 holes). We expected the hovercraft would hover higher with 4 holes rather than 6 holes. The information we have obtained from this experiment was that the hovercraft hovers slightly higher with 4 holes instead of 6 holes. With 4 holes the average amount of how high it hovered was 27cm. Then for 6 holes the average was 26cm. We met all our objectives and we even improved the design by putting the leaf blower in the center of the 4 ft diameter wooden disk and the tube would go 1 ft off the center into the skirt. We did this to keep balance on all sides of the hovercraft.

Scientific Disciplines Selected by Student: AT EE

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

247

4033

Proj. Title: Tension Tamers

Proj. Num  
4033

StudentName(s): K. Cloud, E. Martinez

**Abstract:**

The inspiration for our project happened in the lunchroom. I saw someone drain a water bottle and the drops that were left on the sides gave me an idea. I decided to figure out what they were, and then whether the temperature of the water bottle would affect how the drops stuck to the sides? It turns out they stuck because of surface tension. To find our answer, we laid paper clips on a foil that was floating on water. We changed the temperature of the water and counted how many paper clips the foil could support before it sank; our findings were then recorded in a graph. Our hypothesis was that colder water would hold more paperclips because of the manner in which the molecules moving around. With conducting the experiment we found our hypothesis was supported. It was most difficult to keep the water at the same temperature long enough to measure the results. We also think this is important to know because of the potential effects of global warming. Many insects use surface tension to walk on water, but if it becomes too warm then the insects may die off and many other pests will thrive, spreading diseases. The bugs that walk on water eat mosquitoes and other harmful bugs. I feel like this project can bring awareness to people about global warming and help show how much it would actually change the world. This finding could change how people look at environmental threats.

Scientific Disciplines Selected by Student: PH

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

246

4034

Proj. Title: Constantly Spring

Proj. Num  
4034

StudentName(s): A. Nafis, M. Tedeschi

**Abstract:**

Hooke's Law says that the spring constant (K) is directly proportional to Force (F) and displacement (x). ( $F = -kx$ ). The purpose of this experiment was to prove if Hooke's Law is correct. We also want to see what happens to the spring constant at different temperatures. Place a weight on the end of a spring and measure displacement. Continue to add more weights and record each displacement. Plot data on a graph: force Vs. displacement. The second part of the experiment was to see if the spring constant was affected by temperature. Place a weight at end of a rubber band in water and measured the displacement. Bring water to boil and measure displacement. Does hot water make the rubber band expand? We calculated the spring constant for four (4) different materials. We plotted displacement vs. force for each material. We found that the graphs of the data are mostly straight lines confirming Hooke's Law is correct. We found that the rubber band was the most stretchy. The small spring was the least stretchy. We found that the spring constant changed very little with temperature, but it did change. There is a straight line relationship between force and displacement and the slope of the line is the spring constant. We showed that temperature affects the spring constant slightly. This is important to know if you are designing a bridge or building and you wanted to know how the materials would be affected by forces and temperature

Scientific Disciplines Selected by Student: EE EN

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

4035

Word Count

241

Proj. Title: The Effect of Soil Type on Earthquake Damage on Buildings

Proj. Num  
4035

StudentName(s): L. Field, C. Moss

**Abstract:**

Earthquakes can cause extensive damage, based on many factors. This project evaluated several soil types to determine the best on which to construct a building. Our hypothesis was, if the soil is bedrock, then less damage will be inflicted to a house during an earthquake because the soil will shift less when shaken by seismic waves. Before the experiment was conducted, simulated soil types, test houses, and a shake table were assembled. To conduct the experiment, a foundation of one simulated soil type was set upon the shake table with a test house placed in the center. The table was shaken with a constant force and the damage to the house was observed as the number of broken connections between building units (dependent variable). The procedure was repeated for four trials of each soil simulation: bedrock, gravel, alluvium, and sand (independent variable). The soil types were represented by Play-doh®, grape-nuts™, grape-nuts™/water and cornstarch/water, respectively. The total broken connections for these soil types were 2, 7, 4, and 11, respectively. These results support the hypothesis because the simulated bedrock resulted in the least damage to the test houses. Sand appears to be the worst soil type because it caused the most damage. This experiment gives insight to the important question of where to build houses in an earthquake-prone area. This topic could be further studied to evaluate different types of houses for a given soil type.

Scientific Disciplines Selected by Student: EA

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

PT

# Connecticut Science Fair Abstract

Project Number

Word Count

185

4036

Proj. Title: The Dissolving Effect of Alcohols on Amber

Proj. Num  
4036

StudentName(s): S. Wrotniak, L. Brissette

**Abstract:**

The Dissolving Effect of Alcohols on Amber There are many kinds of alcohols, including Ethanol, Methanol, Isopropyl, and Butanol that all have different properties. We wanted to test which one would have the strongest dissolving effect on amber, a fossilized tree resin. The purpose of our experiment was to find out whether Butanol, Methanol, Isopropyl, or Ethanol dissolves Baltic amber the fastest. We put one piece of Baltic amber in each baby food jar. We used three jars for each alcohol, and filled each jar with the alcohol. We checked on the ambers every week for three weeks. We massed them before we started the experiment, and after we finished it. The results showed that the ambers lost some mass. The ambers that lost the most mass were in Butanol, Methanol, and Ethanol, followed by Isopropyl. We found out that the alcohols we used dissolve amber at about the same speed (except Isopropyl). Our graphs and data show that Butanol, Methanol, or Ethanol can be used to dissolve amber to get fossils out of it and it will take about the same amount of time.

Scientific Disciplines Selected by Student: BI CH

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5001

Word Count

230

Proj. Title: Distance vs. Launch Angle

Proj. Num  
5001

StudentName(s): R. Ayer

### Abstract:

Introduction: This project was designed to investigate the relationship between the launch angle of projectile and the distance it will fly in the air. My hypothesis was that optimal angle of trajectory would be 47 degrees. Procedure: My experiment included recorded launches at regular angle intervals to establish the angle that achieved the greatest flight distance. Key points to my procedure included multiple observers and observations to reduce error and variability. Another key point was to design a launching system that allowed for consistent launch conditions. Results: My findings indicate an optimal distance launch angle of 43 degrees. This angle achieves distances of flight greater than any other. Conclusions: My original hypothesis was wrong. The optimal launch angle for a projectile was slightly lower than 45 degrees. My data indicates the angle to be 43 degrees. The reasons for this became clearer after looking at the data and doing some additional research. All projectiles are slowed by air resistance. This slowing of velocity reduces the projectiles horizontal progress. The higher the air resistance, the lower an angle would be required for maximum flight distance. Sources of Error: The ability to finely adjust angulation and lock it securely would contribute to better accuracy. A system to visually record landing points would add significant accuracy. An Area for Additional Research: An experiment to determine the best launch angle for distance including roll.

Scientific Disciplines Selected by Student: EE PH

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5002

Word Count

246

Proj. Title: Citrus Battery

Proj. Num  
5002

StudentName(s): M. Coughlan

### Abstract:

**Purpose** • To see if a Lemon could power a light bulb. Certain fruits contain ascorbic acid, citric acid and NAHD. If a lemon could power a light bulb, would other citrus fruits be able to power a light bulb? • **Hypothesis:** If a lemon produces enough voltage to power a light bulb, then other citrus fruits should produce enough voltage to power a light bulb as well. **Procedure** 1. Insert a nail into one side of a lemon, and a penny in the opposite side. 2. Attach one alligator clip to the penny, and one clip to the nail. 3. The negative wire of the LED must be connected to the negatively charged nail in the lemon. 4. Connect the positive wire of the LED to the wire attached to the penny. 5. Record if bulb lights. 6. Increase the number of lemons. 7. Using 4 lemons with a nail in one side, and a penny in the opposite side of each. 8. Connect the nail of lemon number 4 to the negative wire of the LED. 9. Connect the penny of the first lemon to the positive wire on the LED. 10. Record if the bulb lights. 11. Repeat using limes. 12. Repeat using Grapefruit. 13. Repeat using Oranges. **Results** • Four lemons produced enough current to light the LED. **Conclusions** Four lemons produced enough voltage to light an LED light. The other fruit powered the bulb. It requires different amounts of each to power the bulb.

Scientific Disciplines Selected by Student: EE

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5003

Word Count

324

Proj. Title: Corrosive Sodas

Proj. Num: 5003

StudentName(s): B. Matta

**Abstract:**

Science Project – Corrosive Soda Question: Are some sodas more corrosive than other?

Introduction: The purpose of my project is to determine which soda is the most corrosive and, thus, worse for our teeth. I will be able to relate the tarnish on the penny to the enamel on our teeth to determine if some sodas are worse than others. To help develop my hypothesis, I performed research to learn about the effects that sugary and acidic foods and drinks have on ones teeth.

Hypothesis: My hypothesis is that the darker sodas are more corrosive than lighter sodas.

Experiment: I gathered 6 different types of soda. The sodas used in my experiment were Diet Coke, MTN Dew, Diet Sierra Mist, Ginger Ale, Root Beer, and Dr. Pepper. I poured some of each into a separate plastic cup. I labeled the cups with the types of soda each contained. I also filled one cup with water to act as the control in this experiment. Finally, I dropped a tarnished penny into each cup. I left the pennies in the soda cups for a total of two weeks. I took out the pennies at various times for only a few minutes to observe and log the change.

Data/Results: The sodas had a cleaning effect on the pennies and they came out shiny. The three darker sodas had less tarnish than the 3 lighter sodas. The tarnish visibly noted on the darker sodas ranged from 0% to 25% while the tarnish on the lighter soda ranged from 35% to 65%. The Diet Coke visibly had less tarnish than all of the other sodas. The water penny remained about the same but also had more shine than originally.

Conclusion: My hypothesis appears to be correct and the darker sodas are more corrosive than the lighter sodas. This is primarily due to the phosphoric acid in the darker sodas which is stronger than citric acid in the lighter sodas.

Scientific Disciplines Selected by Student: BI CH ME

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5004

Word Count

250

Proj. Title: Soundproofing What Type of Material Works Best?

Proj. Num  
5004

StudentName(s): A. Jacoboski

### Abstract:

My project investigated what type of material worked best for soundproofing. I chose this topic because I have always been fascinated by a story my mom had told me about a huge soundproof room that was used to test jet engines. My hypothesis was that foam would be the most effective soundproofing material. This material was most absorbent when impacted by objects and would likely be most absorbent with sound as well. To conduct my experiment I lined boxes with foam, cardboard, and packing peanuts. Then, I placed a speaker, set on high, inside each of the boxes. I recorded the results using a dB meter, which I downloaded on my iPod. I performed this experiment three times for each material and the control, which had no materials in it. The results of my experiment supported my hypothesis. Foam did the best with an average of 78.3 dB for test 1, 2, and 3. Cardboard did the second best with an average of 81 dB for test 1, 2, and 3. Packing Peanuts did the worst with an average of 82.6 dB for test 1, 2, and 3. These were all compared to the control which had an average of 90.6 dB for test 1, 2, and 3. My hypothesis was correct, the foam did create the best sound barrier, with cardboard in second, and packing peanuts in last. Foam produced the lowest average decibel readings overall, meaning that it was the best soundproofing material compared to the other materials.

Scientific Disciplines Selected by Student: AT EN EM

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5006

Word Count

83

Proj. Title: Are Some Magnetic Materials More Temperature Dependent than others?

Proj. Num  
5006

StudentName(s): C. Negron

**Abstract:**

Magnets are used throughout daily life. They are used to hold items to your refrigerator, in the working of motors, and even high speed train transportation. Based on these applications I wondered if temperature changes would affect magnet strength. Magnets were exposed to room temperature, zero degrees Celsius (freezing) and one hundred degrees Celsius (boiling point of water). After each temperature exposure my results demonstrated that temperature did in fact change magnet strength. According to my results, magnets perform best at room temperature.

Scientific Disciplines Selected by Student: PH

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5007

Word Count

235

Proj. Title: Distracted Driving

Proj. Num  
5007

StudentName(s): M. Freeman

**Abstract:**

I choose to do my research on distracted driving because I have always wondered what kinds of distractions affect driving the most. There are so many distractions but I always questioned which one is the worst. The procedure I used was, 1. Gather up materials 2. Start the game. 3. Start course (Infineon) 4. Test all of the distractions 3 laps each, (Control, Talking, Texting, Eating, and Talking on the phone.) 5. Record in seconds how long it takes to make it around the track. 6. Record if any crashes, spin outs, etc. Some data I recorded was average time (min:sec), Control 1:49, Talking 1:50, Eating 1:55, Texting 2:21, Talking on the phone 2:02. Average speed, Control 65.6, Talking 66.5, Eating 62.2, Texting 51.7, Talking on the phone 59.6. Most Amount of Crashes, Control 0, Talking 5, Eating 7, Texting 16, Talking on the phone 9. I concluded that I learned lots from this experiment; including how only having one hand on the wheel is the worst distraction. There were many things I would do differently next time. If I were doing this again I would try different distractions. Testing different distractions would turn up different results. Finally I would test different courses. This experiment I tested Infineon a road course, next time I would test Daytona a high speed course. These are the things I would do differently next time I try this.

Scientific Disciplines Selected by Student: BE ET

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5008

Word Count

129

Proj. Num

5008

Title: Which Type Of Ice Melt Product Works Best?

StudentName(s): M. Bendernagel

**Abstract:**

In this experiment, the student tested different ice melt products compared to ice melting by itself. The student did this to see if ice melt products work and which one works the best and why. The student took identical ice blocks with varying amounts of three ice melt products applied to them and measured the time it took for each block to melt. The student recorded the amount of water melted vs time. The student learned that in higher concentrations, calcium chloride melted the ice approximately three times faster than magnesium chloride, four times faster than sodium chloride, and ten times faster than the control. In lower concentrations, calcium chloride melted the ice approximately 30% faster than magnesium and sodium chloride, and about three times faster than the control.

Scientific Disciplines Selected by Student: CH

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5009

Word Count

233

Proj. Title: Batteries: Should you Buy more or Charge what you Have

Proj. Num: 5009

StudentName(s): B. Godley

### Abstract:

I will buy rechargeable AA Energizer batteries, regular AA Energizer batteries, and an electric toothbrush. I will compare the prices of the batteries. I will put the batteries in a toothbrush. Then I will time the toothbrush to see which battery lasts the longest. Then I will compare the price of buying more regular batteries to the cost of charging the rechargeable batteries.

	Battery type	
Test 1	Test 2	Test 3
6h:22m:29s	6h:12m:31s	8h:14m:29s
6h:12m:31s	Rechargeable AA battery	7h:29m:27s
8h:14m:29s	7h:36m:6s	8h:29m:2s

It cost \$6.94 to buy all of my regular batteries. It cost \$ 11.01 to buy and charge the rechargeable batteries. It cost \$0.08 to charge the rechargeable batteries {my equation was, 6.467 (the time it took to charge) times 0.08 (KpH) times 0.15373(cost of charges)}. Charges by CL&P Charge KWH Used Hours Used

Total Cost	Generation Service Charge	0.094820	0.08	6.467	\$ 0.049
Transmission Charge	0.017490	0.08	6.467	\$ 0.009	Distribution Chg per KWH
0.027570	0.08	6.467	\$ 0.014	CTA Chg per KWA	0.003320
0.002	FMCC Deliver Chg	0.006090	0.08	6.467	\$ 0.003
0.004440	0.08	6.467	\$ 0.002	Total Cost to Charge	\$ 0.080

My conclusion is that the rechargeable batteries lasted two hours longer than the regular batteries, but were \$4.07 more expensive. Rechargeable batteries are better.

Scientific Disciplines Selected by Student: AT

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5011

Word Count

268

Proj. Num

5011

Title: Roller Coaster Cars: How Much Height to the Loop the Loop?

StudentName(s): D. Ciampi, III

**Abstract:**

Roller Coaster Cars: How Much Height to Loop the Loop? Who doesn't love a roller coaster at an amusement park? Why is it that the biggest hills always come at the beginning of the ride, and how do the loops work? The loops go against gravity! Roller coasters are an example of the conversion of potential energy to kinetic energy, or the energy of motion. A roller coaster is a closed energy system. The energy is always balanced. It is interesting to see how this energy fights versus gravity in a roller coaster ride! The experiment examined how much potential energy a roller coaster car needs to loop a loop. It examined this by changing the height of the track that led into the loop. The hypothesis was the higher the height of the track/rise of the hill; the easier it would be for the car to loop the loop. The hypothesis was tested by building a roller coaster track with a loop. The independent variables were the various heights of the track. The dependent variables were the data I collected about the height at which the car would loop the loop. The constants were the size of the car, the track loop and the length of the track. As stated in the hypothesis, the tests and data confirmed that as the height of the track increased, the percent of success for the car looping the loop increased. Further, the higher the slope of the track, the more successful the car's attempt was. Written by: Donald (D.J.) Ciampi, III St. Bridget School, Cheshire, CT February 9, 2

Scientific Disciplines Selected by Student: ET

### Scientific Disciplines

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EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5012

Word Count

244

Proj. Num

5012

Title: Go With The Flow: Applying Darcy's Law to the Flow of Groundwater

StudentName(s): G. Larizza

**Abstract:**

This experiment showed how the flow of groundwater can be affected by the sediments it flows through and the pressure it may be under. First, I hypothesized that water would travel through coarse sediments faster than it would through finer sediments, because coarse sediments have more space in between particles and therefore more room for water to flow. Second, I hypothesized that water that was under more pressure would flow faster than water under low pressure. To test permeability, I ran water through bottles, each filled with different sediment, for one minute and then measured the amount of water that came out of the exit hole (standard height) and compared them. To test the effect of pressure, I ran water through bottles filled with the same sediment but with exit holes at different heights. I entered my data into Darcy's Equation and calculated the permeability for each sediment type and for each of the different pressures. My results showed that the outflow was greater through more coarse sediments than finer sediments. Also, the outflow through the same sediment is greater when the exit point is further below the entry point (high pressure) than when it is closer to the entry point (low pressure). In conclusion, Darcy's Law can be used to predict the flow rate of groundwater based on sediment type and ground pressure. This may be useful in monitoring the movement of ground contamination, and in the planning of ground water supply systems.

Scientific Disciplines Selected by Student: EA EM EV

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CS = Computer Science	MI = Microbiology
EA = Earth Science	PH = Physics & Astronomy
EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5013

Word Count

266

Proj. Num

5013

Title: How is a Soil's Permeability Related to its Grain Size Distribution?

StudentName(s): L. Collins

### Abstract:

Abstract How is a Soil's Permeability Related to its Grain Size Distribution? Collins, Liam Westbrook Middle School, Westbrook CT. This project examined the relationship between a soil's grain size distribution and its permeability. An established correlation would help engineers who only had access to either grain size distribution or permeability values, but not both. Grain size distribution data could be converted to a permeability value which could assist engineers in groundwater analysis and subsurface sewage disposal design. Conversely, permeability values could provide an approximation of soil composition which would be helpful for foundation and earthen dam construction. These are just a few of the many engineering applications for which this data could be utilized. Permeability was determined using the Falling Head Methodology. Core samples collected in the field were subjected to this test, and their permeability calculated. Loose samples collected in the field were passed through a set of sieves and the percent of gravel, sand and silt/clay for each sample recorded. The data resulting from these tests were compared and conclusions made. Soil Sample 1, with 1.57% gravel, 9.05% sand and 89.37% silt/clay had a permeability of 16ft/day. Soil Sample 2, with 25.10% gravel, 10.29% sand and 64.61% silt/clay had a permeability of 20.5ft/day. Soil Sample 3, with 1.18% gravel, 1.57% sand and 97.25% silt/clay had a permeability of 4.3ft/day. This data supports the conclusion that there is a correlation between soil's grain size and its permeability. The soil's with the greatest percentile of gravel will have the highest permeability and those with the most fines, lower permeability.

Scientific Disciplines Selected by Student: EA EN

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5014

Word Count

250

Proj. Title: Passive Solar Energy

Proj. Num: 5014

StudentName(s): H. Congdon

**Abstract:**

ABSTRACT A Passive solar energy heating system is a heating system powered by the sun, and uses no machinery. Many homes already have some part of a passive solar energy system. If there is an expanse of glass that gets a lot of sunlight, that home has a basic element of a passive solar energy system. I had two different systems. My first energy system had an indirect passive solar energy system. In an indirect system, the sun heats a wall of cement or stone just behind the glass. This wall then heats the rest of the space. Excess heat is released at night, warming the space when the sun is absent. My other energy system was a direct passive solar energy system. In a direct system, the sun heats the space directly through the glass. Excess heat is stored in stone or cement walls lining the space during the day, and is released at night. I made small models of these systems with plastic bins. I also had a control bin with no heating system. I put these bins outside and checked the temperatures daily. At the end of my experiment, I concluded that the direct solar energy system was more effective than the indirect system, which basically agreed with my hypothesis, because even though the temperatures were less than my hypothesis stated, they followed the same trend. I now know that a passive solar energy system can save energy by reducing the need for a conventional heating system.

Scientific Disciplines Selected by Student: AT EN ET

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5017

Word Count

101

Proj. Title: Energy Saver

Proj. Num  
5017

StudentName(s): J. Lopez

**Abstract:**

Saving energy is a good way to improve our lives. Energy saving can save money and make our lives more better. If our lives don't improve our government will lose money for the schools and jobs. The lose of jobs have increase each every year. So if we want to improve our lives we must save energy. The fact that the goverment haves no money for schools is the electrical bills. But there is a way we can save money. If we can unplug anything that is not use or change regular light blub we can save money for the better.

Scientific Disciplines Selected by Student: ET EV

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5018

Word Count

108

Proj. Title: Angling for Energy

Proj. Num  
5018

StudentName(s): A. Parmanand

**Abstract:**

The purpose of my experiment was to determine if changing the angle at which light strikes the solar panel affects the potential difference created by the solar panel. A solar panel and a table lamp were used to determine this. The solar panel was wired to the multimeter. The potential difference across the solar panel was measured at four angles: 90°, 60°, 30° and 0°. After doing this once, the same test was conducted at different distances to see if this principle applied consistently at different intensities of light. After analyzing the results, the conclusion was that 90° was the optimum angle for generating energy at all intensities.

Scientific Disciplines Selected by Student: EE

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5019

Word Count

254

Proj. Title: Improving Efficiency of Solar Energy

Proj. Num  
5019

StudentName(s): K. Moya

**Abstract:**

Solar energy can be harnessed to provide electricity to remote areas around the world. The goal of this project was to investigate ways to improve the efficiency of solar energy. If incident sunlight was magnified, angle of sunlight was perpendicular to a silicon solar cell, and temperature of the solar cell was maintained at a relatively hot level, it was expected that the output power of the solar cell would be increased. Magnification of sunlight was simulated by using varying wattage white light bulbs attached to a painter's lamp. For tilt-angle, the lamp was tilted at varying degrees of angle while simultaneously re-positioning the solar cell to the appropriate distance from the lamp. Temperature of the solar cell was varied by changing the physical environment of the experiment: outdoor on a New England winter night (cold), unheated basement (cool), and indoor heated room (warm). Analysis of the data shows that magnification increased the power output of the solar cell. As expected, power output was maximized when the light source was perpendicular to the solar cell and decreased as tilt-angle shifted away. Surprisingly, power output decreased as temperature rose. While higher temperature reduces the band gap, enabling greater number of free-flowing electrons and a rise in current, this effect is overwhelmed by a drop in voltage. The results suggest that development of a solar cell not subject to temperature-drop-in-voltage constraint could significantly benefit remote areas in tropical and subtropical climates, such as Africa and South and Southeast Asia.

Scientific Disciplines Selected by Student: AT EE ET

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5020

Word Count

249

Proj. Num

5020

Title: Back to the Future with Mud Brick and Clay Egyptian Houses and Wooden American Houses: Comparing cooling and heating methods, structure stability, and cost differences.

StudentName(s): M. Enayetallah

### Abstract:

Prior to industrialization, homes were built using materials such as clay and mud. Natural methods were employed to improve the efficiency of heating and cooling, to insure structure stability and reduce cost. My experiment is aimed at improving upon the heating and cooling methods and structure stability of earlier Egyptian houses to make them useful for Egyptians today. I built four houses using either baked (mud brick) or unbaked brick (clay) along with either mud or cement to stick them together. I also built a wooden American style house for comparison. I observed temperature changes upon cooling with a cup of cold water for two hours and upon heating with a lamp for two hours. To test structure stability, I added weights to the roofs, shook the houses and poured water over them. Cost differences were also assessed. Results showed that with exposure to a cup of cold water, the clay house with mud had the greatest temperature drop ( $\downarrow 10^{\circ}\text{F}$ ) and the clay house with cement had the least temperature drop ( $\downarrow 2^{\circ}\text{F}$ ). With exposure to a lamp, the mud brick house with cement and the clay house with mud both had the greatest temperature increase ( $\uparrow 15^{\circ}\text{F}$ ) and the wooden house had the least temperature increase, in fact, the temperature decreased by ( $\downarrow 2^{\circ}\text{F}$ ). The mud brick house with cement withstood the structural stability tests best but both clay houses sagged and displayed cracks. Actual Egyptian style mud brick and clay houses cost significantly less overall than American style wooden houses.

Scientific Disciplines Selected by Student: EN EM

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5021

Word Count

252

Proj. Title: Building, Programming, and Testing a Lego® Robotic Arm

Proj. Num  
5021

StudentName(s): E. O'Connor

**Abstract:**

The purpose of this experiment was to build a robotic arm, learn about programming robots and to investigate variables that affect grasp efficiency of the robotic arm. Building designs for a robotic arm and programs to control the arm were researched. Building instructions were modified based on parts availability and performance. A program was created to pick up objects by controlling the arm remotely. Program operation and control of the robotic arm were tested. Software tasks included commands to control motors/sensors, set variables, download software and communicate with NXT intelligent brick. Objects with different characteristics were selected. Effect of object placement (center vs. edge, parallel vs. perpendicular) was tested. Successes and failures (how many times the robot arm picked up an object and how it was placed) were recorded. Each trial included 5 attempts. Another program was created to use an ultrasonic sensor to find objects, pick them up, move them to another location and drop them. This was a more difficult programming task requiring many modifications and retests. Problems encountered included understanding sensor function, adjusting motor variables to work with it and programming errors. Variables that affect the efficiency of the robotic arm are height, width, weight, shape, object placement and speed of the arm lift motor. The arm picked up Lego® tires, balls, pencils, film canisters, and Lego® bricks/beams. If the lift motor ran too fast, the hand would drop objects. Motor power and motor rotation intervals had the most impact on programming task when using the sensor.

Scientific Disciplines Selected by Student: AT CS EE EN

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5022

Word Count

250

Proj. Num	Title:
5022	A Bright Idea: A Mathematical Comparison of the Efficiency of Incandescent, Energy-Saving Incandescent, Compact Fluorescent, and Light-emitting Diode Light Bulbs

StudentName(s): M. Robertson

**Abstract:**

On January 1, 2012, the Energy Independence and Security Act of 2007 went into effect mandating greater efficiency for light bulbs and banning the manufacturing and importing of most current incandescent light bulbs. The law requires a 200% greater light bulb efficiency or similar energy savings by the year 2020. By comparing cost, light bulb life-span, luminous intensity, watts used, and heat generated by incandescent, energy-saving incandescent, CFL, and LED light bulbs, I determined which light bulbs are most cost-efficient and use the least energy. To compare my test light bulbs I used information supplied on the light bulb packaging, a home-made Joly Photometer, a lux meter, and a home-made calorimeter. I used the Inverse Square Law and other mathematical calculations to quantitatively compare the cost and energy efficiency of my light bulbs. I learned that the material and energy usage costs for 25,000 hours of light from CFL and LED light bulbs is substantially less than that of incandescent light bulbs. The CFL and LED light bulbs also produced more luminous intensity per watt of power used, while the incandescent light bulbs contributed a significant amount of heat to their surrounding environment. Averaged over 23 years, changing all of the light bulbs in my house to the most efficient light bulb tested would save my family \$280.44 every year in light bulb and energy costs. As LED light bulb costs decrease, that savings will increase. It's a bright idea to change your light bulbs.

Scientific Disciplines Selected by Student: AT EE ET EM MA PH

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5023

Word Count

246

Proj. Title: Sands of Time in Computer Processing

Proj. Num  
5023

StudentName(s): S. Terry

**Abstract:**

Purpose: In 1965, Gordon Moore, cofounder of Intel Corp, made a prediction that the number of components on a chip would double every 24 months. Dave House, an Intel executive, decided that since chip complexity was doubling every two years and the transistors were getting faster, the computer performance was going to double every 18 months. Intel presented Moore’s Law as ‘Computer Processing power would double every 18 months’. In this study, the processing speed of the Intel chip was tested in 6 Mac Mini computers issued over 5 years. The hypothesis is that every 18 months the processing power of a computer doubles. Procedure: The processing speed of the Intel chip in 6 Mac Mini computers issued to the consumer from 2006 through 2011 was tested. Macintosh first adapted the Intel chip in 2006, and this became the baseline value. Using Geekbench performance measuring tools, a Geekbench Score (GBS) of actual computer processing power was measured in each Mac Mini and compared to that predicted by Moore’s Law. The increase over baseline was also calculated. Results: The actual overall GBS of processing power ranged from 24-63% of expected values. The actual test relative to Moore’s Law started at 63% but dropped to 34% in Jun 2011. The actual increase over baseline ranged from 20-39% of the expected value. Conclusion: From a consumer perspective, Moore’s Law’s prediction of processing power increasing by double in 18 months was not supported by our observed results using Geekbench Scores.

Scientific Disciplines Selected by Student: CS

**Scientific Disciplines**

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- MI = Microbiology
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- PS = Plant Science

- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5024

Word Count

166

Proj. Title: The Science of Tornadoes

Proj. Num  
5024

StudentName(s): S. Teerlinck

**Abstract:**

Tornadoes are one of the most destructive forces of nature. In an average year, they cause more than 80 deaths and a sizable amount of destruction. They often occur without warning and are not very well understood. More information is needed to gain a better understanding of the factors that affect tornado characteristics. The purpose of this experiment is to investigate how one environmental condition, in this case ground temperature, affects the size of a tornado. A small-scale tornado simulator was built to generate a vortex, which was made visible using dry ice vapor. The ground temperature was controlled using water at temperatures ranging from 6 to 70 degrees Celsius. Before running the experiment, it was hypothesized that warmer water would increase the diameter of the vortex because the warm temperature would cause the air to expand. The experimental results showed that the diameter of the tornado increased from 3 centimeters to 13 centimeters across the range of temperatures tested. These results confirmed the hypothesis.

Scientific Disciplines Selected by Student: EA

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
| AT = Applied Technology                      | EE = Engineering: Electrical & Mechanical |
| AS = Animal Science                          | ET = Energy & Transportation              |
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| EA = Earth Science                           | PH = Physics & Astronomy                  |
| EB = Engineering: Materials & Bioengineering | PS = Plant Science                        |

- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5025

Word Count

252

Proj. Title: The Investigation of the Presence of Caffeine in Groundwater and Sewage

Proj. Num  
5025

StudentName(s): G. Herrick

### Abstract:

A large supply of pharmaceutical pills were collected in the vortex chamber of the Newtown Waste Treatment Plant (NWWTP) during the pre-treatment cycle of sanitizing the water. The purpose of this experiment was to analyze sewage and groundwater samples collected from NWWTP, the Pootatuck River, and Lake Zoar for the presence of caffeine. Caffeine was selected as a marker to test the theory that if caffeine was found then other organic compounds, such as pharmaceuticals, would also be present. Caffeine and pharmaceuticals are both used domestically and would be expected to find it in the sewage water. It would be expected to find higher levels of caffeine concentrations in the discharge of the treatment plant rather than the river or the lake. If caffeine was present, the possibility of other organic compounds including pharmaceuticals would also be present. The collected samples used Solid Phase Extraction Column (SPEC) to extract and filter the caffeine. Caffeine was removed from the SPEC and analyzed using Thin Layer Chromatography (TLC). Caffeine was not detected in the water samples collected in this study. There could be several reasons for not detecting caffeine. Due to heavy rainfall, the caffeine could have been diluted to where it was non-detectable using TLC. TLC is a good technique for detecting caffeine in high levels, but is not the best choice for detecting low levels. It could be that the sample size collected was not large enough. Collecting and extracting caffeine from a larger sample size could have made detection possible.

Scientific Disciplines Selected by Student: BI CH EM EV MA ME MI

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5027

Word Count

249

Proj. Num

5027

Title: Can you (cost effectively) make a solar powered panel hot water heater out of parts you buy at The Home Depot?

StudentName(s): V. Poe

### Abstract:

The purpose of this project was to determine if it would be cost effective to make your own solar panel. The experiment measured the heat gain of various materials in a solar panel. I tested eight different configurations of the solar panel. I wrapped four inch pipes with tin foil and then inserted reflective insulation into the box. I placed copper pipes in the box and pressure tested the pipe system to see if it was water proof. Next, I ran my experiments by utilizing a gravity fed pump system which I created by running a hose from my second floor down to my project which was on the first floor. I was working with water in wintertime outdoors and needed the temperature above 32F or it would freeze. The most important element was to have direct sun radiate into the box, so that it would heat the copper pipes and bounce off the parabolic reflectors to warm the water in the pipes. A glass overlay on top of the box magnified the heat better than plastic. I also learned copper pipes are better conductors of heat than plastic pipes. It is very effective to build your own solar panel because in one year you save an average of \$250 for the cost of \$40 dollars in materials. To optimize heat collection, the best design is to run the experiment on a sunny day, with a glass overlay and a reflective background using copper pipes and parabolic reflectors.

Scientific Disciplines Selected by Student: AT

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5029

Word Count

47

Proj. Title: electromagnetisim

Proj. Num  
5029

StudentName(s): C. Ballestas

**Abstract:**

the electromagnetisim expirement was performed to investigate the effect of voltage on the magnetic field. it was noted that the more voltage (batteries) was ntroduced, the stronger the magnetic field became. the magnetic field's force was mesured by anylizing the quantity of paperclipspicked up by the electromagnet.

Scientific Disciplines Selected by Student: EE

### Scientific Disciplines

### Fair Categories

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5030

Word Count

240

Proj. Title: Aqua- The Swimming Robot

Proj. Num  
5030

StudentName(s): A. Boskovic

**Abstract:**

Robots are machines to help us with all of our problems. Now, robotics can help us so much with disabled humans. A 225 kilogram robot follows a stroke patient down a hallway and catches him when he falls. A machine that suspends a gunshot wound victim over a treadmill and becomes the teacher for her legs and helps her walk again. A virtual reality game that helps people with Parkinson’s disease grasp coffee cups. As you can see, without robotics we would still be like we were before. Something that was discovered was that with one propeller on, it would go 50% slower since the two propellers that control steering also control speed. It was observed that when the robot was going back and forth from one side of the tub to the other, it went slower as time went along because the twelve volt battery was running out of energy. In the end, the average for the two propellers enabled was 20.13, while the average for one propeller enabled was 10.06. My hypothesis was supported. An experimental error was that the robot might have gone a little further or come a little short of a meter. An experimental improvement is to put a piece of wood to mark where a meter is so that the robot would not be able to go past a meter and would have to hit the wood to know that it went a meter.

Scientific Disciplines Selected by Student: EE

### Scientific Disciplines

### Fair Categories

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5031

Word Count

239

Proj. Title: Which metals are more efficient electrodes in the process of electrolysis of water?  
 Num 5031

StudentName(s): E. Feder

**Abstract:**

This project focuses on the process of electrolysis of water, which is the process of splitting water that may one day revolutionize the fuel industry. Different metals were tested to see which metals are most efficient as electrodes in the process of electrolysis. This data can be used to see which metals could work as well as metals such as gold and platinum but would be more affordable to make fuel systems. A solution of phosphate buffer at pH7 had to be created by mixing proportions of sodium phosphate dibasic and sodium phosphate monobasic in distilled water. The solution was put on a stir plate and the testing metals (copper, zinc, silver, and magnesium) were put in one at a time and attached to a galvanostatic circuit. Current was measured and observations of the process of electrolysis were made. When connected, only the magnesium wire was found to be producing oxygen and hydrogen. The other three metals did not produce any visible gasses. The conductivity of each metal seemed not to affect the result because the numbers had no clear pattern. Magnesium might be a good metal for mass producing machines that can split water, but it is still quite expensive. More research would have to be done into different cheaper metals to see if any other metals can be as good as magnesium, but easier to afford. For now, magnesium is a cheaper substitute for gold and platinum.

Scientific Disciplines Selected by Student: CH EE

**Scientific Disciplines**

**Fair Categories**

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- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5032

Word Count

250

Proj. Title: Ocean Wave and Tidal Energy Project

Proj. Num  
5032

StudentName(s): J. Parris

**Abstract:**

Ocean Wave and Tidal Energy Project Abstract Over seventy percent of the earth's surface is covered with oceans. These oceans are large sources of clean, renewable, energy that can be generated using the wave motion of waves in the ocean and the motion of tides that occur near to land. This project will show two methods by which energy can be generated from wave motion and tides. The first method would be to use the wave motion of waves in an Oscillating Wave Column generator to generate energy. The second method would be to use the motion of tides in a Tidal Barrage generator to generate energy. The two generators will then be compared to determine which would generate more electric power. In this project a simple Oscillating Wave Column generator was built that used the motion of waves to create a flow of air that spun the turbine connected to a dc motor generating electric power. A simple Tidal Barrage generator was also built that use tidal motion to create a flow of water that spun a water wheel connected to a dc motor generating electric power. The results of these experiments proved the hypotheses that ocean waves and tidal movement can generate electric power and that the Tidal Barrage generator would provide the most power. These results met all of the objectives of the project and also gave ideas that could improve the efficiency of these generators that will be a large source of renewable energy for mankind.

Scientific Disciplines Selected by Student: ET

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5033

Word Count

253

Proj. Num

5033

Title: Charge your device in a power blackout: Effective methods to generate electricity from heat and solar energy using thermoelectric generators

StudentName(s): O. ElSherbini

### Abstract:

In the past year, Connecticut was hit by two severe storms that resulted in electric outages for several days. During the outages, simple things like charging a cell phone were not easily available. Homes should have a cheap and easy way to generate electricity in case another outage occurs. When two metals are connected with one side heated and the other side cooled, the temperature difference generates electricity, which is called thermoelectricity. A thermoelectric generator (TEG) can be used during power outages to charge or power endless and numerous devices such as phones, radios, and LED lights. This experiment aimed at finding an efficient way of generating a high temperature difference for the TEG to provide enough voltage to charge small devices. I built a system and compared the effectiveness of using candles, a gas stove and a Fresnel lens to heat the hot side of the TEG. For the cold side, I used ice mixed with water. My hypothesis was that the gas stove top would generate the most voltage, followed by the candles, then the Fresnel lens. The maximum voltages (V) measured using the different heat sources from candles, the gas stove and the Fresnel lens were 2.63V, 2.51V, and 0.80V, respectively. The TEG generated the most voltage with the candles as the heating source, because the candles' flames were easier to concentrate on the TEG than the gas stove. Voltage generated using the built system could operate a radio and LED lights, and with simple modifications, charge a cell phone.

Scientific Disciplines Selected by Student: EE ET

### Scientific Disciplines

### Fair Categories

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5034

Word Count

96

Proj. Title: Oils: The Disgusting Truth

Proj. Num  
5034

StudentName(s): A. Sanchez

**Abstract:**

I tested oils because I wanted to find out about the saturated fats in oils. This was done to answer the question of which of these three oils has the most saturated fats. I used iodine to test each oil. I put three drops in each oil and timed how long it took for the oil to clear. Canola oil took the least time to clear. The olive oil cleared right before corn oil. Corn oil took the most time. The final results showed that Canola oil had the least saturated fats of the three oils.

Scientific Disciplines Selected by Student: CH

**Scientific Disciplines**

**Fair Categories**

- AT = Applied Technology
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- EM = Environmental Management
- MA = Mathematical Sciences
- ME = Medicine & Health Sciences
- MI = Microbiology
- PH = Physics & Astronomy
- PS = Plant Science

- |                | Life Sciences | Physical Sciences |
|----------------|---------------|-------------------|
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5035

Word Count

249

Proj. Title: Effects of Acid Rain on Plant Growth and Seed Germination

Proj. Num  
5035

StudentName(s): A. Sciallo

### Abstract:

**PURPOSE** Research shows that acid rain is an on-going crisis in the United States. This experiment investigated the effects of acid rain on plant growth and seed germination.

**METHODS** Three solutions were prepared: pH2 (lemon juice), pH4 (tomato juice), and a pH7 (water). Each solution was used to water the following: three lentil and string bean seeds, three young cucumber plants and three mature spider plants. Young plants were watered 19 days after becoming seedlings. Observations on seed germination and plant growth were recorded daily for a four week period.

**DATA/OBSERVATIONS/RESULTS** Acid rain is precipitation containing a pH level of 5.6 or less. Acid rain results when Sulfur Dioxide (SO<sub>2</sub>) and Nitrogen Oxide (NO<sub>x</sub>) are emitted into the atmosphere. SO<sub>2</sub> is released through the process of burning fossil fuels and NO<sub>x</sub> through the process of using extreme high temperatures. These chemicals oxidize into gases to form acid rain. Rainfall in Stratford, CT was tested on various occasions and resulted as acid rain, with a pH level of 4. This experiment proved that acidic solutions have harmful effects on plants in all stages of life. When watered with pH2 and pH4 solutions, seeds failed to germinate, young plants died within four days and mature plants died within four weeks. When watered with a pH7 solution, seeds germinated and plants flourished. The results confirmed that acid rain cuts off plants' supply of nutrients.

**CONCLUSION** This experiment proved that acid rain has a lethal effect on seeds and plants.

Scientific Disciplines Selected by Student: EM EV PS

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5036

Word Count

251

Proj. Title: Rush Hour

Proj. Num: 5036

StudentName(s): A. Wagnblas

### Abstract:

The objective of this experiment is to find out if the position of the sun affects the power generated by solar panels using a solar car. It is predicted that when the sun is at its highest point, 90 degrees, solar panels will gain the most power from the sun and will cross the finish line the fastest. Mark a 1.542-meter racetrack with 5 cm of tape at each end. Measure the sun's angle with a meter stick, string and protractor. Race the car from the first to second piece of tape at 8:00 AM, 9:00 AM, 10:00 AM, 11:00 AM, and 12:00 PM. Record measurements in Tables 1 and 2. Repeat 2 more times for a total of three trials. At 8:00, the car didn't move. At 9:00, the car finished at about 325.3 seconds. At 10:00, the car finished at about 266.7 seconds. At 11:00, the car finished at about 181 seconds. At 12:00, the car finished at about 65.3 seconds. It was predicted that when the sun is at its highest point, solar panels gain the most power and cross the finish line the fastest. It is concluded that when the sun is at its highest point solar panels gain the most power and cross the finish line fastest. The car went the fastest at noon. It is concluded that solar panels are affected by the amount of sunlight that shines on them. More careful recording of measurements and more trials being completed could improve this experiment.

Scientific Disciplines Selected by Student: ET

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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CS = Computer Science	MI = Microbiology
EA = Earth Science	PH = Physics & Astronomy
EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5037

Word Count

265

Proj. Title: Contribution of Magnus and Coanda Effects Towards Drag Minimization.

Proj. Num  
5037

StudentName(s): A. Roychoudhury

**Abstract:**

Surface finish has a big impact on drag coefficient of moving bodies. Smooth surface finishes are desired to minimize skin friction drag. Counter intuitively though drag can be reduced via introducing surface irregularities which prevents flow separation. These irregularities help break up the boundary layer and minimize the cavitation zone behind a travelling object, helping it to travel with less resistance. The dimples on golf balls are a good example. Examples of this effect in nature include fish scales and shark skin. A simple experiments was setup whereby the effect of surface patterns on drag coefficients in different fluids could be studied. A Nerf Gun with modified bullets was used. Four variations in tip design as well as axial surface modifications were examined, including control samples. The bullets were “fired” in a controlled manner into three fluids, air, water, and denatured alcohol. Impact of the surface patterns due to fluid viscosity and density was also measured. The depth of penetration (measured via a timed exposure camera) was used as an indicator of drag minimization. The impacting force from the Nerf Gun was assumed to be consistent and the bullets had nearly equal weights. The results clearly showed that introduction of “scaly protrusions” on the bullets allowed them to travel further than those without them. Surface irregularities were surprisingly well suited for reducing drag in moving objects and allowed the bullets to glide through more easily. Primary benefits of this approach could be suitable for full body swim suits and boat hulls allowing them to glide with less resistance and consequently improve fuel efficiency and speed.

Scientific Disciplines Selected by Student: AT EN ET

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5038

Word Count

248

Proj. Title: Lights, Water, Reflection!

Proj. Num  
5038

StudentName(s): A. Murphy

**Abstract:**

It is known that light rays can pass through transparent mediums, but in certain circumstances it cannot. This is called total internal reflection. It occurs when light is traveling from a medium with higher density to a medium with lower density. When this occurs the light is forced to reflect, and if it reflects at an angle greater than that medium's critical angle, then total internal reflection will occur. When reading about total internal reflection, a question popped into my head "Could total internal reflection occur in liquids other than water?" That's how I got my project idea. The purpose of my project is to discover if total internal reflection could occur or not occur in water, seltzer water, cranberry juice, and milk. For my project, I used four clear plastic bottles, punched a hole in them, and filled them with water, seltzer water, cranberry juice, and milk. Then, using a laser pointer, I centered the laser beam directly into the stream of liquids flowing out of the hole. After testing my project, I concluded that total internal reflection can occur in water, seltzer water, and cranberry juice, but not in milk. The reason it can occur, is because the water, seltzer water, and cranberry juice are denser than air and cause the laser light to reflect at an angle greater than their critical angle. It did not occur in milk because even though milk is denser than air, the laser light was not able to penetrate it.

Scientific Disciplines Selected by Student: PH

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
| 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                  |
| EB = Engineering: Materials & Bioengineering | PS = Plant Science                        |

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5039

Word Count

372

Proj. Title: How Much Vitamin C is in an Orange?

Proj. Num  
5039

StudentName(s): J. Berger

### Abstract:

How does temperature affect an orange's vitamin C? If the temperature of the orange is freezing then the vitamin C level will be high. This will happen because the vitamin C will not be able to degrade when frozen. This will cause the vitamin C to stay the same. I chose this topic because I was interested in how you would test the vitamin C in an orange. Another reason is that I saw other projects involving orange juice and wanted to see how temperature would affect vitamin C. First, freeze three oranges, refrigerate three oranges and keep three at room temperature. Then make a starch solution by boiling water and corn starch. Next, add water and iodine to the solution to make the indicator solution. After that, add 10 drops of juice to 5 milliliters of the indicator solution in a test tube. Finally, after repeating this for every orange hold them together and find the one that is the lightest color of purple. Vitamin C content causes the indicator solution to lose its color. It was observed that after the temperatures of the oranges were changed that the colder the orange is the more vitamin C it has. All of the refrigerated and room temperature oranges turned the indicator solution a dark purple (low amount of vitamin C) while two out of the three frozen oranges turned it a light purple, making it have the most vitamin C. How does the temperature of an orange affect its vitamin C? After testing each orange with the indicator solution, it was found that frozen oranges had the most vitamin C because they turned the iodine the lightest color of purple. Two out of the three frozen oranges turned a light purple while all three of the room temperature and refrigerated oranges were a dark purple. This proves that my hypothesis was not rejected. This was a fair test because the dependent variable was fairly changed to measure the independent variable. Temperature affects the vitamin C content in an orange by keeping it high at cold temperatures and making it low at warm temperatures. The next thing I want to know is how vitamin C is affected by where the oranges come from?

Scientific Disciplines Selected by Student: PS

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5040

Word Count

225

Proj. Title: Crater Mania

Proj. Num  
5040

StudentName(s): M. Starr

**Abstract:**

An experiment was conducted to test how a crater is made. The hypothesis was if the ball is dropped from a greater height, then the crater size will be larger. The experiment involved dropping balls from 3, 6, and 9 feet into aluminum tins filled with plaster of Paris. A device was constructed using a wooden pole, a two sided clamp, and a small plastic bowl with the bottom cut out. The device was attached to a wall and the balls were dropped through the plastic bowl in order to guide them into the aluminum tins. It appeared that the depth and width of each crater created in the aluminum bowls filled with plaster of Paris became deeper and wider as the height the balls were dropped from increased. The average measured depth and width of the craters from 3, 6, and 9 feet were 3.53cm, 3.80cm and 4.17cm depth and 7.17cm, 7.83cm and 8.83cm width, respectively. The results have proven that the greater the height the ball is dropped from, the crater size will be larger. This experiment was conducted in a controlled environment. There was no more than a 0.5 cm difference between the sizes of the craters within each individual trial. This information is valuable to scientists who want to find the effect of any object that could potentially hit Earth's surface.

Scientific Disciplines Selected by Student: EA EM EV PH

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5041

Word Count

262

Proj. Title: Visible or Invisible

Proj. Num: 5041

StudentName(s): D. Picard

**Abstract:**

I did this experiment to understand how stealth technology makes airplanes invisible to radar. I found this out by making a black box and bouncing light off of different shapes. I would place a shape in the black box and shine a flashlight onto the shape. Then, the light would reflect off the shape to the light sensor inside the box, and it would produce a lux reading outside the box. I found out that the triangle that was on an angle reflected the least amount of light back to the meter (with a reading of 16.71 luxes). The shape that reflected the most light back to the meter was the cylinder (with a reading of 49.42 luxes). This data demonstrates that a plane that is shaped like a triangle is least visible on radar because radar uses microwaves that are part of light ("Electromagnetic spectrum," 2007). If an airplane maker is making a war airplane then they will want to know how to make the plane's shape. My hypothesis was proven somewhat correct. The triangles looked the most like the stealth bomber, and those that were placed at an angle to the flashlight reflected the least amount of light back to the light sensor. However, the triangle that was perpendicular to the flashlight reflected more light back to the light sensor than the "V" shape. I conclude that a stealth bomber directly above a radar station would be more visible than one flying at an angle to the station. Source: Electromagnetic spectrum. (2007). Retrieved from <http://science.hq.nasa.gov/kids/imagers/ems/micro.html>

Scientific Disciplines Selected by Student: AT EN PH

**Scientific Disciplines**

**Fair Categories**

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

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5042

Word Count

244

Proj. Title: What Brand Pops The Most

Proj. Num  
5042

StudentName(s): M. Sullivan

**Abstract:**

Purpose of the Experiment: I would like to find out which brand of popcorn pops the most.

Procedures Used: To do this, I am experimenting with 3 different brands of popcorn: Orville Redenbacher's Gourmet Popping Corn (White), Newman's Own Organic's Pop's Corn Organic Microwave Popcorn (Butter), and Market Pantry (Extra Butter). All 3 of these brands have 3.3 oz. bags so they are all the same size. I am going to pop each brand 3 times and count each individual kernel, popped and unpopped. The purpose of popping the same brand the 3 times is so you can get an average of how many kernels will pop most of the time.

Observation/Data/Results: The data I gathered was that, on the first round, Newman's Own Organic's had 443 popped kernels and 64 unpopped, Market Pantry had 396 popped and 19 unpopped, and Orville Redenbacher's had 454 popped and 10 unpopped. In the second round, Newman's Own Organic's had 463 popped kernels and 43 unpopped, Market Pantry had 400 popped and 14 unpopped, and Orville Redenbacher's had 450 popped and 12 unpopped. In the third round, Newman's Own Organic's had 450 popped and 54 unpopped, Market Pantry had 40 popped and 9 unpopped and Orville Redenbacher's had 447 popped and 9 unpopped.

Conclusions: Newman's Own Organic's, although they popped around the same amount of popcorn as Orville, they had a percentage of 89% popped kernels, Market Pantry had 97%, and Orville Redenbacher's had 98%.

Scientific Disciplines Selected by Student: MA

### Scientific Disciplines

### Fair Categories

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
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5043

Word Count

250

Proj. Title: Do Different Kinds of Wood Burned Affect Burning Time?

Proj. Num  
5043

StudentName(s): N. Perregaux

**Abstract:**

The scientific question being investigated in this experiment is: which type of wood burns the longest? Over the last several decades the cost of home heating with fossil fuels has escalated. People have begun to explore alternative options for heating their homes. There are many different kinds of trees in the Connecticut forests that can be used as firewood to provide heat during the winter. This information will be important for people who rely on wood burning stoves during the winter for heat. It would be beneficial to know which wood burns the longest because not as much wood would be needed. In the experiment, different types of wood were burned to assess burning times as compared to their densities. Fruit trees are dense. If apple is the densest kind of wood, then it should take longer to burn than woods of less density or weight. A base fire was built and equal sized pieces of each different type of wood were placed on the fire and burn times noted. The results showed that red oak burned the longest in the fire. The hickory had the second longest burn time. The wood that burned fastest was maple. The hypothesis was incorrect because apple didn't give the expected results. Based on the results of this experiment a consumer of cord wood in Connecticut should request primarily red oak and hickory. Longer burning times would suggest less wood used over time. More efficient burning could save the consumer money for home heating.

Scientific Disciplines Selected by Student: ET

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
| 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                  |
| EB = Engineering: Materials & Bioengineering | PS = Plant Science                        |

- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5044

Word Count

206

Proj. Title: Aerodynamics

Proj. Num  
5044

StudentName(s): H. Weldon

**Abstract:**

My project is about aerodynamics, I tested if different shaped projectiles go farther than others in a newspaper crossbow. My hypothesis was, if a projectile with a pointy end is used, then it will go farther than a projectile that is flat ended, because of aerodynamics. In order to conduct this experiment I first had to make a working newspaper crossbow. I also made 3 different shaped projectiles, a circular pointy one (labeled 1), a flat ended triangular one (labeled 2), and flat ended circular one (labeled 3). Then I shot each projectile and measured the length. I repeated this three times, then found the average distance. On average the first projectile traveled 241 cm, the second projectile 180 cm, and the third projectile 232 cm. The conclusion that I reached was that my hypothesis was correct. The first projectile did go the farthest with the average length of 241 cm. I also concluded that my project explains why items are shaped a certain way. Such as a football, and the nose of a plain. Lastly I realized that my project could have some human errors, mainly being the weight of the projectiles. I could have avoided this by weighing the projectiles before I used them.

Scientific Disciplines Selected by Student: AT

### Scientific Disciplines

### Fair Categories

- |  |   |
|--|---|
| AT = Applied Technology                      | EE = Engineering: Electrical & Mechanical |
| AS = Animal Science                          | ET = Energy & Transportation              |
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| BI = Biochemistry                            | EM = Environmental Management             |
| CB = Cellular & Molecular Biology            | MA = Mathematical Sciences                |
| CH = Chemistry                               | ME = Medicine & Health Sciences           |
| CS = Computer Science                        | MI = Microbiology                         |
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| EB = Engineering: Materials & Bioengineering | PS = Plant Science                        |

- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5045

Word Count

220

Proj. Title: How Do Video Games Affect Blood Pressure

Proj. Num: 5045

StudentName(s): C. Ehring

**Abstract:**

I have played video games since I was six and thought “how does video games affect blood pressure” was a good project for me. I got background information on my topic from an encyclopedia and various online web sites. I used other web sites to gain individual pieces of information for my project on what blood pressure is, how it affects the body when it is raised and what makes the blood pressure rise. I determined that I needed to have several human test subjects for my project. I needed them to play the videos I gave them to play for a certain length of time. I also needed to take their blood pressure both at the start and finish of their game playing. The difficulties that could have occurred were the subjects were not available to play the games or they didn’t know how to play the games. Also the blood pressure monitor could fail to work properly. I charted my results to see if my hypothesis was correct. My conclusion confirmed that my hypothesis was correct in that the more violent the video game the higher the blood pressure would rise. In the future, I would use more test subjects that were diverse, I would use a different console, longer time periods and different ages for test subjects.

Scientific Disciplines Selected by Student: BE

**Scientific Disciplines**

**Fair Categories**

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

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

P7

# Connecticut Science Fair Abstract

Project Number

5046

Word Count

171

Proj. Title: Effects of Yeast and Fruit Juice Combined

Proj. Num  
5046

StudentName(s): E. Gartrell

**Abstract:**

This project in its present form is the result of bioassay experimentation on the effects of yeast when combined with different fruit juices. The initial idea was to determine if yeast has an effect on the fermentation process of different juices. Alcohol was a by-product of the five day experiment. The sugar and alcohol content was measured with a Brix meter. The fruit juices that ended with the most sugar and alcohol content was a tie. Cranberry juice control and grape juice control had the exact same sugar and alcohol measurements. Their measurements were sixteen grams of sugar and alcohol content. They also had the highest rate of fermentation than the other juices used in the experiment. The conclusion of the hypothesis was that yeast does have an effect on different fruit juice. In this case two fruit juices, cranberry and grape, were in close range with each other. If I were to modify the experiment, more trials would be completed and add more juices for a more specific conclusion.

Scientific Disciplines Selected by Student: CH

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5501

Word Count

149

Proj. Num

5501

Title: Distracted Driving: Does Practice Makes Perfect

StudentName(s): M. Wilson

**Abstract:**

My project is called Distracted Driving: Does Practice Make Perfect. The purpose of this experiment is to see if certain driving distractions are major distractions and if they were to be done repeatedly, would people get better at it. My hypothesis was that music would be the easiest distraction to improve through repeated process while phone usage would be the hardest. The subjects played multiple rounds on Mario Kart Wii with a specific distraction at hand. My data analysis showed that people preformed better when the distractions was music than on any other tests. Surprisingly, people received more zeros on make-up application than on any other distractions. In conclusion my hypothesis was partially correct. The tests subjects driving were not negatively impacted by music. Sadly phone usage was not the hardest to improve on, but make-up application was the distractions that people couldn't do better with practice.

Scientific Disciplines Selected by Student: BE

**Scientific Disciplines**

**Fair Categories**

- AT = Applied Technology
- AS = Animal Science
- BE = Behavioral & Social Sciences
- BI = Biochemistry
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- CS = Computer Science
- EA = Earth Science
- EB = Engineering: Materials & Bioengineering
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- EV = Environmental Analysis
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- MA = Mathematical Sciences
- ME = Medicine & Health Sciences
- MI = Microbiology
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- PS = Plant Science

- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5502

Word Count

252

Proj. Num

5502

Title: The Stirling Engine - and the Effect of Temperature Differential on Engine Performance

StudentName(s): N. Robitaille

**Abstract:**

Developing alternatives to gasoline engines is important if we are to protect our environment for the future. One such alternative is the Stirling engine, which was invented by Robert Stirling in 1816. The Stirling engine is an external combustion engine that can run on almost any fuel source or heat source, including solar and geothermal energy. The power to run the engine comes from the difference in temperature between the lower warm surface and cooler top surface of the engine. This experiment explored the relationship between engine performance and temperature differential. Several prototype Stirling engines were constructed from tin cans and other household materials. The engines were heated with a variable heat source over a range of temperatures up to 185°F. When the prototypes would not operate with this heat source, a low temperature Stirling engine was obtained to conduct the experiment. The engine was first tested with the top of the engine at 65°F and again at 35°F. Engine RPMs were measured at predetermined temperature differentials. Graphs of the results of this experiment showed that Stirling engine performance increased with increasing temperature differential, but eventually leveled off. At lower temperature differentials, the engine with the cooler top produced higher RPMs, but as the temperature differential increased, this advantage was lost. This experiment suggests that if Stirling engines are developed for future use, designs focused to achieve extended performance that does not level out may be more important than building engines with greater temperature differentials or enhanced cooling features.

Scientific Disciplines Selected by Student: AT EE ET PH

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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EA = Earth Science	PH = Physics & Astronomy
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5503

Word Count

175

Proj. Title: What Cools Soda Best?

Proj. Num  
5503

StudentName(s): P. Chapman

**Abstract:**

The purpose of this project was to find ways to chill soda that were said to be the best, and to find out which way really was the best. The four ways I chilled the soda are the refrigerator, ice, ice water and ice water with salt in it. According to my research, ice water with salt in was supposed to be the best. I tested this by submerging cans of soda in each of the above environments, and taking the soda's temperature before and after. I then found the difference between the "before" temperature and the "after" temperature. My conclusion of this experiment was that the ice water with salt was the best choice. It cooled the soda cans 10.10 C on average. The worst choice was definitely the refrigerator, only cooling the cans an average of 0.50 C. The ice test results were the strangest, having the most effective results with a difference of 11.50 C, but also having the least effective results besides the refrigerator, with a difference of only 6.30 C.

Scientific Disciplines Selected by Student: CH

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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CB = Cellular & Molecular Biology	MA = Mathematical Sciences
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EB = Engineering: Materials & Bioengineering	PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5504

Word Count

254

Proj. Title: Tower Power

Proj. Num: 5504

StudentName(s): D. Pagliaro

**Abstract:**

The objective of this experiment was to determine which beam design and structural tower design results in the strongest and lightest tower. 18 different beam designs were constructed of three different pasta types and tested for the best strength/weight ratio. The hypothesis was that the triangle truss tower made of 5-inch cube bucatini beams would be the best design. The overall preferred beam design was determined to be the bucatini 3-way 5 in beam. This beam was then used to build three different structural designs of towers (Plain, Cubed, Triangle Truss) approximately 16 inches tall. Each tower was tested to see which one held the most weight. The Plain Tower held 17.5 lbs, the Cubed Tower held 37.5 lbs, and the Triangle Truss Tower held an unexpected 123 lbs. It was concluded that the Triangle Truss Tower made out of 3-way bucatini was the best design for strength and weight. The hypothesis was partially correct, as the triangle truss tower was the strongest tower, but the beam with the best strength/weight ratio was actually the 3-way linguine. However, since its overall strength was very low, the 3-way bucatini beam was chosen because it had the 2nd best strength/weight ratio and 4.5 times more weight. Some ways to improve this experiment would be to have a higher precision scale for more exact measuring of lightweight beams and to do a tower design control with equal weight to better measure the absolute strength of each tower design tower.

Scientific Disciplines Selected by Student: EN

### Scientific Disciplines

### Fair Categories

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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BI = Biochemistry	EM = Environmental Management
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CS = Computer Science	MI = Microbiology
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5505

Word Count

210

Proj. Title: Programming NANORGS in a Virtual World

Proj. Num  
5505

StudentName(s): G. Correa

**Abstract:**

Imagine you are employed as a software engineer and you are working to try to stop the world's energy crisis caused by the oil usage of the 2000s and 2010s. The only way to stop the energy crisis is by programming nano-organisms (NANORGS) to harvest energy from industrial sludge. You must write a program that is small enough to fit in the NANORGS' processors, and simultaneously solve several challenges. First, your program must allow your NANORGS to be able to move on their own, extract energy from the sludge and find collection points to release the harvested energy. Second, you must also figure out how to cope with the fraction of the sludge that is toxic to your NANORGS. Third, you must find also find a way to avoid or defend your NANORGS from the attacks of enemy nano-drones that are present in the virtual world. These drones will take steps to stop your NANORGS or assimilate them. For this project, I wrote the code for an assembly language control program for the nano-processors of a colony of NANORGS in a virtual world. I focused my efforts on programming the NANORGS with useful capabilities such as giving them the ability to stun enemy drones and identify toxicity.

Scientific Disciplines Selected by Student: AT CS EN

### Scientific Disciplines

### Fair Categories

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5506

Word Count

254

Proj. Num

5506

Title: The Commercialization of Proton Exchange Membrane-based Fuel Cell System for Household Use

StudentName(s): J. Becker

**Abstract:**

Fuel cells have made great strides in industrial and government projects, but for them to truly shape the future of energy, a cost efficient route must be found to commercialize these devices for personal use. The objective of this project was to analyze the cost to commercialize fuel cells for personal use, using a small-scale fuel cell and information from manufacturers to discover what is necessary to make them cost efficient. A solar panel array or other supplementary electricity-producing device can be used as an accessory to the fuel cell for the purpose of electrolyzing water, without requiring a separate installation. This project tested the conversion rate of electricity produced by a supplementary device to the output from the fuel cell. Even though it is particularly inefficient, it is possible to run a fuel cell solely off of another electricity-producing device, while keeping the power load at a minimum. While fuel cells are mainly an industrial product, some companies are leading the movement for household fuel cells. This project compared the cost of purchasing and operating a ClearEdge5 system to the price of running a house powered by conventional grid power on the same electrical load. It was found that the costs even out after roughly 19 years, so for a fuel cell to be purchased currently, the reasons would have to be solely based on pioneering the fuel cell movement, and not on saving money. Once companies are enabled to mass-produce fuel cells, they will finally become cost efficient.

Scientific Disciplines Selected by Student: AT CH EE EN ET EM PH

**Scientific Disciplines**

**Fair Categories**

- AT = Applied Technology
- AS = Animal Science
- BE = Behavioral & Social Sciences
- BI = Biochemistry
- CB = Cellular & Molecular Biology
- CH = Chemistry
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5507

Word Count

148

Proj. Title: Absorbent Answers

Proj. Num: 5507

StudentName(s): C. Rhodes

**Abstract:**

My project, "Absorbent Answers" tests the absorbency of four different fabrics. My problem statement is, how does the type of fabric affect the amount of motor oil absorbed? This question is very important to unlocking the secrets of oil spill cleanups. If we find a type of material that absorbs a lot of oil, the oil will be cleaned up more quickly and less material will be used. The more quickly the oil is cleaned up, the fewer animals get hurt and the less people are out of a job. I took four fabrics, microfiber towels, felt, cotton and paper towels and I put them into a bowl filled with one cup of motor oil for 45 seconds and measured how much oil they absorbed over a series of three trials. The microfiber towel absorbed the most oil, followed by the felt, the cotton and the paper towels.

Scientific Disciplines Selected by Student: EM

### Scientific Disciplines

### Fair Categories

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
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CS = Computer Science	MI = Microbiology
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EB = Engineering: Materials & Bioengineering	PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5508

Word Count

248

Proj. Title: Punxsutawney Phil: Fact or Folklore?

Proj. Num  
5508

StudentName(s): C. Wardlow

**Abstract:**

Groundhog Day is celebrated in the United States on February 2nd each year. All throughout elementary school, the teachers placed great emphasis on this day and what prediction Punxsutawney Phil made that year. I have always wondered if the predictions of this groundhog were an accurate weather tool. My experiment investigated the reliability and accuracy of Punxsutawney Phil’s annual Groundhog Day prediction. Whether or not he sees his shadow determines whether we will have an early spring or if we will have six more weeks of winter like weather. I investigated this by looking at Phil’s predictions for the years of 1980 to 2011. I compared his annual forecast to the actual weather conditions for the six weeks factored into his prediction each year. Looking at the temperatures and snowfall totals, and comparing those to the annual averages I calculated based on historical weather data, Punxsutawney Phil’s predictions are not factual for Bridgeport, Connecticut. Based on the data, he had eight correct predictions and six incorrect predictions. The other 18 years were inconclusive, which means that he predicted both winter and spring like conditions based on my assumptions. The eight correct predictions gave Punxsutawney Phil a 25% accuracy rating for the period of 32 years I studied. I concluded that due to the extreme variations in normal weather patterns across the country, this study would need to be expanded to include weather stations in other select key cities in order to accurately determine the reliability of his predictions.

Scientific Disciplines Selected by Student: EV MA

**Scientific Disciplines**

**Fair Categories**

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CS = Computer Science	MI = Microbiology
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5509

Word Count

244

Proj. Title: Digital Pinhole Cameras and the Effect of Aperture Size on Image Sharpness

Proj. Num  
5509

StudentName(s): A. Agro

### Abstract:

The pinhole camera is a simple device for photography. Pinhole cameras have always interested me, so I did this project on the effect of aperture size on image sharpness to learn more about them. The aperture is the size of the hole that light enters into when the photo is taken. I hoped to understand the principles of pinhole photography and image sharpness. The hypothesis of this project is that the medium pinhole will produce the sharpest image because the aperture would be big enough not to cause visible diffraction and small enough not to let in too much light and wash out the image. To create my experiment I used:

- My pinhole camera and apertures in four sizes
- Foam boards
- Two 300 watt light bulbs
- The test target.

I put my digital camera in long shutter mode with an exposure length of 15 seconds and in ISO 1600 without flash. I also have a timer of 10 seconds to prevent camera shake and give me time to properly position camera. Finally, I followed these steps:

1. Attach a pinhole aperture
2. Position the test sheet and lights
3. Take several shots
4. Repeat steps 1-3 with the other apertures.
5. Compare test results to tell which is the sharpest.

After completing my experiment, I found that my results matched my hypothesis. The medium pinhole did produce the sharpest image. The experiment illustrated a link between the variables of pinhole size and image sharpness.

Scientific Disciplines Selected by Student: EE MA PH

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5510

Word Count

246

Proj. Title: "The Fading of Fabric"

Proj. Num  
5510

StudentName(s): B. Mills

**Abstract:**

Have you ever noticed how your beach towels (and bathing suits) are faded by the sun? I was interested to know if my household light bulbs could have similar results. My hypothesis was that the piece of damp fabric under the highest watt bulb used would fade the most. My procedure for determining this included using four different watt light bulbs: 25 watt, 60 watt 100 watt and 150 watt. Each piece of dampened cloth was exposed to 8 hours of continuous light, synchronized by a timer for seven days. My results showed that the piece of cloth exposed to the highest wattage faded the most. My conclusion was that household light bulbs of significant wattage, in this case 100 and 150 watts, revealed color fading on the fabric. Because I dampened each piece of cloth, it is my conclusion that the same reaction that causes the sun to fade wet clothing also occurs under constant heat from a household light bulb. The water and the heat create a chemical reaction in which the outcome is a bleach which fades the fabric. When the H<sub>2</sub>O reacts with the oxygen and heat in the air, the outcome is hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>). The hydrogen acts as a bleach and drains the color from the clothing. The piece of cloth underneath the 100 and 150 watt light bulb faded the most because more light and heat were able to be given off and mixed with the water the most.

Scientific Disciplines Selected by Student: AT

### Scientific Disciplines

### Fair Categories

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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BE = Behavioral & Social Sciences	EV = Environmental Analysis
BI = Biochemistry	EM = Environmental Management
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5511

Word Count

252

Proj. Title: Trebuchet All the Way

Proj. Num  
5511

StudentName(s): J. Kief

**Abstract:**

The question I was trying to answer was: Does the counterweight or the length of the throwing arm have a greater effect on the distance a trebuchet's projectile is thrown? I chose this question because of the simple machines involved in the trebuchet. Having done my last two science projects on simple machines, I was familiar with the various simple machines and how they function. My hypothesis was: I believe a twenty percent increase in arm length will have a greater effect than a twenty percent increase in counterweight. I believed this because in a lever the longer the arm is the less force it takes to pick up, or in this case throw, the object. I performed a small scale experiment in order to familiarize myself with the trebuchet process and I also wanted to familiarize myself with the effect the throwing arm and the counterweight have on the distance the projectile was thrown. Then I experimented with a large scale PVC pipe trebuchet. I threw a lettuce head using three different counterweights and three different throwing arms. After I threw the projectile, I measured the distance it was thrown. I concluded that the counterweight had a greater effect on the distance the projectile was thrown than the length of the throwing arm. I learned that there are many variables, other than the two I experimented with, and I think the sling is probably the most important. I also learned that there are many complex equations involved in the trebuchet's physics.

Scientific Disciplines Selected by Student: AT EE EN

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5512

Word Count

245

Proj. Title: Cold Pack Chemistry

Proj. Num

5512

StudentName(s): W. Quigley

### Abstract:

Instant cold packs are a useful way to treat many injuries. There are two different chemicals used in instant cold packs sold today. The purpose of the experiment was to determine if a cold pack containing ammonium nitrate or one containing urea provided quicker and more effective cooling. The hypothesis was that the ammonium nitrate cold pack would provide quicker and more effective cooling. The recent use of urea in cold packs may be due to safety concerns which are an issue related to legal liability. Ammonium nitrate and urea each in amounts of 10, 20, 30, 40 and 50 grams were dissolved in 100 ml of distilled water. The temperature of the solution was recorded every 15 seconds using a digital infrared thermometer. The process was repeated to assure that the results were valid. Urea got colder than the ammonium nitrate in smaller amounts over the same period of time. In amounts of 30 grams and larger, ammonium nitrate got colder over the same period of time. The results indicated that ammonium nitrate is a better chemical for standard cold packs containing the usual 250 grams of chemical. Urea, however, is a safer chemical and would also be more effective if cold packs were made in smaller sizes, such as one to be used on a finger. Further research could test mixtures of the two chemicals in varying formulations to determine if they would be more effective than cold packs containing one chemical alone.

Scientific Disciplines Selected by Student: CH

### Scientific Disciplines

### Fair Categories

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5513

Word Count

226

Proj. Title: Effects of Salt and Temperature on Surface Tension

Proj. Num  
5513

StudentName(s): E. Chwatko

**Abstract:**

Surface tension has many effects on the earth around us. Surface tension is the force that helps make a bubble and allows a paper clip to float on top of water or another liquid. I chose to do this experiment because I was interested in the idea that there is force acting on the liquid's surface that allows certain objects or insects to float on top of it. This project focuses on finding out how salt and temperature change the amount of weight that a liquid's surface can support with the help of surface tension acting on the water. My hypothesis for this experiment was that salt water will hold more rice at a lower temperature. I tested this by putting the grains of rice, representing the weight, on a piece of aluminum foil in 2 glasses of water, one glass of water containing salt and one without salt. I heated the glasses of water to different temperatures and counted the rice grains. The results of my experiment supported my hypothesis. I found that the salt water always held up more rice grains. In addition, that as the temperature was increased, the amount of rice grains that were held up decreased. Gaining knowledge about how it can be affected by outside forces, which we can control, will allow us to be able to enhance this force.

Scientific Disciplines Selected by Student: EA EV MA

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

Word Count

245

5514

Proj. Title: Pigg'n Out

Proj. Num  
5514

StudentName(s): J. Watts

**Abstract:**

Justin Watts                      Park City Magnet                      3/1/12

Abstract    What am I really testing? The problem to my experiment is: "Is a cavy's sense of smell effective in finding its way through a maze?" I would have two independent variables; sight and smell. I would see if by sight alone she could get through the maze. "Guinea pigs eyes are positioned on the sides of his/her head. This positioning allows your guinea pig a 340 degree range of vision." They are able to differentiate 33 images per second." When they turn their heads they see an image the entire time as opposed to us humans who see a blur until we stop turning out head and focus on a particular scene." <http://guineapigs101.com/cavy-behavior/a-cavys-perspective> Then after that trial I would see with smell and incentive would help her get through it faster. Guinea pigs can learn complex paths to food, and can accurately remember a learned path for months. I would first time her on sight alone. Next I would time her with both sight and smell; compare the data and see if smell really had a big effect from what the time showed. How did I use the independent variable of smell? I showed her a slice of apple and put it at the end of the maze. Sure enough the greedy thing ran as fast as she could to get it, probably finding her way through the course easier.

Scientific Disciplines Selected by Student: AS

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5515

Word Count

224

Proj. Title: Cooling Soda

Proj. Num  
5515

StudentName(s): D. Herlihy

**Abstract:**

The experiment chosen deals with the fastest way to cool soda. While not extremely important in the grand scheme of things, this does have potential. Understanding how to efficiently cool things has the potential to save money in energy costs and other expenses. But besides this, there are many household applications. For example, what if you are having a party and you want to make sure your soda is cold in time for the party. Instead of placing soda in the fridge and just hoping that it will be cool in time wouldn't it be nice to know exactly what you could do to have everything you want cold in time. The procedure used was: place two types of soda in four different mediums, the refrigerator, ice, ice-water, and ice-water with salt. The starting temperature of the soda was recorded using a digital thermometer. The soda was timed to see how long it would take to reach 40° F. The results show that ice-water with salt is the most efficient method of cooling soda. Ice-water was found to be better than plain ice and all mediums were better than the refrigerator. While all of the soda is started at different temperatures, the rate at which the temperature in the soda dropped paints a clear picture of which method is fastest.

Scientific Disciplines Selected by Student:

[Empty box for scientific disciplines selected]

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
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- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |



Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5516

Word Count

229

Proj. Title: Material Density vs. Angle of Refraction

Proj. Num  
5516

StudentName(s): M. Nana

**Abstract:**

One primary property of light is its refraction or propagation direction in transparent materials with different densities. This principle touches on people's lives in many ways, and as such, the purpose of this study was to understand how light refracts in three common household materials. The hypothesis was that if rays of white light were shone through materials with different densities (IV) (Quartz: 2.66g/cm<sup>3</sup>, Glass 2.60g/cm<sup>3</sup>, Acrylic: 1.18 g/cm<sup>3</sup>), then larger angles of refraction (DV) would be observed for, in denser materials as light is slowed down more. A broad-spectrum LED white light ray was shone at 10, 20, 30, 40, 50 and 60 degree incident angles to the normal line with the surface and at the same point on each selected material. The point where the light emerged on the opposite parallel surface was subsequently marked and measured to obtain the angle of refraction for each incident ray. The measured angle of refraction is consistently greatest for quartz, the densest material tested. Glass refracts light more than the less dense acrylic only for the larger incident angles with no measurable difference between these two materials for the lower angle incident rays. The results support the hypothesis that light refracts more in denser materials. Therefore, all else equal, higher density materials are better suited for applications where more dispersion or refraction of light is desired.

Scientific Disciplines Selected by Student: PH

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5517

Word Count

125

Proj. Title: The Physics of Cheating in Baseball

Proj. Num  
5517

StudentName(s): E. Schofield

**Abstract:**

Title: The Physics of Cheating in Baseball As a fan of baseball and a player of softball, I have wondered what type of filler –cork, rubber balls, or sawdust – effects the distance of a baseball. My experiment investigated this topic using a batting device and four wooden bats, three of which were hollowed-out. I performed 5 trials with each bat with the batting device, and myself doing so. I measured the distance in feet and inches, and then calculated the averages. I then took my averages and the batting device averages and calculated one final average. I concluded that when placed in a hollowed-out wooden bat, rubber balls allow a baseball to travel further than any other filler I utilized in my experiment.

Scientific Disciplines Selected by Student: PH

**Scientific Disciplines**

**Fair Categories**

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- PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5518

Word Count

116

Proj. Title: Ferro Fluid

Proj. Num  
5518

StudentName(s): Z. Mega

**Abstract:**

Ferro Fluid is a project dealing with magnetic fluid and neodymium magnets. Using MICR toner and canola oil I made a magnetic liquid representing all oils. In this project I tested the affect changing the size of neodymium magnets had on ferro fluid. If more intense research were to be conducted there could be important uses for this information. For one example if neodymium magnets can force the flow of one magnetic oil, then could petroleum be moved in the same way? That could be helpful in the case of offshore drilling disasters. Provided that this is just a thought in my head there is a possibility that this could in some way be helpful to our society.

Scientific Disciplines Selected by Student: CH EA

**Scientific Disciplines**

**Fair Categories**

- AT = Applied Technology
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- BE = Behavioral & Social Sciences
- BI = Biochemistry
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- EM = Environmental Management
- MA = Mathematical Sciences
- ME = Medicine & Health Sciences
- MI = Microbiology
- PH = Physics & Astronomy
- PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5519

Word Count

119

Proj. Title: How Does Fabric Softener Affect the Flammability of Different Fabrics?

Proj. Num  
5519

StudentName(s): L. Albert

**Abstract:**

The purpose of this experiment was to determine if fabric softener had an effect on the flammability of fabrics. I hypothesized that fabric washed with liquid fabric softener would burn faster. To test this hypothesis, I used eight different types of fabric and measured three sets of identical equal-sized pieces. All sets were laundered with the same detergent, but one set had added liquid fabric softener, one set had dryer sheet fabric softener, and one set received no fabric softener at all. My data showed that group A, washed with liquid fabric softener, burned the fastest, because when I remeasured the strips of fabric, group A's were shorter on average. Therefore, my hypothesis was proved to be correct.

Scientific Disciplines Selected by Student:

[Empty box for scientific disciplines]

**Scientific Disciplines**

**Fair Categories**

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- MA = Mathematical Sciences
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- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5520

Word Count

205

Proj. Title: Comparison of Baseball bat Composition: Safety

Proj. Num  
5520

StudentName(s): G. McConnell

**Abstract:**

I did my project because, as a baseball player, I wanted to know the dangers of different bats. Recently there have been deaths and injuries due to baseballs coming off the bat too fast for pitchers to react. In my research, I read that metal bats (i.e., composite and aluminum) were to blame. Therefore, I wanted to see how the type of bat material (independent variable) affects the speed of a hit baseball (dependent variable). To test the bats, I built a batting apparatus that swung a bat with equal force to hit baseballs from a tee. Each bat was fastened to a pivoting arm, pulled back to a same point and released. "Speeds" of each bat was determined by timing how long it took the ball from the point of contact to reach a ten meter mark from the tee. Using the speeds, I then calculated the time it would take balls hit from each bat to reach little league and major league pitching mounds. This would determine a reaction time required of a pitcher. Safer bats would have higher reaction times. The purpose of this experiment was to give people (i.e., parents, coaches, players) a realistic idea of the dangers of composite bats.

Scientific Disciplines Selected by Student: MA PH

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5521

Word Count

222

Proj. Num 5521	Title: Evaluation of Experimental Techniques for Protecting Computers from Malware Attacks
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StudentName(s): S. Kumar

**Abstract:**

Computer security has become a serious issue. Forty-eight percent of scanned computers are found to be infected, but solutions can always be implemented to help with the issue. Users need to be able to protect their computers without compromising their functionality. I conducted my research using a virtual machine with various settings such as administrator mode, guest mode, with antivirus software, and without antivirus software. I also tested different brands of antivirus software. The computer was attacked using malware from repositories and scanned to find out how many of the attacks were successful. The data collected represents the percentage of successful attacks on each setting of the virtual machine. I expected my results to show that computers without antivirus software were easily infected. I also believed that the guest user mode would be infected less than the administrator mode because the guest mode cannot install any new potentially harmful software while the administrator mode can. Both these hypotheses were true since the guest mode was infected less than the administrator mode and the computers without antivirus software were infected nearly every time. Administrator mode is not required for most applications to run, so guest mode should be used. I discovered that running antivirus software and logging into guest mode are the best and most effective simple solutions to limit malware attacks.

Scientific Disciplines Selected by Student: CS

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
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| CS = Computer Science                        | MI = Microbiology                         |
| EA = Earth Science                           | PH = Physics & Astronomy                  |
| EB = Engineering: Materials & Bioengineering | PS = Plant Science                        |

- |                | Life Sciences | Physical Sciences |
|----------------|---------------|-------------------|
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5522

Word Count

248

Proj. Title: Color Flash At Work!!!

Proj. Num  
5522

StudentName(s): A. Chanyarakskul

**Abstract:**

Have you ever wondered why the flash is always white and bright? Does it capture more details or make the picture more visible? Well, my experiment is designed to test the impact color makes in developing the picture. My question is “Does Light Intensity of Color Affect the Development of a Photo?” My hypothesis is that color does affect it and that the yellow light bulb will develop the picture much better. In order to test it out, I used; different colored light bulbs, photosensitive paper, a light meter, a detailed feather, a box to simulate a dark room, and a light bulb adapter to make it work. To do this experiment, I used the data I collected in my last year’s science fair experiment. With that, I used a new box to simulate a dark room using the same procedure. I then took a detailed feather and laid it on the photosensitive paper. Next, I screwed on each of the different colored light bulbs, turned the light on, and waited 15 minutes for exposure to occur. Then, I soaked the paper in water to stop further developing. Lastly, I compared results and came up with a conclusion. The results were that the white light bulb developed the paper better than the other colors. The other colors didn’t expose any details of the feather. It turned out that only the white light bulb actually developed the photosensitive paper. Maybe that’s why we always see white flash on cameras.

Scientific Disciplines Selected by Student: AT PH

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5523

Word Count

353

Proj. Title: Measuring the Speed of Light Using Your Microwave

Proj. Num: 5523

StudentName(s): C. Perez

### Abstract:

I did my science fair project on measuring the speed of light using your microwave. The established speed of light is 299,792,458 meters per second and is found by measuring wavelength times frequency. I used my microwave, and certain foods to be melted in the microwave. The foods I used were cheese (sliced and shredded), chocolate bars (hershey milk, hershey dark, and nestle crunch), egg whites, eggs, marshmallows (mini and large), chocolate chips (milk, dark, and white). The very first step in my experiment was to remove the turntable in microwave. This is because microwaves have certain hot and cold spots when electromagnetic waves bounce off the walls of the microwave and the turn table causes the food to cook evenly. The next step was to lay one of the food items on a plate evenly. I took a picture of this as a "before" picture. Then I placed the plate in the microwave for 15 second increments, keeping a steady watch on the food. Once i noticed the food melting, I took it out and placed toothpicks in the middle of each melted point. I then took another picture as the "after" picture. I measured the distance between each toothpick in centimeters and took the most common measurement. This measurement is only half of the wavelength needed to find the speed of light, so I doubled the measurement, finding the wavelength. I needed the measurement in millimeters, so I converted it. To get the frequency, I found a sticker on the inside of my microwave saying 2450 MHz. This is the frequency. I multiplied the wavelength times the frequency and came up with the speed of light in millimeters. To convert to meters, I multiplied the product times 1,000. I repeated these steps with each food item and documented my results. I compared each food items's measurement to the established speed of light and found that they were quite far off from the established speed. The conclusion to my project is that it is possible to measure the speed of light using your microwave, although your measurement may not be very active.

Scientific Disciplines Selected by Student: MA PH

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5524

Word Count

250

Proj. Title: Do Brightly Colored Roofs Affect Thermal Radiation?

Proj. Num  
5524

StudentName(s): P. Agonito

**Abstract:**

Thermal radiation travels through space from the sun heating the Earth, its' atmosphere, and objects on it. Awareness of the causes and effects of global warming has caused people to look for ways to be more energy efficient. This experiment was designed to test various colored roofing shingles to determine their affects on the amount of thermal radiation in a house. The experiment was conducted using two identical bird houses. Roof shingles were painted in a variety of colors. All other variables were controlled. Velcro was attached to the roofs allowing the shingles to be taken on and off. A lamp containing a one hundred and twenty watt halogen light bulb was shined on the roofs. Data was collected over 3 time intervals. Two thermometers, one inside and one outside, were used to collect temperature increases throughout the time period. Data was analyzed to determine overall internal and external temperature increases as well as the differential increases for each roof color. The yellow roof produced an overall increase of 2.6 degrees F inside the house after 120 minutes while the green produced an increase of 6.3 degrees F. Comparing the internal and external differential increases in temperature showed that yellow, differential 22.6 degrees F, is the best color for limiting temperature increases. This data can be used to create more energy efficient homes by applying it to the designing, and building of roofs on homes in cold and hot climates. The resulting roofs could reduce energy consumption and electricity bills.

Scientific Disciplines Selected by Student: AT CH CS EA EE EN ET EM EV MA PH

**Scientific Disciplines**

**Fair Categories**

- AT = Applied Technology
- AS = Animal Science
- BE = Behavioral & Social Sciences
- BI = Biochemistry
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|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5525

Word Count

270

Proj. Title: Development of a Prototype Pendulum Wave Energy Conversion Device

Proj. Num 5525

StudentName(s): M. Oei

**Abstract:**

The total power of waves breaking on the world’s coastlines is estimated at 2 to 3 million megawatts. Capturing a fraction of that power would significantly offset the world’s energy consumption. The Pendulum Wave Energy Conversion Device utilizes a pendulum attached to a buoy. The buoy will float on top of the surface of the water. The ripple of the water wave will induce a rocking motion of the buoy. This will translate into a periodic motion of the pendulum. The pendulum motion will sequentially engage a series of spur gears and freewheels. The mechanical property of spur gears and freewheels will allow a clockwise or counterclockwise rotation of the pendulum to produce a unidirectional rotation of a shaft. The shaft is connected to an electrical generator to produce energy. The power from the Wave Energy Conversion Devices can be collected and this power can then be stored in a battery or transmitted directly to shore. Results from experiments showed that the power generated increases with the increased weight of the pendulum mass and with the length of the pendulum. The prototype model generated a peak of 1.62 Watts for a pendulum weight of 10 lbs. and a pendulum length of 21.5 inches. This correlates with the predicted power curve developed from a mathematical model. Based on the comparison between measured and predicted power curves, the average efficiency is 66% for the 21.5 inch pendulum length. Based on the prototype of the Pendulum Wave Energy Conversion Device that was built and the tests that were run, it is clear that the device produces clean, reliable, scalable, low-cost renewable energy.

Scientific Disciplines Selected by Student: AT EA EE ET EM MA PH

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5526

Word Count

235

Proj. Title: What To Wear

Proj. Num: 5526

StudentName(s): R. Ebrahimi

### Abstract:

This project sought to determine which clothing material insulates the best. It tested cotton, wool, down feathers, fleece, and polyester. I started by filling five containers with a different insulating material each. I then heated water to 160 degrees Fahrenheit (71 degrees Celsius). After the water reached 160 degrees Fahrenheit, I poured it into 5 plastic bottles, filling them completely. I then put a cap on each of the plastic bottles. I then placed the bottles filled with hot water into the containers. I finished filling each container with the insulating material it contained until it was full. I then placed a lid on each container. I checked and recorded the temperature of each hot water bottle in each container hourly. I did this for 5 hours. After I finished my testing I calculated my results. Cotton was the best insulator showing only an average of 35.2083 percent reduction in the temperature of the water bottles. The second best insulator was the polyester, showing a 35.8334 percent reduction in heat over 5 hours. The worst insulator was wool. It showed a 40.2084 percent reduction in the temperature of the hot water bottle. The second worst insulator was the fleece. Over a 5 hour period, it showed a 40 percent reduction in the temperature of the water bottle. In the middle were the down feathers, showing only a 39.5834 percent reduction in temperature, disproving my hypothesis.

Scientific Disciplines Selected by Student: ET MA ME PH

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5527

Word Count

248

Proj. Title: The Wing and the Wind

Proj. Num: 5527

StudentName(s): N. Lob

**Abstract:**

The purpose of this experiment was to determine how the angle of attack of an airplane wing is related to the amount of lift that the wing produced. This information could be used to determine which angle is optimal for helicopters' rotors and which angle a pilot should use to gain maximum lift during takeoff or landing. The hypothesis is that if the angle of attack of the airplane wing veers from zero in either an upward or downward direction, then the amount of lift produced will decrease. The same might also happen if the wind speed is decreased. The procedure in the experiment required the construction of a wooden wind tunnel. The device to measure lift consisted of two dowels with a bolt in between them to adjust the angle of attack. A dowel was inserted through a small hole in the bottom of the wind tunnel. Connected to this dowel was a weight that rested on a scale measuring weight in grams. A fan created wind in the tunnel and the weight on the scale measured the amount of lift produced. The different weights that resulted from the varying wing pitches and varying wind speeds were recorded. The experiment was repeated for high and low speeds at the angles -10, -5, 0, 5, 10, 15, 20, 25, 30, and 35. The results of the experiment were that a 20-degree angle of attack, with the fan on high speed created the best lift at 88.3 grams.

Scientific Disciplines Selected by Student: EE ET PH

**Scientific Disciplines**

**Fair Categories**

- |  |   |
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- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5528

Word Count

251

Proj. Num: 5528 Title: On the Application of Electrochemical Double Layer Capacitors in Electric Vehicles

StudentName(s): P. Han

**Abstract:**

As of this writing, oil is \$106.55 per barrel. It's obvious that gasoline transportation isn't sustainable. Electric battery vehicles have limited range and impractical charging times. Research was conducted on an alternative energy storage medium, the supercapacitor (EDLC). The goal was to study the practicality of EDLC based vehicles by building a model vehicle and charger. A model car was modified to run on two 3000F 2.7v supercapacitors with similar energy capacity as the original battery. A switch-mode power supply (SMPS) was built to regulate the voltage of the supercapacitors. An EDLC charger was built, weighing economy and charge time. Charging of the supercapacitors took 560 seconds using a 384 volt-amp (peak power) charger. (Power consumption decreased over time) The efficiency of the SMPS was 88.19%. Supercapacitor mass was 1.02 kilograms, which caused a 27.3% increase in power draw to run the vehicle at full velocity. This led to a 27.3 % decrease in vehicle run time. Cost for both EDLCs (used) was 50 USD. (These figures were for a model, so it's important to take them as a general outline for a full size car and not as directly applicable ratios.) These results gave a general understanding of the benefits and detriments of EDLCs. Supercapacitors have superior charging times and substantially larger cycle lives than batteries. However, they suffer from low energy densities, severe voltage fluctuations, and significant cost. Current mass produced EDLCs are not practical to use in electric vehicles. However, experimental devices have started to change that.

Scientific Disciplines Selected by Student: AT EE ET

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5529

Word Count

242

Proj. Num

5529

Title: What are the short term,(drying, and long term<(after drying) affects of temperature on water based paint?

StudentName(s): A. Bourque

### Abstract:

The purpose of this project is to determine the short term and long term affects of temperature on water based paint. My hypothesis is that the paint at higher temperatures will dry more quickly than the paint at lower temperatures over a short period of time. However, exposure to high temperatures may cause the paint to bubble or crack more quickly than exposure to lower temperatures over a long period of time. To test my hypothesis three boards of the same size and type of wood were painted with water based paint. The temperature of each board was recorded at the start of the experiment. After painting the boards, they were placed under lamps with three different watt light bulbs. The boards were observed every ten minutes for one hour. Qualitative observations such as; wet, wet and dry, dry, minor bubbling, many bubbles, and cracking were assigned a number on a scale from 0 to 5. Analyzing the data collected from the experiment proved my hypothesis to be incorrect over the short period of time and correct over the long period of time. The data showed that the paint exposed to the lowest temperature dried in the same amount of time as the highest temperatures, however, the paint exposed to higher temperatures showed bubbling, and cracking sooner than the lower temperature. This information could be used by painters to help them provide the best conditions for drying paint without damaging their work.

Scientific Disciplines Selected by Student: CH CS EN EM EV PH

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5530

Word Count

255

Proj. Num

5530

Title: The design and construction of a superlative HHO generator and the effect of complex carbohydrates on the output of oxyhydrogen.

StudentName(s): A. Bin Sajid

### Abstract:

Global warming is on the rise and gas prices are continually increasing, causing economical distress. A promising solution is a hybrid car with an HHO (oxyhydrogen) generator that will combust fuel in a more environmentally friendly and efficient process. Via electrolysis of water, HHO generators help reduce the consumption of gas, improve fuel efficiency and lower exhaust emissions. My experiment aimed at determining the following: 1) The optimal design for an HHO generator: graphite rod, helix coil, or steel-plated. 2) The amount of sodium bicarbonate (NaHCO<sub>3</sub>) electrolyte (1/4, 1/2, 3/4, or 1 tsp) needed for the best HHO generator to improve electrolytic efficiency. 3) The effects of complex carbohydrates on the performance of the best HHO generator. While enzymes have been shown to convert polysaccharides and water into hydrogen, I thought the addition of complex carbohydrates to electrolytes and water would boost the performance of the HHO generator. In part one, the average total amount of oxyhydrogen produced and the average oxyhydrogen produced per minute (oppm) were: steel-plated – 129mL, 25.8mL/min; graphite rod – 13.3mL, 2.7mL/min. The helix-coil design was dropped because the oxyhydrogen did not pass through the tubing. In part two, results proved that 1 tsp NaHCO<sub>3</sub> proved best to use with the steel-plated design. In part three, addition of complex carbohydrates resulted in the following: average total oxyhydrogen and average oppm – 560.5mL, 112.1 mL/min w/o carbs; 499 mL, 99.8mL/min w/carbs. This shows that addition of complex carbohydrates slightly hindered the generator’s production of HHO.

Scientific Disciplines Selected by Student: AT CH EE ET EM

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5531

Word Count

250

Proj. Title: Homemade Water Filtration Models and Pond Water Purification

Proj. Num: 5531

StudentName(s): C. Waskowicz

**Abstract:**

The purpose of this project was to find out which homemade water filtration system would best filter pond water, a system with repeating thin layers or a system with non-repeating thick layers. My hypothesis is that the system with multiple repeating thin layers of filtration substances will purify water better than the system with one thick layer of each substance. I engineered two water filtration systems using plastic containers, large and small gravel, sand, fiberfill, carbon, beakers, and mesh. For "System A" I drilled holes in the bottom of a container, placed in a piece of mesh, layered four centimeters of fiberfill, carbon, large gravel, small gravel, fiberfill and sand on top of each other in that order, secured a piece of mesh on top of the container with a rubber band, and placed the finished product on a beaker. "System B" commenced the same except each layer was one centimeter and the layering process was repeated three times. I collected and tested pond water for bacteria, nitrates, nitrites, pH, chlorine, alkalinity and hardness. I filtered 1.5 liters of the water through both systems and compared test samples of the water before and after filtration. Data analysis showed that "System A" had a neutral pH of 7.2 and a safer nitrite level of .5ppm (mg/L) than "System B". The results proved my hypothesis that the filtration system with multiple repeating thin layers of substances will purify water better than a system with one thick layer of each substance.

Scientific Disciplines Selected by Student: AT EA EN EM EV ME

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5532

Word Count

245

Proj. Num

5532

Title: Greener Cleaner? Testing the Level of Phosphates in Everyday Cleaners

StudentName(s): M. Lavallee

**Abstract:**

In 2010, a law was passed that required cleaning agents to contain no more than 0.5 percent phosphorus. Over 40 cleaners from household, school, and farm sources were tested for phosphate levels. A comparison of testing methods was also analyzed. The cleaners were tested three different ways: 1.) LaMotte Axial Reader Phosphate Kit, 2.) Spectrophotometry at AccuStandard Inc. Lab, and 3.) HACH Colorimetric Model 850 kit. Some levels of phosphate were detected, but all under the legal amount. Fab and Soft Scrub were the only cleaners that tested positive in all three of the tests. Household cleaners tested higher than other categories, but only ranged between 0 - 1.3 ppm. The farm cleaner tested positive on two of the tests, and it was labeled that it contained phosphates, so having phosphates was expected, but the levels were lower than expected. Few phosphates were detected in the school's cleaners; they stayed between .2 ppm and below. There were disadvantages and advantages to all of the testing methods. LaMotte's major disadvantage was having to rely on your eyes to color match, with limited value choices to select from. HACH and the LaMotte testing are colorimeter tests but, HACH was digital and didn't rely on human vision. Spectrophotometry seemed more precise and technical, but limited the conditions of the sample that you were allowed to test. Follow on experiments would include the testing of rivers, streams and local drinking water supplies to see if phosphates are at acceptable levels.

Scientific Disciplines Selected by Student: CH EA EM EV ME

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5533

Word Count

206

Proj. Title: Fermi Action

Proj. Num  
5533

StudentName(s): M. Ernest

**Abstract:**

The title of my experiment is “Fermi Action”. My problem was “How does height of the drop point affect the speed of the chain reaction?” This is important to study because many people are interested in nuclear or atomic things or are involved in chemistry or physics. Chain reactions bring all of that together. Also, this will help future problems in the field of construction. It will help save money, time, and energy. My experiment studied chain reactions, so I did one of the most popular chain reactions: falling dominoes. I did this with 3 different sized strings, studying to see how the heights had the affect on the speeds. I then concluded that the higher the drop height, the shorter the time. If the string was longer, and had a lower drop point, then the time became longer. This was my experiment. My findings are that the shorter the string, the shorter the time of the chain reaction. This means that because the string was shorter, it was able to be lifted at a higher angle and higher drop point. This gave it the most potential energy out of all the strings. This energy made the ball fall faster and made the chain reaction faster.

Scientific Disciplines Selected by Student: PH

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5534

Word Count

265

Proj. Title: Bird Wing Technology

Proj. Num  
5534

StudentName(s): P. LeComer

**Abstract:**

In my project, I had researched and investigated for hours each and every day for a possible way to design an accurate structure of a mechanical bird wing. With the correct measurements and properties, there's absolutely a way to construct new technology that will cure birds' flight due to wing loss or damage. Bringing that into mind, I compared birds on how their wings can capture the air and how they use it to accelerate themselves at different paces. The bald-headed eagle, the canary, and the flamingo are the three main species of birds I used in my studies. The wingspan of the bald-headed eagle design is 7 feet(213.36 cm.) which allows the bird to keep a long extension that supports its body mass of 12.5 pounds averaged. For the accurate measurement, the mechanical wing would be 3.5(106.68 cm.) feet for one wing. The canary mechanical bird wing design wingspan is 21 cm, making the length for one wing about 10.5 cm. With the canary's body weight of about 17 grams(0.03748 lbs.), its wings support about 60% of its total mass. The flamingo mechanical bird wing design has a wingspan of 150 cm which results in measurements of one wing being about 75 cm. With the flamingo's body weight about 5.4 pounds and difficulty maintaining stability, this species of bird can't use its wings in the air for long periods of time. Conclusively, the different varieties of mechanical bird wing design statistics allow accurate measurements to be found when the many laws of physics affect how birds use their wings.

Scientific Disciplines Selected by Student: AS EN

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
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|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

Word Count

277

5536

Proj. Title: Cooling Soda

Proj. Num  
5536

StudentName(s): K. Thomson

### Abstract:

The purpose of my experiment was to find the easiest way to cool a twelve ounce can of soda. I used four different cooling procedures. The first procedure, was putting three, twelve ounce cans of soda in the refrigerator. My second procedure was, putting three, twelve ounce cans of soda in the freezer. The third procedure I used was putting three, twelve ounce cans of soda in an ice only bath. The fourth procedure that I used was putting three, twelve ounce cans of soda in an ice and water bath. Based on the results, my guess was correct. The ice/water bath would be the fastest cooling method. The cooling methods starting with the longest time frame to cool to the shortest time frame to cool were: the freezer, ice bath, refrigerator, and ice/water bath. For each cooling method, I calculated the average temperature of the three cans of soda at each time point. Attached is the graph supporting the results. Also attached are the data tables. For the Freezer, the starting room temperature was about 64°F and after four hours, the temperature of the soda stabilized at 27°F. For the ice bath, the starting room temperature was about 65°F and after three hours and twenty minutes, the temperature of the soda stabilized at 37°F. For the refrigerator, the starting room temperature was about 66°F and after three hours and twenty minutes, the temperature of the soda stabilized at 41°F. For the ice/water bath, the starting room temperature was about 66°F and after an hour and twenty minutes, the temperature of the soda stabilized at 38°F.

Scientific Disciplines Selected by Student: AT

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

Word Count

158

5537

Proj. Num

5537

Title: Killing us slowly? Radiation in our toys and household appliances

StudentName(s): G. Peleckaite

**Abstract:**

My purpose is to show if the amount of radiation in consumer appliances is potentially harmful to your health. The hypothesis is even low levels of non-ionizing electro magnetic radiation can be overtime-harmful to your health. I think there needs to be more research done on this but I don't think it can be good for you to be on the phone for a long time and expose yourself to low levels of radiation. For business people especially because they have a blue tooth in their ear all day and it could not be good to have radiation that close to your brain and body. According to my experiment, I don't believe that much harm can come from cell phone radiation if it's not even strong enough to pop popcorn. My suspicion is that I might have needed to use more cell phones or different type of cell phones because some have higher levels of radiation.

Scientific Disciplines Selected by Student: EE ME

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5538

Word Count

191

Proj. Title: Making Wind Turbines Quieter and More Efficient

Proj. Num  
5538

StudentName(s): S. Eriksson

**Abstract:**

For my science project this year I will be assembling a wind turbine machine and using various reading each day. My goal is to make the wind turbine more efficient and quieter for the community with out losing any valuable power. For my the first I had recorded a wind speed of 19 miles per hour, we had received this reading during of January while I had stood between two large, three story buildings, which had compressed the wind together. I have found that there is energy being used by building a part on my wind turbine machine that indicates the energy by making a light bulb light up red. When using a portable, house fan the wind turbine did not move causing the light bulb to not light up. I had also figured out that if you stand between two large buildings with multiple stories, the air compresses, you will get a higher wind speed and a higher chance of getting the light bulb to light up. I had received most of this information from my science teacher and the numerous resources that I had used to complete the project.

Scientific Disciplines Selected by Student: AT EA EE ET EM EV

**Scientific Disciplines**

**Fair Categories**

- AT = Applied Technology
- AS = Animal Science
- BE = Behavioral & Social Sciences
- BI = Biochemistry
- CB = Cellular & Molecular Biology
- CH = Chemistry
- CS = Computer Science
- EA = Earth Science
- EB = Engineering: Materials & Bioengineering
- EE = Engineering: Electrical & Mechanical
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- MA = Mathematical Sciences
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- MI = Microbiology
- PH = Physics & Astronomy
- PS = Plant Science

- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5539

Word Count

249

<b>Proj. Num</b> 5539	<b>Title:</b> Crude Awakening Disaster in the Gulf Type of Absorbent vs. Time of Oil Absorption
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StudentName(s): E. Rigsby

**Abstract:**

This experiment is to discover the speed of absorbent collecting oil from water. This is a representation on how scientists are using different absorbents trying to clean up our ocean's oil spills. The idea of this is to compare, using four separate absorbents, and their oil absorption times. Each absorbent was timed on how fast it would absorb all fifty mL of oil.

During experimentation, four six hundred mL beakers were filled with cold water and oil. The four absorbents used in the study were shredded paper towel, recycled cardboard, animal wood bedding, and oil absorbing polymer. If the absorbent did not collect all the oil, the timer was paused, the used absorbent was pulled out, and three more ounces of the new absorbent was put in. The timer began again. Each absorbent was timed and recorded. Each absorbent was trialed three times with an average. During experimentation, the oil-absorbing polymer was the superior absorbent. It cleaned up all the oil in forty six seconds while the other absorbents took longer. The wood bedding provided to be the worst due to the longest absorption time at three minutes and two seconds. The recycled cardboard worked the second best with an absorption time at a minute and thirty nine seconds. The shredded paper towel is third for its time at two minutes. (Data provided were averages.) Finally the polymer proved the best absorbent. It can be a solution to our oil spills, creating cleaner oceans and saving sea life.

Scientific Disciplines Selected by Student: CH EA EM EV

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5540

Word Count

248

Proj. Title: Diaper Olympics

Proj. Num: 5540

StudentName(s): B. Greenslade

**Abstract:**

This project was done to determine which diaper absorbs the most simulated urine? My hypothesis was “if the diaper costs more money then it will absorb the most imitation urine (water at 98 degrees Fahrenheit with yellow food coloring).” Two different procedures were used to test the hypothesis. Four different newborn diapers were used in each procedure. The first procedure was the “Pour Procedure”. Thirty two ounces of imitation urine was poured into each diaper. The imitation urine not absorbed was measured and recorded for each diaper brand. The second procedure was the “Immerse Procedure”. This procedure had bowls filled with sixteen ounces of imitation urine and each diaper brand was immersed in the urine. The first test for this procedure was for one minute and the second test was for two minutes. Remaining urine was, at the end of each test, measured and recorded. The Pour procedure showed CVS diapers absorbed the most imitation urine. The Immerse procedure for one minute showed CVS diaper absorbed the most, and Immerse procedure for two minutes showed Stop & Shop diaper absorbed the most. To determine the cost of each diaper I took the number of diapers in each bag and divided by the cost. This was done for each brand. My hypothesis was incorrect. The price of the diaper does not matter when testing how much a diaper absorbs. A better scientific test would be to test how fast the diaper absorbs imitation urine against the cost of the diaper.

Scientific Disciplines Selected by Student:

[Empty box for scientific disciplines selected]

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
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- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |



Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5541

Word Count

225

Proj. Title: A Bridge Too Strong

Proj. Num  
5541

StudentName(s): Z. Guerrero

**Abstract:**

The purpose of this experiment was to determine which bridge design would support the most mass before collapsing. I set out to prove that the weight suspended from the arch bridge structure would support the most mass compared to the suspension and truss bridge types before failing. Each bridge type spanned 60 centimeters and was constructed using 100 popsicle sticks and Carpenter’s glue. A bucket was attached to the center of each bridge using a hanging apparatus. Sand was poured slowly into the bucket until the bridge collapsed. The bucket and sand were weighed on a scale and the mass was recorded in the data table. Upon completion of the experiment, it was determined that the arch bridge design held 29.9 kilograms of sand suspended in a bucket before collapsing. The truss and suspension bridge designs failed at lesser weights. The arch bridge design outlasted the other two designs because the curve of the arch spread the force outwards and greatly reduced the effects of tension on the underside of the arch. The arch bridge structure suspended 29.9 kilograms of sand before collapsing, the truss bridge collapsed at 12.7 kilograms, and the suspension bridge collapsed at 4.4 kilograms. The results of this experiment may be useful to engineers because they prove that the arch bridge structure was superior to the truss and suspension bridge designs.

Scientific Disciplines Selected by Student: EN PH

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5542

Word Count

250

Proj. Title: Killer Waves

Proj. Num  
5542

StudentName(s): S. Gosselin

**Abstract:**

Stephen Gosselin This experiment was to determine if the radiation from different cell phones differ and the quantity of radiation that reaches the body from different lengths. Also, if texting limits the exposure of radiation reaching the body. Three cell phones were tested. Each cell phone was tested in the same manner. A microwave testing device was used to detect the quantity of radiation coming from the phone. A jig was constructed to hold the phone and the testing device at a certain distance. The phones were tested on different sides and distance apart from the meter, and from different states such as calling and texting. The data was compiled and compared between the phones and between types of usage. The data that more radiation is emitted from the backs of the phones than the front, so holding it in your hand will give the body more radiation, proving that it should be set on a table in speaker or text mode for the least amount of radiation received to the body. Texting also emits a much lower radiation than using your phone during a call. In conclusion, the Pantech Laser slide phone, emitted less radiation than flip phones and also the iPhone, particularly during a call. Also, holding the phone in your hand gives you the most radiation to your body since each phone emitted more radiation from the back of the phone than the front. Third, texting is the lowest form of radiation being emitted from the phone.

Scientific Disciplines Selected by Student: AT ET EV

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5543

Word Count

179

Proj. Title: Effects of Current on Power of Electromagnets

Proj. Num  
5543

StudentName(s): M. Murphy

**Abstract:**

My experiments purpose was to determine if current had an effect on a magnetic field that is generated by an electromagnet. In order to come to a conclusion I utilized increasing size and variety of batteries. Knowing that increasing the number of batteries will cause the current directed into the electromagnet I was able to build an apparatus and test format to carry out the experiment properly. My utilized an electromagnet, a scale, a steel weight, wiring and other electrical parts, and a frame to hold said equipment. To carry out the experiment I arranged the required number of batteries in an "in series" type circuit, activated the circuit with a push-button switch, and the n record the force as indicated by the scale. To acquire a force reading I set up the scale beneath the suspended electromagnet with the steel weight on top of it, I used the negative reading, in grams, indicated by the scale as my force reading. My data is as follows: The data I obtained clearly indicated that current does increase electromagnetic power.

Scientific Disciplines Selected by Student: EE

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

Word Count

242

5545

Proj. Title: The Effectiveness of a Trombe Wall

Proj. Num  
5545

StudentName(s): C. Miller

**Abstract:**

The purpose of this project was to test the efficiency of a Trombe wall in maintaining a warm temperature in a home. The Trombe wall is frequently used in the southwestern United States where the sun is strong. The Trombe wall, composed of adobe clay, faces south, and absorbs the energy from the sun during the day. Once the sun sets the Trombe wall radiates heat into the cooler room to maintain a regular temperature in the home. The procedure in this project was first to construct two model homes, one with a Trombe wall and the other without, in order to compare the temperatures in both. Next, two sunlamps were directed at the glass walls of both model houses. I recorded the temperatures at 7:15 am before the sunlamps were turned on; at 5:30 pm when the lamps were turned off; and finally at 10:30 pm, after they had been off for five hours. My hypothesis was that if two homes were heated with the same source of heat, then the home with the Trombe wall will be the warmer after the heat source is removed. Taking the temperatures was the most crucial part of this experiment because it would either support my hypothesis or not. So far the data substantiates the hypothesis. The temperatures were higher in the room with the Trombe wall. The home with the Trombe wall maintained the heat even after the sunlamp had been turned off.

Scientific Disciplines Selected by Student:

[Empty box for scientific disciplines]

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
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- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

Word Count

123

5546

Proj. Title: Electric Car

Proj. Num  
5546

StudentName(s): S. Keo

**Abstract:**

It's common to think that the bigger it is the better. Is this intentionally true though? The problem I am trying to solve is if the type of battery affects how fast a car travels. The project used batteries as the independent variable and recorded the time length the car traveled for the dependant variable. I was sure to control for the same car and testing surface. The experimental results support my hypothesis because I predicted that the double A battery would cause the battery-powered car to travel for longer. My data shows that the double A battery made the car run longer because it held more cells. My project demonstrates to society in this matter the bigger the battery is better!

Scientific Disciplines Selected by Student: EE

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5547

Word Count

207

Proj. Num	Title:
5547	Absorption Rate of Lead Compounds on Simulated Skin and Cells and Effect of Chelators and Heat on Absorption.

StudentName(s): Y. Yaffe

**Abstract:**

The goal of my experiment, "Be Ahead of Lead", was to determine the strength and absorption rates of various lead compounds (in different intensities). I tested five such compounds (Lead, Lead Acetate, Lead Carbonate, Lead Nitrate, and Lead Sulfide) on simulated cells of dialysis tubing, and on gelatin simulated skin. I also used heated solutions to see if it affected the absorption rate. I applied two chelators to the lead compounds: Ethylenediaminetetraacetic acid, which, for obvious reasons, is commonly abbreviated as EDTA, and Zeolite. The results of my experiments is this:

- Every lead compound of every intensity was absorbed by both "skin" and "cells" in under five minutes.
- Lead Acetate was the fastest absorber (10% faster than the next fastest: Lead) into the simulated cells, which is a big problem, because it is the most toxic of the lead compounds.
- Lead Carbonate absorbed the fastest into the simulated skin.
- Zeolite was the strongest chelator, and effectively slowed down the absorption rate by a considerable degree, around 20%.
- Though in some tests EDTA was slowing down the absorption, in others it actually speeded it up.
- Lead Sulfide was the slowest absorber by both simulated cells and skin. I hope this experiment allows people to "Be Ahead of Lead".

Scientific Disciplines Selected by Student: AT BI CH ME

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5548

Word Count

119

Proj. Title: How music affects moods

Proj. Num  
5548

StudentName(s): G. Bernard

**Abstract:**

In my project I got a group of 12 students 11 children 1 adult and gave them a survey asking if Rap ,R&B ,Rock 'n Roll, Techno , and Classical made them feel content, uncomfortable , no different tired, energetic , or upset Question Do different types of music affect people in different ways? Hypothesis I thought Rap: Most people will be energetic R&B: Most people will be content Rock n' Roll: Most people will be energetic Techno: Most people will be energetic Classical: Most people will be tired or content Conclusion In conclusion I was partially right Rap: Most were content R&B: Most were uncomfortable Rock n 'Roll: Most were content Techno: Most were energetic Classical: Most were content

Scientific Disciplines Selected by Student: BE

### Scientific Disciplines

### Fair Categories

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5549

Word Count

147

Proj. Title: Rust Above the Rest

Proj. Num: 5549

StudentName(s): K. Paradis

**Abstract:**

Abstract: The title of my experiment is "Rust above the rest" this experiment is important to study because of today's need for metals in everyday objects from transportation, to home appliances, buildings, bridges, and ships which need to survive the elements and withstand the test of time. The reliability of these objects are also linked to the items sale value which is why companies need to make more reliable appliances. In my experiment I tested the corrosion rate of different metals using salt water. To do this I placed each type metal in a beaker filled with 100ml of salt water and massed them after two weeks. Every metal had a change in weight after the two weeks. Brass and copper gained weight while zinc and cast iron had the highest weight loss which means they are the two metals that are the most susceptible to corrosion.

Scientific Disciplines Selected by Student: CH

**Scientific Disciplines**

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- MI = Microbiology
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5550

Word Count

155

Proj. Title: Which Object Does Static Electricity Have The Most Effect On?

Proj. Num  
5550

StudentName(s): M. Ferraiolo

**Abstract:**

I decided to do this project because I thought it would be interesting to see how static electricity affects different kinds of materials. The first thing I had to do was make an electroscope. First, I placed the bent straw into a small cup. Next, I cut two small strips of aluminum foil, 2 1/2 inches long, and 1/2 inch wide. I taped the strips onto the bent part of the straw so that they were next to each other, but not touching. After constructing my electroscope, I started the experiment. I rubbed a ruler with the silk material to discharge it. I rubbed the ruler onto the piece of wool, and then brought the ruler close to the aluminum foil, without touching it. I repeated this step with cotton, newspaper, and carpet. After conducting my experiment, my results showed that when I rubbed the ruler with cotton, it had the strongest attraction to the electroscope.

Scientific Disciplines Selected by Student:

[Empty box for scientific disciplines]

**Scientific Disciplines**

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- PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5551

Word Count

237

Proj. Title: Which plane design creates the greatest lift?

Proj. Num  
5551

StudentName(s): M. Boykin

**Abstract:**

There are four main forces that affect a plane during flight. They are lift, drag, gravity/weight, and thrust. The purpose of this project is to determine which model plane design creates the greatest lift during flight. The designs of the planes varied in body shape and wind type. My hypothesis is that the model plane known as the Fokker-Tri Plane will produce the greatest lift during flight. A wind tunnel was built to test three model airplanes of different designs. The model planes were built, then, modified so that they would have the same mass. The planes were each suspended in the wind tunnel. The wind source was turned on and the altitude of each plane was recorded. Gram weights were added and the planes were each re-tested to determine which would reach the greatest altitude while carrying the most weight. The results of the experiment proved that my hypothesis was correct. The Fokker-Tri plane obtained the greatest altitude while carrying the most weight. The knowledge of which model plane creates the greatest lift during flight may be useful for aerospace engineers as they attempt to design planes that will be more eco-friendly by consuming less fuel. A plane with greater lift needs less thrust to keep it in the air. If a plane requires less thrust to fly, smaller engines could be designed to use less fuel and reduce air pollution.

Scientific Disciplines Selected by Student: AT CS EE EN ET MA PH

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5552

Word Count

383

Proj. Title: What shape is the most invisible to radar?

Proj. Num: 5552

StudentName(s): A. Jones

### Abstract:

I picked my topic because I was thinking of my brother who is learning to fly and wants to become a fighter pilot in the Air Force. The aviation came to mind and I looked online to find project ideas based on aviation and I found "How to Make an Aircraft Invisible to Radar". Aircrafts have been in use for more than a century, and ever science they have been in use for warfare, enemies have invented radar systems to detect enemy aircraft that were not visible by other means. A radar works by having an energy beam sent out of a radio dish, on the ground, then the radar calculates how much time it took to bounce back, and when the beam bounces back it tells a computer where the exact location of an object is. There are two ways to deflect and conceal aircrafts, by either utilizing metal that absorbs the beam and/or having sharp clean edges that deflect the beam so that when it bounces off it doesn't go back to its point of origin. The British started making stealthy (invisible to radar) aircrafts during World War Two with the F-117. Then other countries started to make stealthy aircrafts to win the war, some of which included Russia, the USA, Japan, and Germany. The F-117 used smooth sharp edged surfaces that deflected the bean away from the radar, hindering it invisible. This advancement in military aircrafts dramatically increased the level of safety for our troops and our ability to drop bombs and military forces without detection by the enemies. My project utilized a beam of light to simulate radar beams and a LUX meter to measure the light that was bounced back. All tests were confined to a black lined box to eliminate any extra light and get accurate measurements. Each shape was tested 3 times in the controlled light environment. Although the project was fairly simple, it clearly demonstrates and proves that a "V" shaped piece of paper (sharp edged aircraft, or other device), will reflect less light than a cumpled cylinder, a smooth cylinder, or a "W" shaped piece of paper. So, if you want to avoid detection by radar utilize a sharp edge design for whatever you are trying to make invisible to radar.

Scientific Disciplines Selected by Student: EE

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5553

Word Count

104

Proj. Title: Measuring Temperature with a Violin

Proj. Num: 5553

StudentName(s): A. Wagner

**Abstract:**

I have played violin for about nine years and questioned why a change in temperature causes my violin to go out of tune. Then I wondered, could I use my violin to measure temperature? I tested my violin at three different temperatures. When I had collected all the data I needed, I created graphs in Microsoft Excel and analyzed the results. I found that the frequency of the violin decreased with increasing temperature. The temperature predicted by the violin was only 4% off of what the actual temperature was. In the end I concluded that yes, you can use a violin to measure temperature.

Scientific Disciplines Selected by Student: PH

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5554

Word Count

238

Proj. Title: Ski Turn Radius and Skiability

Proj. Num  
5554

StudentName(s): G. Moberg

**Abstract:**

The objective of this project was to find the correlation between the advertisement of skis and their mathematical features. The Volkl Bridge and Six Stars have similar side-cuts, but the Bridges are meant for powder. Therefore, the rocker camber style in the Bridges allows for the ability to ski in powder. The Volkl Bridge skis are wide, so they have more surface area on the snow to allow for easier pivot turns. The Atomic Beta Riders did not have rocker camber, but they were advertised as a powder ski, since they have a large surface area. The rocker helps make quicker pivot turns without having to carve with a small sidecut radius. This aspect would be helpful in the moguls, since the skis will be able to turn quickly over the bump. This could save a life if a person had to make a quick turn while on a glade run. The RTM 80 and the Atomic Smoke 150 are most likely skis meant for the groomed mountain, since they have traditional camber with short turn radii. The RTM 84 is meant for powder, because of its rocker shape which allows for easy powder movement without a long ski. Salomon Lord 161 and the Salomon BBR 7.9 are both meant for powder, because of their semi-rocker camber. Overall, the mathematical features of the skis are critical to consumers to become more educated about the ski's use.

Scientific Disciplines Selected by Student: EE MA PH

### Scientific Disciplines

### Fair Categories

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
BE = Behavioral & Social Sciences	EV = Environmental Analysis
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EA = Earth Science	PH = Physics & Astronomy
EB = Engineering: Materials & Bioengineering	PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

P8

# Connecticut Science Fair Abstract

Project Number

5555

Word Count

250

Proj. Title: Bubble Time!

Proj. Num  
5555

StudentName(s): N. Hernandez

**Abstract:**

My project is about exploring the effects a bubble has when you change the temperature and the soap type, and to see which change would have a bigger effect on how long the bubble lasted. I tested to see if glycerin had an effect on the length of bubble time. Supposedly, glycerin is what makes bubbles last longer. I changed the temperature from 72° to -106° by making a bubble on dry ice vapor and then blowing a bubble in the air. I used Dish, Bubble, and Hand soap from the same brand. I predicted that changing the bubble soap will have the biggest effect because it contained glycerin. I noticed that changing the temperature had the greatest effect. The longest amount the bubble prolonged in the dry ice was 40 seconds using Dish Soap. When I created a bubble in 72°, the average time was 5 seconds. For further evidence, I called the manufacturer to find all of the chemicals the soaps contained and learned that the bubble soap did not contain as much glycerin but mostly water; while the other soaps did not contain as much water but mostly thick chemicals to clean. In result, my hypothesis was wrong. I learned that in cold temperature the molecules move slower and warmer temperature makes the molecules move faster. The colder the temperature the thicker and more stable the bubble wall will be. I conclude that glycerin does not have a large effect on bubble time but cold temperature does.

Scientific Disciplines Selected by Student: CH

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
| AT = Applied Technology                      | EE = Engineering: Electrical & Mechanical |
| AS = Animal Science                          | ET = Energy & Transportation              |
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- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6001

Word Count

139

Proj. Num

6001

Title: A Neuroesthetic Study on the Cognitive Perception of the Acoustic Mathematic Harmony of the Golden Section

StudentName(s): S. Werner

**Abstract:**

Humans possess the ability to interpret mathematical patterns visually and acoustically. The goal of this experiment is to determine if the subtle mathematical harmony of the Golden Section can be perceived when translated into form of frequency and rhythm. The properties of the unit Phi will be generated acoustically through the tone, rhythm, or frequency of the Golden Ratio. Tests will determine the cognitive ability to recognize the complex mathematical pattern in audio. If the brain is able to interpret the mathematical elegance of the properties of phi, a neuroesthetic response will be evident through the use of subjective survey and the use of an electroencephalogram (EEG). The EEG will calculate a measurable output of electrical impulses within the brain, which will be analyzed to discover the locations and relations of neural stimulation when exposed to the audio piece.

Scientific Disciplines Selected by Student: AT BE MA PH

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6002

Word Count

294

Proj. Num

6002

Title: Polyvinylidene Fluoride (PVDF) Piezoelectric Generator: A Novel Approach to Harvesting Vibrations from Human Respiration to Power Biological Implants

StudentName(s): B. Oei

### Abstract:

Traditional batteries used in biological implants require the patient to undergo invasive surgery during the replacement process. One promising solution is to directly harvest energy from the biological system itself to realize self-powered biomedical devices. This research explores the development of a practical micro-scale device for harvesting energy from a regular human activity—respiration. The energy harvesting relies on the resonant oscillation of a piezoelectric generator whose prime component is a PVDF thin film shaped in a flapper, reed or wind sock configuration. Piezoelectric Generators with PVDF thin film thickness of 26, 52 and 100 microns were tested to investigate their capability of converting low-speed air flow energy into electricity. Experiments indicated that the peak power generated increased as a function of the cubic power of the peak airflow velocity. Greater power was produced by PVDF of decreasing thickness. This correlated with the prediction from the mathematical model. The wind sock configuration produced the greatest power for a given PVDF thickness throughout the range of peak airflow velocity. This was followed by the flapper configuration and then the reed configuration. The best configuration tested was the 28 micron thick PVDF film in the wind sock configuration. PVDF oscillations and power was produced with airflow velocity as low as 3.4 ft/sec. In the range of human breathing velocity (10 ft/sec to 25 ft./sec), this configuration produced between 10 to 110 microwatts. At a peak of 10 microwatts, a pacemaker is the largest consumer of electricity of any biomedical device. The low end of the PVDF Piezoelectric Generator power range is sufficient to power a pacemaker at its peak requirements. At the high end of this range, the PVDF Piezoelectric Generator generates eleven times the power necessary to operate a pacemaker.

Scientific Disciplines Selected by Student: AT EE EN ET MA ME PH

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6003

Word Count

178

Proj. Title: Aerodynamic drag of a bicycle wheel and its effect of a rider and his bike

Proj. Num  
6003

StudentName(s): G. Pantalone

### Abstract:

The purpose of this test was to study the impact of the drag of a wheel on the entire bike and rider. The theory was that wheels with fewer aerodynamic properties would have more drag. Tests were conducted for both translational and rotational drag. The translational drag, a measure of how much force in pounds is required to balance out the drag of wheel, was measured using a wind tunnel and the rotational drag, a measure of how much force is needed to spin a circle around it's circumference, was measured at home using a cordless drill to spin the wheel to a stable speed and then taking the time elapsed for the wheel to spin back down to ten miles-per-hour. The results came up very similar to the hypothesis, where wheels with aerodynamic properties scored higher on the two drag tests than other wheels. The scope of the effect was fifteen percent which would matter to anyone who competes in any sort of cycling race, but is not something that should trouble the average rider.

Scientific Disciplines Selected by Student: AT EE MA

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CS = Computer Science	MI = Microbiology
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EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6004

Word Count

259

Proj. Title: Air multiplication Technology vs. Bladed Fan Technology

Proj. Num  
6004

StudentName(s): S. McDonough

### Abstract:

The purpose of this experiment was to compare the efficiency of air multiplication technology versus the efficiency of bladed fan technology in terms of energy used, air volume produced, and success as a propulsion device. It was hypothesized that the air multiplication technology would require less energy to create an equal or greater production of air volume, and that it would propel the low-friction platform across a specified distance faster and with less energy than the bladed fan technology. The experiment consisted of two tests. The first test produced data to calculate watts/m<sup>3</sup> of air produced. The devices' air output velocities were multiplied by the area of their faces and then divided into the watts used per second to find this unit of efficiency (watts/m<sup>3</sup>). The second test involved running the devices over a uniform surface on the low-friction platform for 15.24 meters (50 feet). This data allowed the calculation of the speed of each device as well as the watts used per meter propelled. The hypothesis was supported as the air multiplier used 0.0434 watts/m<sup>3</sup> while the conventional propulsion device used 0.0884 watts/m<sup>3</sup>. The air multiplier had an average speed of 0.8819 m/s, while the conventional propulsion device had an average speed of 0.7202 m/s. Finally, the air multiplier used 0.0431 watts/m, while the conventional propulsion device used 0.0913 watts/m. Future experiments may include comparing air multiplication against a series of other propulsion devices using a more efficient home-built model; or applying air multiplication technology to flight.

Scientific Disciplines Selected by Student: AT EE ET PH

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6006

Word Count

247

Proj. Num

6006

Title: The Effect of Indexing String Length on Speed and Memory Usage for Digital Karyotyping Query Algorithms

StudentName(s): J. Henck

### Abstract:

Digital karyotyping query algorithms use computer indexing to help search for specific gene sequences within large DNA databases. A rapid and efficient method to search and identify genes and their mutations will help scientists not only discover mutations in genes but help doctors target treatments for specific patients. Searching databases requires computation time and memory. It is hypothesized that as the length of the indexing string gets larger; the computation processes will be faster but use up more memory. When using an indexing approach, the database is broken up into small segments of a chosen length. Because of the finite length of each string and the four nucleotides which make up DNA, there are a limited number of possible combinations of the nucleotide sequences which make up each string. An index is created indicating the location of each possible sequence combination. Once created, this index can then be used to search for a particular sequence. The independent variable in this study was the indexing string length. The dependent variables were size of the index and the number of computations required to search the index. A string length of about 5 is nearly optimum for minimizing both memory usage and computational time. Any string smaller than 2 requires an extreme amount of computational time while string lengths greater than 7 require large amounts of memory. Optimizing the way in which genetic sequence data is analyzed will allow doctors and researchers to utilize this complex information quickly and efficiently.

Scientific Disciplines Selected by Student: CS

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6007

Word Count

252

Proj. Num

6007

Title: Role of Electro-Chemical Double Layer Capacitors in Energy Storage

StudentName(s): I. Dakers

### Abstract:

For environmental reasons there is a need to increase the efficiency of fossil fuel burning vehicles or replace them with a fully electric model. A shortcoming of batteries is their short life as the result of charge and discharge cycles. This project studies how Electro-Chemical Double Layer Capacitors (EDLC's) can enhance the life of batteries. EDLC's can supplement a battery that is used in energy storage. The EDLC's can be completely discharged and charged for a 1/2 million cycles, or more, unlike a conventional lead-acid battery that has a deep discharge life of hundreds of cycles. This project employed a bank of 6 series-connected 3,000 Farad EDLCs with an energy storage capability of 56,250 Joules at 15 Volts. In initial tests EDLC's self-discharge was measured. In the second series of tests, 1 Amp and 15 Amp loads were applied to the EDLC's, and performance was monitored. In the third series of tests, the EDLC's were connected to vehicles to see how they reacted during nominal running loads and 280 Amp peak transient loading during vehicle starts. During the testing EDLC's showed their energy density to be less than one tenth of a battery. Testing confirmed the high power density of the EDLC's, including the ability to start a vehicle multiple times and power the auxiliary loads without recharging. It was demonstrated that a hybrid system, where a battery and EDLC's are in a parallel circuit, would optimize the recovery of energy and maximize the life of the battery.

Scientific Disciplines Selected by Student: AT CH EE ET EM MA PH

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6008

Word Count

267

Proj. Num	Title:
6008	Novel Fiber Optic Dye Sensitized Solar Cell Aided by the Biosynthesis of Diatom Frustules

StudentName(s): K. Ryan

**Abstract:**

Dye Sensitized Solar Cells (DSSC) are a promising alternative to silicon photovoltaics, but have only achieved power conversion efficiencies of twelve percent. Using nano-particle TiO<sub>2</sub> and a sensitizing dye, a DSSC converts power from the sun into electricity through simple and inexpensive methods. This project attempted to improve DSSC efficiency by increasing surface area and diminishing reflectivity. The hypothesis stated that integration of fiber optic technology and diatom frustules into a DSSC could substantially increase efficiency. Diatoms, specifically Synedra, produce SiO<sub>2</sub> frustules that have nano-scale structures which aid in photosynthesis. Studies have shown that diatoms will accept TiO<sub>2</sub> in place of SiO<sub>2</sub>. When the diatoms become integrated into the DSSC, it increases efficiency by trapping photons that would otherwise be reflected. Synedra diatoms were cultivated in a photobioreactor, immersed in a nutrient solution, and given soluble SiO<sub>2</sub> and TiO<sub>2</sub> in differing fractions. Once the organisms were removed, the frustules were annealed to SnO glass, doctor bladed with a TiO<sub>2</sub> solution, sensitized with a blackberry dye, and then sandwiched with an additional piece of SnO glass coated in carbon. This apparatus was wrapped around an optical fiber that uses total internal reflection to propagate light through its core. By increasing the surface area of the DSSC with the optical fiber and decreasing reflectivity with the diatom frustules, efficiency of the solar cell was significantly increased. These results confirmed the hypothesis that a fiber optic DSSC aided by diatoms is capable of producing greater energy output than the standard DSSC. When used in tandem, these two technologies compliment each other and create a more efficient solar cell.

Scientific Disciplines Selected by Student: AT CH EN ET

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
BE = Behavioral & Social Sciences	EV = Environmental Analysis
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6009

Word Count

185

Proj. Num	Title: Alternative Material and Three-Dimensional Structure to Solar Panel Technology
6009	

StudentName(s): W. Denslow, W. Denslow

**Abstract:**

For the last fifty years, solar panels have been in the shape of a square. The problem is that square shaped solar panels are massively ineffective. To date, the highest efficiency recorded has been 21%. Solar efficiency is the relationship between how much light is reaching the solar panel and how much light is being absorbed by the panel. These square solar panels are inefficient because they are only "two-dimensional". Light rays, which are linear, hit the panel once and then bounce away in the opposite direction. With a "three-dimensional" shape, light rays could bounce within a concave shape, and allow light rays to hit the solar cells more than once. This would increase the amount of energy being absorbed exponentially. To prove this theory, I will construct both cardboard models and actual working prototypes of 3D and 2D solar panels. I will measure the efficiency of both by finding the relationship between how much light is reaching the panels, and how much is being absorbed. I expect my project to prove that 3D solar panels are more efficient than 2D solar panels.

Scientific Disciplines Selected by Student: AT CS EE EN ET EV MA PH

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
| AT = Applied Technology                      | EE = Engineering: Electrical & Mechanical |
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| CS = Computer Science                        | MI = Microbiology                         |
| EA = Earth Science                           | PH = Physics & Astronomy                  |
| EB = Engineering: Materials & Bioengineering | PS = Plant Science                        |

- |                | Life Sciences | Physical Sciences |
|----------------|---------------|-------------------|
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6010

Word Count

253

Proj. Num

6010

Title: The Effectiveness of Targeted Strength and Flexibility Exercises based on Imbalances Identified by Functional Movement Screen at Preventing Injuries in Female Intercollegiate Ice Hockey Players

StudentName(s): A. Mandell

### Abstract:

Purpose: Vicky and I's project aims to determine if corrective exercises targeted at weak spots identified by the Functional Movement Screen (FMS) is successful at reducing injuries and concussions in Female Intercollegiate Ice Hockey Players. The FMS identifies functional movements, muscular imbalances and asymmetries, and inflexibility.

Procedure: Vicky Graham and I screened the athletes on the Wesleyan Women's Intercollegiate Ice Hockey Team using the FMS in October before their season began. The FMS consists of 7 tests which are scored 1-3, 1 being the lowest score. At the end of the season, we re-tested each player and looked at their and the team's injury rate, the number of concussions, and compared those to the FMS scores.

Observations/Data/Results: In October, we screened the athlete. There was a variety of different scores on different tests. Some players scored poorly where others scored strongly. In general, the returning players had higher overall scores compared to the new players. We have not yet looked at the injury results and compared them to the FMS scores or compared the initial FMS score from October to the last FMS score taken in February. Data analysis will be completed within a few weeks. Conclusions Since the study hasn't yet been completed, we have not come to a conclusion of whether or not the FMS and implemented corrective exercises are successful at reducing injuries and concussions. Future research should target a larger group of athletes for more results as we only used on Intercollegiate Females Ice Hockey team.

Scientific Disciplines Selected by Student: ME

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6011

Word Count

236

Proj. Num

6011

Title: Mp3 Compression and It's Relation to Psychoacoustics

StudentName(s): J. Chambers

### Abstract:

Mp3 compression has been in since the 1990's and has revolutionized the trade and use of music in our world, but what was before. Wave or Waveform Audio File Format was in use prior to Mp3 and is the base format that is used on CD's. The question is, how closely can the original Wave sound be retained in Mp3 compression and still be enjoyable to the ear. Most info loosely points out that higher bit-rates and sampling rates in Mp3 compression reproduce better sound and in turn, more original and enjoyable music. This experiment further tests and explores the theory and tests when and how people would use them. Both Quantitative and Qualitative results arose from my testing. About 90% of participants preferred the higher bit-rate and sampling rate songs over the lesser ones. The qualities of the lesser bit-rate/sampling rate songs tended to be grainy and fuzzy, with parts being nearly inaudible, whereas the higher bit-rate songs were crisp, clear, full-ranged and somewhat deep, although due to song choice, many came up grainy, due to the nature of the song. Most participants decides that they wouldn't listen to or use the songs of the lower bit-rates and sampling rates. Analysis concludes that higher bit-rates and sampling rates in Mp3 compression do make for higher quality, more enjoyable songs that are closer to the original Wave format song.

Scientific Disciplines Selected by Student: AT BE CS EE

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AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6012

Word Count

150

Proj. Title: New Methods for Liquid Cooling on a PC

Proj. Num  
6012

StudentName(s): A. Bigi

**Abstract:**

Personal computers have generally been cooled by using fans and heat sinks for the last decade, this experiment will hopefully change that. Computers have a short life span; mainly due to hardware failure caused by inadequate cooling. The experiment will be liquid cooling by dispersing the coolant used in the liquid cooling system in a more effective way by maximizing the surface area of the object that is being cooled. This experiment will also find an alternative to water in liquid cooling systems, this alternative liquid will provide more than adequate cooling for the CPU of the computer, which is expected to produce measurable increases in processing speed, and is considerably more effective than standard cooling methods. The experiment will also be testing which coolant is the most efficient to cool the computer, and if increases in water block surface area will have a positive effect on the cooling process.

Scientific Disciplines Selected by Student: AT CS EE

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6016

Word Count

248

Proj. Num

6016

Title: Maximizing the Efficiency of a Parabolic Trough Solar Heating System by Utilizing a Robotic Rotation Mechanism to Focus on the Sun

StudentName(s): R. Carle

### Abstract:

Is it possible to increase the efficiency of a parabolic trough water heating system by using a robotic rotation mechanism that would turn the trough to face the sun? Parabolic troughs have been used to collect solar energy in the form of hot water. The baseline data shows the limitations of a stationary parabolic trough; peak efficiency is short lived because the sun is constantly moving and the focal point has to be precise. My idea was to utilize robotic technology in order to maintain the focus of the parabolic trough on the sun thereby sustaining maximum efficiency. I designed and constructed a parabolic trough with the ability to rotate freely. The Lego Mindstorm robotics system was adapted to act as a pulley system in order to move the parabolic trough into focus. The robot was then programmed to accept input from a solar cell. The solar cell generated a voltage to provide a signal to control the attitude of the trough. The robot would poll the voltage that was generated by the solar cell and follow the algorithm until it reached a certain voltage, which provided feedback that the trough was focused. The data showed that the robots input during testing maintained the same or better temperature differentials. The peak efficiency was sustained over periods of time as opposed to the baseline. In conclusion, the robot design and software solution was successfully programmed to maintain focus of a parabolic trough to gather heat energy from the sun.

Scientific Disciplines Selected by Student: CS EE ET

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6019

Word Count

250

**Proj. Num** 6019 **Title:** Examination of Vitamin C Levels in Organic vs. Conventional Green Bell Peppers and the Effects of Temperature and Age

**StudentName(s):** J. Mocchiola

**Abstract:**

This project examined levels of vitamin C in organic and conventional green bell peppers, and levels of vitamin C in each with regards to temperature and age. Organic produce is grown without pesticides or synthetic fertilizers. In addition vitamin C or ascorbic acid breaks down over time when exposed to oxygen. The hypotheses stated that organic peppers and the peppers stored in refrigeration would have higher amounts of vitamin C, an essential component of the human diet. Levels of vitamin C in the green bell peppers were determined by vitamin C titration. Seven trials were conducted testing one organic and one conventional green bell pepper for vitamin C. In order to test the effects of temperature and age on the vitamin C levels, three green bell peppers were bought on the same day. One was tested for vitamin C the same day it was bought, one was stored in refrigeration for ten days, and one was stored in room temperature for ten days. Three of these trials were performed. Overall, the organic peppers contained lower levels of vitamin C than the conventional peppers, which did not support the hypothesis. One explanation may involve pesticides on the conventional peppers preserving them for a longer period of time. The levels of vitamin C in both the organic and conventional green bell peppers after being stored in refrigeration and in room temperature were not consistent. The consumer must make the choice of either higher levels of vitamin C or exposure to pesticide residues.

**Scientific Disciplines Selected by Student:** BI CB CH EA EM EV MA ME PS

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6021

Word Count

282

Proj. Title: Remediation of Heavy Metals from River Water via a Novel Lemna minor  
 Num Activated Filtration Apparatus

6021

StudentName(s): N. Dorian

**Abstract:**

Clean water is essential to our well being. A key but expensive step in producing clean water is removal of heavy metals. An efficient yet costly and potentially hazardous method of removing metal ions from water uses modified silica, alumina, and activated carbon. Duckweed (*Lemna minor*) offers a cheap and biological alternative. *L. minor* is a floating freshwater plant that thrives and self-germinates worldwide in temperate climates. With invasive tendencies, *L. minor* grows rapidly, forming a “green blanket” on the water’s surface. *L. minor* has many different functional groups that act to extract certain heavy metals, including copper and iron, from water. This research investigates the use of *L. minor* to remediate heavy metals from water with the intent of fabricating a flow filtration apparatus. Atomic Absorption (AA) Spectroscopy, Scanning Electron Microscopy (SEM) and Electron Dispersive Spectroscopy (EDS) were used to evaluate the remediation of copper and iron by *L. minor* filtration. Results suggest that *L. minor* successfully extracts Cu and Fe heavy metals from solution in first order decay, where the greatest percentage of metal is removed after one day. 3g of *L. minor* removes more than 99% of copper and iron from a 10 ppm solution, which was subsequently found within the *L. minor* leaf structure. A local golf course water sample was filtered with *L. minor*; 95% of the copper content was removed within 1 day of exposure to the fronds. Success of these pilot experiments led to the creation of a *L. minor* water filtration system to remediate heavy metals from water in real time. When tested over 24 hours with 5g of biomass, 72% copper and 61% iron was extracted from solution of both metals.

Scientific Disciplines Selected by Student: EN EM PS

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6022

Word Count

216

Proj. Num

6022

Title: The Effects of Shaking Ten Dose Vaccine Vials on the Amount of Metals Distributed to Each Dose

StudentName(s): A. Collins

### Abstract:

This project was based off of the connection found between autism and vaccinations, and the theory that the thimerosal used as a preservative in vaccines sinks to the bottom of the ten dose vial. Therefore, the final dose extracted would contain the highest amount of thimerosal and the child to receive this dose would be diagnosed with autism. The purpose of this experiment was to determine if not shaking a ten dose vial affects the distribution of the "heavy metal" content per dose. In this experiment, the heavy metal used was lead. Although it is not used in vaccines, its properties are very similar to mercury, which can be found in some vaccines in the form of thimerosal. It was hypothesized that not shaking the vial will cause the final dose to have a larger amount of lead than all other doses from that vial. This experiment was done by putting ten milliliters of lead nitrate solution in three small container which were shaken or not shaken before doses were extracted, then the lead was filtered out of each dose and its weight was measured. Lead precipitate weights showed the most pattern for the vial that was shaken for every other dose, indicating that shaking the vials has an affect on the overall distribution of metals.

Scientific Disciplines Selected by Student: CH ME

### Scientific Disciplines

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CS = Computer Science	MI = Microbiology
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6023

Word Count

247

Proj. Title: Feeding Tube Occlusions: An In-Vitro Evaluation of Ciprofloxacin tablets

Proj. Num  
6023

StudentName(s): H. Zhao

### Abstract:

For patients requiring ventilation, in a coma, or with cancer, nasogastric (feeding) tubes are commonly used to deliver fluids, nutrition supplementation, and medication in hospitals. However, small-bore feeding tube occlusions happen in 23-35% of patients with feeding tubes, which can cause discomfort to the patients and waste money and time of the medical community. The purpose of the current research is to identify how different tablet manufacturers, suspending vehicles, and methods of preparation of a liquid suspension of Ciprofloxacin can affect the occurrence of occlusions in feeding tubes. Different suspensions of ciprofloxacin were run through a feeding tube and marked down whenever an occlusion occurred. In addition, suspendability tests were run on each of the suspensions to test their ability to evenly suspend the medication for different time intervals. The most significant trend indicated by the data shows that suspensions in water caused a lower number of occlusions than those suspended in more viscous vehicles. However, suspensions in water maintained a uniform distribution for much shorter periods than suspensions in viscous vehicles. It was concluded that in general, suspensions with smaller particles and low viscosity vehicles caused a lower number of occlusions and should be administered to patients only if the time between the suspension preparation and administration is short. Due to lack of uniformity of administration methods in hospitals, the ultimate goal is to use the results of the study to able to develop protocol and guidelines for drug administration through feeding tubes for hospitals.

Scientific Disciplines Selected by Student: AT ME

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6024

Word Count

139

Proj. Title: A Study: Can Ski Resorts Be Inferior Goods

Proj. Num  
6024

StudentName(s): J. Epstein

**Abstract:**

Most goods in services are normal, meaning that as consumer income increases the demand for that good increase as well, however some, generally less desirable cheap goods, experience a decrease in demand when incomes increase. It is hypothesized that because some ski resorts provide a cheaper option than other that during a time of lower incomes, expensive destination resorts will suffer much more than smaller resorts. The test was conducted with skier visit data provided by resorts, and with disposable income data that is publicly available. The data was compared against each other and then year over year for each resort. Some of the Vermont resorts showed the expected positive slope, up to a certain point, affirming that they are normal goods; however, most of the data was inconclusive, so the need for more factors, possibly snowfall, is clear.

Scientific Disciplines Selected by Student: MA

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6025

Word Count

169

Proj. Title: Methods of Cleaning an Oil Spill

Proj. Num  
6025

StudentName(s): E. Locke

**Abstract:**

The purpose of this project was to determine the effectiveness of hair as a sorbent when cleaning an oil spill. This particular experiment tested several different types of hair against each other, deciding which would absorb the most oil off the surface of water. To conduct the experiment, crude oil was soaked up off the surface of a saltwater solution (prepared to resemble ocean water) by dyed human hair, by untreated human hair, by dog fur, and also by cat fur. Then, the remaining oil was skimmed off the surface and measured, so the type of hair that absorbed the most oil could be determined. The dyed hair, on average, soaked up 88.44% of the crude oil. Untreated human hair absorbed 93.56% of the crude oil, dog fur absorbed 91.78% of the crude oil, and cat fur absorbed 88.67% of the crude oil. The results yielded by this experiment prove that untreated human hair, of these four types, is the most effective in absorbing oil off the water's surface.

Scientific Disciplines Selected by Student:

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6026

Word Count

249

Proj. Num

6026

Title: Development of Polymeric Membranes for Purification of 1,3 Propanediol by Pervaporation

StudentName(s): P. Chen

### Abstract:

The production of biodiesel results in approximately 1 kg of waste glycerol per 10 kg of biodiesel. This byproduct holds little economic value but can be fermented into 1,3 propanediol, which, in contrast, holds both monetary and practical value. The traditional purification method of 1,3 propanediol, evaporation and distillation, is energy intensive and expensive. Therefore, by developing and studying novel polymeric pervaporation membrane structures that yield a preferential permeability of 1,3 propanediol over water, purification costs can effectively be reduced. This project focuses specifically on the use of 90:10 and 80:20 Poly(HEMA)-Poly(Styrene-co-Allyl Alcohol) blend membranes. These blends were chosen through preliminary mass uptake experiments conducted by Baishali Kanjilal. Permeability data was collected through pervaporation, a simple process that combines the solubility and diffusivity components of the membranes. The binary feeds used had concentrations of about 2%, 3%, and 5% 1,3 propanediol. The permeate concentrations were analyzed using gas chromatography. Such procedures were a collective effort of Baishali Kanjilal, Cheng Diao, and I. The results indicate that there is an enriched concentration of 1,3 propanediol in the permeate as opposed to the initial binary feed for both the 90:10 and 80:20 PHEMA-PSAA blend membranes. The results of this project will provide correlations between selectivity of 1,3 propanediol over water, feed concentration of 1,3 propanediol, and cross flow velocity. In addition, it will show the comparative effectiveness of the 90:10 and 80:20 PHEMA-PSAA membranes, ultimately allowing for further development of more effective polymeric membranes.

Scientific Disciplines Selected by Student: AT BI CH EN ET EV MI

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6027

Word Count

264

Proj. Num

6027

Title: Neutron Star/Black Hole X-Ray Timing Analysis as a Probe of High-Field General Relativity

StudentName(s): J. Lustbader

**Abstract:**

Neutron stars and black holes are the perfect astrophysical laboratories to study the physics of high-density objects. For binary star systems in which the primary object is a neutron star or black hole, an accretion disk will form as matter from the secondary star is pulled toward the primary, heating up in the process and emitting x-ray radiation. The Rossi X-Ray Timing Explorer (RXTE) satellite collects x-ray data from such accretion disks and can measure the arrival time and energy of every x-ray photon during an observation. The project described here uses x-ray timing data from RXTE observations of six neutron star and black hole binary star systems (three of each) to investigate the noise frequency patterns in the two types of systems. A Fourier transform is performed on the x-ray timing data and the following quantities are measured for each observation: the frequency of the quasi-periodic oscillation signal (QPO) from the power spectrum, the frequency of the QPO noise from the power spectrum, the power law describing the curve fit, and the background x-ray count rate. This project then compares the noise characteristics of the two types of systems to see if any correlation exists between the noise patterns and gravitational physics around the different (neutron star or black hole) environments. If a correlation does indeed exist, then the X-ray noise generated during accretion must be affected by the strong-gravity environments surrounding these high-density objects. Such a correlation could then be used as a future probe of high-field gravitational physics.

Scientific Disciplines Selected by Student: PH

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6029

Word Count

279

Proj. Title: Rowing and Ergometers

Proj. Num: 6029

StudentName(s): R. Joseph

### Abstract:

The purpose of this experiment was to determine the effects of height/weight/BMI of the rower, drag factor, and power measured in watts on the speed of a boat, measured in minutes per 500 meters on an ergometer in order to determine the best conditions for boat speed. Four test subjects of various sizes were tested to determine which variables resulted in the lowest split time. The variable that causes the lowest split, or time per 500 meters, from each experiment was considered the ideal condition. The splits of the rowers were tested against each other for their physical aspects such as weight, height, and BMI. Additionally, each rower was independently tested while varying the drag factor and finding the wattage, or power, that was necessary to achieve certain splits. The results show that the ideal conditions for a rower's physique is for him or her to be tall and have a high muscle mass, because the heavyweight athletes, who are taller and heavier than the lightweight athletes, had the best splits overall. Also, the ideal drag factor is as low as necessary, because when the drag factor was set to the lowest option measured in this experiment, the splits were the best for all of the athletes. Lastly, the results show that lower splits are directly related to a higher wattage. Based on the results, the ideal conditions for a fast boat are tall, muscular rowers, very little to no added drag factor, and high power supplied by the athletes. However, when these results were applied to physics and other factors of rowing were considered, the results could be interpreted from a more practical viewpoint (see conclusion).

Scientific Disciplines Selected by Student: PH

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6030

Word Count

270

Proj. Num

6030

Title: Significance of Supernovae on Nearby Near-Supernova White Dwarves

StudentName(s): E. Khan

### Abstract:

This study observed the effects of supernova on nearby white dwarves – the precursors to Type Ia supernova. By observing patterns and tendencies in the far reaches of the cosmos, scientists here on Earth will be better able to predict terrestrial physical behavior. The hypothesis for this project is that supernovae will act as facilitators to nearby near-supernova white dwarves and cause them to go supernova as well. In the D.A Green 2009 Supernova Remnant Catalog, compilers have observed 274 supernova remnants found in the Milky Way and the LMC, a small satellite galaxy of the Milky Way. Regions of the night sky were divided into 6 quadrants, each quadrant being either 45 or 90 degrees in size. The distance between supernova remnants in each quadrant was determined using their Right Ascension and Declination and estimated depth values given by the Green 2009 Catalog. By sorting the SNr according to their proximity in the night sky, it was possible to determine if older supernova may have been responsible for other, newer supernova within their respective quadrants. After results have been collected, there is an insufficient amount of compelling evidence to suggest a correlation between proximity of supernova and their frequency. Out of the 274 SNr, 35 were found to be within a distance to have any sort of effect on each other, and a significantly smaller amount were found to be “neighbors.” However, quadrants that had more “hits” among their supernovae tended to have a larger amount of supernova than quadrants with less hits among their supernovae. While causation cannot be determined, this may provide an avenue for further investigation.

Scientific Disciplines Selected by Student: PH

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6031

Word Count

267

Proj. Num

6031

Title: The Investigation of the Role of Methylating Bacteria in the Reintroduction of Mercury into Long Island Sound

StudentName(s): A. Haley

### Abstract:

It is hypothesized that cyanobacteria methylation of fixed mercury in the sediments of Long Island Sound promotes a reintroduction of mercury into the water column. To determine this, seventy-two sediment samples were collected and analyzed from seventeen sites in Long Island Sound using a ponar grab and from fourteen sites in Ash Creek. Associated water samples were taken one meter from the surface and one meter from the bottom of each site as well. For analysis preparation, sediment samples were lyophilized for twenty-four hours at approximately -48 degrees Celsius at about 0.150 mBar. Post-lyophilization, sediment samples were ground with a mortar and pestle into a fine powder. A standard curve was constructed for a mercury analyzer with a mercury fish tissue standard. Sediment samples were run on a mercury analyzer. The samples from site 3 taken in Ash Creek displayed concentrations of mercury less than 0.160 mg/kg in sediment samples but elevated concentrations of mercury in the corresponding cyanobacteria sample which were greater than 0.180 mg/kg. At site 11 in LIS, the mercury concentration of the sediment sample was 0.1983 mg/kg which is significantly lower than the mercury concentration of the corresponding cyanobacteria sample, which was 0.2396 mg/kg. A regression analysis of the sediment samples versus the associated cyanobacteria samples displayed an R value of 0.9439. The corresponding water sample taken one meter above the bottom of site 11 displayed a mercury concentration of 0.0005 mg/kg. The presence of mercury in the corresponding water sample and the elevated mercury level in the corresponding cyanobacteria sample support the stated hypothesis.

Scientific Disciplines Selected by Student: BI CH EA EM EV MI

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6032

Word Count

303

Proj. Num	Title:
6032	Design of a Smart Brick with Improved Insulation and Intuitive Reflection of Sunlight

StudentName(s): L. Noskin

**Abstract:**

Modern systems designed to regulate the temperature of homes are significant consumers of energy. Studies have explored ways to conserve energy while using such systems, including improvement of the insulative properties of building materials. Brick is a common building material with a low insulative efficiency of 0.030m<sup>2</sup>kw. As the home's interface to external sunlight, an improvement in brick's insulative value and reflective properties as a function of external temperature is highly desirable. This research investigates improvement in the insulation value of clay bricks, to create an intelligent, energy efficient building material that will maintain its integrity/strength, while reflecting more sunlight during summer months. To produce the smart brick (SB), 2g of coffee grinds were added to 110g of clay, molded into a 206 cm<sup>3</sup> brick, and heated to 1200oC for 1 hr. The insulative properties of the SB were evaluated via Peltier heating/cooling. Results indicate that the SB's temperature rose by 14oC upon heating the opposite surface from 22 -103oC, while a normal brick rose by 24oC under the same conditions. SEM analysis suggests that increased insulation of the SB is due to small pockets of air within the structure. SEM images also reveal 1000µm cavities on the SB's exterior, which provides the material with its intuitive property. UV/Vis reflectance analysis of the SB's exterior reveals 31% Reflectance (at 750nm) at 17oC, compared to 68%R for the normal brick. The exterior cavities act as collection spheres for sunlight, allowing the material to capture more heat at lower temperatures. As the temperature of the SB is increased to 52oC, the exterior expands and the cavities become less shallow, allowing the material to reflect more sunlight (39%R). Hardness analysis demonstrates that the coffee-based clay is equivalent in strength, with a breaking force of 252N, compared to 264N for normal clay.

Scientific Disciplines Selected by Student: AT EN ET EM

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6033

Word Count

171

Proj. Title: NGC 2194: Clues to Stellar Evolution

Proj. Num  
6033

StudentName(s): K. Adler

**Abstract:**

In this study, open cluster NGC 2194 was analyzed in order to gain more insight on the evolution and the behavior of open star clusters. The properties of the cluster that were discovered were the distance NGC 2194 is away from Earth, the diameter of the cluster, the mass of the cluster, the age, and whether or not NGC 2194 is bound by gravity. It was determined that NGC 2194 is 4,845.32 light years away, 67.84 light years across, and 172.8 solar masses. Additionally, it was found that NGC 2194 was between 300 and 320 million years old and that the evaporation time of the cluster was  $1.108 \times 10^{10}$  years old. The evaporation time of this cluster is abnormally long for an open cluster since most known open clusters usually have far shorter evaporation times. This raises several questions such as whether NGC 2194 is bound by gravity, and the impact that a known open cluster bound by gravity will have on the field of astronomy as a whole.

Scientific Disciplines Selected by Student: PH

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6034

Word Count

245

Proj. Title: Driving to School is Exhaust-ing

Proj. Num  
6034

StudentName(s): D. Ziegler

**Abstract:**

The purpose of the conducted experiment was to see how car usage adversely affects the environment, including carbon dioxide and nitrogen oxide emissions. The experiment went more in depth as to how the day of the week affected those who were driven to school. It was discovered that there was no significant difference between day of the week and the amount of cars that were driven to school. Besides recording the amount of cars at the school in the morning, one must investigate the average bus and car commute to the school. After a couple of conversion, the amount of carbon dioxide and nitrogen dioxide released into the air per morning could be calculated. The purpose of that experiment was to test the effects of mode of transportation on the amount of pollutants emitted. Every day, there were about 323 cars driven to school. Although this is only about one third of the school's population, the 323 cars emitted about 0.58 pounds of unnecessary carbon dioxide and 0.58 pounds of unnecessary nitrogen oxide. The bus only emitted 0.21 pounds of carbon dioxide and 0.22 liters of nitrogen oxide. Per day it was discovered that 0.37 more pounds of carbon dioxide are omitted into the Earth because people do not take the bus. Also per day cars emit 0.36 more pounds of nitrogen oxide than necessary. This proved that the amount of cars driven to school produce more unneeded carbon dioxide and nitrogen oxide than necessary.

Scientific Disciplines Selected by Student: EM EV

**Scientific Disciplines**

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**Fair Categories**

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6035

Word Count

203

Proj. Title: The Overtones of String and Woodwind Instruments

Proj. Num  
6035

StudentName(s): A. Orlando

**Abstract:**

Purpose: To determine what type of instrument (string or woodwind) produces more overtones. Hypothesis: String instruments produce more overtones than woodwind instruments. Procedure: Use tuning fork to find a common pitch for instruments. Use oscilloscope to measure the overtones in each step. An oscilloscope shows the visual of the waveforms. Use the screen shot of the wave patterns to compare. All instruments are in the same pitch. Play C note on guitar, stand-up bass, flute, and clarinet. Play A note on guitar stand-up bass, flute, and clarinet. Analysis: Out of the four instruments that were tested, all of the instruments produced the same frequency for the two notes that were played. (This was due to the fact that no matter what note is played; all instruments have the same pitch). Overtones are the parts of any pitch. All overtones occur naturally in specific ratios to the fundamental pitch or base note. Conclusion: The result of the experiment did prove that my hypothesis was correct, because according to the data the two string instruments were the instrument that produced the most overtones. This is because, the frequency that produced the resulting wave (is the fundamental pitch plus the overtones) have more interference.

Scientific Disciplines Selected by Student: PH

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

Word Count

249

6036

Proj. Title: Finding the Perfect Basketball Shot

Proj. Num  
6036

StudentName(s): A. Devin

### Abstract:

Finding the Perfect Basketball Shot Alyssa S. Devin Guilford High School, Guilford, CT

Speculations exist regarding what release angle should be used to result in an accurate basketball shot. The purpose of this project, Finding the Perfect Basketball Shot, was to find a precise release angle. The hypothesis for the experiment is, "If a basketball is released at an angle between  $50^\circ$  and  $70^\circ$ , then the shot will be more accurate because a higher release point will cause a higher trajectory which will result in an ideal, or close to an ideal shot." To test this hypothesis, ten players shot ten shots from three different release angles (low, middle, and high). The shot accuracies were recorded, and photographs and videos were taken to capture the player's release angles, which were then measured. The data collections from the three release angles show that the middle release angle was the most accurate with a range of 30% to 100%. The high release angle was next with an accuracy of 0% to 50%. The low release angle was least accurate, at 0% to 20%. The middle release angle covers the angles that range from  $50^\circ$  to  $71^\circ$ . The hypothesis for this experiment was supported, and the theories from the literature search support the outcome of this experiment because it was predicted that a  $52^\circ$  angle would provide the most accuracy. In this experiment, that  $52^\circ$  angle fell under the category of a middle angle which was proven to be the most accurate.

Scientific Disciplines Selected by Student: AT MA PH

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6037

Word Count

271

Proj. Num

6037

Title: Geometrical Symmetry Analysis of Skeletonema costatum Amorphous Cell Structure

StudentName(s): G. Garcia

### Abstract:

The *S. costatum* is a common species of diatom native to coastal waters around the world. The diatom is typically seen to grow in chains or colonies. Each cell is conjoined by long processes or marginal spines to form filaments. Like every other diatom species, *S. costatum* contains a frustule (cell wall), the main component of the silica structure. Within the frustule, just after cell division the Silicon Deposition Vesicle (SDV) forms and expands constructing complex radial symmetrical shapes of areola (pores), spiral processes (ribs) and girdle bands called cincture. In depth analyzes of *S. costatum* amorphous silica leads to achieving an improved method of harvesting the diatom's exoskeleton as a panel for solar energy. Analysis of SEM (Scanning Electron Microscope) imagery including, length: width ratios of individual areola, the average count and the relative distribution angles of the areola interprets *S. costatum*'s frustule geometry. Examining the *S. costatum* in girdle view around the cylindrical can shape of the diatom at 20000x magnification, exposed significant asymmetrical alterations. The following width: length ratios and angles represent volume size and shape; .88µm, 87°: .86µm, 2°, .92µm, 6°: 0.79µm, 86°, 0.94µm, 86°: 0.93µm. The angles help construct the model formation of the diatoms structure. Observations under the SEM display the areola of *S. costatum* to follow a pattern of a hexagonal outline within seven individual pores; a closer look defines an arrangement of growth not yet understood. Interpreting the intricate mold of the areola in *S. costatum* can help understand how this growth pattern forms during the pre stages of cell division that can be applied to solar panel construction improving solar energy efficiency.

Scientific Disciplines Selected by Student: EN ET EM EV MA

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6038

Word Count

251

Proj. Title: Feasibility of Identifying Different Auditory Qualities in Violas Via Audacity

Proj. Num  
6038

StudentName(s): J. Curtis

### Abstract:

The purpose of this was to determine whether or not a computer programme called Audacity can differentiate between a Stradivarius and violas of unknown quality. If this worked, it could be used as a tool in the instrument-buying process. Background research for this project was done by looking at similar studies involving violins and various programmes in place of violas and Audacity, which did not show promisingly conclusive results. This was tested by importing audio tracks of 22 violas into Audacity and using the programme's "plot spectrum" feature to run an analysis on each track individually. This produced a graph (Hz vs dB), and the dB value at several Hz marks (86 Hz, 100 Hz, 200 Hz, 300 Hz, 500 Hz, 1001 Hz, 2004 Hz, 3995 Hz, 7006 Hz, and 20033 Hz) were recorded. These results were used to run a statistical analysis, which measured z-scores from both the mean and the Stradivarius' results, and was used to create a line of best fit in a scatter plot. This line ended up being above the Stradivarius's values, although the Stradivarius was not the instrument with the lowest values, overall. The biggest issue with this was that some of these recordings had to be converted to match the dB and bit value of the others. This research did not show particularly conclusive results. The results of the Stradivarius were below the mean, but not minimum values. This implies that Audacity is not a good tool in measuring quality of violas.

Scientific Disciplines Selected by Student: MA PH

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6039

Word Count

221

Proj. Num

6039

Title: Are Wind Turbines Big Fans of Clean Energy: The Role of Blades in Power Generation

StudentName(s): J. Tung

**Abstract:**

Wind is a renewable source of energy and wind turbines do not pollute our environment. They also do not emit gases that cause acid rain and the greenhouse effect when they convert kinetic energy into electricity. This project investigated how the number of blades, their profile and their pitch angle affect the power output of a wind turbine. Each factor was analyzed separately and the best of each case was combined and evaluated to verify the optimum power generated. In each analysis, the voltage was taken to determine the best factor. The combination of the best factors was tested to assess its efficiency. This was done by measuring the number of revolutions the blade of the wind turbine made in one minute. Using this value, the tip speed of the blade was calculated and compared with the wind speed of the fan to find the tip speed ratio. As a point of reference and for comparison purposes, experimental trials were conducted on different blades profiles that were set at various pitch angles. This study shows that the configuration of the best factors generated the maximum power output for the wind turbine. With the price of fossil fuel skyrocketing and the demand for energy ever growing, the technology to harness the wind efficiently has become both beneficial and essential to our society.

Scientific Disciplines Selected by Student: AT EE ET EM PH

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6040

Word Count

252

Proj. Num

6040

Title: Cantilever Vibrational Amplitude at Resonant Frequencies

StudentName(s): J. Hyde

### Abstract:

A differential mathematical model was developed to predict the resonance frequencies and the shape of the amplitude for cantilevers, or flat beams, of uniform and non-uniform width fixed at one end. Sample cantilevers, nine of uniform width and six of non-uniform width, were cut from sheets of thin aluminum. The resonance frequencies of the samples were determined using Fourier Analysis, and the damping coefficient from the difference between observed and predicted frequencies. Shape of the amplitude at the measured frequencies was determined using the optical lever technique to measure the deflection angle at several points along the length of the beam, since the change in amplitude is proportional to the change in beam deflection. Findings were that resonance peaks corresponded well with those predicted by the model, but that the measured peaks tended to systematically shift lower than those predicted, possibly a result of air resistance. Relative amplitude measurements match predicted values well for first resonance, however the data suggest that incorporating a damping coefficient to represent the effects of air resistance would make the model more accurate. Data for second resonance show a sinusoidal anomaly that is not accounted for in the model, or in prior research. Conclusions are that the model accurately predicts the amplitude shape of cantilevers at first resonance. Future research should investigate more thoroughly the higher resonances, where low amplitude made testing difficult, to determine the nature of the anomaly and explore a greater variety of cantilever shapes to ensure the validity of the model.

Scientific Disciplines Selected by Student: EE PH

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6042

Word Count

243

Proj. Num

6042

Title: Alternative Materials Substituted for Wood in Acoustic Guitars

StudentName(s): J. Morris

### Abstract:

People have been making music for thousands of years. Over the years the guitar has been tweaked, changed and improved. Unfortunately, mass produced guitars require a significant amount of wood. By finding a material that would be more efficient than wood, this will create a better tone and spread sound better more efficiently. In addition developing a better material than wood could drastically improve the already good mode of sound distribution and tone quality from a guitar. The different materials will be tested by making different rigs to emulate a guitar. Various materials will be tested such as plastic, metal, rubber, cork, Styrofoam, synthetic woods and wood as a control. It will be tested for 3 different aspects: sustain intensity and purity, in order to find the perfect wood-substitute. The sound will be recorded via a microphone and saved into my computer. After it is saved it will be imported into a program, called Audacity or Wavasur which both are audio editing soft wares. I predict that a synthetic wood like material or the cork material would be the best wood substitution. Cork comes from a cork oak tree and has many similar properties to wood. Unlike wood, cork is harvested while the tree is still alive and is not full cut down. That makes it so that the tree can produce countless amounts of cork bark which is turned into cork. Better the tonal quality and better sound produce in general.

Scientific Disciplines Selected by Student: EE EN

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6043

Word Count

211

Proj. Num

6043

Title: The Interaction of Glucose with Transition-Metal Complexes of the Ligand Tris (2-aminomethyl)amine

StudentName(s): K. Hora

### Abstract:

Cellulose, a natural polymer consisting of glucose monomers, is the most abundant organic compound on Earth. If this polymer was solubilized and hydrolyzed to release the glucose monomers in a simple and cost-effective way, world hunger would be effectively eliminated. This research was directed toward determining the ability of transition-metal ions to bind with glucose in order to effect the solubilization of the cellulose polymer. In order to determine the actual binding site of the copper complex with glucose, attempts were made to grow single crystals of transition-metal-tren-glucose complexes by dissolving equal amounts of copper, tren, and glucose in water, but they were overall unsuccessful as the solution formed an extremely viscous fluid and failed to fully dehydrate. Copper-tren was reacted with glucose solutions of various molarities and spectrophotometric data were obtained. The data were analyzed using linear regression and Beer's law to obtain a value for the equilibrium constant of 1.5 for the reaction (in the presence of 1.0M NaOH)  $Cu(tren)(H_2O) + glucose \rightarrow Cu(tren)(glucose) + 2H_2O$ , where tren is the quadridentate ligand tris(2-aminoethyl)amine. This result demonstrates the viability of the copper-tren complex in solubilizing the cellulose polymer. In future studies, similar ions can be investigated using similar methods.

Scientific Disciplines Selected by Student: CH

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6044

Word Count

235

Proj. Title: The Power of Domes Geodesic Domes Versus Flat Panels: Solar Efficiency

Proj. Num  
6044

StudentName(s): D. Giebisch

**Abstract:**

Recently, solar energy suppliers have required large areas of land to generate commercially viable amounts of energy. This study aims to determine whether it is possible to solve this problem by placing solar panels on geodesic domes. It is hypothesized that, given a fixed surface land area, the amount of volts generated per day on a geodesic dome would be greater than that on a flat panel array. The independent variable was the type of solar panel array: geodesic dome with eight flexible solar panels distributed over it versus the same number of panels configured in a flat array. Using a voltmeter, the panels in each array were measured on an hourly basis, for a total of 8 hours. This process was repeated for 3 days. The data is calculated to compensate for the difference in land surface area between the two arrays. The dependent variable consisted of the energy generated per surface area of land using each solar panel configuration. Data suggested that solar panels placed on geodesic domes required roughly half the land mass to generate the same amount of electricity as solar panels placed on a flat array. This experiment indicated that the distribution of solar panels on geodesic domes doubles the output of solar power, permitting a more ecologically efficient usage of limited space. Such efficiencies could then be translated into more ecologically sound land management strategies for the construction of solar farms in densely populated and forested areas.

Scientific Disciplines Selected by Student: EE EN ET EM EV

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6045

Word Count

324

Proj. Title: A Hidden Treasure; Dehumidification of Air Improves Indoor Air Quality

Proj. Num  
6045

StudentName(s): S. Bramante

### Abstract:

In recent years, indoor air quality has become a major health consideration. Poor ventilation of indoor air pollutants originating from the burning of oil and gas, second-hand cigarette smoke (SHS), and out gassing of volatile organic compounds (VOCs) from household items has lead to high pollutant concentrations that linger for prolonged periods. There are many types of air cleaners that can reduce the concentration of indoor particulate and biological air pollutants, however their effectiveness against gaseous contaminants is limited. Since elevated humidity enhances indoor air pollution, examination of a device which reduces water content in the air while removing indoor pollutants is desirable. This research investigates the use of dehumidification (DH) of indoor air to remove contaminants of butane and SHS. 350 ml samples of butane were each loaded into an airtight, 296 L Chamber, at 39, 57, and 88% RH, and filtered for 3 hours using a small-scale commercial dehumidifier. Periodic GC and FTIR analysis of the chamber gas reveals a 4.2 µg/ml per hour reduction of butane, with as much as a 74% decrease of the initial 3 µg/ml butane content in the first 30 minutes of filtration, and 88% reduction in 3 hr. This remediation was independent of starting relative humidity. Similar experiments were carried out with SHS from 2 Fortuna cigarettes, containing 26 mg of tar, and 2 mg of nicotine. Both cigarettes were burned in the airtight chamber at varying humidities. GC analysis of the gas over 4 hr of DH reveal that as much as 56% of light hydrocarbon byproducts were removed at 90%RH; 96% was removed at 57%RH. Efficiency of tar and nicotine removal varied with the contaminant's solubility in water. GC analysis of the DH filtrate indicates that removal of water-soluble nicotine was 99% efficient in 4 hr at 90% RH, while removal of insoluble tar was most efficient (55%) at 57%RH in the same time period.

Scientific Disciplines Selected by Student: AT CH EN EM EV

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6047

Word Count

250

Proj. Title: Liquid Magnets

Proj. Num  
6047

StudentName(s): C. Thompson

**Abstract:**

Ferrofluid is a magnetic liquid, created through a combination of heating, bonding, and evaporating. It is made up of many different liquids, two of the primary ones being kerosene and oleic acid. For my science fair, I attempted to, and succeeded in creating ferrofluid. Once this was done, I then altered the amounts of oleic acid and kerosene to observe any possible changes in the fluid. I hypothesized that by altering the amounts of each liquid, I could alter the magnetic strength and speed of the fluid. I began by altering the amount of kerosene, starting from 0mL's and increasing by increments of 20mm. As the amount of kerosene was increased, the reactivity increased to the point that the strongest fluid reacted to a magnetic field being applied 3.5cm away. The second alteration was in the amount of oleic acid stirred into the ferrofluid during the heating process. As more oleic acid was added 1mL at a time, the fluid became stronger, strong enough to suspend 327g of mass at its greatest, containing 6mL. A combination of 140mL of kerosene and 5ml oleic acid produced the greatest results, being so strong that the fluid was able to suspend 312g of mass in the air. In conclusion, I found that the reactivity of ferrofluid can be greatly altered by adding more kerosene and oleic acid, which can have an effect on many industries. In fact, ferrofluid is used in everything from NASA probes, to sports cars, even in speakers and headphones.

Scientific Disciplines Selected by Student: CH

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6048

Word Count

346

Proj. Title: Image Resolution Loss for Dummies

Proj. Num: 6048

StudentName(s): S. Patel

### Abstract:

The purpose of this experiment was to find how much resolution, in pixels per centimeter, was lost through different image manipulations. The hypothesis stated that a .tif image, when undergoing a cut and paste from GIMP to Photoshop, will lose the least pixels because the .tif image is created to lose minimal data. The average differences of saving a .jpeg five times, using the 'Save As' feature on a .jpeg, copy and pasting a .jpeg image from GIMP to Photoshop, and rotating a .jpeg by 90° were individually 2.54x2.54 ppc. The average differences for saving a .tif five times, using the 'Save As' feature on a .png, copy and pasting a .png image from GIMP to Photoshop, copy and pasting a .tif image from GIMP to Photoshop, rotating a .png by 90°, and rotating a .tif by 90° were individually 0x0 ppc too. The average loss for saving a .png image five times was .9144x.9144 ppc while the average for saving a .gif image five times was 2.032x2.032 ppc. The average difference of using the 'Save As' feature on a .tif was 1.9304x1.9304 ppc while performing the same manipulation on a .gif was lower at 1.1176x1.1176 ppc. Copy and pasting a .gif image from GIMP to Photoshop lead to a 5.08x5.08 ppc average difference. Lastly, rotating a .gif by 90° resulted in an average difference of 2.2352x2.2352 ppc. There was only one specific trend shown by the data. The trend for .jpeg image files was they always lost 2.54x2.54 ppc. However, the .tif and .png files lost almost no pixels, so it's safe to say they barely lost pixels as a trend. Only in one I.V. set did they have more than an average difference of zero. The trend of the .tif file being cut and pasted from GIMP to Photoshop supported my hypothesis. The file and its specific manipulation did not lose any pixels throughout the twenty-five trials that had been performed. The significance of the experiment was to explore the possibilities of specific image formats losing resolution once undergone different image manipulations.

Scientific Disciplines Selected by Student: AT

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6049

Word Count

266

Proj. Num

6049

Title: An Organic Thin Film Transistor and Elastic Organic Solar Cell Based Electronic Skin for Biochemical and Tactile Sensing

StudentName(s): R. Ishizuka

### Abstract:

Organic Thin Film Transistors (OTFTs) are low-cost and scalable electronics with versatile applications. Yet practical use of OTFTs has been limited by their rigid substrates and dependence on external power sources. This study demonstrates flexible OTFT pressure sensors powered by reversibly elastic Organic Photovoltaic Cells (OPVC), which may serve as electronic skin mimicking tactile sensing for artificial intelligence. Compressive strains were applied to a PDMS elastomer of OPVCs with e-GaIn liquid metal top contacts and novel grapheme oxide base layers, creating elastic film buckles. PDMS substrate and thin film thicknesses were analyzed by Multiple Interface Spectral Reflectance, Scanning Electron Microscopy, and Energy Dispersive X-Ray Spectroscopy to optimize outputs. Elastic OPVCs generated 0.42V while stretched to 120%, paralleling production from conventional rigid OPVCs. Compression of the PDMS dielectric in OTFT pressure sensors produced changes in device capacitance and output current corresponding to the applied pressure. Sensitivity was maximized with varying substrates, organic semiconductors, and electrodes. OTFTs detected minute pressures of 500 Pa with rapid response times of 0.2 seconds. Adaptability of OTFT applications was demonstrated through a biosensor OTFT with laminated flow cell that converted the binding of biomolecules to changes in electric current. Label-free detection of trace elements of biotin and sodium dodecyl sulfate was achieved. Bilayer organic semiconductor architectures with CuPc surface passivation and charge injection films with pentacene active layers allows for the further incorporation of multiple analyte discriminating sites. The novel elastic, collapsible, mechanically robust, and self-sufficient devices promise the integration of OPVCs and electronics on the non-planar surfaces of textiles, body organs, vehicles, and collapsible displays.

Scientific Disciplines Selected by Student: AT CH EE EN ET PH

### Scientific Disciplines

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6050

Word Count

226

Proj. Title: The Effect of Water Current Direction on Turbine Productivity

Proj. Num  
6050

StudentName(s): S. Purdue

**Abstract:**

The purpose of the experiment was to discover the effect of angle or direction of a propeller in a water current on the efficiency underwater. The hypothesis stated that the angle of the propeller that would directly face the current would be the most productive. Through the use of a plastic container and tubing, a drill, a pipe, and other materials, a water tunnel was created. A propeller was placed at different angles to the flow of water, and rotations for every 10 seconds were counted. This was repeated for various trials. After the data was compiled, a trend supporting the hypothesis was shown. The angle directly facing the current, while not the angle with the highest overall average, was part of a grouping of the closest angles. The angle that faced the propeller on its side directly into the current did not produce any rotations. The more the angle faced the propeller into the current, the more rotations were generated. There was some experimental error generated, due to resources available. The experiment has application in the creation of hydrokinetic power, where tides and currents are used to generate electricity. The ability of the propeller to be consistently productive at many angles in a current allows for many places where a current may change direction frequently to still be used as a source for renewable energy.

Scientific Disciplines Selected by Student: EE ET EM PH

**Scientific Disciplines**

**Fair Categories**

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
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EA = Earth Science	PH = Physics & Astronomy
EB = Engineering: Materials & Bioengineering	PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6051

Word Count

268

Proj. Num

6051

Title: The Analysis of the Spatial Variation of Chromium, Copper, and Lead in Long Island Sound, Black Rock Harbor, and Ash Creek

StudentName(s): D. Kingston

### Abstract:

The spatial variation of copper, chromium, and lead is being investigated in the greater Black Rock Harbor and Ash Creek areas. During the 19th and early mid-20th centuries, industries discharged large amounts of heavy metals into the Sound and its tributaries as byproducts of manufacturing processes. Historically, Black Rock Harbor was the location of the Bridgeport Copper and Sulfuric Acid Works and while the release of heavy metals into waters has been prohibited, the data indicates that in various areas, the levels of concentrations are elevated. Ash Creek and Black Rock Harbor flow into Long Island Sound. The flow of the waters would transport the heavy metals, potentially increasing the concentration of lead, copper, and chromium between the Harbor and Creek in Long Island Sound. Determining the concentration and distribution of copper, chromium, and lead in the sediment of Black Rock Harbor and Ash Creek is important because this data will assist Harbor planners develop dredging protocols and shellfish managers determine suitable shellfish bed areas. Sediment samples were taken with a ponar grab, placed in sample cups, and put into the freezer. The samples were then placed on to watch glasses and put into the oven dryer for 24 hours. They were ground with a mortar and pestle, prepped for microwave digestion, and then analyzed by an atomic absorption spectrophotometer. When the concentrations were determined, a map was constructed, showing the pattern of heavy metals in the Black Rock Harbor and Ash Creek areas. This data supports the hypothesis that heavy metal spatial variation is dependent on the flow patterns of Ash Creek and Black Rock Harbor.

Scientific Disciplines Selected by Student: CH EA EM EV

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6052

Word Count

254

Proj. Title: Paper Battery: A Viable Lithium-Ion Battery Technology

Proj. Num  
6052

StudentName(s): W. Picoli

### Abstract:

With increasing demand for low-volume, high-performance output energy sources, lithium-ion batteries based on copier-paper substrates offer a unique solution to energy demand. Using existing lithium ion battery components in a novel procedure, a series of paper batteries were fabricated. In order to objectively determine the optimal battery configuration, the procedure incorporated multiple battery constructions with varying materials and dimensions to optimize the physical fabrication process and achieve ideal characteristics. Utilizing a customized multimeter, data including voltage, current, and resistance (after calculation) were discovered. The first generation of batteries, fabricated with common lithium-ion electrodes and LiPF<sub>6</sub> electrolyte yielded a maximum voltage of .75V and a current ranging from 11 to 21 mA. The second generation battery with the same materials but different dimensions yielded even greater results, with voltages peaking at .85V and an average current over 20 mA. With this new generation battery there is much greater potential for increases in voltage and current and decrease in resistance over time. A third generation of batteries will focus on changes in dimensions of both the battery and the separator, with two batteries constructed with  $\pm 20\%$  surface area. These results will provide a much greater insight into the greatest performance that can be achieved in paper batteries and in ideas for future research. Paper batteries, with improvements over time, lend themselves to situational requirements for sustainable energy with minimal volume. In the future, paper batteries may allow for paper to be the substrate for technologies such as paper displays and devices.

Scientific Disciplines Selected by Student: AT CH EE EN ET

### Scientific Disciplines

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EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



**Proj. Num** Title: The General Equation of the Sum of Power Series

6053

**StudentName(s):** X. Yu

**Abstract:**

My Topic of the Science Fair is to find a general equation of the sum of power series.  
The sum of power series is defined as:

$$S_k = \sum_{n=1}^k x^n = 1^n + 2^n + 3^n + \dots + k^n$$

$n = 1, 2, 3 \dots$  and  $n = \text{constant}$

The paper will show Bernoulli's way to find the general equation of The Sum of Power series, and it will show a new way to prove the general equation. The concluding mathematical expression is different, but it will yield the same answers as the Bernoulli form.

I use the equation

$$\sum_{i=1}^k x^n - \sum_{i=1}^{k-1} x^n = k^n$$

And the Binomial Theorem

$$(a + b)^n = \sum_{i=0}^n C_n^i a^i b^{n-i} \text{ where } C_n^i = \frac{n!}{(n-i)! i!}$$

And I find the sum equations which is

$$\sum_{i=1}^k x^n = \sum_{i=1}^{n+1} \sum_{\alpha=1}^{p-1} (-1)^{p+1-\beta} \frac{a'_\beta}{(p+1-\beta)!} \frac{n!}{(n+2-p)!} k^{n+2-p}$$

Where  $a'_1 = 1$   $p \geq 2$

Compare it with Bernoulli's conclusion

$$S_p(n) = \sum_{i=1}^p \sum_{j=0}^{i-1} (-1)^j (i-j)^p \binom{n+p-i+1}{n-i} \binom{p+1}{j}$$

The new way is much easier to understand, but takes more work.

**Scientific Disciplines Selected by Student:** MA

**Scientific Disciplines**

**Fair Categories**

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

- |                | Life Sciences | Physical Sciences |
|----------------|---------------|-------------------|
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6055

Word Count

308

Proj. Num

6055

Title: Can the Concentration of Sugar Dissolved in a Liquid be Determined by Using the Index Of Refraction of the Solution?

StudentName(s): M. Chapman

### Abstract:

This experiment was conducted to determine whether the index of refraction can be used to measure the concentration of sugar in liquids. Sugar concentration of a liquid has an effect on its index of refraction. A solution with a greater concentration of sugar will refract the light beam more. If the index of refraction for the liquids tested: Coca Cola Classic, Diet Coke, Mountain Dew, Ginger Ale, Apple Juice, and Grape Juice, is measured, then Grape juice will have the highest index of refraction because it has the highest sugar concentration. Baseline measurements of index of refraction for known amounts of sugar solutions: 0%, 5%, 10%, 15%, were recorded. Then these measurements and the index of refraction of the test liquids were compared to determine the sugar concentration of the liquids tested. The index of refraction of each test liquid was found using a hollowed-out prism and a laser pointer. The prism was filled with the test liquid and was lined up so the laser went straight through the center of one face. The distance the light was bent by the liquid in the prism was measured and the distance the prism was from the wall. These distances were used to find the angle that the light was bent and this angle was used to determine the index of refraction. In the first part, the index of refraction of plain water, and sugar concentrations of 5%, 10%, and 15% were measured and were used to generate a trend line to show how the index of refraction related to sugar concentration. In the second part, the index of refraction of several liquids with known sugar concentrations was measured; the trend line from the first part of the experiment was used to estimate the sugar concentrations to compare with the known sugar concentrations. Grape juice had the highest index of refraction and the greatest sugar concentration.

Scientific Disciplines Selected by Student: PH

### Scientific Disciplines

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EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6056

Word Count

239

Proj. Num

6056

Title: Production of High Quality Ceramic Coatings for Turbine Applications by Freeze Spray Deposition

StudentName(s): K. Patel

### Abstract:

Currently, ceramic coatings for turbines are used as a protective barrier against changing temperatures and friction. A recent study at the used sintering temperatures as high as 1600°C while using complicated and expensive machinery such as a 3D gantry system and layered slurry coatings.[1] In this study the cost of turbine manufacturing and complexity is cut while maintaining quality of product. In order to achieve this goal, the method itself was simplified by using cheaper deposition techniques and lower sintering temperatures. In addition basic steel washers were used as substrates in the experiment. Protective coatings were synthesized by a Freeze Spray Deposition process where Alumina Zirconia slurries were sprayed by a paint gun onto a stainless steel substrate located above a liquid nitrogen bath. These slurries were made with a mixture of 83% H<sub>2</sub>O and 17% C<sub>3</sub>H<sub>8</sub>O<sub>3</sub> by volume. Solid loadings were added comprised of 65.3% Al<sub>2</sub>O<sub>3</sub>, 32.6% ZrO<sub>2</sub>, and 2.1% Y<sub>2</sub>O<sub>3</sub> by mass. Sintering temperatures as low as 540°C produced granular coatings with poor adhesion. However with a maximum temperature of 816°C, hold times of 4 hours, and slow heating/cooling rates of .54°C/min, coatings were produced with strong surface adhesion presumably to better match thermal expansion coefficients. SEM and EMP results are discussed as well in the study. This simplified process has potential for lower temperature ceramic applications and can be further developed in order to perform in real world applications.

Scientific Disciplines Selected by Student: AT CH EE EN

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6057

Word Count

250

Proj. Num

6057

Title: Isaac's Rebel Fluids: A Study of Non-Newtonian Fluids

StudentName(s): M. Bhuiyan

### Abstract:

Cornstarch mixed with water produces a non-newtonian fluid: it is a liquid when no force or very little force is exerted on it, but it will turn into a solid if one applies pressure to it. A large jar was filled with this fluid, and a wooden manikin attached to fishing line, that was wounded around a pulley, was allowed to sink into the fluid in the jar to a certain depth, while a certain increment of weight was added to the other, free end of the line. The goal was to see how adding force affected the amount of time it would take for the manikin to resurface utilizing different amounts of weight. The answer seems simple, adding more weights will make the manikin resurface quicker, which may be the case in a Newtonian fluid where pressure does not affect viscosity; however, in a nonnewtonian fluid like this, adding pressure makes the cornstarch molecules compact, making it difficult for the manikin to move up, but lightweights that apply less force may allow the manikin to glide through the cornstarch more easily. Additionally, the manikin can be posed in different ways, so in addition to different weights, body position was another IV. The results showed that adding more force actually decreased the time it took for the manikin to resurface; however, a stalemate was reached where the amount of force added made the cornstarch too compact to let the manikin through. After adding even more weight, the manikin passed.

Scientific Disciplines Selected by Student: CH EN PH

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6058

Word Count

252

Proj. Num

6058

Title: A Statistical Analysis of Data Input Methodology

StudentName(s): A. Agarwal

### Abstract:

A major problem students face throughout high school is the weight of a backpack. Students carry heavy backpacks full of notebooks, textbooks, and much more, putting a strain on their backs. The goal of my project was to investigate if there is an alternative that would be more convenient for the students without compromising the quality of education. I compared the environmental and economical impacts of conventional note taking with iPad note-taking. In addition, I compared the weight of notebooks needed everyday with that of an iPad. To my surprise, the use of paper and pen for four years of Hamden High School turned out to be more economical than iPad use. However, an iPad weighs less than notebooks needed everyday. In addition, four years of Hamden High School notes can be conveniently stored and accessed on an iPad while it would require 44 conventional notebooks for the same amount of notes. An iPad will also emit 104 pound less carbon dioxide in a four years of usage at Hamden High School as compared to that needed to produce 44 conventional notebooks and pens. This method of note-taking can be also implemented to reduce the use of physical textbooks and old classroom televisions, which consume far more electricity than iPad tablets. This analysis indicates that it is slightly more expensive to use an iPad for note taking in the school environment, but it reduces the weight on a student's back significantly, and is less of a detriment to the environment.

Scientific Disciplines Selected by Student: AT CS EE EN EM EV MA

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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CH = Chemistry	ME = Medicine & Health Sciences
CS = Computer Science	MI = Microbiology
EA = Earth Science	PH = Physics & Astronomy
EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6059

Word Count

252

Proj. Title: Innovative design for cellulosic ethanol production as bio-fuel

Proj. Num  
6059

StudentName(s): N. Haddad

### Abstract:

In the hydrolysis of cellulose, a gradual decrease in the rate of the enzyme activity is observed. This event leads to a lengthy process and high enzyme load. My objectives were to verify enzyme inhibition with kinetics study and attempt to create a more efficient and productive process by gradually removing that particular substance. To determine if the inhibition was a result of product inhibition or that the drop in rate was simply due to declining substrate activity, the following test was conducted: the cellulose was incubated in a pH buffer and sampled every two hours by isolating the residual cellulose that did not react, dry it under vacuum, and weigh it to determine the percent conversion. The isolated cellulose was subjected again to enzyme hydrolysis. The data from repeating the experiment 5 times was plotted, and results indicated low inhibition. In comparison to the experiment in which the solvent was not replaced, high level of inhibition was observed after 2 hours. At this stage, I concluded that product inhibition was the problem which was associated with Ethanol formation. Attempt to overcome the inhibition and remove Ethanol under vacuum did not succeed presumably due to high solubility of EtOH in a large volume of water. This study identified that the main cause for enzyme inhibition relates to water-soluble substrate, presumably EtOH, rather than declining substrate activity. With this knowledge, a variety of innovative approaches to effectively remove the inhibitor can be tested, essentially solving the notorious problem of enzyme product inhibition.

Scientific Disciplines Selected by Student: AT BI CH EN ET EM MI

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6060

Word Count

233

Proj. Title: Minimizing Eutrophication Through the Use of Clay and Plastic Lining for  
Manure Lagoons

Proj. Num  
6060

StudentName(s): R. Lee

**Abstract:**

Farmers often store animal waste into lagoons until it is needed for fertilizing crops, forming "manure lagoons". When the commonly used plastic lining of a manure lagoon is damaged by increased weight, the liquid rich with phosphates and nitrates seeps into the groundwater, posing a serious threat to the quality of the water by encouraging eutrophication. This deathly process means excess nutrients lead to algae blooms, which block sunlight from reaching aquatic life deep under the water's surface. Without a main source of energy, aquatic life dwindles in population. Once these effects take place, it is extremely difficult to reverse them and control the leakage. This project is to determine the efficiency of liners using various materials: clay, plastic, and a combination of the two for keeping liquid from leaking out of a model lagoon. Efficiency is determined by comparing the percentage of liquid retained in each model lagoon during a time period of 5 minutes. This is calculated by dividing the amount of leaked liquid by the sum of the leaked liquid and the retained liquid. The hypothesis that a liner made of clay and plastic is most efficient is not supported by the data collected. The efficiency of a clay liner is found to be considerably greater than that of a plastic liner and a liner made of both plastic and clay (100.00% vs. 72.38% and 50.13% of total liquid retained).

Scientific Disciplines Selected by Student: EN EM

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6061

Word Count

248

Proj. Title: Electromagnetic Accelerators

Proj. Num  
6061

StudentName(s): A. Elmore

**Abstract:**

Andrew Elmore 2/29/12 Science Fair Abstract Electromagnetic accelerators are generally considered to be future of weaponry. This project was to construct three small scale models of the different types of electromagnetic accelerators and compare their effectiveness at accelerating a projectile. The Coil Gun work by employing solenoids. When current is run through them they create a magnetic field. When shut off at the proper time the ball should retain its momentum and be expelled from the barrel. To create this I used insulated copper wire, a ball bearing and a power source. A brass tube was used as a barrel. The Rail Gun works using the principles of Lorentz's force. As current runs from one negative copper rail to a parallel positive copper wire by means of an iron armature a force is applied to the armature. This force is then used to propel a projectile. The rails are set in a nonconductive surface. The Linear Magnetic Accelerator uses neodymium magnets and the principles of conservation of energy. Energy increases on a series of projectiles through several elastic collisions. The device contains twelve ball bearings and four neodymium magnets. A brass tube was used as a barrel. My results showed the coil gun to be far too weak and complex to work effectively; the linear magnetic accelerator would also be far too weak and time consuming to be an effective weapon. The Rail gun was shown to be effective, however repeated firing lead to damage to the device.

Scientific Disciplines Selected by Student: AT EE

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6062

Word Count

249

Proj. Title: Propeller Efficiency

Proj. Num: 6062

StudentName(s): R. Kharbouch

**Abstract:**

The purpose of this project is to determine if increasing the chord length of a propeller decreases its efficiency. The hypothesis was; if the propeller's chord length is increased then the efficiency will decrease because increasing the chord length will increase the propeller's mass, which will decrease its air production. This project may help aerospace engineers build an efficient propeller. To test this project, 3 propellers were made with different chord lengths, but same radius and pitch, and then each was attached to a remote controlled plane that was in a tunnel that was 1 meter long, then the remote controlled plane was turned to full throttle and then the speed of the air produced was measured by a wind speed indicator, and then multiplied by the cross sectional area of the tube to find the air produced by cm cubed. Each propeller was tested 3 times. The propeller with the smallest chord length, 2.5 centimeters produced more air flow at 0.269m<sup>3</sup>/second and the propeller with a 3 centimeter chord length produced an airflow of 0.192m<sup>3</sup>/second, and the propeller with 3.5 centimeter chord length produced an airflow of 0.146m<sup>3</sup>/second. The results supported my hypothesis which was, if the propeller's chord length is increased it will not make a propeller efficient, because when the chord length increases it will increase the propeller's mass and weight, which will decrease its air production. To improve the experiment, a digital wind speed indicator and a brushless engine should be used.

Scientific Disciplines Selected by Student: AT EE ET

**Scientific Disciplines**

**Fair Categories**

- |  |   |
|--|---|
| AT = Applied Technology                      | EE = Engineering: Electrical & Mechanical |
| AS = Animal Science                          | ET = Energy & Transportation              |
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| CS = Computer Science                        | MI = Microbiology                         |
| EA = Earth Science                           | PH = Physics & Astronomy                  |
| EB = Engineering: Materials & Bioengineering | PS = Plant Science                        |

- |                |               |                   |
|----------------|---------------|-------------------|
|                | Life Sciences | Physical Sciences |
| 7th & 8th Team | LT            | PT                |
| 7th Grade      | L7            | P7                |
| 8th Grade      | L8            | P8                |
| High School    | LS            | PS                |
| High Sch. Team | LST           | PST               |

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6063

Word Count

288

Proj. Num

6063

Title: Simplified Detection of Aromatic Nitroamine Pesticides and Explosive Precursors using Honey Bee (*Apis mellifera*) Venom Luminescence

StudentName(s): B. Lew

### Abstract:

Detecting dangerous chemicals throughout the various modes of public transportation has become increasingly important in recent years. As researchers struggle to develop new ways of detecting smaller levels of explosives, scientists at MIT have devised a new detection system for small levels of explosives and related compounds using single-walled carbon nanotubes (SWCNT's) coated with bee venom. This method requires difficult synthesis of the SWCNT/bee venom conjugate, and relies on the costly and complex field detection of shifts in the luminescence of the SWCNTs in the Near Infrared (NIR) region. This research instead focuses on the use of bee venom of the honey bee (*Apis mellifera*) alone for simple detection of the same class of explosives in the visible region. Honey bee venom, composed mainly of Melittin, exhibits a strong native fluorescence at 345 nm, with 280 nm excitation. Imidacloprid is an aromatic nitroamine, a commonly used pesticide, and a model for explosives precursors, exhibits a red-shifted fluorescence at 385 nm, using the same 280 nm excitation. When combined with Imidacloprid, the fluorescence of the honey bee venom is quenched by electron transfer between the two molecules in solution, followed by vibrational relaxation of the analyte. A Stern-Volmer plot of the quenching effect of Imidacloprid on honey bee venom was created, and demonstrates that as little as 8.9 ng of pesticide can be detected by only 50  $\mu$ l of  $3.5 \times 10^{-7}$ M Bee Venom (at a cost of less than \$1). This new detection model requires a simple, visible spectrometer-based device, which can be manufactured with LED illumination and visible (eye) detection. A prototype of a portable, LED-based system was created, and easily demonstrates the quenching effect and detection of Imidacloprid in solution.

Scientific Disciplines Selected by Student: AT CH EN EV

### Scientific Disciplines

### Fair Categories

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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EA = Earth Science	PH = Physics & Astronomy
EB = Engineering: Materials & Bioengineering	PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6065

Word Count

166

Proj. Title: Effect of Magnets on a Linear Motor

Proj. Num  
6065

StudentName(s): N. Martinez

**Abstract:**

Linear motors are the future of space travel. Traditional space launches use huge amounts of fuel and extremely large boosters to send a small shuttle into space, while a mass driver runs on electricity and highly reusable. My problem was how does the number of magnets in a Gauss rifle affect the distance traveled. I built a Gauss rifle that used Conservation of Momentum to propel the projectile. I performed three trials going up to five magnets. When I graphed my data I found that the line it formed resembled a square root function. The change in distance decreased as more stages were added. From this I can conclude that if you wanted to attain a high speed using magnets you'd need a lot of magnets. I believe that the reason the change in distance drops is because of air resistance, so future trials could use a vacuum chamber. I could also see how linear motors could apply to everyday life and build and test models.

Scientific Disciplines Selected by Student: ET

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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EB = Engineering: Materials & Bioengineering	PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6066

Word Count

244

**Proj. Num** 6066 **Title:** Revolutionizing Cancer Treatment: A Simulation of Nanocarriers Using Swarm Intelligence for Targeted Cancer Cells

**StudentName(s):** R. Mahmood

**Abstract:**

Existing approaches to cancer treatment are based on either chemotherapy or radiation oncology. Chemotherapy is based on the treatment of cancer regions by antineoplastic drugs which act by killing cells that divide rapidly. Radiation oncology, on the other hand, damages the DNA of exposed tissue. While these techniques are somewhat effective in destroying cancer cells, their damage to healthy cells cannot be controlled. Recent advances in nanotechnology and swarm intelligence offer new possibilities to the targeted elimination of cancerous cells. Swarm intelligence, which is similar to a flock of birds in nature finding a food source, can be used in locating cancer regions. It has been recently shown that magnetic and fluorescent nanocarriers are capable of binding to molecules unique to the surfaces of cancer cells. Furthermore, the transport of these nanocarriers into the nuclei has been proven to damage the DNA, resulting in an arrest of cytokinesis in cancer cells. In this project, we simulate and investigate the behavior of such nanocarriers in targeting cancer regions and specific cancer cells. The targeting process uses swarm intelligence to first locate the general area of the cancer cells. Then the chemical binding of aptamers takes precedence in attaching to the cancerous cell. Our simulation is not limited to a singular cancer region, but can detect and destroy multiple targeted areas. Our simulation model has successfully demonstrated the effectiveness of targeted cancer cell treatment and can be used to further enhance the field of cancer research.

**Scientific Disciplines Selected by Student:** AT CS EN ME

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6067

Word Count

248

Proj. Title: Does Sugar Lengthen the Life of Cut Roses?

Proj. Num  
6067

StudentName(s): E. Curran

**Abstract:**

Title: Does Sugar Lengthen the Life of Cut Roses? Name: Emily Curran (Entry E8046)  
 School: Norwalk High School **ABSTRACT PURPOSE** The purpose of this experiment is to see if adding sugar to the water of cut flowers will help them live longer. Flowers usually die within a few days of being cut because they get their nutrients through their roots from the soil. I wanted to know whether adding some type of nutrient, such as sugar, to the water would extend the life of the flowers. **HYPOTHESIS** If sugar is added to the water of cut flowers, then the flowers will stay fresh longer than flowers without sugar added. **PROCEDURES** I used twelve roses and divided them among four jars. One jar had plain water and the three remaining jars had one, two and three teaspoons of water added in, respectively. The jars were placed in the same room where all received the same indirect sunlight. I observed the flowers each day and took notes. **OBSERVATION** The flowers without sugar lived the longest, and the flowers with the most added sugar died first. **CONCLUSION** When sugar is added to the water, the flowers did not live for a longer period of time. In fact, adding sugar to the water caused the flowers to die sooner, especially with larger amounts of sugar. The results of this experiment might be different if other types of flowers are tested or if another form of sugar was used instead of table sugar.

Scientific Disciplines Selected by Student: PS

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6068

Word Count

220

Proj. Num

6068

Title: Isotropic Versus Anisotropic Violin Sound Post Materials: Affect on Violin Resonance Using Young's Modulus

StudentName(s): S. Skaller

### Abstract:

Playing a stringed instrument sparks the interest of how the sound is made, and what can make it better. The small manipulation of sound post placement transforms the sound, but what happens if the material of the sound post is completely changed? With the help of experienced mentors in the fields of violin making and audio-recording the experiment was made possible. Categorizing each sound post as either isotropic or anisotropic, the materials I chose to use include: Spruce wood, maple wood, carbon fiber, nickel, titanium, PVC, nylon, and polyurethane. After inserting a new sound post consistently inside the violin, I bowed each string of the violin with a consistent pressure and speed inside a professional sound studio. Using a spectrum analyzer, the visual pictures of the sound waves showed the frequencies of the harmonics each string produced with each sound post. An ideal yet implausible sound wave would have consistent peaks of the same height. After gaining the data, I graphed the findings and interpreted them. There were no trends between the behavior of the sound post materials and Young's modulus. The differences between the behavior of isotropic material and anisotropic material were minimal thus drawing conclusions from a musical perspective. Musically, one sound post could produce a bright sounding upper register (maple wood) or a deeper sound (PVC.)

Scientific Disciplines Selected by Student: EE EN

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6069

Word Count

229

Proj. Num

6069

Title: The Effect of Weather on Common Roadside Trash

StudentName(s): A. Valley

### Abstract:

Litter from food packaging, plastic containers, paper products, and metal, make up a significant amount of trash on the roadside. This investigation is to discover what will happen when the litter is weathered, so one may choose a material that if discarded inappropriately, will be less damaging to the environment. If the objects are allowed to be weathered and tested one group per week, then the degradation of the objects that are made of more resilient and tough material will be less apt to degradation because its properties are such that it would be less prone to the affects of weather. During the experiment materials were collected on a weekly basis, then photographed and tested by pulling on them until they broke, measuring their tensile strength. While testing, the hypothesis was deemed not to be very conclusive since the data was irregular so there seemed to be no set pattern of degradation. A set pattern of degradation would be at the beginning the subject would be strong and the strength would decrease as the weeks went on. In conclusion, the data was so randomly that a pattern could not manifest from the data, but on average there was no noticeable degradation for the aluminum pie plate, and most plastic products. The paper products, and the biodegradable doggy bag did show on the average some changes in strength and appearance.

Scientific Disciplines Selected by Student: EM EV

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6070

Word Count

252

Proj. Num

6070

Title: Correlation Between Global Climate Change and America's Gross Domestic Product

StudentName(s): B. Rigby

### Abstract:

The purpose of this experiment was to see if there was any correlation between the United States' Gross Domestic Product and the rise in global temperature. Using valid Internet sites, data was collected on temperature anomalies and the United States' Gross Domestic Product. Data for the predicted impacts on agriculture was also researched. Statistical analysis of this data in the form of a correlation coefficient test. This specific test generates a figure as to the the strength of the correlation between the two sets of data. The test results were from this coefficient test 0.745. This indicates that there is perhaps a medium strength correlation between the two sets of data. In other words, as one increases (global climate) the other increased (GDP). Overtime they both increased but may not support a cause and effect relationship. One problem encountered while researching was the inability to draw a conclusion from comparing the GDP and average Global Temperature. However, data suggests there is some significance to global climate change and the agricultural, tourist, and energy sectors of our economy. In different parts of the country climate change had a positive or negative effect on the agriculture. Through future research collected, the effects that climate change has on the economy specifically agriculture, are shown. During collection of data it was determined that more specific aspects (like agriculture) of our economy could be researched. Perhaps data collected from more specific aspects of our economy could be used in the correlation coefficient test to produce better results.

Scientific Disciplines Selected by Student: EA EV MA

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6072

Word Count

245

Proj. Title: Producing Ceramic Filters with Varying Sawdust Sizes and a Two-Step Process

Proj. Num  
6072

StudentName(s): A. Jahangir

### Abstract:

Worldwide, approximately eighty percent of health problems are caused by contaminated water and 884 million people do not have access to clean water. Ceramic filtration is a mechanism to purify water that is particularly suited to developing nations. The goal of this study is to create environmentally and economically sustainable ceramic filters that business entrepreneurs can produce and sell locally. The ceramic filters in this study were created using a two step process. The bases and cylindrical shells were created separately and then attached together before being fired in the kiln to form the ceramic filters. The base was made with a mix of clay and sawdust with three different sawdust sizes 10-20 mesh, 20-30 mesh and 30-40 mesh. The ceramic filters thus produced were tested through four techniques in order to see which filter had the fastest hydraulic conductivity rate, greatest turbidity reduction, and highest bacteria removal capability. Turbidity reductions were measured using a Micro 100 Turbidimeter. Bacteria removal was analyzed by placing samples of water in liquefied agar in an incubator under controlled conditions and then counting them using a magnifying lens. The filter with sawdust size 20-30 mesh reduced turbidity the most by 28%, had the highest hydraulic conductivity of  $7.72 \times 10^{-6}$  m/s, and the best bacteria removal of 80%. The data led to the conclusion that the filter with sawdust size of 20-30 mesh would be the best for reducing health problems, such as the incidence of diarrhea in developing nations.

Scientific Disciplines Selected by Student: AT

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7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6073

Word Count

165

Proj. Title: The Effect of the Stick Tip Size on the Height of Rebound

Proj. Num  
6073

StudentName(s): A. Willette

**Abstract:**

The experiment that was performed was about the affect of the drumstick tip size (small, medium, large) on the height of rebound. My hypothesis for the outcome of this experiment was that the small drumstick tip would create the most distance between the tip and the head of the drum (highest rebound). The results of this experiment were for the small tip (15mm in diameter) the average height of rebound was 23.77cm, for the medium size drumstick tip (22mm in diameter) the average height of rebound was 26.62cm, and for the large stick tip (29mm in diameter) the average height of rebound was 27.37cm. The trends that were shown based on these results were that the larger the drumstick tip the higher the rebound. In comparison with my hypothesis, the results show that my hypothesis was refuted and not supported by the data. This exeriment was significant in the world of music and will now make drummers better and more competitive based on the results.

Scientific Disciplines Selected by Student:

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6074

Word Count

228

Proj. Title: Catalase & pH Sensitivity

Proj. Num  
6074

StudentName(s): J. Cruz

### Abstract:

Enzymes are protein catalysts that speed up the rate of chemical reactions by lowering a chemical reaction's activation energy. Enzymes speed up the rate of chemical reactions, but are not chemically altered in the process, for this reason they can be re-used many times over. The name of enzymes usually end with the suffix "ase" some examples are: amylase and lipase, which are enzymes used in our digestive system to help us break down food. The enzyme Catalase is abundant in the cell of living organisms. Its job is to patrol the cells and counteract the production of hydrogen peroxide which could be dangerous for our cells because it can mutate our DNA. Our bodies need to maintain a constant pH to survive. pH can affect the way enzymes work in our body. I will be measuring the sensitivity of the Catalase enzyme to the changes in pH by adding solutions with basic and acidic pH. This will be demonstrated by the effervescence (amount of bubbles produced) in the solution. All five test tubes will have 2cm of Hydrogen Peroxide each. Vinegar (acidic pH) and sodium bicarbonate (basic pH) is going to be added in different amounts to test tube #2 (1cm vinegar), test tube #3 (2cm vinegar), test tube #4 (1cm sodium bicarbonate) and test tube #5 (2cm sodium bicarbonate), before the potato cores are added.

Scientific Disciplines Selected by Student: BI CH

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6075

Word Count

276

Proj. Num

6075

Title: Minimizing CO2 Emission in an Optimized Dual-System [Fe][Fe]-hydrogenase Photobioreactor with Carbon Nanotube Composite Membranes

StudentName(s): T. Yang

### Abstract:

Use of [Fe][Fe]-hydrogenase containing algae, such as *Chlamydomonas reinhardtii* (Cr), in an enclosed photobioreactor, commonly referred to as photobiolysis, has the potential to replace conventional hydrogen producing methods which release greenhouse gases. Reactivation of photosynthetic processes within the algae and the inevitable consequences of sulfur deprivation inhibit commercial application of photobiolysis with algae. Carbon nanotube composite membranes of (CNT-PPOdp) are durable, yet flexible, solution-diffusion membranes that allow CO<sub>2</sub> to efficiently diffuse out of a mixture of gases. They can be applied to a photobioreactor to rid the system of CO<sub>2</sub>, while keeping in desired products, i.e. H<sub>2</sub>. Prior to using CNT-PPOdp on the photobioreactor system, several parameters were tested to maximize photobiolysis. The pH levels of TAP-sulfur media containing Cr were adjusted from 4 to 8, and the H<sub>2</sub> content was measured with GC/TCD. Temperature of TAP-sulfur that contained inoculated Cr was elevated from room temperature to 44°C to determine optimum conditions. Throughout the research, algae content within each bioreactor was measured as a function of the culture's reflectance at 675 nm. Optimized properties of pH and temperature were integrated into the final photobioreactor, with CNT-PPOdp covered openings. After several days of photobiolysis, an increase of hydrogen concentration, compared to the control parameters, is observed. To prevent CO<sub>2</sub> of the photobioreactor system from contributing to greenhouse pollution, a polyvinyl tube is attached to the opening containing CNT-PPOdp and connected to another photobioreactor system containing Cr in sulfur-rich tap solution. The result is a gas-interchanging dual system photobioreactor (gi-DSPBR) that allows algal bioreactors to become a more promising contender for commercializing hydrogen gas.

Scientific Disciplines Selected by Student: AT BI EN ET

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AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6076

Word Count

185

Proj. Num

6076

Title: Emulsification Effects of Synthetic, Microbial and Plant-Derived Surfactants

StudentName(s): M. Jordan

**Abstract:**

Surfactants, specifically emulsifiers, are used in a variety of industries and applications, from the pharmaceutical industry to bioremediation efforts. Many chemically synthesized surfactants, however, are harmful to the environment and can have adverse health effects. Microbial and plant-derived surfactants are alternatives to these potentially harmful synthetic surfactants. In this experiment, three different surfactants were compared in terms of emulsification activity through measuring the turbidity of solutions spectrophotometrically and using an emulsification index. Solutions contained diesel fuel (a substitute for crude oil), water, and a surfactant. The surfactants tested were Triton X-100, a synthetic surfactant, soy lecithin, a plant-derived surfactant, and rhamnolipid biosurfactant, a microbial surfactant. The microbial surfactant was comparable to Triton X-100 in terms of emulsification activity as determined by both the measurement of turbidity using a spectrophotometer and using an emulsification index. Both showed high levels of emulsion of the hydrocarbon and the water. Because of this, it can be concluded that microbial surfactants could potentially replace synthetic surfactants. Further research should focus on testing the efficacy of microbial surfactants in specific applications and industries currently using synthetic surfactants.

Scientific Disciplines Selected by Student: BI CH EM MI PS

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6078

Word Count

244

Proj. Num

6078

Title: Exploring the Relationship between Soil Chemistry and Water Quality at the Upper Cove River Watershed

StudentName(s): Z. Wang

### Abstract:

The Cove River watershed drains an area of about 13km<sup>2</sup>. A previous study in this area examined whether the presence of a golf course located north of the Cove River watershed affects dissolved nitrate concentrations (NO<sub>3</sub><sup>-</sup>) in the tributaries of the watershed. While it was found that dissolved nitrate levels were on average 0.2mg/L higher in the tributary from the golf course than in the control tributary, this difference is minimal and it is unclear whether the difference is caused by the golf course fertilization or by difference in the soil composition adjacent to the two tributaries. The question to be determined in this study is: How does soil composition of the upper Cove River watershed affect the water quality? Water nitrate concentrations and water pH as well as soil nitrate concentrations and soil pH was monitored at 2 week intervals throughout summer-fall of 2011, using Vernier electronic probes. Soil was also tested for nitrate, phosphorus, and potassium availability using a NPK soil nutrient testing kit (qualitative). All soil pH levels measured below 5. Soil nitrate concentrations were found to be below 3.5mg/L. Data indicates that soil pH is negatively correlated with water pH. Also, soil nitrate concentration is negatively correlated with water nitrate concentration, likely due to leaching of nitrate ions into the streams. Testing with the NPK soil nutrient kit indicates that phosphorus amounts in the soil are low, likely due to phosphorus forming insoluble compounds in acidic soil.

Scientific Disciplines Selected by Student: CH EA EV

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6079

Word Count

315

**Proj. Num** 6079 **Title:** Recovery of Light Hydrocarbon Fuels from PETE Recycling with Concurrent Reduction in the Recyclable Footprint

**StudentName(s):** C. Eizayaga

**Abstract:**

Plastics are one of the most commonly used materials as it is used in a variety of ways. The stability of the polymers, however, makes it very difficult to store or dispose of the plastic waste. Many methods of recycling are used today, however they are energy intensive and very costly. Recent research suggests that heating of common household plastics may lead to the capture of light hydrocarbon fuel (LHF), when heated to high temperatures in the absence of oxygen. This research investigates an alternate recycling process for water bottles made of Polyethylene Terephthalate (PETE) in the presence of oxygen, at temperatures as low as 250oC, and standard pressure. In this process, useable LHF's of methane and butane are produced, while the structural integrity of the polymer is maintained. 2g of PETE is chopped and inserted into a tilted test tube/gas trap within a muffle furnace at temperatures ranging from 200-500oC. As the plastic melts, the gas produced is collected, and analyzed via Gas Phase FTIR and Gas Chromatography. FTIR and GC results confirm the presence of measureable amounts of methane and butane within the plastic-melt Syngas. Total LHF content increases with temperature; methane content within Syngas increases from 10% at 250oC to more than 50% at 500oC. Butane content increases from 0.4% at 250oC to 4% at 500oC. At 500oC, ~ 30 ml of methane and 4 ml of butane are produced from only 2 grams of PETE. Attenuated Total Reflectance FTIR spectra of the remaining plastic pellet verify that the structural integrity of the heated PETE remains, while its footprint is dramatically reduced. The novel recycling process discussed here has two major benefits: It creates LHF's that may be used to power the recycling process, making it less energy intensive, or autonomous. Secondly this new process will lower the polymers footprint of the plastic, while maintaining its structural integrity for future use.

**Scientific Disciplines Selected by Student:** AT CH EN ET EM EV

**Scientific Disciplines**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6080

Word Count

278

Proj. Num

6080

Title: The Development of an Innovative Bandage Membrane using Silk-Derived Proteins

StudentName(s): J. McKinney

### Abstract:

One major problem that is at the forefront of policymakers globally is the need for medical treatment in underdeveloped countries. The research presented here attempts to address this issue, through the extraction and application of silk-derived proteins to design a biodegradable bandage membrane. These new membranes can be assimilated into host skin, while simultaneously advancing cell growth, unlike a traditional bandage. The desired proteins, Sericin and Fibroin, were first extracted by boiling silk cocoons in 0.02M Na<sub>2</sub>CO<sub>3</sub>. The resulting solution was then dialyzed for two days in 12 kDa bags, and analyzed via Attenuated Total Reflectance Fourier Transform Infrared (ATR-FTIR) spectroscopy. Spectral analysis confirms the extraction of the desired proteins, which were then concentrated against Polyethylene Glycol. Hydrated Gelatin (type A from porcine skin) was then added, and 200  $\mu$ l Glutaraldehyde along with 40  $\mu$ l of 12 N HCl were used as group-activating agents. Subsequent FTIR analysis provides evidence for the assimilation of Sericin and Fibroin into the membranes. These membranes, alongside a control membrane subject the same synthetic process minus the added proteins, were then floated on agar broth and exposed to yeast cells. Scanning Electron Microscopy (SEM) images provide evidence for the viable extracellular relationship formed between the yeast cells and the protein-carrying membrane. Yeast cell growth was markedly faster on protein-carrying membranes. Additionally, the membranes that had Sericin and Fibroin displayed the ability to dissociate upon prolonged exposure to yeast cells faster than membranes without the proteins, even though both shared the same initial durable characteristics. These results suggest that Sericin and Fibroin proteins expedite cell growth and are able to be assimilated into the host's extracellular matrix.

Scientific Disciplines Selected by Student: BI EN

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6081

Word Count

254

Proj. Num

6081

Title: The Use of Berries from Connecticut Invasive Plants in Dye-Sensitized Solar Cells

StudentName(s): T. Breckel

### Abstract:

The purpose of this experiment is to determine if the juice from invasive plant species of Connecticut could generate electricity in a dye-sensitized solar cell. Many different berries were collected from the plants to be ground and boiled into a dye, which the solar cells soaked in. Once the dye-sensitized solar cell was created, it was placed under a halogen lamp to simulate being in the sun. Every cell could produce electricity, with the most successful being able to generate 0.151 volts and 0.004 amps. This experiment supported the objective, as voltage was created in each dye-sensitized solar cell, which signifies that the juice was able to excite electrons, thus starting an electrical flow. Due to the success of this investigation, it is a viable option to implement this on a much larger scale, with each geographic location using the invasive species which thrive. Not only is this an environmentally-friendly route, since fossil fuels are not being burned for energy, but that harmful invasive plant species that crowd out and kill native plants are being put to good use as well. These solar cells can be incorporated into the windows of buildings or even backpacks as a cheap and effective way to produce electricity cleanly. As the world searches for new forms of renewable energy and attempts to find a use for invasive plants, it is possible to solve both problems through the use of dye-sensitized solar cells made from the juice of the berries of invasive plant species.

Scientific Disciplines Selected by Student: CH ET EM EV PS

### 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
EB = Engineering: Materials & Bioengineering	PS = Plant Science

### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PS

# Connecticut Science Fair Abstract

Project Number

6082

Word Count

252

Proj. Title: Nuts About Energy

Proj. Num: 6082

StudentName(s): R. Pilepich

**Abstract:**

One issue facing our world today is the need to find a renewable energy source. This experiment investigates one possible solution – nuts. Wood pellets were used as a control for five different types of nuts that were tested: almonds, walnuts, cashews, pecans, and peanuts. Additionally, the same types of nuts were frozen overnight, thawed, and tested to simulate storage in a freezer. The goal was to find the nut that would produce the greatest amount of energy. Nuts were burned on a paperclip inside a can under the hood. The can acted as a chimney and drew heat up towards a beaker filled with water that was placed above the can. A temperature probe was used to measure the water’s temperature change as the nut burned. Afterwards, the equation  $Q/g = (\text{mass})(\Delta T)(C_p)$  was used to determine the Joules of energy released per gram of nut, assuming it was proportional to the heat gained by the water. In the end, though wood pellets burned longer and produced less soot, they yielded less energy than the nuts. Of the nuts kept at room temperature, pecans gave off the most energy. Comparing these results with those of frozen nuts, three of five nuts emitted more energy after having been frozen. However, in trials with frozen nuts, almonds gave off the most energy. In fact, the trial with frozen almonds yielded the most energy of all. Perhaps in the future, nuts, or even discarded foodstuffs, will be used as a valuable fuel source.

Scientific Disciplines Selected by Student: ET EM EV

**Scientific Disciplines**

**Fair Categories**

- AT = Applied Technology
- AS = Animal Science
- BE = Behavioral & Social Sciences
- BI = Biochemistry
- CB = Cellular & Molecular Biology
- CH = Chemistry
- CS = Computer Science
- EA = Earth Science
- EB = Engineering: Materials & Bioengineering
- EE = Engineering: Electrical & Mechanical
- ET = Energy & Transportation
- EV = Environmental Analysis
- EM = Environmental Management
- MA = Mathematical Sciences
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- MI = Microbiology
- PH = Physics & Astronomy
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6501

Word Count

249

Proj. Num	Title:
6501	A Comparative Analysis of Bio Diesel Emissions Versus Emissions of Petroleum diesel

StudentName(s): M. Mayfield, V. Bodas

**Abstract:**

The purpose of this experiment was to collect and compare emissions of hydrocarbons, carbon dioxide, and carbon monoxide during combustion of diesel fuels. It was hypothesized that when compared to petrodiesel emissions during combustion, biodiesel fuels would produce less carbon dioxide, carbon monoxide, and hydrocarbons. In the first part of the experiment, three types of biodiesel were created from sunflower, vegetable, and canola oil. Each oil was blended for 30 minutes with 150ml of distilled water containing 4.9g of dissolved potassium hydroxide, a solution known as methoxide. After blending, the mixture was allowed to settle for 48 hours and was then washed with 150ml of distilled water four times over the course of 2 days. In the second part of the experiment, the three samples of biodiesel, plus one sample of petrodiesel, were placed in separate oil lanterns and burned independently in the fume hood, under an acrylic box measuring 16x12x30 inches. A 2-inch opening in the acrylic box allowed inserted probes to collect data. Carbon dioxide data was collected using a Vernier probe, hydrocarbon data was qualitative and measured with a special-order gas detection tube, and carbon monoxide levels were measured with a household carbon monoxide alarm with a digital display. After analysis of the collected data, the original hypothesis was partially supported as the petrodiesel fuel produced higher levels of carbon dioxide and hydrocarbons, but carbon monoxide production was not significantly different. Future experiments include testing emissions of the created biodiesels in actual diesel engine.

Scientific Disciplines Selected by Student: AT BI ET EM EV

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6502

Word Count

178

Proj. Title: The Effect of Geometric Shapes on Parachutes

Proj. Num  
6502

StudentName(s): T. Murphy, Y. Eley

**Abstract:**

If one decides to skydive one needs a parachute. And parachutes come in different shapes, but which shape will work the best? We did this project because thought it was a legitimate science fair project, but also to find which parachute shapes were best for those who need to use a parachute, such as skydivers, smokejumpers, and people who need to jump out from a high place due to an emergency. We were testing which parachute shape would provide the safest landing. We dropped different shaped parachutes made out of plastic garbage bags from a height of three meters and 77 centimeters. Our hypothesis was that the circular parachute would fall the most slowly, and the triangular would fall most quickly. Our circular parachute fell most slowly, followed by the elliptical parachute, then the square one, pentagon, rectangle, and then the triangle. We found that the shapes with more sides worked best (if you see a circle as a shape with infinity sides), and the shapes that had fewer sides, such as the triangle, didn't work as well.

Scientific Disciplines Selected by Student: MA

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6503

Word Count

235

**Proj. Num** 6503 **Title:** Effective Removal of BTEX from Industrial Wastewater by Using Banana Peels as an Environmentally Friendly and Low-Cost Bio-Sorbent

**StudentName(s):** S. Tukupov, V. Gasimov, H. Ahmed

**Abstract:**

Benzene, Toluene, Ethylbenzene and Xylene (BTEX), toxic hydrocarbons, are polluting water sources near industrial production sites. Federal regulations mandate BTEX concentrations to be below 0.005, 1, 0.7, and 10 milligrams per liter of wastewater (0.005 mg/L, 1 mg/L, 0.7 mg/L, 10 mg/L) respectively (EPA). The most common method for removing BTEX from wastewater is activated carbon, a substance that is expensive and promotes the growth of deadly bacteria and also produces high amounts of sulfur dioxide in its manufacturing. As an alternative to such harmful methods that pose high risks to human health and the environment, banana peels were tested as adsorbents. Sets of 10 g/L BTEX solutions were prepared and mixed with varying amounts of banana peels (1g, 2g, 3g). Samples were withdrawn from the solutions at regular time intervals (0-30-60-90 min). Collected samples were analyzed by a Gas Chromatography. BTEX concentrations were calculated against standard BTEX solutions. A significant decrease in each of Benzene, Toluene, Ethylbenzene and Xylene concentrations was observed. The decrease was directly proportional to the amounts of banana peels used. Also, the rate of decrease was the highest in the first 30 minutes. Our experiments indicated that banana peels are harmless yet effective and cost-efficient method for removing BTEX. At the end of the experiments, possible commercial application was proposed. Further studies may be planned to identify banana peels' efficacy on other toxic pollutants.

**Scientific Disciplines Selected by Student:** AT BI CH EN EM EV ME PS

**Scientific Disciplines**

**Fair Categories**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6504

Word Count

83

Proj. Num

6504

Title: The Effect of Different Packaging Materials on Allowing and Egg to Crak When Dropped

StudentName(s): L. Rainone, E. Warfield

**Abstract:**

Our reason for doing the project was to see which materials would keep the egg safe from dropping to the ground. We wanted to see which material was stronger. Basically we took some common household materials and wrapped them around an egg and dropped it from a deck to the ground. The eggs that where wrapped with only one material either broke completely or cracked. The end results came out to be that the one egg wrapped in all the materials didn't crack.

Scientific Disciplines Selected by Student: PH

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6505

Word Count

91

Proj. Title: Chromatography with Lip Gloss and Lipstick

Proj. Num  
6505

StudentName(s): L. Figueroa, L. Santore

**Abstract:**

In this experiment, 6 different types of lip glosses and lip sticks were separated by Thin Layer Chromatography (TLC). Using three different solvents, the lip glosses and lipsticks were tested for coloring agents. Our hypothesis was that red dyes would be the most evident. However, we found that a light red(pink) was the most prevalent. Continued trials using column chromatography are ongoing. In trying to keep the solvents green, we used water, alcohol, ethyl acetate and a buffer solution. Interesting results were that clear lip stick produced a pink color.

Scientific Disciplines Selected by Student: CH

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6506

Word Count

248

Proj. Title: Quantitative Determination of Lead

Proj. Num: 6506

StudentName(s): K. Seymour, L. Guadalupa

### Abstract:

Visible light scattering analysis could be a less expensive technique to detect lead in the environment. The purpose of the experiment was to see if a correlation between the percent transmittance of light and the concentration of lead could be established. It was predicted that if a suspension of lead hydroxide is formed, then there should be a correlation between the transmittance and the concentration of lead in the solution. Different concentrations of lead solutions were created and an aliquot of each was mixed with NaOH. The resulting suspension was placed in a spectrometer and the percent transmittance was recorded. The result showed that there was a relationship between the concentration of lead and the percent transmittance. Higher concentration solutions had a low transmittance of light while the lower concentration solutions had a high transmittance. This was consistent with the visual appearance of the samples. Suspensions from high concentration samples were almost opaque. The results supported the hypothesis. A relationship between the lead concentration and the percent transmittance was observed. Using a visible light scattering analysis to quantize lead is, based on the experiment, an effective method to determine lead. The lead hydroxide solids in an aqueous solution caused the light to scatter making it difficult for light to pass through. A future experiment would be to apply this technique to a soil solution from a local Brownfield site. It is hoped that this technique will evolve to be an economical method to detect lead in the environment.

Scientific Disciplines Selected by Student: AT CH EV

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6508

Word Count

67

Proj. Title: The Effects of Humidity on Music

Proj. Num  
6508

StudentName(s): A. Johnson, L. Montagna

**Abstract:**

When a musician goes outside or plays in a room that has a lot of people in it, for some reason their pitch seems to change regardless of the instrument. The question of this experiment was why does this happen. The project looks at how the difference in humidity of the air changes the pitch of a c flute inside a room kept at 65 degrees Fahrenheit.

Scientific Disciplines Selected by Student: AT EM

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6509

Word Count

250

Proj. Num

6509

Title: The Impact of Altering the Internal Structure of an Instant Icepack

StudentName(s): B. Dellaripa, L. Andersen, D. Ormrod

### Abstract:

Many traditional instant icepacks used by athletes are inefficient with a fleeting burst of cold due to the quick endothermic reaction. The purpose and main drive behind this experiment was to engineer a prototype for a more efficient instant icepack. The main problem with ordinary icepacks is that they do not stay under 15° Celsius for a substantial amount of time. This experiment was designed with the goal to alter the inner structure of an icepack so that it remains colder longer. A controlled icepack was built using plastic dividers to separate the slow and fast reactions, and plastic baggies were used to hold the water. The slow reaction was created by puncturing 15 holes in each bag, so the water slowly leaked into the ammonium nitrate chamber. The normal reaction was simulated by slicing the bag, allowing water to instantly rush into the chamber. The temperature was measured in minute increments until it reached 15° Celsius. Three trials were performed. Results showed that the slow reaction lasted on average one minute and thirty five seconds longer than the instant reaction. If the actual quantity of ammonium nitrate in the control was used, the slow reaction would last four minutes and forty five seconds longer. Athletes would benefit from this engineered icepack, if it were to be produced by manufacturers. This icepack would prevent athlete's injuries from swelling, ultimately benefiting their health. If this research is continued an icepack that can be applied to safely human skin will be built.

Scientific Disciplines Selected by Student: CH

### Scientific Disciplines

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CS = Computer Science	MI = Microbiology
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6510

Word Count

223

Proj. Num

6510

Title: Efficient and Practical Approach to Removal of BTEX from Industrial Wastewater by Using Tea Waste

StudentName(s): R. Gurbannazarov, K. On

### Abstract:

Scientists have been trying to find new ways that are much easier and efficient to remove toxic chemicals out of our wastewater. Benzene, Toluene, Ethylbenzene and Xylene (BTEX) are some of those toxic chemicals that challenge scientists today. Because of irresponsibility of some factories our environment gets polluted. This project focused on how tea waste could be a cost-effective and reliable source to remove BTEX from wastewater discharged from the chemical factories. The tea waste was prepared by boiling, until the tea became tasteless and colorless. Next the tea waste was placed in the oven to dry. Then 10 g/L solutions of each BTEX were prepared. Each of those solutions was mixed with different amounts of tea waste (0.5g, 1g, 1.5g). Solutions were stirred for 90 min. Samples were withdrawn at 0, 30, 60, and 90 minutes intervals. Samples were analyzed in Gas Chromatography to find the remaining pollutant concentrations. As a result, it was observed that BTEX concentrations decreased significantly as the time passed. The decrease was faster in the first 30 minutes than the 60th and 90th minute intervals. Also, the rate of decrease was directly proportional with the amount of the tea waste used. From the results of our experiments we have concluded that tea waste is the efficient and cost-effective way of removing BTEX from wastewater.

Scientific Disciplines Selected by Student: AT BI CH EM EV ME

### Scientific Disciplines

### Fair Categories

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
AS = Animal Science	ET = Energy & Transportation
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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6511

Word Count

115

Proj. Title: Rasing away from Fossil Fuels

Proj. Num  
6511

StudentName(s): R. Crumley, J. Vincent

**Abstract:**

With the price of fossil fuels skyrocketing and the demand increasing daily, the need for alternative fuel sources is on the rise. This is evident when you look at all the companies trying to design and improve cars that operate on fuel sources other than the traditional gasoline. This project looks at the efficiency of cars powered by hydrogen, solar and battery. Three different types of car were tested on a 200 foot track measuring how much energy was used for each test run. The hypothesis is that the hydrogen car will perform more efficiently than both the battery and solar cars. In the end, this project showed that no single alternative fuel source was reliable.

Scientific Disciplines Selected by Student: EE ET MA

### Scientific Disciplines

### Fair Categories

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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CS = Computer Science	MI = Microbiology
EA = Earth Science	PH = Physics & Astronomy
EB = Engineering: Materials & Bioengineering	PS = Plant Science

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6512

Word Count

252

Proj. Title: Seeing Dye In A New Shade

Proj. Num: 6512

StudentName(s): N. Fronsaglia, E. Arroyo

### Abstract:

The loss of dye (fading) of clothing is a significant problem for clothing manufacturers and consumers. An attempt to address this issue was made in this experiment by analyzing the auxochromes in the dye being used on the textile. Auxochromes, groups of atoms containing non bonded electrons that are able to alter the color of a compound, or deepen it, though not present in all dyes, were the focus of the experiment. Auxochromes are able to alter the wavelength of absorption of radiation that is captured by chromophores, another group of atoms that changes the energy of the electron cloud. This ability allows auxochromes to deepen the perceived color of the clothing, reducing the appearance of fading. In order to prove that auxochromes would be useful at preventing fading, wool textiles were dyed with two different dyes. The first was FD&C Yellow 5, a yellow dye that did not contain auxochromes. The second was Naphthol Yellow S, which contains auxochromes. Once the textiles had dried, they were submerged into four different solutions, mimicking substances that clothing is routinely exposed to: sea water, detergent water, soap water, and chlorinated water. After being dried, there was a significant difference between the original FD&C Yellow dyed textiles and the current wool textiles, while there was barely a difference between the original and current textiles dyed with Naphthol Yellow S, which proved our theory. This difference was based on a scale of 1 to 10, 10 being vibrant and 1 being dull when compared.

Scientific Disciplines Selected by Student: CH

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6513

Word Count

248

Proj. Num

6513

Title: Using Environmental Friendly and Cost Effective Ferrofluid Magnetite as an Adsorbing Agent to Efficiently Remove Petroleum Spills from Water Sources and its Commercial Application with a Robot Arm.

StudentName(s): Z. Abacioglu, B. Ozgenturk

### Abstract:

When petroleum is spilled into the ocean, it is almost impossible to recollect and reuse it. Petroleum spills are virulent to marine ecosystems, resulting in death of the marine wildlife. There are several methods of removing spilled oil from the ocean but some are detrimental. It either poisons the life in the ocean or emits greenhouse gases. These methods are ineffective, expensive and require multiple operators to regulate. Therefore, a more efficient method is needed. Magnetite is a mineral that has pores which allows it to adsorb hydrocarbons. As the surface area of each magnetite particle increases per kg, the adsorption capacity increases. Hence nanoparticles are necessary to produce the greatest impact. Ferrofluid magnetite was created by mixing FeCl<sub>2</sub> and FeCl<sub>3</sub> in the presence of ammonia. Experiments were done by mixing high viscosity motor oil and ferrofluid. The ferrofluid adsorbed a significant amount of the gasoline and floated on the water. It was also observed that magnetite did not lose its paramagnetic property, enabling magnets to attract the magnetite and separate the mixture from water. To commercialize this method of removal, a robotic arm that is capable of 3 way motion was assembled. An electromagnet was attached to collect the magnetite. The robot was tested several times. As a result, the robot collected 99% of the magnetite. Unlike its powdered predecessor, the ferrofluid did not coagulate and sink. Instead, it stayed on top with the oil adsorbed. This method is a cost-effective alternative to remove oil spills.

Scientific Disciplines Selected by Student: AT CH EA EE EN ET EM EV ME

### Scientific Disciplines

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6515

Word Count

249

Proj. Num

6515

Title: Testing the Viability of Adaptive Winglet Technology to Improve Fuel Efficiency on Midsize Commercial Airliners using Computational Fluid Dynamics

StudentName(s): C. Muckle, M. Rahematpura, M. Chris

### Abstract:

Problems due to increasing carbon emissions, fuel prices, and noise pollution have pressured airlines to revisit the efficiency of airplanes. Recently midsize commercial planes have trended towards implementing winglets, angled surfaces at the tips of wings, to improve fuel efficiency by increasing effective wingspan and reducing drag vortices. Unfortunately, winglets improve fuel efficiency only at cruise conditions—during climb and descent, winglets actually decrease fuel efficiency. This research proposed an adaptive/morphing winglet structure which mimics bird-like flight by changing its cant angle, relative to the wing, to improve the fuel efficiency compared to airplanes with fixed cant winglets. First, using Computer Aided Design (CAD) and Computational Fluid Dynamics (CFD) as well as static equations of equilibrium, a proof-of-concept innovative mechanism was designed to adapt the winglet cant in flight. Next, drag reduction due to winglets on a baseline midsize commercial airplane (representative of a Boeing 737)/wing model was calculated using CFD analyses. Afterwards, the wing geometry was remodeled and analyzed with array of canted winglets to represent variable adaptive winglet configuration at six different flight conditions. By employing the adaptive winglet design —“Falcon Tip”—in lieu of the standard fixed cant winglet, based on the calculated reduction in drag, the airline industry just flying the B737 will save 600 million gallons of jet fuel per year, worth roughly 2 billion dollars. This fuel savings corresponds to a 7% reduction in CO2 emissions, approximately equivalent to the amount of CO2 absorbed by 50 million trees.

Scientific Disciplines Selected by Student: ET

### Scientific Disciplines

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

**Fair Category**

PST

**Connecticut Science Fair Abstract****Project Number**

6517

**Word Count**

273

**Proj. Num**

6517

**Title:** Harnessing Low Frequency Vibrations to Wirelessly Charge Cellphones  
Electricity generation by piezoelectric excitation from background vibrations**StudentName(s):** S. Roychoudhury, W. Kimmel**Abstract:**

Cell phones are ubiquitous; however, they must be tethered to the wall for periodic charging. To enable true “wireless” operation, means for charging the devices cordlessly must be developed. We set out to determine if this was possible. Our goal was to identify options for transferring electricity wirelessly. We identified acoustical and mechanical vibration harvesting via piezoelectric crystals as a possible option. We found and acquired a class of piezoelectric crystals marketed for remote sensing applications. We subsequently designed a circuit and adapted them for power generation from acoustic vibrations. The circuit consisted of a rectifier, capacitor and load. Both AC and DC power generated by the vibrating piezoelectric material was measured. We mapped the response of the crystals to five parameters: Frequency, Amplitude, Tip Mass, Distance from the acoustic excitation source and length of the piezoelectric strip. By changing these variables, we found harmonic frequencies where the voltage output peaked and one specific resonant frequency where it was dramatically higher. Although we generated less than 1 milliwatt of power, it successfully powered an LED! However, the power generated was relatively low. Additional work towards maximizing power output, minimizing size, etc. remains to be done in order to realistically charge a cell phone. Nevertheless, we demonstrated proof-of-concept that with future development cell phones can be cordlessly recharged by harvesting energy from ambient sound and mechanical vibrations. The data generated from the research and testing should be extremely valuable towards developing high-fidelity engineering solutions. Acknowledgements: The authors thank Mr. Tim LaBreche, Mr. Tony Bova, Mr. Rich Mastanduno, and Mr. Subir Roychoudhury for their guidance in designing and setting up the experiment.

**Scientific Disciplines Selected by Student:** AT EE ET**Scientific Disciplines**

AT = Applied Technology	EE = Engineering: Electrical & Mechanical
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**Fair Categories**

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6518

Word Count

246

Proj. Title: Bulletproof Liquid

Proj. Num: 6518

StudentName(s): A. Kehoe, L. Oldziej

### Abstract:

We tested whether or not non-Newtonian fluids helped cotton, vinyl, and polyester fabrics absorb more force. This project has worldly applications, as non-Newtonian fluid can be used in bulletproof vests and other protective gear. We hypothesized that the fabric with the non-Newtonian fluid on it would absorb more force than the fabric without non-Newtonian fluid on it. We gathered our materials, which most importantly included a force plate and the necessary equipment to gather data from it, and began testing. We used a 500g weight and dropped it from 60cm above the force plate onto swatches of cotton, vinyl, and polyester, and collected the data on a TI-84 calculator. We first tested the fabric without non-Newtonian fluid to determine a baseline for each fabric. Then we tested each fabric with the non-Newtonian fluid on it. We took the averages of the three trials of each fabric and then found the difference between how the fabric preformed without the non-Newtonian fluid and how the fabric preformed with the non-Newtonian fluid. Our results definitively proved our hypothesis. The average for every type of fabric with the non-Newtonian fluid on it was around 16 newtons. This was a drastic change from the averages of the trials without the non-Newtonian fluid, which ranged from 29.806 newtons for the cotton to 106.69 newtons for the polyester. This clearly proves that the non-Newtonian fluid helped absorb great amounts of force.

Scientific Disciplines Selected by Student: PH

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6519

Word Count

224

Proj. Title: What Factor Affects the pH of Bodies of Water More: Rain or Direct Sunlight?

Proj. Num  
6519

StudentName(s): S. Moquin, M. Moquin

### Abstract:

The pH, or percent hydrogen, measures the acidity or basicity of bodies of water. This has a large effect on what plant and animal species can inhabit a given body of water. The pH of different bodies of water can be affected through multiple different mediums. The goal of this experiment was to measure the pH of ten bodies of water in Marlborough, Connecticut, before a rainstorm, after a rainstorm, and when exposed to direct sunlight at high noon to see which affected the pH of the water the most. To meet this goal, the samples were tested for pH with AquaChek Select® test strips. It was hypothesized that rain would make the most dramatic pH drop because of the acidity of rain water. This hypothesis was disproved, as sunlight had a greater effect of dropping the pH of bodies of water due to photosynthesis of living things. Rainwater raised the pH of the water, plausibly because of the run off of basic fertilizers into the water, influencing it to become more basic. It was found that 70% of the bodies of water showed positive or 0 differences after a rain storm and 80% of bodies of water showed a decrease or retention of pH when samples were exposed to direct sunlight. Therefore, exposure to direct sunlight affects the pH of water the most.

Scientific Disciplines Selected by Student: CH EA EV

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6520

Word Count

151

Proj. Title: Fingerprints on various surfaces

Proj. Num  
6520

StudentName(s): N. Terry, M. Hird

**Abstract:**

When detectives and investigators arrive at a crime scene, they begin looking for clues. One of the most important pieces of evidence to collect is fingerprints. This experiment tests multiple surfaces for fingerprint quality. There are 3 main fingerprint types: whorl, arch, and loop. In this experiment, only one type, the arch, is used. Fingerprints were placed on various surfaces. Iron fingerprint powder was then dusted on the prints and subsequently lifted using clear packing tape. The fingerprints were then enlarged using a ProScope, and ridges were measured with a ruler and analyzed for clarity. My hypothesis is : Smoother surfaces will yield fingerprints with the most definition. This experiment did prove this to be true. Also noted was that many unlikely surfaces, such as skin, produced readable fingerprints. Only portions of fingerprints were measured and complete prints were destroyed to protect privacy. Glass surfaces were found to produce the clearest fingerprints.

Scientific Disciplines Selected by Student:

**Scientific Disciplines**

**Fair Categories**

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6521

Word Count

249

Proj. Title: Fire Retardant Paint

Proj. Num  
6521

StudentName(s): A. Boisvert, M. HoPONICK, R. Cataudella

### Abstract:

In 2010, U.S. fire departments responded to 369,500 home structure fires in America, a disturbing record for our time. Fire is an exothermic oxidation process by which heat and light energy is given out. Fire starts when a fuel with adequate supply of oxygen is subjected to enough heat, and it is sustained by the further release of heat energy, as well as a continuous supply of oxygen and combustible fuel. To stop fire means to impede the fuel in contact with oxygen (O<sub>2</sub>). Water, foam, halons, carbon dioxide (CO<sub>2</sub>) are some common fire extinguishers. The problem is how these substances can be released immediately to either reduce or prevent fire. By exploring the methods of releasing CO<sub>2</sub> instantly, it's apparent that we can use Potassium bicarbonate (KHCO<sub>3</sub>), Sodium bicarbonate (NaHCO<sub>3</sub>), ash or sand to provide carbon dioxide (CO<sub>2</sub>) to put out fire. By creating three procedures in which fire retardant paint mixtures were created, painted onto pieces of wood, and introduced to an open flame, we were able to test its ability to retard fire. The two variables being tested were the time elapsed before the paint mixture caught fire and the temperature at which the paint mixture burned in degree Fahrenheit. The paint mixtures varied in retarding the fire between 6.30 to 18.06 seconds, and its temperature ranging from 322.6 to 456 degrees. As a result the Potassium bicarbonate induced paint was the most successful of all variables tested due to its vast releasing of carbon dioxide.

Scientific Disciplines Selected by Student: CH

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6522

Word Count

214

Proj. Title: A Chemical Analysis of Soil with Respect to Birch Tree Growth

Proj. Num  
6522

StudentName(s): T. Cersonsky, C. Jiang

### Abstract:

The white birch prefers well-drained, slightly acidic, sandy soils. They grow better in dry soil than on wet or poorly drained soils. The lack of moisture under the white birch limits production of CO<sub>2</sub>. The birch tolerates pH of 4.2-7.4. The tree does poorly in summer heat and prefers cooler climates. It is not tolerant of pollution or difficult sights. Factors in areas chosen for soil extraction included sun exposure and tree concentration; samples were taken near and far from the birch location. Locations chosen for soil extraction were close to the birch tree, at the top of the driveway (hill), at the edge of the parking lot, near the manor, and by the athletic field. Five samples of soil were tested for pH, carbon content, and moisture content. Results of said tests displayed a higher pH in the birch tree soil, as well as a similar pH in areas of close proximity. The moisture content test similarly showed the birch tree to be unique compared to the other soils, with a lower moisture content than most of the other soils. The carbon content test indicated that the birch tree soil had the lowest percent carbon content. The birch tree soil was proven to have distinct qualities unlike those of the other soils.

Scientific Disciplines Selected by Student: CH EV

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6523

Word Count

250

Proj. Title: Decibel output related to the grade of clarinet reed.

Proj. Num  
6523

StudentName(s): M. Delgado, N. Bowe

### Abstract:

The appreciation of music is something many people share. This experiment combines strong interest in music with computer analysis of sound intensity. The problem asked in this experiment is: does decibel output differ with different grades of reeds? In the world of clarinets, the reeds are a very crucial part in having the most beautiful sound possible. We hypothesized that the smaller grade of reed would make the decibel output larger. For this project the clarinet was played for 30 seconds and recorded with a Vernier sound level meter. Three tests were conducted for each type of reed. Our variable was the different reed sizes, however during the experiment we noticed that there were many more that we could not control. An additional variable was how much air was blown through the instrument, though we tried to be as uniform as possible. Another variable was the amount of background sound in the room when the experiment was conducted. The last variable was if the reed was dry or if it was moist. The end of our experiment saw that the decibel averages were in the same range and we concluded that the grade of the reed did not matter. This experiment could be applied in an orchestra to ensure the use of a reed that does not sound too loud and unpleasant. It can also be used during marching season when an instrument needs to be louder and it doesn't really matter if your instrument sounds a bit dreadful.

Scientific Disciplines Selected by Student: AT

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	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6524

Word Count

241

Proj. Num

6524

Title: The Effects of Volatile Organic Compounds on The Quality of Paint

StudentName(s): E. Dragan, S. DeMaio

### Abstract:

Paints are now made with lower levels of volatile organic compounds (VOCs) to improve environmental conditions, however, it is important to determine if these paints perform to the same standards as paints with high levels of these compounds. It was assumed that paints of low VOC content would not achieve the same level of overall performance as high VOC paints, and would not be ideal for consumers. A three part procedure was completed with a series of tests to validate the average drying time and durability of two selected paint brands, each containing standard, low, or zero VOCs. Drying time and durability were assessed by allowing a specific amount of time for the paint to dry, followed by tests of temperature effects and physical strength. These trials were analyzed through qualitative means. A Biology Gas Pressure Sensor and computer software were utilized to determine the amount of evaporated substances from the drying paint. These pressures were used to conclude what percentage of evaporated substances were water and VOCs. Through this experimentation, results suggested low VOC paints have the best overall performance, while standard VOC paint was mediocre. Zero VOC paint was found to fail in each category. It may be concluded that paints of low VOC content are the optimum choice for everyday consumers, however other variables will affect the final decision. This research may offer suggestions to improve the quality of low VOC paints and raise awareness of their benefits.

Scientific Disciplines Selected by Student: CH

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7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST

Fair Category

PST

# Connecticut Science Fair Abstract

Project Number

6525

Word Count

249

Proj. Title: Javonic Bonding

Proj. Num  
6525

StudentName(s): M. Olaosebikan, J. Gooden, C. Roach

### Abstract:

Two programs the Algorithmic Method and the Monte Carlo Method were written using the Java Programming Language and were tested against each other to determine which one could ionically bond compounds the quickest. The elements were bonded first by hand so that an accurate example was present. The time was measured in nanoseconds using a timer embedded into each program. The Algorithmic method used the absolute value of the charges of each element and divided it by the charge of the smaller element to determine the exact number of atoms each element needed in order to become neutral, while the Monte Carlo method randomly put different amounts of the two elements together until it found a match. It was found that the compounds that were bonded using the Monte Carlo method were not always accurate but at certain times, bonded some compounds faster than the Algorithmic method. However, the Algorithmic method did bond most of the compounds faster than the Monte Carlo method and more importantly, unlike the Monte Carlo method, it bonded all compounds accurately. Accuracy is an important factor in any computer program implementation. For example, a pharmacist or scientist could plan to mix compounds together to make a certain pill for patients and used a computer program to speed up the process. If the program does the synthesis incorrectly then certain components may be used in the pill causing severe damage to anyone who uses the pill. And that is what we always try to avoid.

Scientific Disciplines Selected by Student: CH CS MA

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### Fair Categories

	Life Sciences	Physical Sciences
7th & 8th Team	LT	PT
7th Grade	L7	P7
8th Grade	L8	P8
High School	LS	PS
High Sch. Team	LST	PST



# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Animal Sciences

Project Number	Title
1021	What Medium Gathers the Most Molusk Mucus?
2003	Depleting Oyster Population: Alarming Coincidence, or CO2?
2004	Environmental Acidity and Bioluminescent Algae
2018	Ants, Glucose, Diabetes....Huh?
2020	Should We Be Going Bananas?! The Study of Ocean and Freshwater Acidification and its Harmful Effect on the Shells of Aquatic Organisms and the Evaluation of a Banana-Derived Additive to Reduce It.
2021	Frog Peptides Vs. Bacteria
2022	One Dog's Poop, Another Man's Treasure.
2030	How Does Caffeine Effect the Heart
2503	Teredo Navalis - A Population Density Study
2505	How Does Different Water Solutions (Pollution) Affect Daphnia?
2509	Do Ambient Temperatures Affect Bat Mortality?
2516	The Effect of Different Organic Materials on the Number of Ants Repelled
2517	Measuring Air Pockets in Store-Bought vs. Farm Fresh Eggs
2522	The Dirt on Worms
2525	How Do Different Colors and Sizes Affect Memory
3003	Planarian Regeneration: A Comparison of a Triclad
3006	The effect of different protein sources on the growth and development of Tenebrio Molitor
3029	The effects of antibiotics on the development of zebrafish embryos.
3038	Propagation and Mass Changes of Coral under Different Circumstances
3041	The Effect of Increased Sea Surface Temperature and Overfishing on Carcharhiniformes Attacks on Humans
3043	Club Heartbeatz
3057	Use of Formant Values in Classifying Vocalizations of Beluga Whales ( <i>Delphinapterus leucas</i> )
3079	Pigeon Talk: A Bio-acoustical Analysis of Variation in Male Fantail Pigeon Display Calls
3084	The Biological Control of Zebra Mussels Using the Marine Natural Product Aaptamine.
3098	The Effects Of Commercial Non-Agricultural Target Specific And Non-Specific Herbicides at Specific Temperatures On The Embryonic Development Of Zebrafish
3101	THE EFFECT OF INTRAUTERINE GROWTH RETARDATION ON GENE EXPRESSION IN MUSCLE TISSUE OF NEWBORN LAMBS
3105	The Effect of Turmeric on Mice Cognition and Development
3501	Beluga Behavior Study
3506	Investigation of Factors that Affect the Regeneration Rate of Planaria
3507	Which Species of Earthworm Decompose Waste in Landfills Most Efficiently?
3514	Bass Attack
3518	The Effect of Pesticide on Cherry Barb Embryonic Development
3523	The Effects of Common Painkillers on Zebrafish
5514	Pigg'n Out
5534	Bird Wing Technology

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Applied Technology

Project Number	Title
2021	Frog Peptides Vs. Bacteria
2512	A Sustainable Hydrogen-Producing Algae Bioreactor
2525	How Do Different Colors and Sizes Affect Memory
2531	Should a School Advertise more Sports or Academics Online?
2534	Password Security
2543	Phytoremediation: Removal of metal pollutants from contaminated soil and effect of chelators
3004	Bio-engineering: Microbial Properties of Shark Skin and Other Natural Surfaces
3008	Which Intestinal Bacteria is Best? A study of the Effectiveness of Single and Multi-Strain Probiotics.
3019	The True Origins of River Foams
3026	Algae Biodiesel
3028	Topical Gel Method Toward the Removal of Tattoo Pigment in the Epidermis and Dermis Skin Layers
3034	Nanoparticle-Enhanced Radiofrequency Ablation of Simulated Cancer Cells
3055	Using Phage Therapy to Kill Escherichia coli on Meats
3065	Mud Power, Harnessing Electro-Microbial Energy From Bacteria Strains
3069	Microstructured Hydrogels for Drug Delivery
3074	Novel Removal of Escherichia Coli 0157:H7 from Fresh Water Sources using Amino Acid Attractants
3084	The Biological Control of Zebra Mussels Using the Marine Natural Product Aaptamine.
3510	Microbial Fuel Cell Efficiency and Design
3513	Agave: The Future of Biofuels A Comparison of the Biofuel Potential of Agave Americana Grown with Different Amounts of Water
3515	Environmentally Friendly Photodegradation of Aliphatic Pollutants in Water by Using Visible Light Activated Chlorophyll
3521	The Effect of Hydrocarbon Materials on Oil
4002	Determining Amount Of Sugar, Salt, and Alcohol in a Water Solution with a Laser Pointer
4005	Egg-ceptional Packaging Material
4010	Analysis and Bioavailability of Chemical Dyes Versus Natural Dyes with their Antioxidant Benefits.
4015	The Windy 500: The Test of Drag and Down Force on Rear Spoilers
4017	"Block that Sound"
4019	Hills and Valleys: How driving on a flat surface can save you money
4023	The Improved Refrigeration Unit
4026	ND-9 No Dirt-9 Innings
4032	Riding On Air
5004	Soundproofing "What Type of Material Works Best?"
5005	Designing an Effective Dye-Sensitized Solar Cells
5009	Batteries: Should you Buy more or Charge what you Have
5014	Passive Solar Energy
5019	Improving Efficiency of Solar Energy
5021	What variables affect the grasp efficiency of a robotic arm?
5022	A Bright Idea: Comparing the Efficiency of Incandescent, CFL, and LED Light Bulbs
5027	Can you Cost-Effectly make a Solar Powered panel Water Heater out of Parts you Buy at Home Depot
5037	Quantifying Magnus Effect Induced Drag Minimization
5041	Visible or Invisible
5044	Aerodynamics
5502	The Stirling Engine and the Effect of Temperature Differential on Engine Performance
5505	Programming NANORGS in a Virtual World

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Applied Technology

Project Number	Title
5506	The Commercialization of Proton Exchange Membrane-based Fuel Cell Systems for Household Use
5510	The Fading of Fabric
5511	Trebuchet All the Way
5522	Color Flash At Work
5524	Do Brightly Colored Roofs Reduce Thermal Radiation?
5525	Development of a Prototype Pendulum Wave Energy Conversion Device
5528	On the Application of Electrochemical Double Layer Capacitors in Electric Vehicles
5530	The design and construction of a superlative HHO generator and the effect of complex carbohydrates on the output of hydroxide.
5531	Homemade Water Filtration Models and Pond Water Purification
5536	Cooling Soda
5538	Making Wind Turbines Quieter and More Efficient
5542	Killer Waves
5547	Absorption Rate of Lead Compounds on Simulated Skin and Cells and Effect of Chelators and Heat on Absorption.
5551	Which Plane Design Creates the Greatest Lift?
6001	A Neuresthetic Study on the Acoustical Cognitive Perception of the Mathematical Harmony in the Golden Section
6002	Polyvinylidene Flouride (PVDF) Piezoelectric Generator: A Novel Approach to Harvesting Vibrations from Human Respiration to Power Biological Implant Devices
6003	Aerodynamic drag of bicycle wheels and its effect on total drag of a rider and his bike
6004	The Efficiency of Air Multiplication Technology versus the Efficiency of Bladed Fan Technology
6007	Role of Electro-Chemical Double Layer Capacitors in Energy Storage
6008	Development of TiO <sub>2</sub> Nanotubes and Spectral Absorbance Enhancement as Methods to Increase Efficiency of Dye Sensitized Solar Cells
6009	Alternative Material and Three-Dementional Structure to Solar Panel Technology
6011	Mp3 Compression and it's relation to Psychoacoustics.
6012	Alternative liquid cooling methodes for a computers central processing unit.
6013	Testing Turbines
6014	Music, Chemicals, and Elements
6015	Autochrome: The Chemical Renovation of a 19th Century Art.
6023	Feeding Tube Occlusions: An In-Vitro Evaluation of Ciprofloxacin Tablets
6026	Membranes for Biochemical Separations
6028	UNDERWATER CONSTRUCTION DESIGN FOR RESIDENTIAL PURPOSES WITH MATERIALS AND ENERGY USED
6032	Design of a Smart Brick with Improved Insulation and Intuitive Reflection of Sunlight
6036	Finding the Perfect Basketball Shot
6039	Are wind turbines big fans of clean energy?
6045	A Hidden Treasure; Dehumidification of Air Improves Indoor Air Quality
6048	Image Resolution Loss for Dummies
6049	An Organic Thin Film Transistor and Elastic Organic Solar Cell Based Electronic Skin for Biochemical and Tactile Sensing
6052	Paper Batteries: A Viable Lithium Ion Battery Technology
6054	Hydropower from Rainwater
6056	Production of High Quality Ceramic Coatings for Turbine Applications by Freeze Spray Deposition
6058	A Statistical Analysis of Data Collecting Methodology
6059	Innovative design for cellulosic ethanol production as bio-fuel
6061	Electromagnetic Accelerator

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Applied Technology

Project Number	Title
6062	Propeller Efficiency
6063	Simplified Molecular Detection of Aromatic Nitroamine Pesticides using Bee Venom Luminescence
6066	Revolutionizing Cancer Treatment: A Simulation of Nanocarriers Using Swarm Intelligence for Targeted Cancer Cells
6072	Producing Ceramic Filters with Varying Sawdust Sizes and a Two-Step Process
6075	Application of iDS-PBR to Prolongate Algal Photobiolysis in <i>C. Reinhardtii</i>
6079	Recovery of Light Hydrocarbon Fuels from PETE Recycling with Concurrent Reduction in the Recyclable Footprint
6501	A Comparative Analysis of Bio-Diesel Emissions Versus Emissions of Petroleum Diesel
6503	Effective Removal of BTEX from Industrial Wastewater by Using Banana Peels as an Environmentally Friendly and Low-Cost Bio-Sorbent
6506	Visible Light Scattering Analysis To Detect Lead
6508	Effects of Humidity on Music
6510	Efficient and Practical Approach to Removal of BTEX from Industrial Waste Water by Using Tea Waste
6513	Using Environmental Friendly and Cost Effective Ferrofluid Magnetite as an Adsorbing Agent to Efficiently Remove Petroleum Spills from Water Sources and its Commercial Application with a Robot Arm
6517	Can you charge your phone wirelessly? Cordless electricity transmission by piezoelectric excitation via low frequency acoustic waves.
6523	Decibel output related to the grade of clarinet reed.

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Behavioral and Social Sciences

Project Number	Title
1020	Say Cheese
1026	Colorful Choices
2019	When Your Sniffer Snoozes
2024	Music and Its Effect on Reading Speed
2025	Think Fast
2034	Does the time of day affect the performance on a quiz?
2509	Do Ambient Temperatures Affect Bat Mortality?
2510	Distracted Driving
2519	THE NAME GAME: BOYS V.S. GIRLS
2520	Musical Sociology: The Placebo Effect in Action
2523	Blood Pressure: Red Rising?
2525	How Do Different Colors and Sizes Affect Memory
2526	Duped by Stroop
2529	DONT DRINK AND DRIVE
2531	Should a School Advertise more Sports or Academics Online?
2533	The Power of Suggestion: Flavor
2534	Password Security
2536	Does Facial Composition affect first impressions?
2538	Are You Really Going to Eat That?
2542	Stooped By Stroop
2544	Relationship between ability to recall and typed notes versus handwritten notes in 8th grade girls
3001	Learning a new language and age
3009	The Effect of Dance on Mood and Mental Acuity
3014	The Dietary Effects of Caffeine and Sugar on Anxiety in Correspondence with Psychogenic Non-Epileptic Seizures
3023	The Effect of Social Fear on Racial Stereotyping
3040	The Correlation Between Acute Stress and Cognitive/Memory Function In High School Students
3053	Words and images– how the collaboration of left and right brains can increase the speed of memorization
3056	An Examination of Autism in Connecticut Public Schools
3057	Use of Formant Values in Classifying Vocalizations of Beluga Whales ( <i>Delphinapterus leucas</i> )
3062	From Shape Recognition to Multi-Calculus Thinking: Study of Geometric Perception and Spatial Cognition in Early Alzheimer's Disease Patients
3066	What is This About Again? A Study of the Correlation Between Age and Short Term Memory
3068	Confirming Conclusions Made in a Previous Study Which Found a Correlation between Lucid Dreaming and Ventromedial Versus Dorsolateral Prefrontal Task Performance in Minors versus Adults
3078	Do Optimal Outcome Individuals Have a Less of a Prevalence of Family History of Major Mood, Anxiety, or Psychotic Disorders than Individuals who Have Retained Their Autism Spectrum Disorder Diagnoses?
3083	How Wise are Your Eyes? Does brain development affect optical perception?
3091	The Effects of Music on Memory
3096	An Investigation of the Effects of Distraction on Concentration
3100	Color Appeal and Age
3105	The Effect of Turmeric on Mice Cognition and Development
3501	Beluga Behavior Study
3509	Lie Detection through Pulse Rate
3520	The Application of Sufi Music as a Communication Method with Plants to Stimulate O <sub>2</sub> and CO <sub>2</sub> Production during Photosynthesis and Aerobic Respiration
3521	The Effect of Hydrocarbon Materials on Oil

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Behavioral and Social Sciences

Project Number	Title
4005	Egg-ceptional Packaging Material
4021	Physics Or Lyrics?
4030	Floating in Density
5007	Distracted Driving
5028	Signs of the Times: A Comprehensive Study of Street Signs
5045	How Do Video Games Affect Blood Pressure
5501	Distracted driving: practice makes perfect
5548	How Music Affect Moods
6001	A Neuresthetic Study on the Acoustical Cognitive Perception of the Mathematical Harmony in the Golden Section
6011	Mp3 Compression and it's relation to Psychoacoustics.
6014	Music, Chemicals, and Elements

# Scientific Disciplines Selected by Student

## 2012 Connecticut Science Fair

### Biochemistry

Project Number	Title
1014	Hydration Benefits with Fruits and Vegetables and Effect on Cell Absorption
1016	Harvesting Wild Yeast For Local Sourdough
1017	The Effects of Global Warming on Marine Life
1018	Eco-friendly, Equally Effective?
1022	Analysis of Omega Oils as Cancer Inhibitors and Antioxidants plus Effect on Cell Bioavailability
2004	Environmental Acidity and Bioluminescent Algae
2009	Is My Water Potable
2011	The Efficacy of Bleach as a Disinfectant
2012	Watch it Rot
2020	Should We Be Going Bananas?! The Study of Ocean and Freshwater Acidification and its Harmful Effect on the Shells of Aquatic Organisms and the Evaluation of a Banana-Derived Additive to Reduce It.
2021	Frog Peptides Vs. Bacteria
2030	How Does Caffeine Effect the Heart
2032	The Greenhouse Effect
2507	Analysis of Local Watershed and River Contaminated Sediments, and Effect on River and Long Island Sound Waters
2508	Indicate your Vitamin C
2512	A Sustainable Hydrogen-Producing Algae Bioreactor
2513	Out With Indigestion
2527	Manufacturing and Biodegrading Bioplastics: Observing the speed of biodegradation of potato, rice, tapioca and corn starch based plastics.
2528	Should We Doubt the Short and Stout?
2530	GMO OR NO GMO
2537	Make a Mummy Out of Me
2540	The Effects of De-Icing Salts and Chemical Compounds on <i>Adiantum pedatum</i>
2543	Phytoremediation: Removal of metal pollutants from contaminated soil and effect of chelators
3002	Making Friends with an Invasive; Novel Evaluation of Key Resources of <i>Gracilaria tikvahiae</i>
3006	The effect of different protein sources on the growth and development of <i>Tenebrio Molitor</i>
3007	Antibiotic inactivation at home: A Proposal for Disposal Can antibiotics be inactivated so that they may be disposed of down the drain?
3012	Pseudoscience or Agriculturally Beneficial: The Effect of Magnetic Water on the Growth of Two Different Plant Species
3013	Is It Blood?
3019	The True Origins of River Foams
3020	The effects of bovine serum albumin (BSA) on restriction digestion and analysis of Lambda Phage DNA
3021	Is our water safe?
3028	Topical Gel Method Toward the Removal of Tattoo Pigment in the Epidermis and Dermis Skin Layers
3030	The effect of compounds on <i>Planaria</i> regeneration.
3036	Athletes Performance on Different Types of Drinks!
3037	The Application of the Photosynthetic Hydrogen Production of <i>C. reinhardtii</i> in Hydrogen Fuel Cells
3039	The Physical Relationship of NOTCH4 and MKL1
3047	Biochemistry of antibiotics in Dentistry
3050	Chromosome segregation and localization patterns in FtsZ mutant strains
3051	Saving the Planet by Decomposing Ink
3059	The effect of different Northern Catalpa Bark chemicals on <i>Pogonomymex</i>
3061	Role of MyD88 in DNA Damage Response
3065	Mud Power, Harnessing Electro-Microbial Energy From Bacteria Strains

# Scientific Disciplines Selected by Student

## 2012 Connecticut Science Fair

### Biochemistry

Project Number	Title
3067	Hydrogels as a Novel Drug Delivery System
3069	Microstructured Hydrogels for Drug Delivery
3075	A Study of "Ebb and Flo" Aquaponics as the Most Effective Growing System for Romaine Lettuce as Compared to a Hydroponic and an Organic, Soil-Based, Growing System
3086	The Application of LT and 5-HTP in Serotonin Synthesis
3088	Linum usitatissimum and Cottage Cheese On MCF7 Breast Cancer Cells.
3089	Cleaning Worms
3098	The Effects Of Commercial Non-Agricultural Target Specific And Non-Specific Herbicides at Specific Temperatures On The Embryonic Development Of Zebrafish
3501	Beluga Behavior Study
3503	Ethylene Production
3508	The Effect of Drugs and Herbal Remedies on Propionibacterium Acnes
3510	Microbial Fuel Cell Efficiency and Design
3513	Agave: The Future of Biofuels A Comparison of the Biofuel Potential of Agave Americana Grown with Different Amounts of Water
3515	Environmentally Friendly Photodegradation of Aliphatic Pollutants in Water by Using Visible Light Activated Chlorophyll
3516	Effects of Pollutants in Soil on Peroxidase Activity in Radish Plants
3518	The Effect of Pesticide on Cherry Barb Embryonic Development
3520	The Application of Sufi Music as a Communication Method with Plants to Stimulate O <sub>2</sub> and CO <sub>2</sub> Production during Photosynthesis and Aerobic Respiration
4036	The Dissolving Effect of Alcohols on Amber
5003	Corrosive Sodas
5025	The Investigation of the Presence of Caffeine in Groundwater and Sewage
5547	Absorption Rate of Lead Compounds on Simulated Skin and Cells and Effect of Chelators and Heat on Absorption.
6019	The Effects of Temperature and Age on Vitamin C Levels in Organic vs. Conventional Green Bell Peppers
6020	The Deep Blue: How salt water affects flesh...Hot? Cold?
6026	Membranes for Biochemical Separations
6031	The Investigation of the Role of Methylating Bacteria in the Reintroduction Of Mercury into Long Island Sound
6059	Innovative design for cellulosic ethanol production as bio-fuel
6074	Catalase & pH Sensitivity
6075	Application of iDS-PBR to Prolongate Algal Photobiolysis in C. Reinhardtii
6076	Surfactants: Emulsification Effects of Synthetic, Microbial and Plant-Derived Surfactants
6080	The Compatibility Between Pure 2-D Sericin Membranes and Cell Growth
6501	A Comparative Analysis of Bio-Diesel Emissions Versus Emissions of Petroleum Diesel
6503	Effective Removal of BTEX from Industrial Wastewater by Using Banana Peels as an Environmentally Friendly and Low-Cost Bio-Sorbent
6510	Efficient and Practical Approach to Removal of BTEX from Industrial Waste Water by Using Tea Waste



# Scientific Disciplines Selected by Student

## 2012 Connecticut Science Fair

## Biotechnology

Project Number	Title
1001	Is Your Daphnia Hopped Up On Caffeine?
1002	Is it REALLY Blood?
1003	Do magnets effect the growth of radishes?
1004	Algae The Key to our Future
1005	The Effectiveness of Natural Acne Products vs. Chemical Commercial Products
1006	Do you know how much bacteria you are touching?
1007	Environmental Effects
1008	Weed Massacre
1009	Strange Heights
1010	Testing the Effect of pH Levels of Polluted Fresh Water on Elodea Canadensis Life Span
1011	One Nasty Fact
1012	The Effect of Electromagnetic Fields on Scenedesmus Algae Cells
1014	Hydration Benefits with Fruits and Vegetables and Effect on Cell Absorption
1015	X-rays: Friend or Foe
1016	Harvesting Wild Yeast For Local Sourdough
1017	The Effects of Global Warming on Marine Life
1018	Eco-friendly, Equally Effective?
1019	The Mighty Houseplant
1021	What Medium Gathers the Most Molusk Mucus?
1022	Analysis of Omega Oils as Cancer Inhibitors and Antioxidants plus Effect on Cell Bioavailability
1023	Efficacy of a Natural Pest Repellent
1024	The Battle of Lung Capacity
1025	Drastic Plastics
1027	Hidden Horrors: Do Germs Lurk in Our School?
2001	Battling Bacteria of the Mouth
2003	Depleting Oyster Population: Alarming Coincidence, or CO <sub>2</sub> ?
2004	Environmental Acidity and Bioluminescent Algae
2005	In which of the three environments does a green banana ripen the fastest?
2006	Affects of Phosphorus on Growth of Azolla.
2007	Peel Power
2008	Food is Fuel
2009	Is My Water Potable
2010	Total Suspended Solids on Waste Water
2011	The Efficacy of Bleach as a Disinfectant
2012	Watch it Rot
2013	THE ECO-FRIENDLY DIAPER: LANDFILL DESIGN. "The Type of Cloth Versus the Rate of Decomposition"
2015	Affect of Fertilizer on Algal Growth
2017	Can homeopathic solutions inhibit the growth of Group A Streptococcus bacteria?
2018	Ants, Glucose, Diabetes....Huh?
2019	When Your Sniffer Snoozes
2020	Should We Be Going Bananas?! The Study of Ocean and Freshwater Acidification and its Harmful Effect on the Shells of Aquatic Organisms and the Evaluation of a Banana-Derived Additive to Reduce It.
2021	Frog Peptides Vs. Bacteria
2022	One Dog's Poop, Another Man's Treasure.

# Scientific Disciplines Selected by Student

## 2012 Connecticut Science Fair

## Biotechnology

Project Number	Title
2023	Hydroponic Tomatoes
2026	How Plants React to Different Types of Music During Growth
2027	How What we Eat for Breakfast Affects Schoolwork, Mood, Wakefulness, and Energy Throughout the Morning.
2029	Plants and Lights
2030	How Does Caffeine Effect the Heart
2031	Geotropism: Fact or Fake
2032	The Greenhouse Effect
2502	The Great Plains of Change
2503	Teredo Navalis - A Population Density Study
2504	The Effect of Rising Carbon Dioxide Levels on Plant Growth
2505	How Does Different Water Solutions (Pollution) Affect Daphnia?
2506	Balance
2507	Analysis of Local Watershed and River Contaminated Sediments, and Effect on River and Long Island Sound Waters
2508	Indicate your Vitamin C
2509	Do Ambient Temperatures Affect Bat Mortality?
2510	Distracted Driving
2512	A Sustainable Hydrogen-Producing Algae Bioreactor
2513	Out With Indigestion
2514	A More Efficient Way to Detect Schistosomiasis
2515	Polypropylene Oil Magnets: A comparison of this novel approach using ferrofluids to established methods of oil spill removal including OEMs, woodchips, hay, and compost.
2516	The Effect of Different Organic Materials on the Number of Ants Repelled
2517	Measuring Air Pockets in Store-Bought vs. Farm Fresh Eggs
2521	The Effect of Vitamin D on Bone Recalcification
2522	The Dirt on Worms
2523	Blood Pressure: Red Rising?
2524	The Effects of Symphytum on Bone Cell Growth
2525	How Do Different Colors and Sizes Affect Memory
2527	Manufacturing and Biodegrading Bioplastics: Observing the speed of biodegradation of potato, rice, tapioca and corn starch based plastics.
2528	Should We Doubt the Short and Stout?
2529	DONT DRINK AND DRIVE
2530	GMO OR NO GMO
2532	Hydroponics vs. Soil
2535	Grapefruit Juice or Gatorade, Which Has More Electrolytes?
2537	Make a Mummy Out of Me
2538	Are You Really Going to Eat That?
2539	Pharmaceutical and Herbal Antibiotic Effectiveness on Bacteria from Multiple Collection Sources
2540	The Effects of De-Icing Salts and Chemical Compounds on Adiantum pedatum
2541	KILLING THE INVISIBLE ENEMY ON OUR HANDS: DO WE USE SOAP OR HAND SANITIZER?
2543	Phytoremediation: Removal of metal pollutants from contaminated soil and effect of chelators
3002	Making Friends with an Invasive; Novel Evaluation of Key Resources of Gracilaria tikvahiae
3003	Planarian Regeneration: A Comparison of a Triclad
3004	Bio-engineering: Microbial Properties of Shark Skin and Other Natural Surfaces
3006	The effect of different protein sources on the growth and development of Tenebrio Molitor

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Biotechnology

Project Number	Title
3007	Antibiotic inactivation at home: A Proposal for Disposal Can antibiotics be inactivated so that they may be disposed of down the drain?
3008	Which Intestinal Bacteria is Best? A study of the Effectiveness of Single and Multi-Strain Probiotics.
3010	How temperature affects the Peroxidase enzyme
3011	In Vitro 15-Lipoxygenase Inhibition of Polyphenolic Anti-inflammatory Agents From Malae Domestica
3012	Pseudoscience or Agriculturally Beneficial: The Effect of Magnetic Water on the Growth of Two Different Plant Species
3013	Is It Blood?
3014	The Dietary Effects of Caffeine and Sugar on Anxiety in Correspondence with Psychogenic Non-Epileptic Seizures
3017	Determination of evolutionary relationships among coral species by comparison of nuclear and mitochondrial DNA markers
3018	The Influence of Estradiol Beta on the Development of Zebrafish Embryos
3019	The True Origins of River Foams
3020	The effects of bovine serum albumin (BSA) on restriction digestion and analysis of Lambda Phage DNA
3021	Is our water safe?
3022	The Effect of Sodium Chloride on Heart Rate
3026	Algae Biodiesel
3027	The Effect of a Bacteria's Source On A Microbial Fuel Cell's Electrical Output
3028	Topical Gel Method Toward the Removal of Tattoo Pigment in the Epidermis and Dermis Skin Layers
3029	The effects of antibiotics on the development of zebrafish embryos.
3030	The effect of compounds on Planaria regeneration.
3031	Antiseptics in the Hospital: A Comparative Study of Soaps Used In Our Health Facilities
3032	EMDR:Successfully Treating PTSD
3033	Chaos in Bacterial Growth with Sinusoidal Temperature Cycles
3034	Nanoparticle-Enhanced Radiofrequency Ablation of Simulated Cancer Cells
3035	Using New Approaches to Evaluate Polyvinylpyrrolidone's Effects on Renal Function
3036	Athletes Performance on Different Types of Drinks!
3037	The Application of the Photosynthetic Hydrogen Production of <i>C. reinhardtii</i> in Hydrogen Fuel Cells
3038	Propagation and Mass Changes of Coral under Different Circumstances
3039	The Physical Relationship of NOTCH4 and MKL1
3041	The Effect of Increased Sea Surface Temperature and Overfishing on Carcharhiniformes Attacks on Humans
3042	Mycoremediation of PCB Soil Contaminants with <i>Pleurotus Ostreatus</i>
3043	Club Heartbeatz
3046	Optogenetic Interrogation of Prefrontal Cortex Dopamine D1 Receptor-Containing Neurons as a Technique to Restore Timing: A Novel Approach to Treat Prefrontal Disorders
3047	Biochemistry of antibiotics in Dentistry
3048	Analysis of Agent X and Methylglyoxal in Honey Variance
3050	Chromosome segregation and localization patterns in FtsZ mutant strains
3051	Saving the Planet by Decomposing Ink
3052	The Effectiveness of <i>P.virgatum</i> inoculated with Mycorrhizal fungi at remediating formaldehyde (Voc) in a controlled environment
3054	Photodynamic Therapy for Wound Healing
3055	Using Phage Therapy to Kill <i>Escherichia coli</i> on Meats
3057	Use of Formant Values in Classifying Vocalizations of Beluga Whales ( <i>Delphinapterus leucas</i> )
3058	The Effect of Different Nutrient Solutions on Hydroponically Grown Plants
3059	The effect of different Northern Catalpa Bark chemicals on <i>Pogonomymex</i>
3061	Role of MyD88 in DNA Damage Response

# Scientific Disciplines Selected by Student

## 2012 Connecticut Science Fair

### Biotechnology

Project Number	Title
3062	From Shape Recognition to Multi-Calculus Thinking: Study of Geometric Perception and Spatial Cognition in Early Alzheimer's Disease Patients
3065	Mud Power, Harnessing Electro-Microbial Energy From Bacteria Strains
3067	Hydrogels as a Novel Drug Delivery System
3068	Confirming Conclusions Made in a Previous Study Which Found a Correlation between Lucid Dreaming and Ventromedial Versus Dorsolateral Prefrontal Task Performance in Minors versus Adults
3069	Microstructured Hydrogels for Drug Delivery
3070	Non-Invasive Dissipation of 2,4-D Pesticide in Standing Water Using Iris Versicolor
3071	The Effect of Using Gracilaria tikvahiae as a Soil Conditioner in Clay Soil
3072	Assessment of Lepidoptera Plant Preference at Mass Audubon's Felix Neck Wildlife Sanctuary
3073	The Effects of the Tobacco Mosaic Virus on Cherry Tomatoes and Pepperz
3074	Novel Removal of Escherichia Coli 0157:H7 from Fresh Water Sources using Amino Acid Attractants
3075	A Study of "Ebb and Flo" Aquaponics as the Most Effective Growing System for Romaine Lettuce as Compared to a Hydroponic and an Organic, Soil-Based, Growing System
3076	The effect of the overexpression of HDAC5 in N2A cells on PGC-1 $\alpha$ and glucose transporters
3077	Pseudomonas aeruginosa
3078	Do Optimal Outcome Individuals Have a Less of a Prevalence of Family History of Major Mood, Anxiety, or Psychotic Disorders than Individuals who Have Retained Their Autism Spectrum Disorder Diagnoses?
3079	Pigeon Talk: A Bio-acoustical Analysis of Variation in Male Fantail Pigeon Display Calls
3080	Expression Patterns of MicroRNA-228 in C. Elegans
3081	Assessment of the Accuracy of the Euroscore and STS risk predicting algorithms for patients undergoing Aortic Valve Replacement
3082	The Regulation of DcR3 and TL1A by Pro-inflammatory Cytokines in First Trimester Decidual Cells
3084	The Biological Control of Zebra Mussels Using the Marine Natural Product Aaptamine.
3086	The Application of LT and 5-HTP in Serotonin Synthesis
3087	Investigation and Remediation of the Health of New Creek Salt Marsh through the Studies of Benthic Invertebrates
3088	Linum usitatissimum and Cottage Cheese On MCF7 Breast Cancer Cells.
3089	Cleaning Worms
3090	Exploring the Levels of Environmental Chitin and Chitineses in House Dust and their association with Asthma
3092	Creating a Cre/Lox Barcoding System: a Potential Breakthrough in Tracking the Heterogeneity of Glioblastoma Multiforme
3093	Are High School Band Students at Risk for Hearing Damage?
3094	Natural Fruit-Based Drinks vs. Sports Drinks: Is one "electro-light?"
3095	The Effect of Disinfectant Byproducts in Relation to Allergic Asthma
3097	The Effect of Diazofluorenes on Ovarian Cancer Cells
3098	The Effects Of Commercial Non-Agricultural Target Specific And Non-Specific Herbicides at Specific Temperatures On The Embryonic Development Of Zebrafish
3099	The regeneration of human tooth enamel in physiological conditions
3101	THE EFFECT OF INTRAUTERINE GROWTH RETARDATION ON GENE EXPRESSION IN MUSCLE TISSUE OF NEWBORN LAMBS
3103	Can Grass be Used to Absorb Oil from Soil?
3104	Wet Pits: The Effect of Active Ingredient of Antiperspirant Deodorant on the Amount of Human Perspiration
3105	The Effect of Turmeric on Mice Cognition and Development
3501	Beluga Behavior Study
3502	The Heart of Gaming
3503	Ethylene Production
3504	The Effects of Watershed Pollution on the Common Inhabitant Fresh Water Plant, Nasturtium officinale
3505	Which removes the most bacteria?

# Scientific Disciplines Selected by Student

## 2012 Connecticut Science Fair

## Biotechnology

Project Number	Title
3506	Investigation of Factors that Affect the Regeneration Rate of Planaria
3507	Which Species of Earthworm Decompose Waste in Landfills Most Efficiently?
3508	The Effect of Drugs and Herbal Remedies on Propionibacterium Acnes
3510	Microbial Fuel Cell Efficiency and Design
3511	Bioremediation with Duckweed and Elodea Densa
3512	Are you looking at my Brach?! (That's because I mutated it...): A Study of Mutated Brachypodium distachyon
3513	Agave: The Future of Biofuels A Comparison of the Biofuel Potential of Agave Americana Grown with Different Amounts of Water
3514	Bass Attack
3515	Environmentally Friendly Photodegradation of Aliphatic Pollutants in Water by Using Visible Light Activated Chlorophyll
3516	Effects of Pollutants in Soil on Peroxidase Activity in Radish Plants
3518	The Effect of Pesticide on Cherry Barb Embryonic Development
3519	Target Practice: The Effects of Herbicides and Pesticides on Unintended Targets
3520	The Application of Sufi Music as a Communication Method with Plants to Stimulate O <sub>2</sub> and CO <sub>2</sub> Production during Photosynthesis and Aerobic Respiration
3521	The Effect of Hydrocarbon Materials on Oil
3522	How Radiation Affects Cells
3523	The Effects of Common Painkillers on Zebrafish
4001	The Effect of Different Angles of Impact on the Area of a Simulated Blood Spatter
4005	Egg-ceptional Packaging Material
4006	Are you Safe this Winter?
4010	Analysis and Bioavailability of Chemical Dyes Versus Natural Dyes with their Antioxidant Benefits.
4011	The Negative Effects of Teeth Whiteners
4023	The Improved Refrigeration Unit
4025	which pain reliever acts the fastest
4026	ND-9 No Dirt-9 Innings
4034	Constantly Spring
4036	The Dissolving Effect of Alcohols on Amber
5003	Corrosive Sodas
5004	Soundproofing "What Type of Material Works Best?"
5005	Designing an Effective Dye-Sensitized Solar Cells
5010	The effectiveness of Peat Biofilters
5013	How is a Soils Permeability Related to its Grain Size Distribution?
5014	Passive Solar Energy
5020	Back to the Future with Mud Brick and Clay Egyptian Houses and Wooden American Houses: Comparing cooling and heating methods, structure stability, and cost differences
5021	What variables affect the grasp efficiency of a robotic arm?
5025	The Investigation of the Presence of Caffeine in Groundwater and Sewage
5035	Acid Rain and its effects on Plant Growth and Seed Germination
5037	Quantifying Magnus Effect Induced Drag Minimization
5039	How Much Vitamin C Is In AN Orange
5041	Visible or Invisible
5504	Tower Power
5505	Programming NANORGS in a Virtual World
5506	The Commercialization of Proton Exchange Membrane-based Fuel Cell Systems for Household Use

# Scientific Disciplines Selected by Student

## 2012 Connecticut Science Fair

## Biotechnology

Project Number	Title
5511	Trebuchet All the Way
5514	Pigg'n Out
5524	Do Brightly Colored Roofs Reduce Thermal Radiation?
5526	What to Wear?
5529	What Are The Short Term (drying) And Long Term (after drying) Affects Of Temperature On Water Based Paints?
5531	Homemade Water Filtration Models and Pond Water Purification
5532	Greener Cleaner? Testing the Level of Phosphates in Everyday Cleaners
5534	Bird Wing Technology
5537	Killing us slowly, radiation in our toys and household appliances.
5541	A Bridge Too Strong
5547	Absorption Rate of Lead Compounds on Simulated Skin and Cells and Effect of Chelators and Heat on Absorption.
5551	Which Plane Design Creates the Greatest Lift?
6002	Polyvinylidene Fluoride (PVDF) Piezoelectric Generator: A Novel Approach to Harvesting Vibrations from Human Respiration to Power Biological Implant Devices
6008	Development of TiO <sub>2</sub> Nanotubes and Spectral Absorbance Enhancement as Methods to Increase Efficiency of Dye Sensitized Solar Cells
6009	Alternative Material and Three-Dementional Structure to Solar Panel Technology
6010	The Effectiveness Of Targeted Strength And Flexibility Exercises Based On Imbalances Identified By Functional Movement Screen At Preventing Injuries In Female Intercollegiate Ice Hockey Players
6013	Testing Turbines
6015	Autochrome: The Chemical Renovation of a 19th Century Art.
6019	The Effects of Temperature and Age on Vitamin C Levels in Organic vs. Conventional Green Bell Peppers
6020	The Deep Blue: How salt water affects flesh...Hot? Cold?
6021	Remediation of Heavy Metals from River Water via a Novel Lemna minor Activated Filtration Medium
6022	The Effects of Shaking or Not Shaking Ten Dose Vaccine Vials on the Amount of Metals per Dose
6023	Feeding Tube Occlusions: An In-Vitro Evaluation of Ciprofloxacin Tablets
6026	Membranes for Biochemical Separations
6028	UNDERWATER CONSTRUCTION DESIGN FOR RESIDENTIAL PURPOSES WITH MATERIALS AND ENERGY USED
6031	The Investigation of the Role of Methylating Bacteria in the Reintroduction Of Mercury into Long Island Sound
6032	Design of a Smart Brick with Improved Insulation and Intuitive Reflection of Sunlight
6037	Geometrical Symmetry Analysis of the Skeletonema costatum Amorphous Cell Structure
6042	Alternative Materials Substituted For Wood in Acoustic Guitars
6044	The Power of Domes Geodesic Domes Versus Flat Panels: Solar Efficiency
6045	A Hidden Treasure; Dehumidification of Air Improves Indoor Air Quality
6049	An Organic Thin Film Transistor and Elastic Organic Solar Cell Based Electronic Skin for Biochemical and Tactile Sensing
6052	Paper Batteries: A Viable Lithium Ion Battery Technology
6056	Production of High Quality Ceramic Coatings for Turbine Applications by Freeze Spray Deposition
6057	Isaac's Rebel Fluids: A Studu of Non-Newtonian Fluids
6058	A Statistical Analysis of Data Collecting Methodology
6059	Innovative design for cellulosic ethanol production as bio-fuel
6060	Minimizing Eutrophication Through the Use of Clay and Plastic Lining for Manure Lagoons and Feedlots
6063	Simplified Molecular Detection of Aromatic Nitroamine Pesticides using Bee Venom Luminescence
6066	Revolutionizing Cancer Treatment: A Simulation of Nanocarriers Using Swarm Intelligence for Targeted Cancer Cells
6067	Does Sugar Lengthen the Life of Cut Roses?

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Biotechnology

Project Number	Title
6068	Isotropic Versus Anisotropic Materials: Affect on Violin Resonance Using Young's Modulus
6074	Catalase & pH Sensitivity
6075	Application of iDS-PBR to Prolongate Algal Photobiolysis in <i>C. Reinhardtii</i>
6076	Surfactants: Emulsification Effects of Synthetic, Microbial and Plant-Derived Surfactants
6079	Recovery of Light Hydrocarbon Fuels from PETE Recycling with Concurrent Reduction in the Recyclable Footprint
6080	The Compatibility Between Pure 2-D Sericin Membranes and Cell Growth
6081	The Use of Berries from Connecticut Invasive Plants in Dye- Sensitized Solar Cells
6501	A Comparative Analysis of Bio-Diesel Emissions Versus Emissions of Petroleum Diesel
6503	Effective Removal of BTEX from Industrial Wastewater by Using Banana Peels as an Environmentally Friendly and Low-Cost Bio-Sorbent
6510	Efficient and Practical Approach to Removal of BTEX from Industrial Waste Water by Using Tea Waste
6513	Using Environmental Friendly and Cost Effective Ferrofluid Magnetite as an Adsorbing Agent to Efficiently Remove Petroleum Spills from Water Sources and its Commercial Application with a Robot Arm

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Cellular and Molecular Biology

Project Number	Title
1018	Eco-friendly, Equally Effective?
2012	Watch it Rot
2015	Affect of Fertilizer on Algal Growth
2017	Can homeopathic solutions inhibit the growth of Group A Streptococcus bacteria?
2021	Frog Peptides Vs. Bacteria
2509	Do Ambient Temperatures Affect Bat Mortality?
2512	A Sustainable Hydrogen-Producing Algae Bioreactor
2537	Make a Mummy Out of Me
2539	Pharmaceutical and Herbal Antibiotic Effectiveness on Bacteria from Multiple Collection Sources
3003	Planarian Regeneration: A Comparison of a Triclad
3004	Bio-engineering: Microbial Properties of Shark Skin and Other Natural Surfaces
3006	The effect of different protein sources on the growth and development of Tenebrio Molitor
3012	Pseudoscience or Agriculturally Beneficial: The Effect of Magnetic Water on the Growth of Two Different Plant Species
3014	The Dietary Effects of Caffeine and Sugar on Anxiety in Correspondence with Psychogenic Non-Epileptic Seizures
3017	Determination of evolutionary relationships among coral species by comparison of nuclear and mitochondrial DNA markers
3018	The Influence of Estradiol Beta on the Development of Zebrafish Embryos
3028	Topical Gel Method Toward the Removal of Tattoo Pigment in the Epidermis and Dermis Skin Layers
3029	The effects of antibiotics on the development of zebrafish embryos.
3035	Using New Approaches to Evaluate Polyvinylpyrrolidone's Effects on Renal Function
3039	The Physical Relationship of NOTCH4 and MKL1
3046	Optogenetic Interrogation of Prefrontal Cortex Dopamine D1 Receptor-Containing Neurons as a Technique to Restore Timing: A Novel Approach to Treat Prefrontal Disorders
3047	Biochemistry of antibiotics in Dentistry
3050	Chromosome segregation and localization patterns in FtsZ mutant strains
3055	Using Phage Therapy to Kill Escherichia coli on Meats
3061	Role of MyD88 in DNA Damage Response
3065	Mud Power, Harnessing Electro-Microbial Energy From Bacteria Strains
3076	The effect of the overexpression of HDAC5 in N2A cells on PGC-1 $\alpha$ and glucose transporters
3080	Expression Patterns of MicroRNA-228 in C. Elegans
3088	Linum usitatissimum and Cottage Cheese On MCF7 Breast Cancer Cells.
3097	The Effect of Diazofluorenes on Ovarian Cancer Cells
3098	The Effects Of Commercial Non-Agricultural Target Specific And Non-Specific Herbicides at Specific Temperatures On The Embryonic Development Of Zebrafish
3105	The Effect of Turmeric on Mice Cognition and Development
3506	Investigation of Factors that Affect the Regeneration Rate of Planaria
3508	The Effect of Drugs and Herbal Remedies on Propionibacterium Acnes
3518	The Effect of Pesticide on Cherry Barb Embryonic Development
3519	Target Practice: The Effects of Herbicides and Pesticides on Unintended Targets
3522	How Radiation Affects Cells
3523	The Effects of Common Painkillers on Zebrafish
6019	The Effects of Temperature and Age on Vitamin C Levels in Organic vs. Conventional Green Bell Peppers



# Scientific Disciplines Selected by Student

## 2012 Connecticut Science Fair

## Chemistry

Project Number	Title
1002	Is it REALLY Blood?
1013	Can Pepsi Kill?
1017	The Effects of Global Warming on Marine Life
2003	Depleting Oyster Population: Alarming Coincidence, or CO <sub>2</sub> ?
2004	Environmental Acidity and Bioluminescent Algae
2007	Peel Power
2011	The Efficacy of Bleach as a Disinfectant
2012	Watch it Rot
2020	Should We Be Going Bananas?! The Study of Ocean and Freshwater Acidification and its Harmful Effect on the Shells of Aquatic Organisms and the Evaluation of a Banana-Derived Additive to Reduce It.
2021	Frog Peptides Vs. Bacteria
2030	How Does Caffeine Effect the Heart
2033	The Clean Water Project
2503	Teredo Navalis - A Population Density Study
2512	A Sustainable Hydrogen-Producing Algae Bioreactor
2514	A More Efficient Way to Detect Schistosomiasis
2527	Manufacturing and Biodegrading Bioplastics: Observing the speed of biodegradation of potato, rice, tapioca and corn starch based plastics.
2540	The Effects of De-Icing Salts and Chemical Compounds on Adiantum pedatum
3002	Making Friends with an Invasive; Novel Evaluation of Key Resources of Gracilaria tikvahiae
3007	Antibiotic inactivation at home: A Proposal for Disposal Can antibiotics be inactivated so that they may be disposed of down the drain?
3008	Which Intestinal Bacteria is Best? A study of the Effectiveness of Single and Multi-Strain Probiotics.
3011	In Vitro 15-Lipoxygenase Inhibition of Polyphenolic Anti-inflammatory Agents From Malae Domestica
3019	The True Origins of River Foams
3026	Algae Biodiesel
3028	Topical Gel Method Toward the Removal of Tattoo Pigment in the Epidermis and Dermis Skin Layers
3042	Mycoremediation of PCB Soil Contaminants with Pleurotus Ostreatus
3047	Biochemistry of antibiotics in Dentistry
3059	The effect of different Northern Catalpa Bark chemicals on Pogonomymex
3065	Mud Power, Harnessing Electro-Microbial Energy From Bacteria Strains
3067	Hydrogels as a Novel Drug Delivery System
3070	Non-Invasive Dissipation of 2,4-D Pesticide in Standing Water Using Iris Versicolor
3074	Novel Removal of Escherichia Coli 0157:H7 from Fresh Water Sources using Amino Acid Attractants
3075	A Study of "Ebb and Flo" Aquaponics as the Most Effective Growing System for Romaine Lettuce as Compared to a Hydroponic and an Organic, Soil-Based, Growing System
3089	Cleaning Worms
3095	The Effect of Disinfectant Byproducts in Relation to Allergic Asthma
3098	The Effects Of Commercial Non-Agricultural Target Specific And Non-Specific Herbicides at Specific Temperatures On The Embryonic Development Of Zebrafish
3501	Beluga Behavior Study
3503	Ethylene Production
3505	Which removes the most bacteria?
3510	Microbial Fuel Cell Efficiency and Design
3515	Environmentally Friendly Photodegradation of Aliphatic Pollutants in Water by Using Visible Light Activated Chlorophyll
3520	The Application of Sufi Music as a Communication Method with Plants to Stimulate O <sub>2</sub> and CO <sub>2</sub> Production during Photosynthesis and Aerobic Respiration

# Scientific Disciplines Selected by Student

## 2012 Connecticut Science Fair

## Chemistry

Project Number	Title
4002	Determining Amount Of Sugar, Salt, and Alcohol in a Water Solution with a Laser Pointer
4004	Disappearing Act
4007	Soap Mania
4009	Fading Away
4010	Analysis and Bioavailability of Chemical Dyes Versus Natural Dyes with their Antioxidant Benefits.
4022	How do acids effect cupcake size?
4028	What's The Freezing Point Of Oil
4029	How Does Combining Metals Lead to Rust Development
4030	Floating in Density
4036	The Dissolving Effect of Alcohols on Amber
5003	Corrosive Sodas
5005	Designing an Effective Dye-Sensitized Solar Cells
5008	Which Type of Ice Melt Product Works Best?
5010	The effectiveness of Peat Biofilters
5025	The Investigation of the Presence of Caffeine in Groundwater and Sewage
5031	Which metals are more efficient electrodes in the process of electrolysis of water?
5034	Oils: The Disgusting Truth
5046	YEAST VS. JUICE
5503	What Cools Soda Best?
5506	The Commercialization of Proton Exchange Membrane-based Fuel Cell Systems for Household Use
5512	Cold Pack Chemistry
5518	Ferro Fluid
5524	Do Brightly Colored Roofs Reduce Thermal Radiation?
5529	What Are The Short Term (drying) And Long Term (after drying) Affects Of Temperature On Water Based Paints?
5530	The design and construction of a superlative HHO generator and the effect of complex carbohydrates on the output of hydroxide.
5532	Greener Cleaner? Testing the Level of Phosphates in Everyday Cleaners
5539	Crude Awakening Disaster In The Gulf Type of Absorbent vs. Time of Oil Absorption
5544	Cold Pack Chemistry - Where does the heat go?
5547	Absorption Rate of Lead Compounds on Simulated Skin and Cells and Effect of Chelators and Heat on Absorption.
5549	Rust Above The Rest
5555	Bubble Time!
6005	The Effect of Acid Catalysts on the Esterification of Methyl Salicylate
6007	Role of Electro-Chemical Double Layer Capacitors in Energy Storage
6008	Development of TiO <sub>2</sub> Nanotubes and Spectral Absorbance Enhancement as Methods to Increase Efficiency of Dye Sensitized Solar Cells
6014	Music, Chemicals, and Elements
6015	Autochrome: The Chemical Renovation of a 19th Century Art.
6019	The Effects of Temperature and Age on Vitamin C Levels in Organic vs. Conventional Green Bell Peppers
6022	The Effects of Shaking or Not Shaking Ten Dose Vaccine Vials on the Amount of Metals per Dose
6026	Membranes for Biochemical Separations
6031	The Investigation of the Role of Methylating Bacteria in the Reintroduction Of Mercury into Long Island Sound
6043	The Coordination of Glucose with Transition-Metal-Ion Complexes of tris(2-aminoethyl)amine
6045	A Hidden Treasure; Dehumidification of Air Improves Indoor Air Quality
6047	Fluid of the Future

# Scientific Disciplines Selected by Student

## 2012 Connecticut Science Fair

### Chemistry

Project Number	Title
6049	An Organic Thin Film Transistor and Elastic Organic Solar Cell Based Electronic Skin for Biochemical and Tactile Sensing
6051	An Analysis of the Spatial Variation of Chromium, Copper, and Lead in Long Island Sound, Black Rock Harbor, and Ash Creek
6052	Paper Batteries: A Viable Lithium Ion Battery Technology
6056	Production of High Quality Ceramic Coatings for Turbine Applications by Freeze Spray Deposition
6057	Isaac's Rebel Fluids: A Studu of Non-Newtonian Fluids
6059	Innovative design for cellulosic ethanol production as bio-fuel
6063	Simplified Molecular Detection of Aromatic Nitroamine Pesticides using Bee Venom Luminescence
6071	BATTLE OF THE SOLVENTS-THIN LAYER CHROMATOGRAPHY
6074	Catalase & pH Sensitivity
6076	Surfactants: Emulsification Effects of Synthetic, Microbial and Plant-Derived Surfactants
6078	Exploring the Relationship between Soil Chemistry and Water Quality at the Upper Cove River Watershed
6079	Recovery of Light Hydrocarbon Fuels from PETE Recycling with Concurrent Reduction in the Recyclable Footprint
6081	The Use of Berries from Connecticut Invasive Plants in Dye- Sensitized Solar Cells
6503	Effective Removal of BTEX from Industrial Wastewater by Using Banana Peels as an Environmentally Friendly and Low-Cost Bio-Sorbent
6505	Chromatography of Lip Gloss and Lipstick
6506	Visible Light Scattering Analysis To Detect Lead
6507	Vitamin C + Iodine
6509	Interminable Instant Icepacks
6510	Efficient and Practical Approach to Removal of BTEX from Industrial Waste Water by Using Tea Waste
6512	Auxochromes and Fading Prevention
6513	Using Environmental Friendly and Cost Effective Ferrofluid Magnetite as an Adsorbing Agent to Efficiently Remove Petroleum Spills from Water Sources and its Commercial Application with a Robot Arm
6519	Which Factor Affects the pH Levels of Bodies of Water More: Direct Sunlight or Rain?
6521	Fire Retardant Paint
6522	The Chemical Analysis of Soil with Respect to Birch Tree Growth
6524	The Toxic Truth About Paint
6525	Javonic Bonding

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Computer Science

Project Number	Title
2021	Frog Peptides Vs. Bacteria
2525	How Do Different Colors and Sizes Affect Memory
2531	Should a School Advertise more Sports or Academics Online?
2534	Password Security
2540	The Effects of De-Icing Salts and Chemical Compounds on Adiantum pedatum
3019	The True Origins of River Foams
3033	Chaos in Bacterial Growth with Sinusoidal Temperature Cycles
3060	The Factors of Life
3065	Mud Power, Harnessing Electro-Microbial Energy From Bacteria Strains
4005	Egg-ceptional Packaging Material
5021	What variables affect the grasp efficiency of a robotic arm?
5023	The Sands of Time in Computer Processing
5505	Programming NANORGS in a Virtual World
5521	Experimental Evaluation of Techniques for Protecting Users from Malware Attacks
5524	Do Brightly Colored Roofs Reduce Thermal Radiation?
5529	What Are The Short Term (drying) And Long Term (after drying) Affects Of Temperature On Water Based Paints?
5551	Which Plane Design Creates the Greatest Lift?
6006	Effect of Indexing String Length On Speed and Memory Usage for Digital Karyotyping Query Algorithms
6009	Alternative Material and Three-Dementional Structure to Solar Panel Technology
6011	Mp3 Compression and it's relation to Psychoacoustics.
6012	Alternative liquid cooling methodes for a computers central processing unit.
6016	Utilizing a Robotic Turning Mechanism to Focus on the Sun in Order to Maximize the Efficiency of a Parabolic Trough Water Heating System
6058	A Statistical Analysis of Data Collecting Methodology
6066	Revolutionizing Cancer Treatment: A Simulation of Nanocarriers Using Swarm Intelligence for Targeted Cancer Cells
6516	What is the Fastest Way to Solve a Sudoku Puzzle?
6525	Javonic Bonding

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Earth Science

Project Number	Title
1007	Environmental Effects
1008	Weed Massacre
1010	Testing the Effect of pH Levels of Polluted Fresh Water on Elodea Canadensis Life Span
1019	The Mighty Houseplant
1025	Drastic Plastics
2003	Depleting Oyster Population: Alarming Coincidence, or CO2?
2011	The Efficacy of Bleach as a Disinfectant
2015	Affect of Fertilizer on Algal Growth
2017	Can homeopathic solutions inhibit the growth of Group A Streptococcus bacteria?
2021	Frog Peptides Vs. Bacteria
2029	Plants and Lights
2032	The Greenhouse Effect
2501	Rock the Brownfields Green: Food for Fungi
2503	Teredo Navalis - A Population Density Study
2504	The Effect of Rising Carbon Dioxide Levels on Plant Growth
2512	A Sustainable Hydrogen-Producing Algae Bioreactor
2522	The Dirt on Worms
2527	Manufacturing and Biodegrading Bioplastics: Observing the speed of biodegradation of potato, rice, tapioca and corn starch based plastics.
2528	Should We Doubt the Short and Stout?
2532	Hydroponics vs. Soil
2540	The Effects of De-Icing Salts and Chemical Compounds on Adiantum pedatum
3019	The True Origins of River Foams
3021	Is our water safe?
3065	Mud Power, Harnessing Electro-Microbial Energy From Bacteria Strains
3071	The Effect of Using Gracilaria tikvahiae as a Soil Conditioner in Clay Soil
3084	The Biological Control of Zebra Mussels Using the Marine Natural Product Aaptamine.
3098	The Effects Of Commercial Non-Agricultural Target Specific And Non-Specific Herbicides at Specific Temperatures On The Embryonic Development Of Zebrafish
3510	Microbial Fuel Cell Efficiency and Design
3520	The Application of Sufi Music as a Communication Method with Plants to Stimulate O2 and CO2 Production during Photosynthesis and Aerobic Respiration
3521	The Effect of Hydrocarbon Materials on Oil
4004	Disappearing Act
4005	Egg-ceptional Packaging Material
4008	Hydropower
4020	Does the shape of an ice cube effect how quickly it melts?
4029	How Does Combining Metals Lead to Rust Development
4030	Floating in Density
4035	The Effect of Soil Type on Earthquake Damage
5010	The effectiveness of Peat Biofilters
5012	Go With The Flow: Applying Darcy's Law to the Flow of Groundwater
5013	How is a Soils Permeability Related to its Grain Size Distribution?
5024	The Science of Tornadoes
5040	Crater Mania

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Earth Science

Project Number	Title
5513	Effects of Salt and Temperature on Surface Tension
5518	Ferro Fluid
5524	Do Brightly Colored Roofs Reduce Thermal Radiation?
5525	Development of a Prototype Pendulum Wave Energy Conversion Device
5531	Homemade Water Filtration Models and Pond Water Purification
5532	Greener Cleaner? Testing the Level of Phosphates in Everyday Cleaners
5538	Making Wind Turbines Quieter and More Efficient
5539	Crude Awakening Disaster In The Gulf Type of Absorbent vs. Time of Oil Absorption
6019	The Effects of Temperature and Age on Vitamin C Levels in Organic vs. Conventional Green Bell Peppers
6028	UNDERWATER CONSTRUCTION DESIGN FOR RESIDENTIAL PURPOSES WITH MATERIALS AND ENERGY USED
6031	The Investigation of the Role of Methylating Bacteria in the Reintroduction Of Mercury into Long Island Sound
6051	An Analysis of the Spatial Variation of Chromium, Copper, and Lead in Long Island Sound, Black Rock Harbor, and Ash Creek
6064	Ideal Location
6070	Correlation Between Average Annual Global Temperature and Annual Gross Domestic Product in United States
6078	Exploring the Relationship between Soil Chemistry and Water Quality at the Upper Cove River Watershed
6513	Using Environmental Friendly and Cost Effective Ferrofluid Magnetite as an Adsorbing Agent to Efficiently Remove Petroleum Spills from Water Sources and its Commercial Application with a Robot Arm
6519	Which Factor Affects the pH Levels of Bodies of Water More: Direct Sunlight or Rain?

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Energy & Transportation

Project Number	Title
2013	THE ECO-FRIENDLY DIAPER: LANDFILL DESIGN. "The Type of Cloth Versus the Rate of Decomposition"
2022	One Dog's Poop, Another Man's Treasure.
2510	Distracted Driving
2512	A Sustainable Hydrogen-Producing Algae Bioreactor
3026	Algae Biodiesel
3037	The Application of the Photosynthetic Hydrogen Production of <i>C. reinhardtii</i> in Hydrogen Fuel Cells
3065	Mud Power, Harnessing Electro-Microbial Energy From Bacteria Strains
3510	Microbial Fuel Cell Efficiency and Design
4005	Egg-ceptional Packaging Material
4012	Rubber Bands For Energy
4015	The Windy 500: The Test of Drag and Down Force on Rear Spoilers
4019	Hills and Valleys: How driving on a flat surface can save you money
4024	Increasing Solar Energy
4027	Solar Panel in Greenhouse
5005	Designing an Effective Dye-Sensitized Solar Cells
5007	Distracted Driving
5011	How Much Height to Loop the Loop?
5014	Passive Solar Energy
5017	Energy Saver
5019	Improving Efficiency of Solar Energy
5022	A Bright Idea: Comparing the Efficiency of Incandescent, CFL, and LED Light Bulbs
5026	Nut Job
5032	Ocean Wave and Tide Energy Project
5033	Charge your device in a power blackout: Effective methods to generate electricity from heat and solar energy using thermoelectric generators
5036	Rush Hour
5037	Quantifying Magnus Effect Induced Drag Minimization
5043	Do Different Kinds of Wood Burned Affect the Burning Time?
5502	The Stirling Engine and the Effect of Temperature Differential on Engine Performance
5506	The Commercialization of Proton Exchange Membrane-based Fuel Cell Systems for Household Use
5524	Do Brightly Colored Roofs Reduce Thermal Radiation?
5525	Development of a Prototype Pendulum Wave Energy Conversion Device
5526	What to Wear?
5527	The Wing and the Wind
5528	On the Application of Electrochemical Double Layer Capacitors in Electric Vehicles
5530	The design and construction of a superlative HHO generator and the effect of complex carbohydrates on the output of hydroxide.
5538	Making Wind Turbines Quieter and More Efficient
5542	Killer Waves
5551	Which Plane Design Creates the Greatest Lift?
6002	Polyvinylidene Fluoride (PVDF) Piezoelectric Generator: A Novel Approach to Harvesting Vibrations from Human Respiration to Power Biological Implant Devices
6004	The Efficiency of Air Multiplication Technology versus the Efficiency of Bladed Fan Technology
6007	Role of Electro-Chemical Double Layer Capacitors in Energy Storage
6008	Development of TiO <sub>2</sub> Nanotubes and Spectral Absorbance Enhancement as Methods to Increase Efficiency of Dye Sensitized Solar Cells

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Energy & Transportation

Project Number	Title
6009	Alternative Material and Three-Dementional Structure to Solar Panel Technology
6016	Utilizing a Robotic Turning Mechanism to Focus on the Sun in Order to Maximize the Efficiency of a Parabolic Trough Water Heating System
6026	Membranes for Biochemical Separations
6032	Design of a Smart Brick with Improved Insulation and Intuitive Reflection of Sunlight
6037	Geometrical Symmetry Analysis of the Skeletonema costatum Amorphous Cell Structure
6039	Are wind turbines big fans of clean energy?
6044	The Power of Domes Geodesic Domes Versus Flat Panels: Solar Efficiency
6049	An Organic Thin Film Transistor and Elastic Organic Solar Cell Based Electronic Skin for Biochemical and Tactile Sensing
6050	The Effect of Water Current Direction on Turbine Productivity
6052	Paper Batteries: A Viable Lithium Ion Battery Technology
6054	Hydropower from Rainwater
6059	Innovative design for cellulosic ethanol production as bio-fuel
6062	Propeller Efficiency
6065	Effects of Magnets on a Linear Motor
6075	Application of iDS-PBR to Prolongate Algal Photobiolysis in C. Reinhardtii
6079	Recovery of Light Hydrocarbon Fuels from PETE Recycling with Concurrent Reduction in the Recyclable Footprint
6081	The Use of Berries from Connecticut Invasive Plants in Dye- Sensitized Solar Cells
6082	Nuts About Energy
6501	A Comparative Analysis of Bio-Diesel Emissions Versus Emissions of Petroleum Diesel
6511	Racing Away From Fossil Fuels
6513	Using Environmental Friendly and Cost Effective Ferrofluid Magnetite as an Adsorbing Agent to Efficiently Remove Petroleum Spills from Water Sources and its Commercial Application with a Robot Arm
6514	Pizza Box Oven
6515	Testing the Viability of Adaptive Winglet Technology to Improve Fuel Efficiency on Midsize Commercial Airlines using Computational Fluid Dynamics
6517	Can you charge your phone wirelessly? Cordless electricity transmission by piezoelectric excitation via low frequency acoustic waves.



# Scientific Disciplines Selected by Student

## 2012 Connecticut Science Fair

## Engineering

Project Number	Title
1012	The Effect of Electromagnetic Fields on Scenedesmus Algae Cells
1021	What Medium Gathers the Most Mollusk Mucus?
2010	Total Suspended Solids on Waste Water
2022	One Dog's Poop, Another Man's Treasure.
2503	Teredo Navalis - A Population Density Study
2512	A Sustainable Hydrogen-Producing Algae Bioreactor
2540	The Effects of De-Icing Salts and Chemical Compounds on Adiantum pedatum
3004	Bio-engineering: Microbial Properties of Shark Skin and Other Natural Surfaces
3026	Algae Biodiesel
3028	Topical Gel Method Toward the Removal of Tattoo Pigment in the Epidermis and Dermis Skin Layers
3034	Nanoparticle-Enhanced Radiofrequency Ablation of Simulated Cancer Cells
3037	The Application of the Photosynthetic Hydrogen Production of <i>C. reinhardtii</i> in Hydrogen Fuel Cells
3042	Mycoremediation of PCB Soil Contaminants with <i>Pleurotus Ostreatus</i>
3046	Optogenetic Interrogation of Prefrontal Cortex Dopamine D1 Receptor-Containing Neurons as a Technique to Restore Timing: A Novel Approach to Treat Prefrontal Disorders
3065	Mud Power, Harnessing Electro-Microbial Energy From Bacteria Strains
3067	Hydrogels as a Novel Drug Delivery System
3510	Microbial Fuel Cell Efficiency and Design
3512	Are you looking at my Brach?! (That's because I mutated it...): A Study of Mutated <i>Brachypodium distachyon</i>
3515	Environmentally Friendly Photodegradation of Aliphatic Pollutants in Water by Using Visible Light Activated Chlorophyll
3521	The Effect of Hydrocarbon Materials on Oil
3522	How Radiation Affects Cells
4005	Egg-ceptional Packaging Material
4006	Are you Safe this Winter?
4008	Hydropower
4016	Linear Accelerator
4018	Can You Hear Me Now?
4019	Hills and Valleys: How driving on a flat surface can save you money
4023	The Improved Refrigeration Unit
4024	Increasing Solar Energy
4026	ND-9 No Dirt-9 Innings
4032	Riding On Air
4034	Constantly Spring
5001	Distance Versus Launch Angle
5002	Citrus Battery
5004	Soundproofing "What Type of Material Works Best?"
5005	Designing an Effective Dye-Sensitized Solar Cells
5013	How is a Soils Permeability Related to its Grain Size Distribution?
5014	Passive Solar Energy
5018	Angling For Energy
5019	Improving Efficiency of Solar Energy
5020	Back to the Future with Mud Brick and Clay Egyptian Houses and Wooden American Houses: Comparing cooling and heating methods, structure stability, and cost differences
5021	What variables affect the grasp efficiency of a robotic arm?
5022	A Bright Idea: Comparing the Efficiency of Incandescent, CFL, and LED Light Bulbs

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Engineering

Project Number	Title
5029	Electromagnetism
5030	Aqua- The Swimming Robot
5031	Which metals are more efficient electrodes in the process of electrolysis of water?
5033	Charge your device in a power blackout: Effective methods to generate electricity from heat and solar energy using thermoelectric generators
5037	Quantifying Magnus Effect Induced Drag Minimization
5041	Visible or Invisible
5502	The Stirling Engine and the Effect of Temperature Differential on Engine Performance
5504	Tower Power
5505	Programming NANORGS in a Virtual World
5506	The Commercialization of Proton Exchange Membrane-based Fuel Cell Systems for Household Use
5509	Digital Pinhole Cameras and the Effect of Aperture Size on Image Sharpness
5511	Trebuchet All the Way
5524	Do Brightly Colored Roofs Reduce Thermal Radiation?
5525	Development of a Prototype Pendulum Wave Energy Conversion Device
5527	The Wing and the Wind
5528	On the Application of Electrochemical Double Layer Capacitors in Electric Vehicles
5529	What Are The Short Term (drying) And Long Term (after drying) Affects Of Temperature On Water Based Paints?
5530	The design and construction of a superlative HHO generator and the effect of complex carbohydrates on the output of hydroxide.
5531	Homemade Water Filtration Models and Pond Water Purification
5534	Bird Wing Technology
5535	The Relationship between the Heat Emitted and Energy Efficiency of Various Types of Light Bulbs
5537	Killing us slowly, radiation in our toys and household appliances.
5538	Making Wind Turbines Quieter and More Efficient
5541	A Bridge Too Strong
5543	Effects of Current on Power of Electromagnets
5546	Electric Car
5551	Which Plane Design Creates the Greatest Lift?
5552	How To Make An Aircraft Invisible to Radar
5554	Ski Physics
6002	Polyvinylidene Fluoride (PVDF) Piezoelectric Generator: A Novel Approach to Harvesting Vibrations from Human Respiration to Power Biological Implant Devices
6003	Aerodynamic drag of bicycle wheels and its effect on total drag of a rider and his bike
6004	The Efficiency of Air Multiplication Technology versus the Efficiency of Bladed Fan Technology
6007	Role of Electro-Chemical Double Layer Capacitors in Energy Storage
6008	Development of TiO <sub>2</sub> Nanotubes and Spectral Absorbance Enhancement as Methods to Increase Efficiency of Dye Sensitized Solar Cells
6009	Alternative Material and Three-Dimensional Structure to Solar Panel Technology
6011	Mp3 Compression and its relation to Psychoacoustics.
6012	Alternative liquid cooling methods for a computers central processing unit.
6013	Testing Turbines
6015	Autochrome: The Chemical Renovation of a 19th Century Art.
6016	Utilizing a Robotic Turning Mechanism to Focus on the Sun in Order to Maximize the Efficiency of a Parabolic Trough Water Heating System
6021	Remediation of Heavy Metals from River Water via a Novel Lemna minor Activated Filtration Medium

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Engineering

Project Number	Title
6026	Membranes for Biochemical Separations
6028	UNDERWATER CONSTRUCTION DESIGN FOR RESIDENTIAL PURPOSES WITH MATERIALS AND ENERGY USED
6032	Design of a Smart Brick with Improved Insulation and Intuitive Reflection of Sunlight
6037	Geometrical Symmetry Analysis of the Skeletonema costatum Amorphous Cell Structure
6039	Are wind turbines big fans of clean energy?
6040	Cantilever Vibrational Amplitude at Resonant Frequencies
6042	Alternative Materials Substituted For Wood in Acoustic Guitars
6044	The Power of Domes Geodesic Domes Versus Flat Panels: Solar Efficiency
6045	A Hidden Treasure; Dehumidification of Air Improves Indoor Air Quality
6049	An Organic Thin Film Transistor and Elastic Organic Solar Cell Based Electronic Skin for Biochemical and Tactile Sensing
6050	The Effect of Water Current Direction on Turbine Productivity
6052	Paper Batteries: A Viable Lithium Ion Battery Technology
6054	Hydropower from Rainwater
6056	Production of High Quality Ceramic Coatings for Turbine Applications by Freeze Spray Deposition
6057	Isaac's Rebel Fluids: A Studu of Non-Newtonian Fluids
6058	A Statistical Analysis of Data Collecting Methodology
6059	Innovative design for cellulosic ethanol production as bio-fuel
6060	Minimizing Eutrophication Through the Use of Clay and Plastic Lining for Manure Lagoons and Feedlots
6061	Electromagnetic Accelerator
6062	Propeller Efficiency
6063	Simplified Molecular Detection of Aromatic Nitroamine Pesticides using Bee Venom Luminescence
6066	Revolutionizing Cancer Treatment: A Simulation of Nanocarriers Using Swarm Intelligence for Targeted Cancer Cells
6068	Isotropic Versus Anisotropic Materials: Affect on Violin Resonance Using Young's Modulus
6075	Application of iDS-PBR to Prolongate Algal Photobiolysis in C. Reinhardtii
6079	Recovery of Light Hydrocarbon Fuels from PETE Recycling with Concurrent Reduction in the Recyclable Footprint
6080	The Compatibility Between Pure 2-D Sericin Membranes and Cell Growth
6503	Effective Removal of BTEX from Industrial Wastewater by Using Banana Peels as an Environmentally Friendly and Low-Cost Bio-Sorbent
6511	Racing Away From Fossil Fuels
6513	Using Environmental Friendly and Cost Effective Ferrofluid Magnetite as an Adsorbing Agent to Efficiently Remove Petroleum Spills from Water Sources and its Commercial Application with a Robot Arm
6517	Can you charge your phone wirelessly? Cordless electricity transmission by piezoelectric excitation via low frequency acoustic waves.

# Scientific Disciplines Selected by Student

## 2012 Connecticut Science Fair

### Environmental

### Env. Mgmt't & Env. Analysis

Project Number	Title
1004	Algae The Key to our Future
1007	Environmental Effects
1008	Weed Massacre
1010	Testing the Effect of pH Levels of Polluted Fresh Water on Elodea Canadensis Life Span
1012	The Effect of Electromagnetic Fields on Scenedesmus Algae Cells
1017	The Effects of Global Warming on Marine Life
1018	Eco-friendly, Equally Effective?
1019	The Mighty Houseplant
1021	What Medium Gathers the Most Molusk Mucus?
1025	Drastic Plastics
2002	REDUCE! REUSE! RECYCLE! - The Biodegradable Factor
2003	Depleting Oyster Population: Alarming Coincidence, or CO2?
2004	Environmental Acidity and Bioluminescent Algae
2007	Peel Power
2009	Is My Water Potable
2010	Total Suspended Solids on Waste Water
2013	THE ECO-FRIENDLY DIAPER: LANDFILL DESIGN. "The Type of Cloth Versus the Rate of Decomposition"
2015	Affect of Fertilizer on Algal Growth
2016	Rain...Runoff...Ramifications?
2020	Should We Be Going Bananas?! The Study of Ocean and Freshwater Acidification and its Harmful Effect on the Shells of Aquatic Organisms and the Evaluation of a Banana-Derived Additive to Reduce It.
2021	Frog Peptides Vs. Bacteria
2022	One Dog's Poop, Another Man's Treasure.
2026	How Plants React to Different Types of Music During Growth
2029	Plants and Lights
2032	The Greenhouse Effect
2033	The Clean Water Project
2501	Rock the Brownfields Green: Food for Fungi
2503	Teredo Navalis - A Population Density Study
2504	The Effect of Rising Carbon Dioxide Levels on Plant Growth
2505	How Does Different Water Solutions (Pollution) Affect Daphnia?
2507	Analysis of Local Watershed and River Contaminated Sediments, and Effect on River and Long Island Sound Waters
2512	A Sustainable Hydrogen-Producing Algae Bioreactor
2515	Polypropylene Oil Magnets: A comparison of this novel approach using ferrofluids to established methods of oil spill removal including OEMs, woodchips, hay, and compost.
2522	The Dirt on Worms
2527	Manufacturing and Biodegrading Bioplastics: Observing the speed of biodegradation of potato, rice, tapioca and corn starch based plastics.
2528	Should We Doubt the Short and Stout?
2540	The Effects of De-Icing Salts and Chemical Compounds on Adiantum pedatum
2543	Phytoremediation: Removal of metal pollutants from contaminated soil and effect of chelators
3002	Making Friends with an Invasive; Novel Evaluation of Key Resources of Gracilaria tikvahiae
3007	Antibiotic inactivation at home: A Proposal for Disposal Can antibiotics be inactivated so that they may be disposed of down the drain?
3015	An Analysis of Biotic and A biotic Factors in Newtown Vernal Pools
3016	Photoremediation properties of the Vigna Radiata

# Scientific Disciplines Selected by Student

## 2012 Connecticut Science Fair

### Environmental

#### Env. Mgmt'n't & Env. Analysis

Project Number	Title
3018	The Influence of Estradiol Beta on the Development of Zebrafish Embryos
3019	The True Origins of River Foams
3021	Is our water safe?
3026	Algae Biodiesel
3027	The Effect of a Bacteria's Source On A Microbial Fuel Cell's Electrical Output
3041	The Effect of Increased Sea Surface Temperature and Overfishing on Carcharhiniformes Attacks on Humans
3042	Mycoremediation of PCB Soil Contaminants with Pleurotus Ostreatus
3049	The Effects of Water Temperature on Tornadoes
3051	Saving the Planet by Decomposing Ink
3059	The effect of different Northern Catalpa Bark chemicals on Pogonomymex
3065	Mud Power, Harnessing Electro-Microbial Energy From Bacteria Strains
3070	Non-Invasive Dissipation of 2,4-D Pesticide in Standing Water Using Iris Versicolor
3071	The Effect of Using Gracilaria tikvahiae as a Soil Conditioner in Clay Soil
3072	Assessment of Lepidoptera Plant Preference at Mass Audubon's Felix Neck Wildlife Sanctuary
3074	Novel Removal of Escherichia Coli 0157:H7 from Fresh Water Sources using Amino Acid Attractants
3084	The Biological Control of Zebra Mussels Using the Marine Natural Product Aaptamine.
3085	Marsh Elevation in Response to Sea Level Rise on Long Island, NY
3087	Investigation and Remediation of the Health of New Creek Salt Marsh through the Studies of Benthic Invertebrates
3089	Cleaning Worms
3090	Exploring the Levels of Environmental Chitin and Chitineses in House Dust and their association with Asthma
3098	The Effects Of Commercial Non-Agricultural Target Specific And Non-Specific Herbicides at Specific Temperatures On The Embryonic Development Of Zebrafish
3102	The Effect of Buffer Zone Composition on Water Pollution
3103	Can Grass be Used to Absorb Oil from Soil?
3503	Ethylene Production
3504	The Effects of Watershed Pollution on the Common Inhabitant Fresh Water Plant, Nasturtium officinale
3507	Which Species of Earthworm Decompose Waste in Landfills Most Efficiently?
3510	Microbial Fuel Cell Efficiency and Design
3513	Agave: The Future of Biofuels A Comparison of the Biofuel Potential of Agave Americana Grown with Different Amounts of Water
3514	Bass Attack
3515	Environmentally Friendly Photodegradation of Aliphatic Pollutants in Water by Using Visible Light Activated Chlorophyll
3516	Effects of Pollutants in Soil on Peroxidase Activity in Radish Plants
3517	How Temperature Change Affects the Pulsation Rate of Moon Jellyfish
3518	The Effect of Pesticide on Cherry Barb Embryonic Development
3519	Target Practice: The Effects of Herbicides and Pesticides on Unintended Targets
3520	The Application of Sufi Music as a Communication Method with Plants to Stimulate O2 and CO2 Production during Photosynthesis and Aerobic Respiration
3521	The Effect of Hydrocarbon Materials on Oil
4004	Disappearing Act
4005	Egg-ceptional Packaging Material
5004	Soundproofing "What Type of Material Works Best?"
5010	The effectiveness of Peat Biofilters
5012	Go With The Flow: Applying Darcy's Law to the Flow of Groundwater
5017	Energy Saver

# Scientific Disciplines Selected by Student

## 2012 Connecticut Science Fair

### Environmental

#### Env. Mgmt't & Env. Analysis

Project Number	Title
5020	Back to the Future with Mud Brick and Clay Egyptian Houses and Wooden American Houses: Comparing cooling and heating methods, structure stability, and cost differences
5022	A Bright Idea: Comparing the Efficiency of Incandescent, CFL, and LED Light Bulbs
5025	The Investigation of the Presence of Caffeine in Groundwater and Sewage
5035	Acid Rain and its effects on Plant Growth and Seed Germination
5040	Crater Mania
5506	The Commercialization of Proton Exchange Membrane-based Fuel Cell Systems for Household Use
5507	Absorbent Answers
5508	Puxatawney Phil: Fact or Folklore?
5513	Effects of Salt and Temperature on Surface Tension
5524	Do Brightly Colored Roofs Reduce Thermal Radiation?
5525	Development of a Prototype Pendulum Wave Energy Conversion Device
5529	What Are The Short Term (drying) And Long Term (after drying) Affects Of Temperature On Water Based Paints?
5530	The design and construction of a superlative HHO generator and the effect of complex carbohydrates on the output of hydroxide.
5531	Homemade Water Filtration Models and Pond Water Purification
5532	Greener Cleaner? Testing the Level of Phosphates in Everyday Cleaners
5538	Making Wind Turbines Quieter and More Efficient
5539	Crude Awakening Disaster In The Gulf Type of Absorbent vs. Time of Oil Absorption
5542	Killer Waves
5556	Snow Problem? No Problem.
6007	Role of Electro-Chemical Double Layer Capacitors in Energy Storage
6009	Alternative Material and Three-Dementional Structure to Solar Panel Technology
6019	The Effects of Temperature and Age on Vitamin C Levels in Organic vs. Conventional Green Bell Peppers
6021	Remediation of Heavy Metals from River Water via a Novel Lemna minor Activated Filtration Medium
6026	Membranes for Biochemical Separations
6028	UNDERWATER CONSTRUCTION DESIGN FOR RESIDENTIAL PURPOSES WITH MATERIALS AND ENERGY USED
6031	The Investigation of the Role of Methylating Bacteria in the Reintroduction Of Mercury into Long Island Sound
6032	Design of a Smart Brick with Improved Insulation and Intuitive Reflection of Sunlight
6034	Driving to School is Exhaust-ing
6037	Geometrical Symmetry Analysis of the Skeletonema costatum Amorphous Cell Structure
6039	Are wind turbines big fans of clean energy?
6041	Pollution's Effect on the Angle of Refraction in Water
6044	The Power of Domes Geodesic Domes Versus Flat Panels: Solar Efficiency
6045	A Hidden Treasure; Dehumidification of Air Improves Indoor Air Quality
6050	The Effect of Water Current Direction on Turbine Productivity
6051	An Analysis of the Spatial Variation of Chromium, Copper, and Lead in Long Island Sound, Black Rock Harbor, and Ash Creek
6054	Hydropower from Rainwater
6058	A Statistical Analysis of Data Collecting Methodology
6059	Innovative design for cellulosic ethanol production as bio-fuel
6060	Minimizing Eutrophication Through the Use of Clay and Plastic Lining for Manure Lagoons and Feedlots
6063	Simplified Molecular Detection of Aromatic Nitroamine Pesticides using Bee Venom Luminescence
6064	Ideal Location
6069	The Effect of Weather on Common Roadside Trash

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Environmental

### Env. Mgmt'n't & Env. Analysis

Project Number	Title
6070	Correlation Between Average Annual Global Temperature and Annual Gross Domestic Product in United States
6076	Surfactants: Emulsification Effects of Synthetic, Microbial and Plant-Derived Surfactants
6077	Re-Recycling
6078	Exploring the Relationship between Soil Chemistry and Water Quality at the Upper Cove River Watershed
6079	Recovery of Light Hydrocarbon Fuels from PETE Recycling with Concurrent Reduction in the Recyclable Footprint
6081	The Use of Berries from Connecticut Invasive Plants in Dye- Sensitized Solar Cells
6082	Nuts About Energy
6501	A Comparative Analysis of Bio-Diesel Emissions Versus Emissions of Petroleum Diesel
6503	Effective Removal of BTEX from Industrial Wastewater by Using Banana Peels as an Environmentally Friendly and Low-Cost Bio-Sorbent
6506	Visible Light Scattering Analysis To Detect Lead
6508	Effects of Humidity on Music
6510	Efficient and Practical Approach to Removal of BTEX from Industrial Waste Water by Using Tea Waste
6513	Using Environmental Friendly and Cost Effective Ferrofluid Magnetite as an Adsorbing Agent to Efficiently Remove Petroleum Spills from Water Sources and its Commercial Application with a Robot Arm
6519	Which Factor Affects the pH Levels of Bodies of Water More: Direct Sunlight or Rain?
6522	The Chemical Analysis of Soil with Respect to Birch Tree Growth

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Mathematical Sciences

Project Number	Title
2010	Total Suspended Solids on Waste Water
2021	Frog Peptides Vs. Bacteria
2503	Teredo Navalis - A Population Density Study
2534	Password Security
3041	The Effect of Increased Sea Surface Temperature and Overfishing on Carcharhiniformes Attacks on Humans
3062	From Shape Recognition to Multi-Calculus Thinking: Study of Geometric Perception and Spatial Cognition in Early Alzheimer's Disease Patients
3081	Assessment of the Accuracy of the Euroscore and STS risk predicting algorithms for patients undergoing Aortic Valve Replacement
4002	Determining Amount Of Sugar, Salt, and Alcohol in a Water Solution with a Laser Pointer
4005	Egg-ceptional Packaging Material
4019	Hills and Valleys: How driving on a flat surface can save you money
5022	A Bright Idea: Comparing the Efficiency of Incandescent, CFL, and LED Light Bulbs
5025	The Investigation of the Presence of Caffeine in Groundwater and Sewage
5042	What Brand Pops The Most Popcorn
5508	Puxatawney Phil: Fact or Folklore?
5509	Digital Pinhole Cameras and the Effect of Aperture Size on Image Sharpness
5513	Effects of Salt and Temperature on Surface Tension
5520	Comparison of Baseball Bat Composition: Safety
5523	Measuring the Speed of Light Using a Microwave
5524	Do Brightly Colored Roofs Reduce Thermal Radiation?
5525	Development of a Prototype Pendulum Wave Energy Conversion Device
5526	What to Wear?
5551	Which Plane Design Creates the Greatest Lift?
5554	Ski Physics
6001	A Neuresthetic Study on the Acoustical Cognitive Perception of the Mathematical Harmony in the Golden Section
6002	Polyvinylidene Flouride (PVDF) Piezoelectric Generator: A Novel Approach to Harvesting Vibrations from Human Respiration to Power Biological Implant Devices
6003	Aerodynamic drag of bicycle wheels and its effect on total drag of a rider and his bike
6007	Role of Electro-Chemical Double Layer Capacitors in Energy Storage
6009	Alternative Material and Three-Dementional Structure to Solar Panel Technology
6019	The Effects of Temperature and Age on Vitamin C Levels in Organic vs. Conventional Green Bell Peppers
6024	Can Ski Resorts be Inferior Goods?
6036	Finding the Perfect Basketball Shot
6037	Geometrical Symmetry Analysis of the Skeletonema costatum Amorphous Cell Structure
6038	Feasibility of Identifying Different Auditory Qualities in Violas Via Audacity
6041	Pollution's Effect on the Angle of Refraction in Water
6053	The general equation of the sum of power series
6058	A Statistical Analysis of Data Collecting Methodology
6070	Correlation Between Average Annual Global Temperature and Annual Gross Domestic Product in United States
6502	The Effect of Geometric Shapes on Parachutes
6511	Racing Away From Fossil Fuels
6525	Javonic Bonding



# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Medicine and Health Sciences

Project Number	Title
1001	Is Your Daphnia Hopped Up On Caffeine?
1002	Is it REALLY Blood?
1005	The Effectiveness of Natural Acne Products vs. Chemical Commercial Products
1014	Hydration Benefits with Fruits and Vegetables and Effect on Cell Absorption
1022	Analysis of Omega Oils as Cancer Inhibitors and Antioxidants plus Effect on Cell Bioavailability
1024	The Battle of Lung Capacity
2001	Battling Bacteria of the Mouth
2008	Food is Fuel
2009	Is My Water Potable
2017	Can homeopathic solutions inhibit the growth of Group A Streptococcus bacteria?
2018	Ants, Glucose, Diabetes....Huh?
2019	When Your Sniffer Snoozes
2021	Frog Peptides Vs. Bacteria
2027	How What we Eat for Breakfast Affects Schoolwork, Mood, Wakefulness, and Energy Throughout the Morning.
2030	How Does Caffeine Effect the Heart
2506	Balance
2508	Indicate your Vitamin C
2510	Distracted Driving
2513	Out With Indigestion
2514	A More Efficient Way to Detect Schistosomiasis
2517	Measuring Air Pockets in Store-Bought vs. Farm Fresh Eggs
2521	The Effect of Vitamin D on Bone Recalcification
2523	Blood Pressure: Red Rising?
2524	The Effects of Symphytum on Bone Cell Growth
2525	How Do Different Colors and Sizes Affect Memory
2529	DONT DRINK AND DRIVE
2535	Grapefruit Juice or Gatorade, Which Has More Electrolytes?
2539	Pharmaceutical and Herbal Antibiotic Effectiveness on Bacteria from Multiple Collection Sources
2541	KILLING THE INVISIBLE ENEMY ON OUR HANDS: DO WE USE SOAP OR HAND SANITIZER?
3007	Antibiotic inactivation at home: A Proposal for Disposal Can antibiotics be inactivated so that they may be disposed of down the drain?
3008	Which Intestinal Bacteria is Best? A study of the Effectiveness of Single and Multi-Strain Probiotics.
3010	How temperature affects the Peroxidase enzyme
3011	In Vitro 15-Lipoxygenase Inhibition of Polyphenolic Anti-inflammatory Agents From Malae Domestica
3012	Pseudoscience or Agriculturally Beneficial: The Effect of Magnetic Water on the Growth of Two Different Plant Species
3014	The Dietary Effects of Caffeine and Sugar on Anxiety in Correspondence with Psychogenic Non-Epileptic Seizures
3022	The Effect of Sodium Chloride on Heart Rate
3028	Topical Gel Method Toward the Removal of Tattoo Pigment in the Epidermis and Dermis Skin Layers
3029	The effects of antibiotics on the development of zebrafish embryos.
3030	The effect of compounds on Planaria regeneration.
3032	EMDR:Successfully Treating PTSD
3034	Nanoparticle-Enhanced Radiofrequency Ablation of Simulated Cancer Cells
3035	Using New Approaches to Evaluate Polyvinylpyrrolidone's Effects on Renal Function
3036	Athletes Performance on Different Types of Drinks!

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Medicine and Health Sciences

Project Number	Title
3039	The Physical Relationship of NOTCH4 and MKL1
3043	Club Heartbeatz
3046	Optogenetic Interrogation of Prefrontal Cortex Dopamine D1 Receptor-Containing Neurons as a Technique to Restore Timing: A Novel Approach to Treat Prefrontal Disorders
3047	Biochemistry of antibiotics in Dentistry
3050	Chromosome segregation and localization patterns in FtsZ mutant strains
3054	Photodynamic Therapy for Wound Healing
3061	Role of MyD88 in DNA Damage Response
3062	From Shape Recognition to Multi-Calculus Thinking: Study of Geometric Perception and Spatial Cognition in Early Alzheimer's Disease Patients
3067	Hydrogels as a Novel Drug Delivery System
3068	Confirming Conclusions Made in a Previous Study Which Found a Correlation between Lucid Dreaming and Ventromedial Versus Dorsolateral Prefrontal Task Performance in Minors versus Adults
3078	Do Optimal Outcome Individuals Have a Less of a Prevalence of Family History of Major Mood, Anxiety, or Psychotic Disorders than Individuals who Have Retained Their Autism Spectrum Disorder Diagnoses?
3081	Assessment of the Accuracy of the Euroscore and STS risk predicting algorithms for patients undergoing Aortic Valve Replacement
3082	The Regulation of DcR3 and TL1A by Pro-inflammatory Cytokines in First Trimester Decidual Cells
3086	The Application of LT and 5-HTP in Serotonin Synthesis
3090	Exploring the Levels of Environmental Chitin and Chitineses in House Dust and their association with Asthma
3092	Creating a Cre/Lox Barcoding System: a Potential Breakthrough in Tracking the Heterogeneity of Glioblastoma Multiforme
3093	Are High School Band Students at Risk for Hearing Damage?
3094	Natural Fruit-Based Drinks vs. Sports Drinks: Is one "electro-light?"
3095	The Effect of Disinfectant Byproducts in Relation to Allergic Asthma
3097	The Effect of Diazofluorenes on Ovarian Cancer Cells
3098	The Effects Of Commercial Non-Agricultural Target Specific And Non-Specific Herbicides at Specific Temperatures On The Embryonic Development Of Zebrafish
3099	The regeneration of human tooth enamel in physiological conditions
3104	Wet Pits: The Effect of Active Ingredient of Antiperspirant Deodorant on the Amount of Human Perspiration
3105	The Effect of Turmeric on Mice Cognition and Development
3502	The Heart of Gaming
3508	The Effect of Drugs and Herbal Remedies on Propionibacterium Acnes
3515	Environmentally Friendly Photodegradation of Aliphatic Pollutants in Water by Using Visible Light Activated Chlorophyll
3521	The Effect of Hydrocarbon Materials on Oil
4001	The Effect of Different Angles of Impact on the Area of a Simulated Blood Spatter
4005	Egg-ceptional Packaging Material
4010	Analysis and Bioavailability of Chemical Dyes Versus Natural Dyes with their Antioxidant Benefits.
4011	The Negative Effects of Teeth Whiteners
4025	which pain reliever acts the fastest
5003	Corrosive Sodas
5025	The Investigation of the Presence of Caffeine in Groundwater and Sewage
5526	What to Wear?
5531	Homemade Water Filtration Models and Pond Water Purification
5532	Greener Cleaner? Testing the Level of Phosphates in Everyday Cleaners
5537	Killing us slowly, radiation in our toys and household appliances.
5547	Absorption Rate of Lead Compounds on Simulated Skin and Cells and Effect of Chelators and Heat on Absorption.

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Medicine and Health Sciences

Project Number	Title
6002	Polyvinylidene Fluoride (PVDF) Piezoelectric Generator: A Novel Approach to Harvesting Vibrations from Human Respiration to Power Biological Implant Devices
6010	The Effectiveness Of Targeted Strength And Flexibility Exercises Based On Imbalances Identified By Functional Movement Screen At Preventing Injuries In Female Intercollegiate Ice Hockey Players
6019	The Effects of Temperature and Age on Vitamin C Levels in Organic vs. Conventional Green Bell Peppers
6022	The Effects of Shaking or Not Shaking Ten Dose Vaccine Vials on the Amount of Metals per Dose
6023	Feeding Tube Occlusions: An In-Vitro Evaluation of Ciprofloxacin Tablets
6066	Revolutionizing Cancer Treatment: A Simulation of Nanocarriers Using Swarm Intelligence for Targeted Cancer Cells
6503	Effective Removal of BTEX from Industrial Wastewater by Using Banana Peels as an Environmentally Friendly and Low-Cost Bio-Sorbent
6510	Efficient and Practical Approach to Removal of BTEX from Industrial Waste Water by Using Tea Waste
6513	Using Environmental Friendly and Cost Effective Ferrofluid Magnetite as an Adsorbing Agent to Efficiently Remove Petroleum Spills from Water Sources and its Commercial Application with a Robot Arm

# Scientific Disciplines Selected by Student

## 2012 Connecticut Science Fair

### Microbiology

Project Number	Title
1006	Do you know how much bacteria you are touching?
1011	One Nasty Fact
1012	The Effect of Electromagnetic Fields on Scenedesmus Algae Cells
1014	Hydration Benefits with Fruits and Vegetables and Effect on Cell Absorption
1022	Analysis of Omega Oils as Cancer Inhibitors and Antioxidants plus Effect on Cell Bioavailability
1027	Hidden Horrors: Do Germs Lurk in Our School?
2001	Battling Bacteria of the Mouth
2004	Environmental Acidity and Bioluminescent Algae
2010	Total Suspended Solids on Waste Water
2017	Can homeopathic solutions inhibit the growth of Group A Streptococcus bacteria?
2021	Frog Peptides Vs. Bacteria
2507	Analysis of Local Watershed and River Contaminated Sediments, and Effect on River and Long Island Sound Waters
2512	A Sustainable Hydrogen-Producing Algae Bioreactor
2514	A More Efficient Way to Detect Schistosomiasis
2515	Polypropylene Oil Magnets: A comparison of this novel approach using ferrofluids to established methods of oil spill removal including OEMs, woodchips, hay, and compost.
2538	Are You Really Going to Eat That?
2539	Pharmaceutical and Herbal Antibiotic Effectiveness on Bacteria from Multiple Collection Sources
2541	KILLING THE INVISIBLE ENEMY ON OUR HANDS: DO WE USE SOAP OR HAND SANITIZER?
3004	Bio-engineering: Microbial Properties of Shark Skin and Other Natural Surfaces
3007	Antibiotic inactivation at home: A Proposal for Disposal Can antibiotics be inactivated so that they may be disposed of down the drain?
3008	Which Intestinal Bacteria is Best? A study of the Effectiveness of Single and Multi-Strain Probiotics.
3022	The Effect of Sodium Chloride on Heart Rate
3027	The Effect of a Bacteria's Source On A Microbial Fuel Cell's Electrical Output
3031	Antiseptics in the Hospital: A Comparative Study of Soaps Used In Our Health Facilities
3033	Chaos in Bacterial Growth with Sinusoidal Temperature Cycles
3039	The Physical Relationship of NOTCH4 and MKL1
3047	Biochemistry of antibiotics in Dentistry
3048	Analysis of Agent X and Methylglyoxal in Honey Variance
3050	Chromosome segregation and localization patterns in FtsZ mutant strains
3055	Using Phage Therapy to Kill Escherichia coli on Meats
3065	Mud Power, Harnessing Electro-Microbial Energy From Bacteria Strains
3074	Novel Removal of Escherichia Coli 0157:H7 from Fresh Water Sources using Amino Acid Attractants
3075	A Study of "Ebb and Flo" Aquaponics as the Most Effective Growing System for Romaine Lettuce as Compared to a Hydroponic and an Organic, Soil-Based, Growing System
3077	Pseudomonas aeruginosa
3088	Linum usitatissimum and Cottage Cheese On MCF7 Breast Cancer Cells.
3090	Exploring the Levels of Environmental Chitin and Chitineses in House Dust and their association with Asthma
3505	Which removes the most bacteria?
3508	The Effect of Drugs and Herbal Remedies on Propionibacterium Acnes
3510	Microbial Fuel Cell Efficiency and Design
3522	How Radiation Affects Cells
5025	The Investigation of the Presence of Caffeine in Groundwater and Sewage
6026	Membranes for Biochemical Separations

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Microbiology

**Project  
Number**

**Title**

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6031	The Investigation of the Role of Methylating Bacteria in the Reintroduction Of Mercury into Long Island Sound
6059	Innovative design for cellulosic ethanol production as bio-fuel
6076	Surfactants: Emulsification Effects of Synthetic, Microbial and Plant-Derived Surfactants

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Physics and Astronomy

Project Number	Title
2021	Frog Peptides Vs. Bacteria
2518	Giggle, Giggle
3093	Are High School Band Students at Risk for Hearing Damage?
3521	The Effect of Hydrocarbon Materials on Oil
4001	The Effect of Different Angles of Impact on the Area of a Simulated Blood Spatter
4002	Determining Amount Of Sugar, Salt, and Alcohol in a Water Solution with a Laser Pointer
4003	Ping Pong Jazz
4012	Rubber Bands For Energy
4019	Hills and Valleys: How driving on a flat surface can save you money
4033	Tension Tamers
5001	Distance Versus Launch Angle
5006	Are some magnetic materials more temperature dependent than others?
5022	A Bright Idea: Comparing the Efficiency of Incandescent, CFL, and LED Light Bulbs
5038	Lights, Water, Reflection!
5040	Crater Mania
5041	Visible or Invisible
5502	The Stirling Engine and the Effect of Temperature Differential on Engine Performance
5506	The Commercialization of Proton Exchange Membrane-based Fuel Cell Systems for Household Use
5509	Digital Pinhole Cameras and the Effect of Aperture Size on Image Sharpness
5516	Material Density vs. Angle of Refraction
5517	The Physics of Cheating in Baseball
5520	Comparison of Baseball Bat Composition: Safety
5522	Color Flash At Work
5523	Measuring the Speed of Light Using a Microwave
5524	Do Brightly Colored Roofs Reduce Thermal Radiation?
5525	Development of a Prototype Pendulum Wave Energy Conversion Device
5526	What to Wear?
5527	The Wing and the Wind
5529	What Are The Short Term (drying) And Long Term (after drying) Affects Of Temperature On Water Based Paints?
5533	Fermi Action
5541	A Bridge Too Strong
5551	Which Plane Design Creates the Greatest Lift?
5553	Measuring Temperature with a Violin
5554	Ski Physics
6001	A Neuresthetic Study on the Acoustical Cognitive Perception of the Mathematical Harmony in the Golden Section
6002	Polyvinylidene Flouride (PVDF) Piezoelectric Generator: A Novel Approach to Harvesting Vibrations from Human Respiration to Power Biological Implant Devices
6004	The Efficiency of Air Multiplication Technology versus the Efficiency of Bladed Fan Technology
6007	Role of Electro-Chemical Double Layer Capacitors in Energy Storage
6009	Alternative Material and Three-Dementional Structure to Solar Panel Technology
6013	Testing Turbines
6027	Neutron Star/Black Hole X-Ray Timing Analysis as a Probe of High-Field General Relativity
6028	UNDERWATER CONSTRUCTION DESIGN FOR RESIDENTIAL PURPOSES WITH MATERIALS AND ENERGY USED
6029	Rowing and Ergometers

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Physics and Astronomy

Project Number	Title
6030	Significance of Supernovae on Nearby Near-Supernova White Dwarves
6033	NGC 2194: Clues to Stellar Evolution
6035	The Overtones of String and Woodwind Instruments
6036	Finding the Perfect Basketball Shot
6038	Feasibility of Identifying Different Auditory Qualities in Violas Via Audacity
6039	Are wind turbines big fans of clean energy?
6040	Cantilever Vibrational Amplitude at Resonant Frequencies
6041	Pollution's Effect on the Angle of Refraction in Water
6049	An Organic Thin Film Transistor and Elastic Organic Solar Cell Based Electronic Skin for Biochemical and Tactile Sensing
6050	The Effect of Water Current Direction on Turbine Productivity
6055	Can the Concentration of Sugar Dissolved in a Liquid be Determined by Using the Index of of Refraction of the Solution?
6057	Isaac's Rebel Fluids: A Studu of Non-Newtonian Fluids
6504	The Effect of Different Packaging Materials On Allowing An Egg To Crack When Dropped
6518	Bulletproof Liquid

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Plant Sciences

Project Number	Title
1003	Do magnets effect the growth of radishes?
1004	Algae The Key to our Future
1007	Environmental Effects
1008	Weed Massacre
1009	Strange Heights
1010	Testing the Effect of pH Levels of Polluted Fresh Water on Elodea Canadensis Life Span
1012	The Effect of Electromagnetic Fields on Scenedesmus Algae Cells
1015	X-rays: Friend or Foe
1018	Eco-friendly, Equally Effective?
1019	The Mighty Houseplant
1023	Efficacy of a Natural Pest Repellent
1025	Drastic Plastics
2004	Environmental Acidity and Bioluminescent Algae
2005	In which of the three environments does a green banana ripen the fastest?
2006	Affects of Phosphorus on Growth of Azolla.
2007	Peel Power
2012	Watch it Rot
2013	THE ECO-FRIENDLY DIAPER: LANDFILL DESIGN. "The Type of Cloth Versus the Rate of Decomposition"
2015	Affect of Fertilizer on Algal Growth
2023	Hydroponic Tomatoes
2026	How Plants React to Different Types of Music During Growth
2029	Plants and Lights
2031	Geotropism: Fact or Fake
2032	The Greenhouse Effect
2502	The Great Plains of Change
2504	The Effect of Rising Carbon Dioxide Levels on Plant Growth
2512	A Sustainable Hydrogen-Producing Algae Bioreactor
2527	Manufacturing and Biodegrading Bioplastics: Observing the speed of biodegradation of potato, rice, tapioca and corn starch based plastics.
2528	Should We Doubt the Short and Stout?
2530	GMO OR NO GMO
2532	Hydroponics vs. Soil
2540	The Effects of De-Icing Salts and Chemical Compounds on Adiantum pedatum
3002	Making Friends with an Invasive; Novel Evaluation of Key Resources of Gracilaria tikvahiae
3012	Pseudoscience or Agriculturally Beneficial: The Effect of Magnetic Water on the Growth of Two Different Plant Species
3026	Algae Biodiesel
3052	The Effectiveness of P.virgatum inoculated with Mycorrhizal fungi at remediating formaldehyde (Voc) in a controlled environment
3058	The Effect of Different Nutrient Solutions on Hydroponically Grown Plants
3059	The effect of different Northern Catalpa Bark chemicals on Pogonomymex
3070	Non-Invasive Dissipation of 2,4-D Pesticide in Standing Water Using Iris Versicolor
3071	The Effect of Using Gracilaria tikvahiae as a Soil Conditioner in Clay Soil
3072	Assessment of Lepidoptera Plant Preference at Mass Audubon's Felix Neck Wildlife Sanctuary
3073	The Effects of the Tobacco Mosaic Virus on Cherry Tomatoes and Pepperz



# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Plant Sciences

Project Number	Title
3075	A Study of "Ebb and Flo" Aquaponics as the Most Effective Growing System for Romaine Lettuce as Compared to a Hydroponic and an Organic, Soil-Based, Growing System
3084	The Biological Control of Zebra Mussels Using the Marine Natural Product Aaptamine.
3087	Investigation and Remediation of the Health of New Creek Salt Marsh through the Studies of Benthic Invertebrates
3103	Can Grass be Used to Absorb Oil from Soil?
3503	Ethylene Production
3504	The Effects of Watershed Pollution on the Common Inhabitant Fresh Water Plant, <i>Nasturtium officinale</i>
3510	Microbial Fuel Cell Efficiency and Design
3511	Bioremediation with Duckweed and <i>Elodea Densa</i>
3513	Agave: The Future of Biofuels A Comparison of the Biofuel Potential of <i>Agave Americana</i> Grown with Different Amounts of Water
3516	Effects of Pollutants in Soil on Peroxidase Activity in Radish Plants
3519	Target Practice: The Effects of Herbicides and Pesticides on Unintended Targets
3520	The Application of Sufi Music as a Communication Method with Plants to Stimulate O <sub>2</sub> and CO <sub>2</sub> Production during Photosynthesis and Aerobic Respiration
5010	The effectiveness of Peat Biofilters
5035	Acid Rain and its effects on Plant Growth and Seed Germination
5039	How Much Vitamin C Is In AN Orange
6019	The Effects of Temperature and Age on Vitamin C Levels in Organic vs. Conventional Green Bell Peppers
6021	Remediation of Heavy Metals from River Water via a Novel <i>Lemna minor</i> Activated Filtration Medium
6067	Does Sugar Lengthen the Life of Cut Roses?
6076	Surfactants: Emulsification Effects of Synthetic, Microbial and Plant-Derived Surfactants
6081	The Use of Berries from Connecticut Invasive Plants in Dye- Sensitized Solar Cells
6503	Effective Removal of BTEX from Industrial Wastewater by Using Banana Peels as an Environmentally Friendly and Low-Cost Bio-Sorbent

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Sustainability

Project Number	Title
1004	Algae The Key to our Future
1007	Environmental Effects
1008	Weed Massacre
1010	Testing the Effect of pH Levels of Polluted Fresh Water on Elodea Canadensis Life Span
1012	The Effect of Electromagnetic Fields on Scenedesmus Algae Cells
1017	The Effects of Global Warming on Marine Life
1018	Eco-friendly, Equally Effective?
1019	The Mighty Houseplant
1021	What Medium Gathers the Most Molusk Mucus?
1025	Drastic Plastics
2002	REDUCE! REUSE! RECYCLE! - The Biodegradable Factor
2003	Depleting Oyster Population: Alarming Coincidence, or CO2?
2004	Environmental Acidity and Bioluminescent Algae
2007	Peel Power
2009	Is My Water Potable
2010	Total Suspended Solids on Waste Water
2011	The Efficacy of Bleach as a Disinfectant
2013	THE ECO-FRIENDLY DIAPER: LANDFILL DESIGN. "The Type of Cloth Versus the Rate of Decomposition"
2015	Affect of Fertilizer on Algal Growth
2016	Rain...Runoff...Ramifications?
2017	Can homeopathic solutions inhibit the growth of Group A Streptococcus bacteria?
2020	Should We Be Going Bananas?! The Study of Ocean and Freshwater Acidification and its Harmful Effect on the Shells of Aquatic Organisms and the Evaluation of a Banana-Derived Additive to Reduce It.
2021	Frog Peptides Vs. Bacteria
2022	One Dog's Poop, Another Man's Treasure.
2026	How Plants React to Different Types of Music During Growth
2029	Plants and Lights
2032	The Greenhouse Effect
2033	The Clean Water Project
2501	Rock the Brownfields Green: Food for Fungi
2503	Teredo Navalis - A Population Density Study
2504	The Effect of Rising Carbon Dioxide Levels on Plant Growth
2505	How Does Different Water Solutions (Pollution) Affect Daphnia?
2507	Analysis of Local Watershed and River Contaminated Sediments, and Effect on River and Long Island Sound Waters
2510	Distracted Driving
2512	A Sustainable Hydrogen-Producing Algae Bioreactor
2515	Polypropylene Oil Magnets: A comparison of this novel approach using ferrofluids to established methods of oil spill removal including OEMs, woodchips, hay, and compost.
2522	The Dirt on Worms
2527	Manufacturing and Biodegrading Bioplastics: Observing the speed of biodegradation of potato, rice, tapioca and corn starch based plastics.
2528	Should We Doubt the Short and Stout?
2532	Hydroponics vs. Soil
2540	The Effects of De-Icing Salts and Chemical Compounds on Adiantum pedatum
2543	Phytoremediation: Removal of metal pollutants from contaminated soil and effect of chelators

# Scientific Disciplines Selected by Student

## 2012 Connecticut Science Fair

## Sustainability

Project Number	Title
3002	Making Friends with an Invasive; Novel Evaluation of Key Resources of <i>Gracilaria tikvahiae</i>
3004	Bio-engineering: Microbial Properties of Shark Skin and Other Natural Surfaces
3007	Antibiotic inactivation at home: A Proposal for Disposal Can antibiotics be inactivated so that they may be disposed of down the drain?
3015	An Analysis of Biotic and A biotic Factors in Newtown Vernal Pools
3016	Photoremediation properties of the <i>Vigna Radiata</i>
3018	The Influence of Estradiol Beta on the Development of Zebrafish Embryos
3019	The True Origins of River Foams
3021	Is our water safe?
3026	Algae Biodiesel
3027	The Effect of a Bacteria's Source On A Microbial Fuel Cell's Electrical Output
3028	Topical Gel Method Toward the Removal of Tattoo Pigment in the Epidermis and Dermis Skin Layers
3034	Nanoparticle-Enhanced Radiofrequency Ablation of Simulated Cancer Cells
3037	The Application of the Photosynthetic Hydrogen Production of <i>C. reinhardtii</i> in Hydrogen Fuel Cells
3041	The Effect of Increased Sea Surface Temperature and Overfishing on Carcharhiniformes Attacks on Humans
3042	Mycoremediation of PCB Soil Contaminants with <i>Pleurotus Ostreatus</i>
3046	Optogenetic Interrogation of Prefrontal Cortex Dopamine D1 Receptor-Containing Neurons as a Technique to Restore Timing: A Novel Approach to Treat Prefrontal Disorders
3049	The Effects of Water Temperature on Tornadoes
3051	Saving the Planet by Decomposing Ink
3059	The effect of different Northern <i>Catalpa</i> Bark chemicals on <i>Pogonomymex</i>
3065	Mud Power, Harnessing Electro-Microbial Energy From Bacteria Strains
3067	Hydrogels as a Novel Drug Delivery System
3070	Non-Invasive Dissipation of 2,4-D Pesticide in Standing Water Using <i>Iris Versicolor</i>
3071	The Effect of Using <i>Gracilaria tikvahiae</i> as a Soil Conditioner in Clay Soil
3072	Assessment of Lepidoptera Plant Preference at Mass Audubon's Felix Neck Wildlife Sanctuary
3074	Novel Removal of <i>Escherichia Coli</i> 0157:H7 from Fresh Water Sources using Amino Acid Attractants
3084	The Biological Control of Zebra Mussels Using the Marine Natural Product Aaptamine.
3085	Marsh Elevation in Response to Sea Level Rise on Long Island, NY
3087	Investigation and Remediation of the Health of New Creek Salt Marsh through the Studies of Benthic Invertebrates
3089	Cleaning Worms
3090	Exploring the Levels of Environmental Chitin and Chitineses in House Dust and their association with Asthma
3098	The Effects Of Commercial Non-Agricultural Target Specific And Non-Specific Herbicides at Specific Temperatures On The Embryonic Development Of Zebrafish
3102	The Effect of Buffer Zone Composition on Water Pollution
3103	Can Grass be Used to Absorb Oil from Soil?
3503	Ethylene Production
3504	The Effects of Watershed Pollution on the Common Inhabitant Fresh Water Plant, <i>Nasturtium officinale</i>
3507	Which Species of Earthworm Decompose Waste in Landfills Most Efficiently?
3510	Microbial Fuel Cell Efficiency and Design
3512	Are you looking at my Brach?! (That's because I mutated it...): A Study of Mutated <i>Brachypodium distachyon</i>
3513	Agave: The Future of Biofuels A Comparison of the Biofuel Potential of <i>Agave Americana</i> Grown with Different Amounts of Water
3514	Bass Attack
3515	Environmentally Friendly Photodegradation of Aliphatic Pollutants in Water by Using Visible Light Activated Chlorophyll
3516	Effects of Pollutants in Soil on Peroxidase Activity in Radish Plants

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Sustainability

Project Number	Title
3517	How Temperature Change Affects the Pulsation Rate of Moon Jellyfish
3518	The Effect of Pesticide on Cherry Barb Embryonic Development
3519	Target Practice: The Effects of Herbicides and Pesticides on Unintended Targets
3520	The Application of Sufi Music as a Communication Method with Plants to Stimulate O <sub>2</sub> and CO <sub>2</sub> Production during Photosynthesis and Aerobic Respiration
3521	The Effect of Hydrocarbon Materials on Oil
3522	How Radiation Affects Cells
4004	Disappearing Act
4005	Egg-ceptional Packaging Material
4006	Are you Safe this Winter?
4008	Hydropower
4012	Rubber Bands For Energy
4015	The Windy 500: The Test of Drag and Down Force on Rear Spoilers
4016	Linear Accelerator
4018	Can You Hear Me Now?
4019	Hills and Valleys: How driving on a flat surface can save you money
4020	Does the shape of an ice cube effect how quickly it melts?
4023	The Improved Refrigeration Unit
4024	Increasing Solar Energy
4026	ND-9 No Dirt-9 Innings
4027	Solar Panel in Greenhouse
4029	How Does Combining Metals Lead to Rust Development
4030	Floating in Density
4032	Riding On Air
4034	Constantly Spring
4035	The Effect of Soil Type on Earthquake Damage
5001	Distance Versus Launch Angle
5002	Citrus Battery
5004	Soundproofing "What Type of Material Works Best?"
5005	Designing an Effective Dye-Sensitized Solar Cells
5007	Distracted Driving
5010	The effectiveness of Peat Biofilters
5011	How Much Height to Loop the Loop?
5012	Go With The Flow: Applying Darcy's Law to the Flow of Groundwater
5013	How is a Soils Permeability Related to its Grain Size Distribution?
5014	Passive Solar Energy
5017	Energy Saver
5018	Angling For Energy
5019	Improving Efficiency of Solar Energy
5020	Back to the Future with Mud Brick and Clay Egyptian Houses and Wooden American Houses: Comparing cooling and heating methods, structure stability, and cost differences
5021	What variables affect the grasp efficiency of a robotic arm?
5022	A Bright Idea: Comparing the Efficiency of Incandescent, CFL, and LED Light Bulbs
5024	The Science of Tornadoes
5025	The Investigation of the Presence of Caffeine in Groundwater and Sewage

# Scientific Disciplines Selected by Student

## 2012 Connecticut Science Fair

## Sustainability

Project Number	Title
5026	Nut Job
5029	Electromagnetisim
5030	Aqua- The Swimming Robot
5031	Which metals are more efficient electrodes in the process of electrolysis of water?
5032	Ocean Wave and Tide Energy Project
5033	Charge your device in a power blackout: Effective methods to generate electricity from heat and solar energy using thermoelectric generators
5035	Acid Rain and its effects on Plant Growth and Seed Germination
5036	Rush Hour
5037	Quantifying Magnus Effect Induced Drag Minimization
5040	Crater Mania
5041	Visible or Invisible
5043	Do Different Kinds of Wood Burned Affect the Burning Time?
5502	The Stirling Engine and the Effect of Temperature Differential on Engine Performance
5504	Tower Power
5505	Programming NANORGS in a Virtual World
5506	The Commercialization of Proton Exchange Membrane-based Fuel Cell Systems for Household Use
5507	Absorbent Answers
5508	Puxatawney Phil: Fact or Folklore?
5509	Digital Pinhole Cameras and the Effect of Aperture Size on Image Sharpness
5511	Trebuchet All the Way
5513	Effects of Salt and Temperature on Surface Tension
5518	Ferro Fluid
5524	Do Brightly Colored Roofs Reduce Thermal Radiation?
5525	Development of a Prototype Pendulum Wave Energy Conversion Device
5526	What to Wear?
5527	The Wing and the Wind
5528	On the Application of Electrochemical Double Layer Capacitors in Electric Vehicles
5529	What Are The Short Term (drying) And Long Term (after drying) Affects Of Temperature On Water Based Paints?
5530	The design and construction of a superlative HHO generator and the effect of complex carbohydrates on the output of hydroxide.
5531	Homemade Water Filtration Models and Pond Water Purification
5532	Greener Cleaner? Testing the Level of Phosphates in Everyday Cleaners
5534	Bird Wing Technology
5535	The Relationship between the Heat Emitted and Energy Efficiency of Various Types of Light Bulbs
5537	Killing us slowly, radiation in our toys and household appliances.
5538	Making Wind Turbines Quieter and More Efficient
5539	Crude Awakening Disaster In The Gulf Type of Absorbent vs. Time of Oil Absorption
5541	A Bridge Too Strong
5542	Killer Waves
5543	Effects of Current on Power of Electromagnets
5546	Electric Car
5551	Which Plane Design Creates the Greatest Lift?
5552	How To Make An Aircraft Invisible to Radar
5554	Ski Physics

# Scientific Disciplines Selected by Student

## 2012 Connecticut Science Fair

## Sustainability

Project Number	Title
5556	Snow Problem? No Problem.
6002	Polyvinylidene Flouride (PVDF) Piezoelectric Generator: A Novel Approach to Harvesting Vibrations from Human Respiration to Power Biological Implant Devices
6003	Aerodynamic drag of bicycle wheels and its effect on total drag of a rider and his bike
6004	The Efficiency of Air Multiplication Technology versus the Efficiency of Bladed Fan Technology
6007	Role of Electro-Chemical Double Layer Capacitors in Energy Storage
6008	Development of TiO <sub>2</sub> Nanotubes and Spectral Absorbance Enhancement as Methods to Increase Efficiency of Dye Sensitized Solar Cells
6009	Alternative Material and Three-Dementional Structure to Solar Panel Technology
6011	Mp3 Compression and it's relation to Psychoacoustics.
6012	Alternative liquid cooling methodes for a computers central processing unit.
6013	Testing Turbines
6015	Autochrome: The Chemical Renovation of a 19th Century Art.
6016	Utilizing a Robotic Turning Mechanism to Focus on the Sun in Order to Maximize the Efficiency of a Parabolic Trough Water Heating System
6019	The Effects of Temperature and Age on Vitamin C Levels in Organic vs. Conventional Green Bell Peppers
6021	Remediation of Heavy Metals from River Water via a Novel Lemna minor Activated Filtration Medium
6026	Membranes for Biochemical Separations
6028	UNDERWATER CONSTRUCTION DESIGN FOR RESIDENTIAL PURPOSES WITH MATERIALS AND ENERGY USED
6031	The Investigation of the Role of Methylating Bacteria in the Reintroduction Of Mercury into Long Island Sound
6032	Design of a Smart Brick with Improved Insulation and Intuitive Reflection of Sunlight
6034	Driving to School is Exhaust-ing
6037	Geometrical Symmetry Analysis of the Skeletonema costatum Amorphous Cell Structure
6039	Are wind turbines big fans of clean energy?
6040	Cantilever Vibrational Amplitude at Resonant Frequencies
6041	Pollution's Effect on the Angle of Refraction in Water
6042	Alternative Materials Substituted For Wood in Acoustic Guitars
6044	The Power of Domes Geodesic Domes Versus Flat Panels: Solar Efficiency
6045	A Hidden Treasure; Dehumidification of Air Improves Indoor Air Quality
6049	An Organic Thin Film Transistor and Elastic Organic Solar Cell Based Electronic Skin for Biochemical and Tactile Sensing
6050	The Effect of Water Current Direction on Turbine Productivity
6051	An Analysis of the Spatial Variation of Chromium, Copper, and Lead in Long Island Sound, Black Rock Harbor, and Ash Creek
6052	Paper Batteries: A Viable Lithium Ion Battery Technology
6054	Hydropower from Rainwater
6056	Production of High Quality Ceramic Coatings for Turbine Applications by Freeze Spray Deposition
6057	Isaac's Rebel Fluids: A Studu of Non-Newtonian Fluids
6058	A Statistical Analysis of Data Collecting Methodology
6059	Innovative design for cellulosic ethanol production as bio-fuel
6060	Minimizing Eutrophication Through the Use of Clay and Plastic Lining for Manure Lagoons and Feedlots
6061	Electromagnetic Accelerator
6062	Propeller Efficiency
6063	Simplified Molecular Detection of Aromatic Nitroamine Pesticides using Bee Venom Luminescence
6064	Ideal Location
6065	Effects of Magnets on a Linear Motor

# Scientific Disciplines Selected by Student

2012 Connecticut Science Fair

## Sustainability

Project Number	Title
6066	Revolutionizing Cancer Treatment: A Simulation of Nanocarriers Using Swarm Intelligence for Targeted Cancer Cells
6068	Isotropic Versus Anisotropic Materials: Affect on Violin Resonance Using Young's Modulus
6069	The Effect of Weather on Common Roadside Trash
6070	Correlation Between Average Annual Global Temperature and Annual Gross Domestic Product in United States
6075	Application of iDS-PBR to Prolongate Algal Photobiolysis in <i>C. Reinhardtii</i>
6076	Surfactants: Emulsification Effects of Synthetic, Microbial and Plant-Derived Surfactants
6077	Re-Recycling
6078	Exploring the Relationship between Soil Chemistry and Water Quality at the Upper Cove River Watershed
6079	Recovery of Light Hydrocarbon Fuels from PETE Recycling with Concurrent Reduction in the Recyclable Footprint
6080	The Compatibility Between Pure 2-D Sericin Membranes and Cell Growth
6081	The Use of Berries from Connecticut Invasive Plants in Dye- Sensitized Solar Cells
6082	Nuts About Energy
6501	A Comparative Analysis of Bio-Diesel Emissions Versus Emissions of Petroleum Diesel
6503	Effective Removal of BTEX from Industrial Wastewater by Using Banana Peels as an Environmentally Friendly and Low-Cost Bio-Sorbent
6506	Visible Light Scattering Analysis To Detect Lead
6508	Effects of Humidity on Music
6510	Efficient and Practical Approach to Removal of BTEX from Industrial Waste Water by Using Tea Waste
6511	Racing Away From Fossil Fuels
6513	Using Environmental Friendly and Cost Effective Ferrofluid Magnetite as an Adsorbing Agent to Efficiently Remove Petroleum Spills from Water Sources and its Commercial Application with a Robot Arm
6514	Pizza Box Oven
6515	Testing the Viability of Adaptive Winglet Technology to Improve Fuel Efficiency on Midsize Commercial Airlines using Computational Fluid Dynamics
6517	Can you charge your phone wirelessly? Cordless electricity transmission by piezoelectric excitation via low frequency acoustic waves.
6519	Which Factor Affects the pH Levels of Bodies of Water More: Direct Sunlight or Rain?
6522	The Chemical Analysis of Soil with Respect to Birch Tree Growth