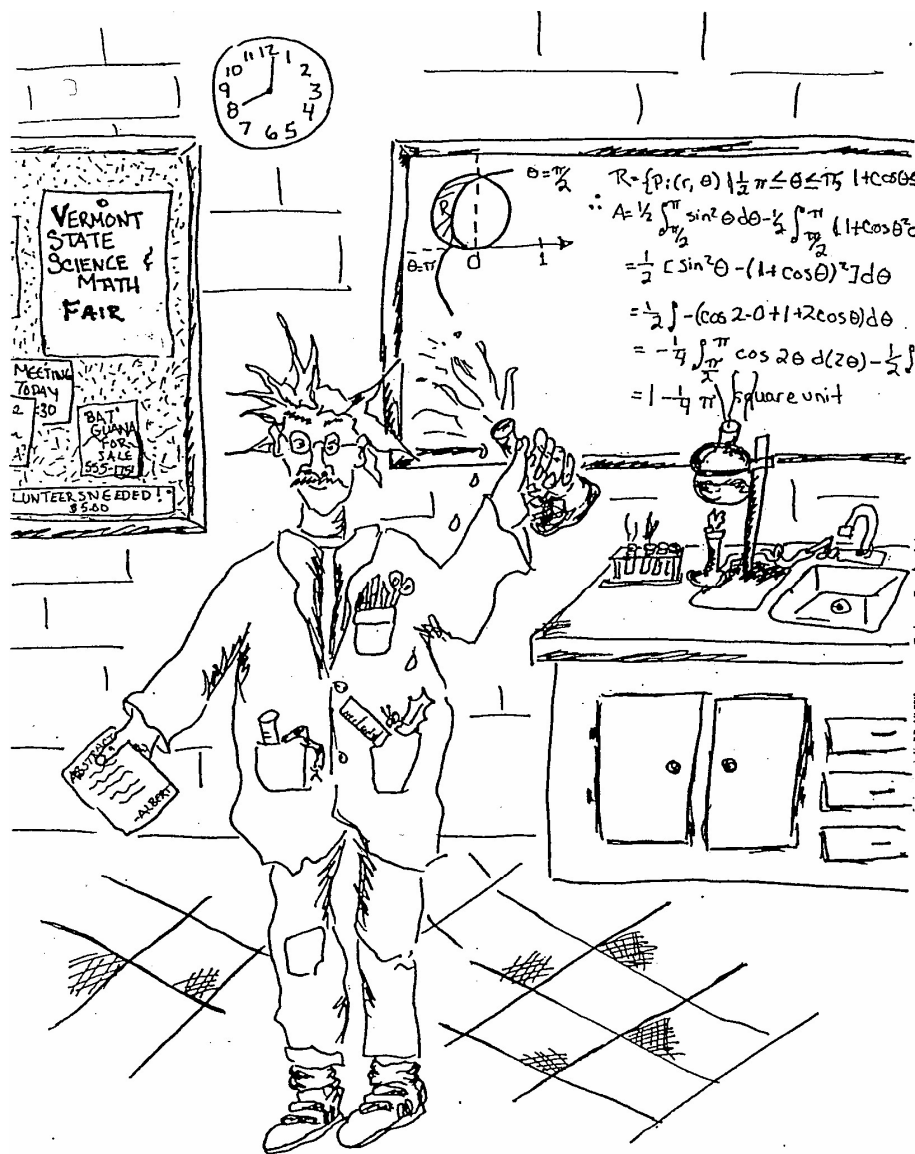


# 45<sup>th</sup> ANNUAL VERMONT STATE SCIENCE & MATHEMATICS FAIR

NORWICH, UNIVERSITY  
NORTHFIELD, VERMONT

**April 5 2008**



## SPONSORED BY:

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**Vermont State Nurses' Association**

## **SCHEDULE OF EVENTS**

<b><u>TIME</u></b>	<b><u>EVENT</u></b>	<b><u>LOCATION</u></b>
7:15 am - 7:45 am	NU Student Assistants' Meeting	Cabot 283
7:45 am - 9:00 am	Students Set Up Projects	Science Complex
8:30 am - 9:00 am	Judges' Meeting	Cabot 295
9:00 am - 12:30 pm	Judging of Projects - Projects Open to Public	Science Complex
9:00 am - 12:30 pm	Judges Lounges Open	Science Complex
12:30 pm - 1:15 pm	Luncheon	Wise Campus Center
1:15 pm - 1:30 pm	Students take down projects	Science Complex
1:30 pm - 3:00 pm	Awards Ceremony	Dole Auditorium in Webb Hall

**Projects must remain in place at least until 12:30 pm to be eligible for monetary awards.**

# PROJECTS

<u>PROJECT AREA</u>	<u>PROJECT NUMBER</u>	<u>LOCATION</u>
BIOLOGY: botany, physiology & zoology	B 01 - B 28	Room 243
CHEMISTRY: general	C 01 - C 05	Room 239
consumer chemistry	C 06 - C 23	Room 239
GEOLOGY: geology & env.chem.	G 01 - G 09	Room 145
GROUP PROJECTS (7th and 8th grade):	GP 01 - GP 17	Room 235
MATHEMATICS: math and computer science	M 01 - M02	Room 151
PHYSICS: general	P 01 - P 17	Room 151
energy	P 51 - P 58	Room 145
SOCIAL SCIENCE: psychology and sociology	S 01 - S 16	Room 165

**(Abstracts are arranged in this booklet alphabetically by students' last names; group projects are alphabetized by the name of the student who comes first on the abstract.)**

## **Judges Lounges**

Science Building	146
Science Building	155
Science Building	251
Partridge Hall	228
Thompkins Hall	275

**Judges Lounges are for Judges only.**

NAME(s)	<b>Andrew Akiki</b>	PROJECT NUMBER	<b>P01</b>
SCHOOL	Mater Christi School	GRADE	<b>7</b>
TEACHER	Michelle Donlon		
PROJECT TITLE	<b>Finding Your Way In A Storm</b>		

### ABSTRACT

Global Positioning System (GPS) technology is widely used. The accuracy of GPS depends on radio signals from space and errors result from any delay or degradation of the signal. This experiment tests the effects of geomagnetic activity on the accuracy of a GPS receiver. The expectation is that the accuracy of the GPS will decrease as the intensity of geomagnetic activity increases. The experiment uses a GPS receiver and geomagnetic activity data obtained from the internet.

The hypothesis was that if the intensity of geomagnetic storms increases, then the error of a GPS will also increase. A geomagnetic storm is defined as activity with a kp index (estimated planetary K-index) equal to or greater than 5. The only data available during the experiment were kp indices of 4 or less. Geomagnetic activity less than or equal to 4 did not affect the error of the GPS.

The percent change between data with WAAS (Wide Area Augmentation System) on and off was calculated. The percent change for the longitude and latitude were graphed on the vertical axis versus the kp index on the horizontal axis. The percent change data points on the longitude graph were primarily located between -0.0002 and 0.0001 and the percent change data points on the latitude graph were primarily located between -0.00004 and 0.00004. Both the longitude and the latitude data suggests that geomagnetic activity rated from 0 to 4 on the kp index did not affect the GPS receiver and did not cause a major increase in error.

NAME(s)	<b>Louis Altobell</b>	PROJECT NUMBER	<b>P02</b>
SCHOOL	Mount Saint Joseph High School	GRADE	<b>10</b>
TEACHER	Mr. Spatzer		
PROJECT TITLE	<b>Does the Grain of a Bullet Affect it's Accuracy</b>		

### ABSTRACT

In my experiment I tested whether the grain of a bullet would affect the accuracy of same caliber bullets. I hypothesized that both bullets would be equally accurate at closer distances but the larger caliber bullet would be more accurate at the longer distances. To test this I used a shooting stand and placed it on a table at one end of a 250 yard flat field. Then I set up 3 identical targets at 25 yards, 100 yards, and 200 yards. Each one appearing to be side by side as so no one bullet would penetrate more than one target. Then each shooter took turns shooting 5 rounds at a single target while sitting at the table. After each shooter finished shooting at every target the gun would be cleaned. The same gun was used for the entire experiment and every shot was taken on the same day to try to keep the conditions as close as possible. In my results all the rounds shot very close. At the two closer ranges both grains shot almost exactly the same. But at 200 yards the larger grain bullets where more accurate. After looking over my results I can conclude that of two different grain bullets of the same caliber the larger grain will be more accurate at farther distances but at closer distances the grain difference will not significantly affect the accuracy.

NAME(s)	<b>Christopher Barrett, Geoffrey Gadbois, Zachary Zuk</b>	PROJECT NUMBER	<b>GP02</b>
SCHOOL	Christ the King School Burlington	GRADE	<b>7</b>
TEACHER	Vidula Srivastava		
PROJECT TITLE	<b>Be Glad About Glad</b>		

### ABSTRACT

The purpose of our project is to find out which type of plastic wrap preserves food the best. Our hypothesis was that there would be no difference between the uses of different plastic wraps. It turns out that there are three main types of plastic used in plastic wraps. These are polyethylene, polyvinyl chloride, and polyvinylidene.

We wrapped apples directly and in containers using a variety of common plastic wraps. Over a one-week period, we observed the apples and recorded our observations. Next, we added in the variables: tightly wrapped vs. loosely wrapped, in the refrigerator vs. left outside the refrigerator, repeating the one-week cycle.

We found that polyethylene, used in Glad wrap, prevented oxidation the best, considering all the variables. This proved our hypothesis wrong because using different types of plastic wrap does, in fact, have an effect on the physical characteristics of the apples. We also found that by placing the wrapped apples in the refrigerator, you may be able to decrease the amount of oxidation that the apple undergoes. This additionally means that the fruit will last longer and remain edible for a longer period of time.

NAME(s)	<b>Helen Bearse</b>	PROJECT NUMBER	<b>C06</b>
SCHOOL	Weathersfield Middle School	GRADE	<b>8</b>
TEACHER	David E. Lambert		
PROJECT TITLE	<b>Do Different Types of Orange Juice Have the Same Levels of Vitamin C?</b>		

### ABSTRACT

The problem I studied was: Do different types of orange juice have the same levels of vitamin C? I wanted to see if frozen, fresh, bottled, and boxed orange juice had the same levels of vitamin C.

○I collected information from various sites on the internet. I learned that vitamin C is a fragile vitamin and it is affected by light, heat, and exposure to air.

○My hypothesis was that orange juice in different states or forms will not have the same levels of vitamin C. I believed this because of the different types of processing needed to get the orange juice into the different forms I was comparing.

○To compare the vitamin C content in each type of orange juice, I made an indicator solution from water, cornstarch, and iodine. The vitamin C in the juice was supposed to turn the indicator from a royal blue to colorless. For each type of I counted the number of drops of juice added to the indicator until the indicator was completely colorless. Then I compared the results using a bar graph.

○My principal findings were that it took different amounts of orange juice to turn the indicator colorless. Fresh orange juice required the least amount of drops, while frozen orange juice took the most number of drops. From this I concluded that fresh orange juice contained the highest concentration of vitamin C.

○The major conclusion I came to was all four of those orange juices have different levels of vitamin C and that my hypothesis was supported.

NAME(s)	<b>Andrea Bizon</b>	PROJECT NUMBER	<b>P03</b>
SCHOOL	Mount St. Joseph Academy	GRADE	<b>9</b>
TEACHER	Michael Spatzer		
PROJECT TITLE	<b>The Effect of Arc on the Success of Making a Basket</b>		

### ABSTRACT

I want to do this experiment because I play basketball and if I can figure out a way to make a basket almost every time I shoot, then I can improve. I want to be able to make baskets and win games. I think that this would be a good project for me. I am interested in my project so that means that I will work hard at trying to find a good conclusion.

NAME(s)	<b>Katherine Brown</b>	PROJECT NUMBER	<b>S01</b>
SCHOOL	Windsor High School	GRADE	<b>12</b>
TEACHER	Jennifer Townsend		
PROJECT TITLE	<b>False memories</b>		

### ABSTRACT

It is difficult to surmise that our memories are not as solid as a concrete wall, but rather they are as impressionable as clay. Even some of our clearest recollections can be proven false when compared to other people's accounts of the same situation. What makes our memories unreliable at times? It is the capacity to create false memories.

A false memory is a memory that is the distortion of an actual memory or the confabulation of an imaginary one. False memories occur when actual memories are combined with the content of suggestions received by others, especially counselors or therapists. Existing schemas affect our memories greatly, since they are the frameworks we use to make sense of the world. In order to add memories, you must either change the memory to fit your schema or change your schema.

This brings me to the purpose of my experiment which was to discover whether high school students would form false memories in response to word suggestions. I hypothesized that all of the high school students would equally form false memories in response to my suggestions. To test this I created a word list that contained fourteen words all relating to a similar topic, and allowed my participants to look at it for fifteen seconds. I then collected the word list and presented the participants with a second list of fourteen words, which contained two words from the original word list and two that related to the topic of the first word list. The participants were then instructed to circle any words that they recognized from the first word list. What this experiment showed was that the females were more likely to create a false memory than the males in my study, thus disproving my hypothesis that all of the participants would create false memories. I contribute this to the choice of the word topic, because a person's prior knowledge of the subject would affect how they remembered the words. This point could be further proven through the use of other word lists of varying topics.

NAME(s)	<b>Patrick Campbell</b>	PROJECT NUMBER	<b>S02</b>
SCHOOL	South Burlington High School	GRADE	<b>10</b>
TEACHER	Curtis Belton		
PROJECT TITLE	<b>Binaural Beats</b>		

## ABSTRACT

The purpose of this experiment is to find what, if any, effects can be obtained from listening to a binaural beat. It is to see if it could be used a synthetic drug, and possibly used to wean people off of real drugs or to stop kids from using real drugs, as there are no health risks involved in taking these.

I will have people of different race, gender, age, and background listen to different binaural beats and will test them afterwards to see if they are at all physically or mentally impaired, to try to determine if the desired effects were in fact achieved.

What I predict will happen is that the desired effects will be partially achieved, and that, even though the effects will be noticeable, they will not be as strong or the same as it is described. I also believe that the persons gender will make a difference, as i believe the woman will have more concentration and more patience and therefore will have greater effects.

In conclusion, I believe that the testing will show some results, but not the intended results that are described. Also, I believe that different people will experience different effects from the same dose, because it will depend on what type of person you are, how much patience you have, etc.

NAME(s)	<b>Asa Carter</b>	PROJECT NUMBER	<b>S03</b>
SCHOOL	South Burlington High School	GRADE	<b>10</b>
TEACHER	Curtis Belton		
PROJECT TITLE	<b>The Stroop Effect</b>		

## ABSTRACT

For my experiment, I am going to test the effect of different stages of hunger on how people perform with the Stroop test. I will need the participation of at least 40 subjects for the experiment, whom will most likely be recruited from my school and neighborhood. These subjects will probably be from 14-16 years of age, and of both genders. The subjects will be required to skip a meal (most likely breakfast) in order for this experiment to work. The nature of the Stroop effect can be very frustrating, but besides that there are virtually no risks involved with the experiment. In order to make the subjects feel calm and confident I will assure them that the Stroop effect is very difficult if not impossible to overcome and that any mistakes made during the experiment are completely natural.

The Stroop test will probably be done electronically, using Power Point, so the time is constant and the mistakes being the dependent variable. As of now, I have not started any experimentation, but have created a consent form for the subjects to fill out, and have started making the Power Point with which the experiment will be done. I have also started to recruit people to participate in my experiment.



NAME(s)	<b>Mandy Chan</b>	PROJECT NUMBER	<b>G01</b>
SCHOOL	South Burlington High School	GRADE	<b>10</b>
TEACHER	Curtis Belton		
PROJECT TITLE	<b>Lead Paint Removal and Environmental Effects</b>		

### ABSTRACT

The purpose of this experiment is to determine which method of removing lead containing paint is most effective and environmentally friendly. Using a belt-sander, propane torch, heat gun, dry scraper, or sandpaper to remove lead-based paint is not recommended because it creates large amounts of lead laden dust. For demonstration purposes, I will use two-by-two inch sandpaper squares and a piece of the original clapboard to simulate power sanding on large clapboards.

Several factors have to be taken into consideration when removing lead-based paint because they can determine the effectiveness and performance of the paint stripper. In order for my experiment to yield significant results, I will need to take into account the measurable data as well as observations from my experimentations. The variation of the amount and material of the building system component, temperature, time, substrate, and number of paint layers may lead to inaccurate results.

In the environment, lead is toxic to plants, animals, and microorganisms. Therefore, I will be performing invasive and intrusive studies on Escheria coli bacteria (common; found in intestines), Subtilis bacteria (common; found in soil), brown Planaria (Dugesia tigrina/flatworm), and Daphnia (crustaceans; commonly found in lakes/ponds). This will represent the chemical effects of toxic lead waste on humans, plants, insects, and marine life (live subjects) until a negative effect is evident. Lead is a neuro-toxin, so the movements of microbial subjects will decline when exposed to lead. I will observe bacterial movements at regular intervals and record my observations. Cell counts will be taken with a microscope. I will also be performing demonstration soil tests to determine if lead is present in the soil. In order to measure the effects of toxic agents on live subjects, exposing the microorganisms to the toxin is necessary. Note that the toxic lead waste will eventually kill the microbial subjects.

For experimental purposes, I will only be working with small portions in a controlled environment in a glovebox. Four Petri dishes per paint stripper will be allotted to each live culture. Additionally, a second set of each component will provide a backup.

NAME(s)	<b>Daniel Cone</b>	PROJECT NUMBER	<b>B01</b>
SCHOOL	Mater Christi School	GRADE	<b>7</b>
TEACHER	Ms. Donlon		
PROJECT TITLE	<b>Determining the Duration of a Weighted Lacrosse Stick Drill by Creating Assessment Tool</b>		

### ABSTRACT

The purpose of this project was to determine if the duration of a weighted lacrosse stick drill could be established. The initial idea came about when a weight for a lacrosse stick became available to players. The appropriate duration for use was unknown. As a player uses a stick with added weight, it is expected that his level of fatigue would increase with potential risk for decreased shot speed and accuracy. It was hypothesized that the appropriate duration for a weighted lacrosse stick drill could be demonstrated by creating an assessment tool that objectively captured the point at which performance was hindered and the player was fatigued. The review of data would help establish the appropriate duration for each player and decrease the risk of unwanted fatigue and poor player performance.

The experiment was conducted by recording shot speed, shot accuracy and fatigue levels while players performed a lacrosse drill using a weighted lacrosse stick. Objective findings of increasing levels of fatigue were reported when comparing start to finish. This trend was most significant and consistent. A gradual decline in shot speed and accuracy were also observed. After the drill, the player survey revealed that they were satisfied with the 20 shot drill but a longer drill would have been too fatiguing.

Based on the data collected, the conclusion was made that an appropriate duration of a weighted lacrosse stick drill can be established by utilizing an assessment tool. Further weighted lacrosse stick drills can be explored.

<b>NAME(s)</b>	<b>Rebekah Cory</b>	<b>PROJECT NUMBER</b>	<b>S04</b>
<b>SCHOOL</b>	<b>Hinesburg Community School</b>	<b>GRADE</b>	<b>8</b>
<b>TEACHER</b>	<b>Stephanie Konowitz</b>		
<b>PROJECT TITLE</b>	<b>A Peppy Assessment: Peppermint and Testing</b>		

### ABSTRACT

Peppermint is an herb cultivated for its aromatic oils. A number of essential oils, including peppermint, impart mental clarity or focus, and can be used to rejuvenate a tired, sluggish mind. Peppermint also is said to ease such problems as the common cold or headaches. I got the idea for my experiment when our teacher gave us students each a piece of peppermint gum before our test began. He said that it was supposed to make us more alert and help us to do better on the test. I found this interesting, and decided for the science fair that I would make up my own test and try to see if peppermint really did have helpful affects on how well someone does on a test. For the experiment, I split up the class into two equal groups. To one of the groups I gave each student a peppermint candy. I didn't give the other group any peppermint. Then, both groups were handed out a test that I had made up. The students who consumed peppermint before the test had an average grade 6% higher than the group without peppermint. The clarity and mental focus that peppermint is said to provide seems to have worked for my experiment. According to my experiment, peppermint can have a positive effect on how well you do on a test.

<b>NAME(s)</b>	<b>Ariel Culupa, Ryan DiFalco, Emilie Cifrian</b>	<b>PROJECT NUMBER</b>	<b>GP07</b>
<b>SCHOOL</b>	<b>Christ The King, Burlington</b>	<b>GRADE</b>	<b>8</b>
<b>TEACHER</b>	<b>Vidula Srivastava</b>		
<b>PROJECT TITLE</b>	<b>Is Your Hairspray To Die For?</b>		

### ABSTRACT

The main objective of our project was to determine if any harmful or lethal chemicals are contained in hairspray and conclude if they are unnecessary to the product and may be omitted. Our hypothesis is that most of these chemicals can be eliminated. We also hypothesized that many of the chemicals will play some part in harming the human body.

The first step of our procedure was to obtain three different types of hairspray from three different distributors. After purchasing the hairspray of each designated company we chose, the next step is to list the ingredients from the back of the bottle. The following step is to locate the phone numbers of the three distributors on the back of the bottle, and call them to inquire about the purpose of each ingredient. The concluding step is to research and record the health risks of each ingredient on a data table.

Based on our analysis, we concluded that there are many side effects caused by the chemicals including minor dermatitis, mild irritations in eyes and nose, and even cancer. It is purely up the consumer whether or not they want to risk getting these ailments to achieve maximum hold for the perfect hairstyle. "Let the buyer beware."

NAME(s)	Emily Cutting, Alaina Sarvak	PROJECT NUMBER	GP11
SCHOOL	Mater Christi	GRADE	7
TEACHER	Michelle Donlon		
PROJECT TITLE	Nature's Batteries		

## ABSTRACT

The purpose of our experiments was to determine which fruits or vegetables create the greatest electrical voltage, and if fruits injected with electrolytes will create more electrical voltage. Alternative renewable sources of energy and the effectiveness of energy drinks were the primary motivations for these experiments.

The first experiment was to find out what how much power each fruit and vegetable creates. Two fruits, an orange and a lemon, and two vegetables, an onion and a potato, were tested, using a copper wire and a paper clip. Readings were taken with a voltmeter with probes connected to the copper wire and paper clip with wooden clothesline pins.

Because of its density, the potato was expected to generate the highest reading, but the lemon performed slightly better than the potato, at 0.92 volts versus 0.90 volts. The onion and orange generated smaller readings, both averaging 0.836 volts.

The second experiment examined whether a lemon injected with electrolytes will create more energy. Lemons were injected with Powerade, orange juice, Monster, or Red Bull, and tested to see which energy drink raised the lemons' voltage output. A paperclip and a piece of copper wire were placed in each lemon and connected to a voltmeter. Multiple measurements were taken for four days, and then averaged. The highest average voltage readings were from the Powerade lemon, 0.933 volts, followed by orange juice, 0.890 volts, Monster, 0.888 volts, and then Red Bull, 0.865 volts. The energy drink readings increased over the four testing days.

The results indicate that lemons generate the most energy of the food items tested, and that lemons injected with Powerade create slightly more energy than lemons alone.

NAME(s)	Andrew D'Audelin	PROJECT NUMBER	P51
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	Investigation of Photovoltaic Efficiency in Vermont		

## ABSTRACT

The purpose of this lab is to study the difference between the amount of electrical energy available through the use of solar panels in Vermont versus the amount available in an area with a very high amount of available sunlight. A survey conducted by the National Oceanic and Atmospheric Association found that Yuma, Arizona received the highest levels of sunlight when the survey was performed in 2004. This will be the area simulated in the experiment for comparison.

For the sake of simplicity, amount of sunlight will be the only variable in this experiment, though other variables, such as temperature and panel setup, have also been found to affect the amount of power generated by a photovoltaic panel.

Investigation has revealed that halogen lamps provide a large enough amount of light to allow a panel to produce a current. Therefore, due to the obvious variability of natural sunlight, such lamps will be used in the experiment to simulate natural sunlight. The panel will be exposed to a level of light proportional to the amount its representative location receives, based on weather reports from each area (Yuma, Arizona and Burlington, Vermont). As it has been noted that separate panels will inherently produce slightly different amounts of energy, a single panel will be used to perform the investigations for both areas.

NAME(s)	<b>Dominique Danco</b>	PROJECT NUMBER	<b>C09</b>
SCHOOL	Mater Christi School	GRADE	<b>7</b>
TEACHER	Michelle Donlon		
PROJECT TITLE	<b>C for Yourself: Vitamin C in Orange Juice</b>		

### ABSTRACT

Have you ever wondered which type of orange juice has the most vitamin C? The purpose of my experiment was to find out. I tested the vitamin C level in four different types of orange juice using a vitamin C indicator. I predicted that if the juice were fresh-squeezed, then it would have the most vitamin C.

First, I created the vitamin C indicator, called starch-iodine. I put a drop of juice into the indicator and swirled. I added drops of juice and recorded how many were needed to turn the indicator clear. I did this three times for each different juice.

The four types of juice were fresh-squeezed, bottled Tropicana, bottled Florida's Natural, and Minute Maid frozen concentrate. The fresh-squeezed turned the indicator clear in an average of 6 drops. In an average of 13 drops of Tropicana, the indicator started to take on the color of the juice, indicating low vitamin C levels. The Florida's Natural and frozen concentrate turned the indicator clear in an average of 10.3 and 7.6 drops in that order. The fresh-squeezed juice and the frozen concentrate turned the indicator clear quickly, the Florida's Natural took a little bit longer, and the Tropicana never turned the indicator clear.

My hypothesis was correct. The fresh-squeezed orange juice had the most vitamin C. However, the frozen concentrate had almost as much. This could mean that vitamin C is broken down when it is out of the orange, but not frozen, such as in bottled orange juice.

NAME(s)	<b>Joseph Dexter</b>	PROJECT NUMBER	<b>C01</b>
SCHOOL	Green Mountain Union High School	GRADE	<b>11</b>
TEACHER	Jonathan A. Rice, Ph.D.		
PROJECT TITLE	<b>2X2 Combinatorial Chemical Synthesis Using a Single-Layer PDMS Microfluidic Chip</b>		

### ABSTRACT

A novel microfluidic chip for performing parallel combinatorial chemical syntheses was designed, fabricated, and tested. Past studies on microfluidic parallel combinatorial synthesis have generally utilized multilayer glass microchips that are difficult and expensive to fabricate. In this investigation, a single-layer microchip was designed for conducting 2X2 parallel combinatorial chemical syntheses. The microchip was fabricated from polydimethylsiloxane (PDMS) using a standard photolithographic procedure. A silicon wafer spin-coated with SU-8 photoresist was patterned using a chrome photomask of the channel design. The PDMS microchips were then cast from the silicon master and bonded to glass slides via oxygen plasma treatment. The microfluidic chip was tested by performing a combinatorial series of chemical reactions under electro-osmotic flow control. This investigation constitutes the first-ever development of a single-layer PDMS chip for parallel combinatorial synthesis and should provide a strong basis for effectively applying microfluidics to combinatorial chemical synthesis.

NAME(s)	Julia Dockum	PROJECT NUMBER	C10
SCHOOL	Fair Haven Union High School	GRADE	9
TEACHER	Ben Worthing		
PROJECT TITLE	Do Horses Prefer Peppermint or Apple Bit Wipes?		

### ABSTRACT

For my Science Fair project, I wanted to do something that was related to horses because I ride and I thought it would be nice to say that I was doing my homework when I was at the stable. I chose a topic of Bit Wipes. Bit Wipes are wipes for the bit of the bridle that clean it and give it a delightful flavor to encourage the horse to take the bit. I would answer the question: Do horses prefer Peppermint or Apple Bit Wipes?

○I would test this by timing how long it would take for the horse to take the bit with a stop watch. I needed three bits, one for each flavor and another without being wiped as a control. I also used one canister of Peppermint Bit Wipes, one canister of Golden Delicious Apple Bit Wipes, some horses, and a helper.

○I predicted that the horses would prefer the Peppermint flavored Bit in a quicker time than the Apple. I predicted this because the Peppermint Bit Wipes leave the bit smelling fresher than Apple, and Peppermint bit wipes smell more like peppermint, whereas the Apple doesn't smell as much like apple.

○In the end, the horses didn't prefer Peppermint. Overall, the bits wiped by Apple wipes were preferred the most. Most horses that liked Apple, liked the non-wiped bit the same. The peppermint was rarely preferred. This could be because the way that I presented the bits. I offered them one after the other to the horses. They could have gotten bored or annoyed by the time the third bit was presented, and reject it just to be difficult. Lesson horses often do this. I tried to prevent that from happening by changing the order of which I presented the bits. This could be a flaw in the experiment which could have effected the accuracy of the results.

○You could add to this by seeing if breed, gender, or what the bit is made of effects which flavor the horse prefers.

NAME(s)	Jessica Dorr	PROJECT NUMBER	C11
SCHOOL	Manchester Elementary Middle School	GRADE	7
TEACHER	Scott Diedrich		
PROJECT TITLE	Which Common Cold Medicine does the best job in Killing Bacteria from the Mouth?		

### ABSTRACT

This project was to determine which brand of cold medicine works best. The bacteria that I used, was from my mouth. The first trial, I was perfectly healthy, but then on the second trial, I had a cold, so it affected my results. On the first trial, the medication that grew the most, would be the one to work the best. Then on the second trial the medication that grew the least, would work the best.

My results were determined by how much the bacteria grew or didn't grow. On the first trial, Dimetapp grew the most, I new that it would be the best working. And the store brand worked the worst. Then on the second trail, when I was sick, Dimetapp and Robatussin grew the least, making it so they grew the best.

The amount that grew was calculated by finding the area.. Because of the fact that the bacteria would grow in a perfect circle (because the paper disk was circular) all I had to do was measure the diameter, divide it by two, then times pi, 3.14159, by the radius squared.

In conclusion, I now know that the best medication to buy would be Dimetapp. I know this because on the first trial it grew 11.34cm on the first trial, and .3cm on the second trial. I also learned that the brand of medicine that you buy is very important because if you buy a medication that is weak, it will take longer to recover from sickness.

NAME(s)	Hayden Dublois	PROJECT NUMBER	P52
SCHOOL	Manchester Elementary Middle School	GRADE	7
TEACHER	Scott Diedrich		
PROJECT TITLE	Making Batteries From Fruits and Vegetables û Is It Possible?		

### ABSTRACT

This project is the result of experimentation on which electrolyte acid from different foods provides the most electricity/voltage. My purpose was to determine the amount of voltage and amperage that could be produced by common fruits and vegetables.

To conduct the experiment, I created a simple battery/circuit using a copper wire, zinc nails, and alligator leads/clips attached to a digital multi-meter. The wire and nails acted as the positive and negative electrodes, and the fruit or vegetable acid (electrolyte) allowed the electrical current to pass through it. The multi-meter measured this simple battery's voltage.

The voltage and amperage was recorded for each fruit and vegetable. I recorded .82 volts and .02 amps for an apple, the weakest fruit, and .969 volts and .12 amps for the lime, the strongest fruit. I also created a series and parallel circuit using multiple limes, and in this way attempted to light up a 1.5 volt lamp, but was unsuccessful.

In conclusion, my project demonstrated that fruits and vegetables can create small amounts of voltage and amperage. These items can create more voltage, depending on the amount of electrolyte acid they contain. By putting them together on a series circuit, voltage is increased and by stringing them in parallel circuit, amperage is increased. Finally, I determined that a great deal more electrolyte acid would be needed for any real use, such as lighting up a mini-bulb.

NAME(s)	Dieter Ekstrom	PROJECT NUMBER	P53
SCHOOL	Fair Haven Union High School	GRADE	9
TEACHER	Mr. Roberts		
PROJECT TITLE	The Effect of Blade Design on Mill Speed		

### ABSTRACT

In modern society, more and more environmentally-concerned people are using renewable, clean energy. One of the best sources for this type of energy is wind power. The speed of a mill directly affects the energy output. The larger the output of a mill, the cheaper the energy produced by it will be. My project tested the relationship between the size of a windmill's blades and its effectiveness (speed). The data collected by my experiment could be useful in the future development of windmills to have greater output, making this renewable, clean form of energy more available and cheaper. My hypothesis was that, the larger a windmill blade, the faster the windmill will be. I first created a windmill using Tinkertoys and thin cardboard blades of different sizes. Using a box fan to simulate wind, I recorded how long it took, with each differently sized blade set, for the circular motion of the windmill to coil a set amount of string. For the large size blades, it took an average of 13.36 seconds to coil the string. This set was by far the slowest. For the medium size blades, it took an average of 11.25 seconds to coil the string. This set was the fastest. For the small size blades, it took an average of 11.73 seconds to coil the string. This set was a little slower than the medium-sized set but far faster than the large-sized set. I concluded that my hypothesis was correct. After a certain point, increasing the size of the blade actually decreased the windmill's speed, rather than increasing it. I plan to make the experiment more reliable and retest before the science fair. I will use a small electric generator to convert the windmill's mechanical energy to electrical energy. Not only will this eliminate several variables, I will be able to be able to measure the electrical output of the mill, which is more directly related to the purpose of this experiment.

NAME(s)	Courtney Elliott	PROJECT NUMBER	B02
SCHOOL	Mount St. Joseph Academy	GRADE	10
TEACHER	Michael Spatzer		
PROJECT TITLE	The Effects of the Sense of Sight on the Sense of Hearing		

### ABSTRACT

For this project I set out to prove that when the sense of sight is taken away does the sense of hearing will become stronger. My hypothesis was that when the sight of sense is taken away then the sight of hearing will become stronger. The procedure I used was to take twenty four subjects and test them in groups of three. I tested them with their sight by playing three different volumes and asking if they could hear them. Then I blindfolded them and tested them again. Then I kept them blindfolded for fifteen minutes testing them every three minutes. The results I got were that they could all hear with their sight. Then on the first test they usually heard better or the same. Then in the second through fifth tests the hearing improved. Then in the sixth through eighth tests the hearing stayed the same or got better only a little bit. The conclusion I drew was that when the sense of sight is taken away then hearing does become stronger.

NAME(s)	Taeyoon Eom	PROJECT NUMBER	P04
SCHOOL	Mount St. Joseph Academy	GRADE	10
TEACHER	Michael Spatzer		
PROJECT TITLE	What Roof Shapes can Hold the Best in Hurricanes?		

### ABSTRACT

In this experiment, I made a model of the house and three different shaped roofs. And then I put the model of the house with one of the roof shapes on top of it, in the tunnel. Then I put the fan in front of the tunnel that has three different velocities of the winds; high, medium, and low. And I had a ruler on the tunnel so I can see how far the house is from the fan. And every time I moved the house away from the fan by 5". So the distances of the house was from 5" to 35". I gave the fan a maximum time of 10 seconds, and if the house did not moved in 10 seconds I put down 'No Movement', if the house moved a little bit then I put the distance it moved, and than if the roof fell off in 10 seconds I just put down 'Fell Off'.

NAME(s)	<b>Elizabeth Fell</b>	PROJECT NUMBER	<b>C12</b>
SCHOOL	St. Francis Xavier School	GRADE	<b>7</b>
TEACHER	Mrs. Mary Ellen Varhue		
PROJECT TITLE	<b>A Bit About Bits</b>		

### ABSTRACT

When riding in the art of dressage, you need to be able to communicate with the horse. You need to be able to communicate, with your movements, looking invisible. You need to tell the horse what to do, when to do it and that it's all right to move on. The bit enables the rider to achieve all of this. The purpose of my experiment was to find out what bits are the best for my horses. My hypothesis was that the Turnado would be the best bit. I thought this because of the shape of the bit, and the metal the bit is made of.

First, get together all your bits, including the Myler Comfort Snaffle, the KK Ultra, the Plain Snaffle, the JP Snaffle, the French Link Snaffle, and the Sprenger Turnado. Get five horses, ride each of them five times in each bit, have the rider fill out a questionnaire after each ride. The questionnaire should ask riders to rate the horse's performance in several areas on a scale of 1 to 5. Also, have a control horse to ride in their own bit for the whole period.

I found out that the JP Snaffle was the favorable bit. This disproves my hypothesis. My experiment says the single jointed bits are the best.

NAME(s)	<b>Heather Foley</b>	PROJECT NUMBER	<b>B03</b>
SCHOOL	Fair Haven Union High School	GRADE	<b>11</b>
TEACHER	Peter Woods		
PROJECT TITLE	<b>Does the level of pH affect the regeneration of Planarians?</b>		

### ABSTRACT

For my science fair project I wanted to see if the level of pH affects the regeneration of brown Planarians. Planarians have the unique ability to regenerate up to two sections on their body if severed. Planarians have this ability by constant cell turnover and being constantly in repair mode. My hypothesis was that Planarians would regenerate best in a neutral solution made of plain pond water. To do the experiment I put the planarians in separate groups, equally. The groups are acidic, neutral, and basic. The acidic solution is made up of acetic acid or vinegar and the basic is made up of calcium carbonate. I cut the planarians all the same way, which will be across the middle. I will determine the ideal solution for regeneration based on an average length of each group. We've had to order two batches of planarians because the first batch died because they were put in distilled water which lacks sufficient nutrients they need, which was unknown at the time. The second batch has begun the experiment and further results are still to come. I chose this experiment because I heard about Planarians in my biology class last year and thought that it would make for an interesting experiment, because I am now in a chemistry class I decided to incorporate some chemistry into the experiment.



NAME(s)	<u>Liza Fontaine</u>	PROJECT NUMBER	<u>C02</u>
SCHOOL	<u>Weathersfield Middle School</u>	GRADE	<u>8</u>
TEACHER	<u>David E. Lambert</u>		
PROJECT TITLE	<u>Does temperature affect the acidity in fruit juices?</u>		

### ABSTRACT

I did an experiment to see if temperature would affect the acidity in fruit juices. My problem was: Does temperature affect the acidity in fruit juices?

○Before I did my experiment I gathered some information to form my hypothesis. I found out that water's pH is not affected by different temperatures. I also found the pH of all the juices I would be testing and the pH of water. I based my hypothesis on whether the pH of the juice was close to water's pH or not and I did this because I thought if the juice's pH was close to water's pH it would get similar results as I found in my research.

○My hypothesis was, The pH of the tomato juice and the pH of the orange juice would not be affected by different temperatures and the pH of lemon juice, apple juice, and grape juice would be at their lowest at boiling point.

○In my experiment I tested each of the juices nine times, three times for boiling temperature, three times for refrigerated temperature, and three times for room temperature. I put a set four tablespoons of each of the juices plus water in the refrigerator, I left a set of juices out to get to room temperature, and I took each of the juices and water and tested them one by one at boiling temperature. When I got done testing them at boiling point I tested the cups I left in the refrigerator and the ones I left out to sit. I repeated this process two more times. When I got had all of my data recorded I figured out my results.

○After I completed my experiment I found out that my hypothesis for orange juice and tomato juice was supported because there was really no change in pH at different temperatures. My hypothesis for grape juice and my hypothesis for lemon juice were both supported because they were at their lowest at boiling temperature. My hypothesis for apple juice was not supported because I thought it would be at it's lowest at boiling temperature but it was really at it's highest at boiling temperature.

NAME(s)	<u>Antonio Forehand</u>	PROJECT NUMBER	<u>S05</u>
SCHOOL	<u>Mater Christi</u>	GRADE	<u>7</u>
TEACHER	<u>Mrs. Donlon</u>		
PROJECT TITLE	<u>Does the Golden Ratio Secretly Guide our Choices?</u>		

### ABSTRACT

For my science fair project, I tested people to see if the idea that people prefer the Golden Ratio is really true. My hypothesis stated that it was true and when I finished collecting my data, the results ended up being real. The golden ratio is a mathematical formula that is a relationship between the length and width of what ever form it is.

○The way that I tested this was that I took a board and put three rows of three different rectangles in each row. There were three different kinds of rectangles but each had the same area and one had sides in the Golden Ratio. In each row, they were rearranged in a different order. A person would walk in and I would assign them a row. I would ask them which rectangle in that row looks most appealing to them. They would choose one and I would check to see if that's the correct one. I would record which one they picked and then ask a new person.

○When I collected my data, I immediately realized that most people picked the rectangle with the golden ratio. But when boys were compared with girls, only boys preferred the Golden Ratio.

NAME(s)	Josh Frye, Casey Wentz	PROJECT NUMBER	GP06
SCHOOL	Green Mountain Union MS/HS	GRADE	7
TEACHER	Karen Surma		
PROJECT TITLE	Imploding Cans		

### ABSTRACT

Our topic is Imploding Cans. The question that we were trying to answer is: Can the size of a can change its difference in size after an implosion. Our hypothesis was that the large can would implode the most due to more area for gas inside. Our methods were imploding the can and then measuring the volume of the can afterward. Our results came to be opposite of our hypothesis. The smaller can had less volume after the implosion than the larger or the regular cans. In conclusion the amount of gas does not affect the implosion, but the size does.

NAME(s)	Joseph Gagne	PROJECT NUMBER	G02
SCHOOL	St. Francis Xavier School	GRADE	7
TEACHER	Mrs. Mary Ellen Varhue		
PROJECT TITLE	Decomposing Plastic		

### ABSTRACT

Purpose: The purpose of my experiment is to find out the decomposing time of homemade plastic and petroleum plastic. I want to see if plastic made from animal fat will decompose or start to decompose in two weeks. I will test it with petroleum plastic to see if there is a difference in the rate of decomposition.

Hypothesis: I think my natural plastic is going to decompose because it has fat and minerals in it that will help eat the plastic away. I don't think any of the hard petroleum plastic or the plastic wrap will have any changes.

Observations/Analysis: After putting my homemade plastic and the other plastics in soil, I checked on them every day to make sure the soil stayed damp. I had to add water to the samples every other day. After two weeks, I dug out the plastic samples. The first one I dug out was my homemade plastic. It was in a chunk of soil and you could see a white line in the dirt. I broke up the dirt a little and it all fell apart. I then dug out my other samples to see if there were any changes or decomposition. There were no changes in any of the petroleum samples.

Conclusion: In my research I found out that many petroleum plastics take many years to decompose. I was surprised that even thin plastic wrap showed no changes in my experiment. My homemade plastic did decompose in the two weeks that it was in the soil.

NAME(s)	<b>Josh Gately</b>	PROJECT NUMBER	<b>G03</b>
SCHOOL	South Burlington High School	GRADE	<b>10</b>
TEACHER	Curtis Belton		
PROJECT TITLE	<b>Soil Buffering</b>		

### ABSTRACT

○My science project is focused on soils and the effect that pH in water has on different types of soils. The idea comes from studies I have read about where there was neutral water poured on acidic soil, and then the water becomes slightly acidic. So naturally I was curious if it also worked the other way.

○Bioaccumulation is the process of pollutant or some other substance staying in the ecosystem and building up over time. This process occurs most of the time with pollutants such as DDT, cadmium, lead, and gasoline. Sandy soils do not hold on to their water or nutrients well. Therefore sandy soil is not as susceptible to pollution, because it is so porous. Clay soils, on the other hand are most susceptible to bioaccumulation because of the watertight nature of the soil.

Soil buffering is how well the soil resists changes in its pH. The agents that could change the soil pH include manure and fertilizer. This makes sense because they stay in the soil for an extended period of time. The question that I am interested in answering, though, is whether water, which stays in the soil a relatively short time, would affect the soil's pH. Different soils should have different soil buffering capacity, and that is what the lab is all about.

NAME(s)	<b>Michael Gilmartin</b>	PROJECT NUMBER	<b>M01</b>
SCHOOL	South Burlington High School	GRADE	<b>12</b>
TEACHER	Gerard LaVarnway, Ph.D.		
PROJECT TITLE	<b>Cryptology and the Hill Cipher</b>		

### ABSTRACT

Secret communication has been of interest since humans began communicating. With the development of the internet and different methods of communication over a variety of platforms, secure communication has placed the Science of Secret Writing at the forefront of research in mathematics and computer science.

A historical study of cryptology was performed with special interest on the mathematical theory behind encryption/decryption methods and practice. In particular, the Hill Cipher first introduced by Dr Lester Hill in a paper Cryptography in an Algebraic Alphabet published in The American Mathematical Monthly for June-July 1929 was investigated in detail. The Hill Cipher is one example of a block cipher; specifically it uses matrix multiplication in a given modulus to perform encryption.

The culmination of my research resulted in a Senior Challenge offered through the Career Development Center (CDC) at South Burlington High School. My presentation, Cryptology and the Hill Cipher (12/12/2007) aired on RETN public access television in South Burlington, VT.

NAME(s)	<b>Chantal Girard</b>	PROJECT NUMBER	<b>B04</b>
SCHOOL	South Burlington High School	GRADE	<b>10</b>
TEACHER	Curtis Belton		
PROJECT TITLE	<b>Effect of Epicatechin on Mice Memory</b>		

### ABSTRACT

For my project, I will be testing the effect of the natural compound, epicatechin, on the memory of mice. I will use blueberries as the source of epicatechin. My testing will consist of a control and an experimental group of 6 mice each. Each group will have 3 males and 3 females to test if gender also affects memory. I will be feeding both groups regular mouse food, but the experimental group will receive a measured amount of blueberries every day to supply epicatechin. To test if the epicatechin affects their memory, I will be sending every single mouse through a Plexi-glass maze and timing them each trial. I will run 3 trials a week for 4 weeks for a total of 12 trials. At the end of my trials, I will take the results and compare my experimental group to my control group to see if this natural compound does in fact affect the memory of mice. I will also be looking at if and how gender affects my results.

NAME(s)	<b>Allison Giroux</b>	PROJECT NUMBER	<b>B05</b>
SCHOOL	Hinesburg Community School	GRADE	<b>8</b>
TEACHER	Stephanie Konowitz		
PROJECT TITLE	<b>The Effect of Melatonin on Students</b>		

### ABSTRACT

Melatonin, called the wonder drug of the decade, is a fairly new pill on the market. Many species of animals produce the melatonin hormone naturally from their pineal glands. Melatonin is produced to control the circadian rhythm which keeps us awake during the day and asleep at night. The amount produced depends on how much light gets to our eyes. The more light that gets into our eyes, the less melatonin is produced in order to help us stay awake. Melatonin pills (natural and synthetic) are commonly used for insomnia, jet lag, arthritis, alcoholism, and migraines. This double-blind and placebo-controlled experiment was designed to find out if melatonin, taken the night before, had an affect on students' test results in the morning. Each student test subject was given three gelatin capsules; two of which had 1.5 mg of melatonin in them and one placebo capsule (filled only with sugar). Students took and recorded one of the labeled capsules each scheduled night. The following morning, the test subjects took a math and spelling test along with filling out a survey about how they felt and slept. The test results from the mornings after taking a melatonin capsule and the ones after they took placebo capsules showed that the placebos lead to better results on the tests. This means that the melatonin decreased their test scores. On the surveys, melatonin and the placebos both had better results for several of the questions. Although, students reported that overall they felt better after taking a melatonin capsule. From the results, I found that melatonin had a negative affect on students' test scores but made them feel better overall. Due to the small amount of test subject participation, I concluded that these results may not be accurate and with a much larger study the results may be different.

NAME(s)	<b>Alayna Hauke</b>	PROJECT NUMBER	<b>P05</b>
SCHOOL	Mater Christi	GRADE	<b>8</b>
TEACHER	Michelle Donlon		
PROJECT TITLE	<b>Siphons</b>		

### ABSTRACT

The purpose of my project is to determine how the height of a siphon affects the flow rate of water. My hypothesis states that if the height increases, then the rate of flow will decrease and that at one point the flow will stop completely.

I collected some information about what would be happening in the experiment. I researched what causes a siphon to work, what causes the flow to change and what causes the flow to stop. The research supported my hypothesis.

For the experiment I first had to set up. I placed two buckets spread apart and placed one end of a hose in each bucket. I then used pulleys to adjust the height of the hose. I put 8 liters of water in one bucket and started the siphon. I recorded the time and repeated the experiment two more times at that height and at other heights going in .3 meter (1 foot) increments.

The results were not quite as planned. The times were not steady. The flow rates for the first 3 heights were decreasing but increased at the highest height. There were many sources of error that affected the experiment.

It was hard to tell if my hypothesis was correct. I could only go up to a height of 2.1 meters (7 feet) so I couldn't find out what would happen if the heights increased more. Because of having inconsistent times, I couldn't tell how or if the height actually affects the rate of flow.

NAME(s)	<b>James Healey, Travis Clark, Paul Cirignano</b>	PROJECT NUMBER	<b>GP13</b>
SCHOOL	Christ the King School Burlington	GRADE	<b>8</b>
TEACHER	vidula srivastava		
PROJECT TITLE	<b>The answer, my friend, is blowig in the wind.</b>		

### ABSTRACT

We hypothesize that wind turbines and wind farms of large proportion currently being used and constructed across the world could have an effect on weather and air flow. These wind farms could possibly divert weather masses and air flow, ultimately changing local weather. First we intend to build a wind tunnel, wind turbines, and two landscapes all down to scale. Using the smoke airflow method designed by NASA we will test both landscape with and without turbines to the changes in Airflow, if any. With a digital video recorder we will record the air flow over the landscapes, and create wind flow charts. Using our data and wind flow videos we came to the conclusion that in both landscape, flat and mountainous, the wind flow was effected. Especially in the case of the flat landscape, turbulence, diversion in air flow, and reduction in ground winds were created. These changes in wind flow including the lack of ground winds could result in local climatic and environmental changes.

NAME(s)	<b>Ian Horton</b>	PROJECT NUMBER	<b>P06</b>
SCHOOL	St. Francis Xavier School	GRADE	<b>7</b>
TEACHER	Mrs. Mary Ellen Varhue		
PROJECT TITLE	<b>Brick Structure</b>		

### ABSTRACT

For my project I investigated brick structure. I did this because I wanted to know why bricks overlapped each other. Using Legos I built five walls, one with regular (2x4) bricks overlapped halfway, one with regular bricks only staggered in the middle by one, one with regular bricks overlapped by one and three-quarters, one made with the three middle layers made of 2x3 bricks and one made entirely of 2x2 bricks. My hypothesis was the first one, the one with 2x4 bricks staggered halfway, would bend the least.

I took weights of 100g, 200g, 300g, 500g and 1kg and put them on the walls and measured how far they bent. My hypothesis was correct. I also found that the two walls with the smaller bricks bent the most, so the bigger the brick, the better.

NAME(s)	<b>Damon Jones</b>	PROJECT NUMBER	<b>P54</b>
SCHOOL	Northfield High School	GRADE	<b>12</b>
TEACHER	James Jones		
PROJECT TITLE	<b>Windmill Project</b>		

### ABSTRACT

This investigation is to see at what angle and amount of wind puts out the most power in a windmill. By using different windmill wing angles and a different wind speeds for each angle I will be able to find which combination makes the most power.

In test one I tried to find at what mass-produced the most power stating that 45 degrees and 300g of weight on it. I discovered that my data did not support my hypothesis because the power in watts was the most at 500g with 0.164595watts. With 400g it was 0.155947watts and with 600g it was 0.145461watts.

In test two I investigated if there would be more power produced at 45 degrees then at 30 or 60 degrees.

My hypothesis was not supported by my data because at 30 degrees the max power was at 300g equaling 0.232841watts. For 45 degrees the max power was at 500g with 0.164595watts. For 30 degrees the max power was at 500g with 0.145804. This shows that 30 created the most power.

Test 3 I test to see if 45 degrees has the most power even with different wind speeds. I found that my data did not support my hypothesis; wind speed 1 did the best for the 30 degrees and 300g with a max power of 0.171696watts. For wind speed 2 the one that produced the max power was 30 degrees and 300g with a max power of 0.232841watts. For wind speed 3 I found that the max power was the 30 degrees and 500g with a max power of 0.403182watts.

NAME(s)	<u>Emily Jonynas</u>	PROJECT NUMBER	<u>B06</u>
SCHOOL	<u>Green Mountain Union MS/HS</u>	GRADE	<u>7</u>
TEACHER	<u>Karen Surma</u>		
PROJECT TITLE	<u>Do Preferences Affect Our Choices?</u>		

### ABSTRACT

○People's color preferences determine which color they like or dislike. Do these preferences affect other things too, like their everyday, quick decisions such as picking certain colored M&Ms over others? My hypothesis is that people's color preferences will affect which color M&Ms they choose. I tested this by asking participants to pick M&Ms out of a bowl for ten seconds only using two fingers and seeing if they picked their favorite color. The result of the experiment turned out that people did pick certain colored M&Ms according to their favorite color, even though all of the M&Ms taste the same. So, since people based their decisions off of their color preferences, color preferences did affect their choices.

NAME(s)	<u>Hannah Kay</u>	PROJECT NUMBER	<u>G04</u>
SCHOOL	<u>South Burlington High School</u>	GRADE	<u>10</u>
TEACHER	<u>Curtis Belton</u>		
PROJECT TITLE	<u>The Effects of Acid Rain</u>		

### ABSTRACT

I am testing the effects of acid rain on building materials and the run off onto the soil, and how it complicates plant growth. I will use limestone, asphalt, and copper as my building materials. To simulate acid rain I will use vinegar, and I will measure the affects by the germination of beans. This is important because pollution can create acid rain, which can further cause harm to the environment and the ability for plants to grow. Global Warming is a serious issue that causes more harm than we know. Also, this will inform gardeners of which building materials they either want to keep near their plants or away.

NAME(s)	Patrick Keelan	PROJECT NUMBER	P07
SCHOOL	Manchester Elementary Middle school	GRADE	7
TEACHER	Mr. Scott Diedrich		
PROJECT TITLE	What amounts of water will change the hardness of concrete		

### ABSTRACT

The purpose of my procedure was to see if there is a better way to make concrete for the world and also to find about its history. My procedure, first find out how many ounces of water needed to make each different cement mix. Next use scale to measure 5 bowls of dry cement. Then measure correct amount of water needed for each mix. Create 5 cement mixes. Next let them harden for 4 hours. Finally drop a metal ball in each one to test hardness.

My results were simple. The ones with less water turned less hard and dry as I predicted and the more watery ones came out watery and softer. After letting them harden for 4 hours I found that the ball impacted more on them than the other ones. After a couple more days the more watery ones turned out to be almost as hard as the normal batch.

My hypothesis was correct, I said that less water would be more dry and chunky and more would be watery and soft. The mixes with less water didn't even harden. Even with the parts that had water. Its shows that it was much more watery but it took much longer to dry. I think I should of changed my experiment. Instead of amounts of water I should of done temperature of water and that would make it much harder to come up with a hypothesis.

NAME(s)	Pheobe Kehoe	PROJECT NUMBER	S06
SCHOOL	Manchester Elementary Middle School	GRADE	7
TEACHER	Scott Diedrich		
PROJECT TITLE	Text Color v.s. Accuracy		

### ABSTRACT

The purpose of the experiment was to determine if the color of the text could improve someone's accuracy on a test. This experiment will hopefully show if the color of text will project to the cerebrum (which controls your senses) to help people solve equations more intelligently.

○

The way the experiment was conducted was 6 people were given on of the five assorted math tests. They would each get a total of sixty seconds to complete the test. After they complete the test I calculate they scores for each individual person then I calculate the overall score for the color. This step is repeated for the other four color assortments. I did four trials each to make the score as accurate as possible.

○

The data I collected showed that the blue had the highest average accuracy percentage with 60%. Then came green with 18.75%. Purple's outcome was 47.50, and then came black with 46.24, and finally orange with a total accuracy percentage of 43.75%.

○

The results were not exactly as I had predicted but as I looked into the affects different colors had on humans the results began to make more sense to me. Deep colors such as blues and purples tend to make people more calm, which I think would have, has a great affect on how the people relaxed while taking the test. Overall I thought the experiment went pretty smoothly and I learned a lot from it.



<b>NAME(s)</b>	<b>Tim Kehoe</b>	<b>PROJECT NUMBER</b>	<b>C03</b>
<b>SCHOOL</b>	<b>Otter Valley</b>	<b>GRADE</b>	<b>12</b>
<b>TEACHER</b>	<b>Lori Fretta</b>		
<b>PROJECT TITLE</b>	<b>How low does the freezing point of water get after adding certain substances?</b>		

### ABSTRACT

○The purpose of my experiment is to see what substance would effect the freezing point of water the most. My hypothesis is that if I add sodium chloride, calcium chloride, sucrose, and aluminum chloride then sodium chloride would lower the temperature the most. My independent variable is the substances being used, the dependent variable is the freezing point of water. My controlled variables are the salts and ice-water mixture being used. I will use four substances; sodium chloride, sucrose, aluminum chloride hexahydrate, and calcium chloride, and measure the freezing point depression of water which theoretically freezes at 0°C. I have encountered some difficulties with the calcium chloride. Initially I started with anhydrous calcium chloride lumps which wouldn't dissolve readily for an accurate measurement. Then I got anhydrous calcium chloride (4-8 mesh), which at first froze to the bottom of the beaker, then I used the 4-8 mesh again and stirred immediately after putting it into tap water, it dissolved and melted the crushed ice but didn't effect the freezing point of the water. I will use calcium chloride dihydrate for the next part of my experiment to see if it is easier to work with. After doing the preliminary exercise, I found that sodium chloride had the lowest freezing point.

<b>NAME(s)</b>	<b>Devin Kelsey</b>	<b>PROJECT NUMBER</b>	<b>G05</b>
<b>SCHOOL</b>	<b>Northfield middle and high school</b>	<b>GRADE</b>	<b>11</b>
<b>TEACHER</b>	<b>Cynthia Tomczyk</b>		
<b>PROJECT TITLE</b>	<b>The Effects 4.0, 4.8, 5.0, 6.0 pH Acid Rain has on the Growth of Cherry Radish Plants</b>		

### ABSTRACT

○The purpose of this experience was to see how different amounts of acid solutions effect the growth of cherry radish plants. This experiment would simulate the effects that acid rain would have on the growth of plants. Water with the pH levels 6, 5, 4.8, and 4 pH levels were sprayed into 4 different sets of growing trays, each containing 10 cherry radish plants. It was done over a period of 18 days in each trial, and for every trial the amount of time the radishes were spray with the appropriate amounts of acid rain solution changed. Then Every 6 days the plants were measured with a small ruler, using the cm side. In each trial the results were clear that the ones spray with the lower pH level grew better. At the end of all 18 day in each trial one the average growth of the radishes sprayed with 6.0 pH were 7.13cm tall, whereas the ones sprayed with 4.0 and 4.8pH levels were 6.5 and 5.4cm, and the average growth for the 5pH level was in between with 6.5cm. In all three trials each group had a constant growth and over all the ones sprayed with 6.0 and 5.0 were taller then the rest of the plants by almost 1.5cm

○The hypothesis was supported in this experiment; the average growth of the radish plants was smaller as the pH level became more acidic. This happens because the metals in the soil are released by the sulfur in the acid solution. The metals bond with the phosphorous in the soil, which ruins the root system and depletes the amount of the nutrients the plants receive; this stunts the growth of the plant. If this happens while the plant is still maturing, the plant will not grow as well and possibly die. (Middleton, 2005)

NAME(s)	<b>Sumin Kim</b>	PROJECT NUMBER	<b>C13</b>
SCHOOL	South Burlington High School	GRADE	<b>10</b>
TEACHER	Curtis Belton		
PROJECT TITLE	<b>A Way to Efficiently Reduce Bacteria</b>		

### ABSTRACT

○ The purpose of this experiment is to find the most efficient way to reduce the number of general bacteria, coliforms, and E. coli on poultry. Chicken liver will be used in this experiment because of its high number and concentration of bacteria. Pieces of chicken liver will be rinsed in tap water, 1mg/L chlorine solution, and in MPT, which is a disinfectant made of grape seed extract.

○ This experiment is to last three days. On the first day, bacteria sample of chicken liver will be obtained and incubated for 24 hours to derive the baseline bacterial count from. On the second day, three pieces of chicken liver will each be rinsed in tap water, chlorine solution, or in MPT. Bacteria samples will be taken from each liver piece and will be incubated on separate agar plates for 24 hours. On the last day, the collected data of general bacteria, total coliforms, and E. coli of Day 2 will be compared to the data from Day 1.

○ Data will include the total number of bacteria in general, E. coli, and total coliforms. Through several dilutions, the number of general bacteria will be counted by counting the total colony forming units grown on the agar plates. In order to count E. coli and coliforms, both filtering and dilutions will be used since there will not be as many E. coli and coliforms on chicken liver as general bacteria.

○ My hypothesis is the most efficient way to reduce the number of bacteria on chicken liver is to rinse it in MPT. However, I also expect the chlorine solution to reduce the number of bacteria significantly, although not as much as MPT. Since MPT is an edible substance, if the results show that rinsing in MPT is the most efficient way to reduce bacteria, people will be able to use it in their real lives to prepare poultry more safely.

NAME(s)	<b>Anna Krause, Elaine Bauer, Veronica Huber</b>	PROJECT NUMBER	<b>GP01</b>
SCHOOL	Christ the King School, Burlington	GRADE	<b>8</b>
TEACHER	Mrs. Srivastava		
PROJECT TITLE	<b>Add A Little Joy In Your Life</b>		

### ABSTRACT

For this experiment we are trying to figure out which of the four dishwashing detergents; Dawn, Sunlight, Joy, and Palmolive, works as the best grease cutter. We put these detergents to work by burning bacon grease onto aluminum pans and letting the detergents sit in the pan for a certain amount of time to break down the grease.

We found that Joy dishwashing detergent worked the best in cutting down grease and removing burnt on bacon. The detergent that was the worst was Palmolive, because it left a lot of burnt on bacon in the pan and it also left a lot of greasy residue. To make this project more scientific we called up each of the four soap companies and got the ingredients from the ones that were helpful and determined which ingredients caused Joy to be the best.

We did this experiment just for the sake of making ever day life easier. No one likes to stand there scrubbing at dishes for an hour. We found that Joy makes everyday life easier.

NAME(s)	<b>Eliza-Eve Leas</b>	PROJECT NUMBER	<b>B07</b>
SCHOOL	South Burlington High School	GRADE	<b>10</b>
TEACHER	Curtis Belton		
PROJECT TITLE	<b>Nitrogen Fixation Based Companion Planting</b>		

### ABSTRACT

This experiment will attempt to find a difference between the results of planting two legumes, beans and peas, with corn. The project is based upon the concept of companion planting, which pairs two plants in the same pot that are beneficial for each other. In this case, the legumes, with the rhizobium bacteria which reside on their roots, benefit the corn by providing fixed nitrogen.

The experiment is designed with four different combinations of plant, inoculate, and fertilizer. Originally, there were twelve pea plants with corn and twelve bean plants with corn, six of each of which had been inoculated with the rhizobium. Within each six, three pots are fertilized weekly with a Hoagland solution containing nitrogen and three are fertilized with a Hoagland solution containing all nutrients except nitrogen. Unfortunately, although multiple seeds were planted in each pot to prevent this, four bean plants failed to germinate due to mold. This reduced the number of bean-corn combinations to eight, with four inoculated pots and four non-inoculated pots. I have decided to continue the experiment as is, however, the reduction in duplicates for the beans may mean that the results of the experiment will only focus on a comparison between the different pea-corn combinations.

The controls are the pots which have not been inoculated. By growing the legumes with the corn we ensure the same competition for sunlight and nutrients, without fixed nitrogen provided by the rhizobium. The experiment is at the end of its first month, and will continue for another month. The plants are being housed in a UVM greenhouse, which also is allowing the use of the machinery to analyze the results of the experiment, such as measuring the dry weight and leaf area. As of now, there is no noticeable difference between the corn plants of those pots which have been inoculated and those which have not.

Companion planting legumes with nitrogen-hungry crops is more typically used in home gardens, but in large scale agriculture, a similar concept is used. Many farms rotate their crops to regenerate the soil, and legumes are commonly used to fix nitrogen lost after seasons of corn. The results of my study may affect the choice of legume, or the choice to fertilize rather than rotate crops.

NAME(s)	<b>Haley Leavitt</b>	PROJECT NUMBER	<b>B08</b>
SCHOOL	South Burlington High School	GRADE	<b>10</b>
TEACHER	Curtis Belton		
PROJECT TITLE	<b>Caffeine and the Heart</b>		

### ABSTRACT

I will be testing how caffeine affects the human heart. I will be testing this by putting water fleas in caffeine tablets that have dissolved in water. I will first test the heart rates of 10 water fleas. I will put them in a droplet of water. I will be able to see the beat of their heart under the microscope. I will figure the heart rate and then record this. After I have tested 10 water fleas I will dissolve caffeine tablets in water. I will then put the water fleas in the water. After they are in the water under the microscope I will look at the heart rate of many water fleas. I will compare these results to the heart rates of the water fleas in normal water.

○I predict that the heart rate of the water fleas will increase in the caffeinated water. Caffeine is a stimulant and speeds up the nervous system in your body. This increases your heart rate. I think once the fleas have been in caffeinated water I will see that their heart rate has increased.

NAME(s)	<b>Danielle Leonard</b>	PROJECT NUMBER	<b>B09</b>
SCHOOL	Northfield Middle High School	GRADE	<b>11</b>
TEACHER	Cynthia Tomczyk		
PROJECT TITLE	<b>The Affect of 0, 1, 3, and 5 ppms of Sucralose on Rodent Weight</b>		

## ABSTRACT

Sucralose, more commonly known as Splenda, is a man made chemically altered form of sugar. It is used in drinks and foods, and is diabetic safe. This is because it is man made, so the body does not recognize it and dispels it from the body. The purpose of this lab is to observe the side affects that sucralose has on the life of a mouse. The basis for this experiment was a news story warning humans that sucralose could be dangerous and harmful to their health.

○Very few studies have been done to recognize any side affects of sucralose. What the studies show is that the test subjects lost some weight, which scientists say was attributed to decreased food intake, enlarged thymus and lymph follicles, increased liver weight in female mice and increased cecal rates. It also notes reduced growth weight, which scientists also attribute to decreased food intake.

○My hypothesis is that the weight loss will occur in conjunction with the amount of sucralose fed to the mice. 16 mice, 8 male and 8 female, were divided up with two from each sex receiving a different amount of sucralose. The four different amounts were 0ppm, 1ppm, 3ppm and 5ppm. The basis for these amounts was from a former experiment done by a professional science lab that used these amounts to feed the mice. The control for this experiment is the mice receiving no sucralose. The weight of the mice will be measured periodically through the experiment to record any weight loss that occurs. Each mouse must be weighed separately before the experiment, during the experiment and after two weeks of receiving the sucralose. The weight will be averaged between the four mice for each amount of sucralose.

○As of now, my hypothesis has been supported. The mice receiving no sucralose lost very little weight, the mice receiving one ppm lost a little more than the control mice, the mice receiving three ppms lost a significant amount of weight, and the mice receiving the five ppms of sucralose lost a large amount of weight. So far it appears that sucralose does affect the weight of mice, because the mice receiving the most concentrated amount of sucralose lost a massive amount of weight, while the control, receiving no sucralose, lost a very small amount.

NAME(s)	<b>Anna Lidofsky</b>	PROJECT NUMBER	<b>S08</b>
SCHOOL	South Burlington High School	GRADE	<b>10</b>
TEACHER	Curtis Belton		
PROJECT TITLE	<b>Equine Learning Patterns</b>		

## ABSTRACT

○The ability of horses to learn is very important in their training. Although many factors may influence learning patterns in horses, these have not been entirely defined. My hypothesis is that learning in horses is influenced by age, gender, and personality. Specifically, there are four personality types in horses; aloof, social, challenging, and fearful. I hypothesize that aloof and challenging horses will learn more quickly than fearful and social horses. I also hypothesize that mares and older horses will learn more quickly as well. To test this, I have used a model of visual learning and problem solving. I measured the time it took for a horse to identify a blue bucket (which contained an apple) and to distinguish it from two other empty buckets of different colors. Each trial was performed in an enclosed arena and repeated 4 times. The buckets were in different sequences for each trial, yet the apple always was in the blue bucket. To date, I have performed these measurements in 14 horses (4 female and 10 male). There were three main patterns of learning: shorter times with successive trials, longer times with successive trials, and inconsistent times. I am currently analyzing the data for any statistically significant correlation between these patterns and age, gender, and personality. If I find a correlation, this information would allow trainers to tailor their training styles according to these traits.

NAME(s)	<b>Noah Limanek, Terry Morrissey</b>	PROJECT NUMBER	<b>GP08</b>
SCHOOL	Christ the King Burlington	GRADE	<b>8</b>
TEACHER	Mrs. Vidula Srivastava		
PROJECT TITLE	<b>Lime Time?</b>		

### ABSTRACT

Our project is a way to protect small plots of pine from acid rain. After reading an article on acid rain and then seeing a project on protecting pines with limestone, in a science fair book, we decided upon this experiment. We hoped to see a large difference between the trees treated with limestone and the trees without. We thought the limestone trees would stay healthy and the trees without would sicken. The acid rain affects the soil by blocking the passage way of the nutrients to the roots. The more acid in the soil the fewer nutrients the plant receives.

On the flip side when a base meets an acid it forms a salt. The limestone(base) and the acid rain(acid) may create a salt when they meet in the soil affecting the plants.

What we found was that the salt that was created from the acid mixing with the base was affecting the trees.

NAME(s)	<b>Melissa Lindberg</b>	PROJECT NUMBER	<b>B10</b>
SCHOOL	South Burlington High School	GRADE	<b>10</b>
TEACHER	Curtis Belton		
PROJECT TITLE	<b>Reaction Time</b>		

### ABSTRACT

○For my project I will be researching reactions. I will be test one young male/female and a older male/female. I will be timing their reaction to my series of test and see hoe they differ. Then, I will also have someone who plays video games all the time and someone who has never or rarely does and I will do my test to them also. Then I will research what part of the brain controls the reaction and try to get a better understanding or why this could be happening. Their will be two rounds of experiments, one with the older and younger male/female (group 1) and a second experiment (group 2) with a male/female that does and does not play video games. ○For the first round of experiments I will be using a ruler and I will have then have I will instruct then to place their thumb and index finger an inch apart, I will also have them blind folded. After they have done that I will drop the ruler and say go. Once they have grabbed the ruler I will then place a mark where their fingers were. I will do the same thing when the other experimenter does it. ○For my second round of testing I will have group one and group 2, I will bring then to a computer and put them on a website ( <http://www.topendsports.com/testing/reactiontest.htm> ) this website is just for testing reactions. Once you press start at any time the screen will turn a color and you have to press the stop button as quickly as possible. Once you lick the button the website automatically tells you how long it took for you to press the stop button. I will record the time by each person from group 1 and group 2 then compare their different reactions.

NAME(s)	<b>Kathryn Macaulay</b>	PROJECT NUMBER	<b>B11</b>
SCHOOL	Mount St. Joseph Academy	GRADE	<b>10</b>
TEACHER	Michael Spatzer		
PROJECT TITLE	<b>Enjoy Endurance?</b>		

### ABSTRACT

In my project, I am going to use simple exercises to relate the subjects increased pulse to their relaxed pulse rate. I will also test fifteen to seventeen year old boys and girls to see if preference helps to succeed in a specific exercise. I will also see which gender has the most control over their heart rates, and finding their level of fitness. My procedure is to take a straw and put it into a ball of clay, and find the pulse on the subjects' neck. Then, place the clay on the pulse in the neck and count how many times the straw moves per minute. Record my data and repeat for the other motions which consist of jogging, jumping jacks, sit- ups, and push ups for two minutes each. Next I will see the effect of the movement on the pulse and record the difference. I will perform this on 10 subjects with different weights and genders to get more results. I will also test the subjects and ask them which exercise is their favorite and see if they excel in that category. The subjects are allowed to forfeit during an exercise and that will be added into my conclusions. Some pros and cons are that I can get a wide range of subjects, height wise, and weight wise but I cannot find any of the same fitness.

NAME(s)	<b>Allison Mancuso</b>	PROJECT NUMBER	<b>C14</b>
SCHOOL	Fair Haven Union High School	GRADE	<b>11</b>
TEACHER	P. Woods		
PROJECT TITLE	<b>Amount of Vitamin C in Packaged Orange Juice Vs. Fresh Squeezed</b>		

### ABSTRACT

Does packaged orange juice contain more vitamin C than fresh squeezed oranges? I believe fresh squeezed orange juice will have more vitamin C than packaged orange juice because of pasteurization. Also I wanted to find out if the packaged orange juice really has the amount of vitamin C that it says. My science fair project will give you all of those answers.

First I prepared a 1 percent starch solution. I then prepared a 250mg solution of vitamin C. After I made that, I added 10 drops of 1 percent of starch solution to 25ml of vitamin C solution. I made that by crushing a vitamin C tablet, weighed out .250g of the tablet, and put it into 100ml of distilled water. Afterwards I then performed a titration with Potassium Iodide, IKI, until the end point was reached, which is when you see a light blue or purple color. I then calculated the vitamin C formula; how much iodine I started with divided by .250g Vitamin C equals the amount of iodine solution I used divided by Xml of Vitamin C. After I titrated samples of packaged orange juices and fresh squeezed oranges, I did 3 trials for each.

After I did each trial I found out that squeezed oranges have more vitamin C then the packaged orange juice.

<b>NAME(s)</b>	<b>Tamara Maravalli</b>	<b>PROJECT NUMBER</b>	<b>P08</b>
<b>SCHOOL</b>	<b>Mount St. Joseph Academy</b>	<b>GRADE</b>	<b>10</b>
<b>TEACHER</b>	<b>Michael Spatzer</b>		
<b>PROJECT TITLE</b>	<b>Which Material Makes the Most Efficient Trombe Wall?</b>		

### ABSTRACT

This experiment was designed to compare three different building materials and how well they act as insulators in Trombe Walls. I hypothesized that of the three materials tested the concrete would prove superior to the others. Three liters of water were heated to 150 degrees and placed in three separate boxes. One made of concrete, another of sheet rock, and the third of wood. The temperature of the water was recorded over 5 hours. After an hour, there was no significant different in the results for the sheet rock and the wood. However, the concrete lagged behind in effectiveness as an insulator- it had the greatest rate of cooling.

<b>NAME(s)</b>	<b>Ethan Marsh</b>	<b>PROJECT NUMBER</b>	<b>C15</b>
<b>SCHOOL</b>	<b>Manchester Elementary Middle School</b>	<b>GRADE</b>	<b>7</b>
<b>TEACHER</b>	<b>Scott Diedrich</b>		
<b>PROJECT TITLE</b>	<b>Which kind of snowboard wax is better for rails?</b>		

### ABSTRACT

The purpose of my project is to learn about which kind of wax is better for snowboarding rails. Snowboarders need to choose wax that provides the least of friction possible so that the snowboards don't stick to the rails. I chose this project because I love to snowboard. I like to go on the rails in the terrain park and I became curious about the kinds of wax they use.

First I erected the rail, after I made the starting line and ending line and then I rubbed the rail with one kind of wax and then I went to the starting line strapped in and went. when the back end of his snowboard crossed the finish line I stopped the stopwatch and repeated this 5 times and then scraped off the wax and switched the type of waxes and did the run five more times.

The data I collected was that the Burton was the best by 1 millisecond and that the no wax was 1 millisecond behind the Burton wax and the Pom Pom was the slowest by 14 milliseconds. The fastest times where Burton had 365, Pom Pom had 378, and no wax had 369 milliseconds.

In conclusion the Burton wax proved to be the best by one millisecond and if you were ever in a race you would want Burton wax to use. The Burton wax reduced the friction greatly on the rail.

NAME(s)	Will Martin	PROJECT NUMBER	P09
SCHOOL	Northfield High School	GRADE	10
TEACHER	Amy Urling		
PROJECT TITLE	of Angle of Attack Variation on the Efficiency of Airplane Wing Lift		

## ABSTRACT

There are passenger planes that seat many, jets for combat, and planes for fun, such as air gliders. Each of these planes has different angle of attacks for their wings. The angle of attack is simply the angle at which the wing is positioned that efficiently provides lift but works for its speed and what's necessary for it to work for its specific use.

○In the experiment I tested different wing types that are used on several types of aircrafts. I tested a high camber air foil wing, a low camber air foil, and a high camber air foil with a reflex. In testing different wings I was able to see how different wings lifted at specific angle of attacks. This was simply done by placing a fan at a set distance and then placing each wing type at the angle of attacks and seeing if the wing would lift (the wing would be lifted.) If it did, I would place washers onto the a paper clip attached to the wing; adding more and more until it could no longer lift. This way I could tell what wing type would lift the most, or most efficiently, at certain angle of attacks.

○The high camber air foil lifted the most efficiently with the angle of attacks I tested, which were generally low angles (0-18 degrees.) This makes sense because aircrafts with high camber air foils lift efficiently at lower angles, especially with low air speed. The fan only provided a low air speed simulation. Because I knew this ahead of time from background research, my hypothesis for the first trial was supported. My hypothesis was that it would lift most efficiently when the angle of attack was 14 degrees. The second trial, which tested a low camber air foil, also supported my hypothesis, which was that the wing would not lift until 16-18 degrees for an angle of attack. The wing did not lift at all until the angle of attack of the wing was 18, and even then it did not lift any washers. The high camber air foil was again tested in the third trial, but this time a reflex was added to the backside of the wing. This is used on wings to help prevent an aircraft from going into a deadly dive. Although a nice safety feature, this reflex causes more drag. Because of this, my hypothesis was that it would most efficiently lift at a slightly higher angle of attack than when the high camber air foil had no reflex, so about 18 degrees. My hypothesis was supported because the wing lifted most efficiently at 18 degrees, lifting 4 washers.

NAME(s)	Connor Mawe	PROJECT NUMBER	C16
SCHOOL	Hinesburg Community School	GRADE	7
TEACHER	Stephanie Konowitz		
PROJECT TITLE	My Quest for the Perfect Cupcake		

## ABSTRACT

I did an experiment to determine if, by changing the baking time and temperature, I could make a cupcake better tasting with a more appealing texture. I chose this experiment to help in my wanted career of baking. Baking a cupcake for little time at a high temperature makes a cupcake with a molten center, a cupcake baked longer at a low temperature will create a drier cupcake, with a lot of air bubbles, also a cupcake baked at a medium temperature for medium time will create a cupcake with a fine texture and taste .I made a cupcake recipe that makes 18 cupcakes, preheated the oven to 300 °F, and then put 1/3 of the batter in a cupcake tin that holds 6 cupcakes. After the oven was preheated, I baked them for 20 min. and removed 2 cupcakes, then baked the remaining cupcakes for 10 more min. and took out 2 more, then baked the last 2 cupcakes for another 10 min. I repeated this process at 350 °F and 400 °F. I gave every time alteration and temperature alteration a code (so tasters will not assume which cupcake would taste and feel better), cut all of the cupcakes in to quarters, and had tasters evaluate every code variation. After compiling my results and analyzing the data, it was easy to tell that time and temperature greatly affect a cupcakes taste and texture.



NAME(s)	Caitlyn McCain	PROJECT NUMBER	S09
SCHOOL	St. Francis Xavier School	GRADE	8
TEACHER	Mrs. Mary Ellen Varhue		
PROJECT TITLE	Concentrate!!		

### ABSTRACT

Purpose-I chose this project because I love listening to music. I listen to it while I do my homework and I wanted to see if it had any affect on how well I performed in school.

My question was; does listening to music affect how well students perform on tests?

Hypothesis-My hypothesis is that if the students are exposed to music their test scores will go up.

Procedure- First gather your test subjects in a room with little distractions, a classroom or lab. Set them a space apart to eliminate cheating. Then give them each a test consisting of double digit multiplication problems. Then let them sit for ten seconds listening to the quiet in the room. Tell them to start on the first sheet of math problems. Time them for two minutes. Say STOP! Repeat the process with your choice of music. Repeat the process as many times as you feel are needed for your results (five or six times). When they are done collect the tests. Correct them and gather your results.

Results-My results showed that on average students could effectively answer one more math problem when they were in silence than when they heard music. However, there was a lot of variation in the results from student to student.

NAME(s)	Bailey McCarthy, Michaela Finneran	PROJECT NUMBER	GP12
SCHOOL	Mater Christi	GRADE	7
TEACHER	Michelle Donlon		
PROJECT TITLE	Oil Spill!		

### ABSTRACT

○The purpose of our experiment was to determine whether the temperature of water, and the salinity of water affected how far oil spreads in a given amount of time. Our hypothesis was if the oil was in hot, and salty water, then the oil would spread throughout the majority of the bowl in thirty seconds.

The reason we expected our results to turn out this way was because the majority of oil spills that we read about took place near warmer places that had warmer waters. Since most articles were about warm water oil spills we knew that they were bigger and more threatening. When we were researching the salinity of water, and oil spills that took place in salt water rather than fresh, we thought that the oil might react differently to sodium.

We first got interested in this project when we saw a commercial for Dawn Detergent, and how it was used to clean off animals after oil spills. Once we did some research, we came to the realization that oil spills are not only devastating to animals, they also kill plants and other underwater life.

When it was time to do our testing, we had a bowl of water for each experiment. We would put oil in each bowl (warm or cold, salt or fresh) and left it in for thirty seconds. When the thirty seconds was over, we measured how far the cluster of oil was from the rime of the bowl. Our results showed that oil spread faster in unsalted, warm water.

NAME(s)	<b>Katie McNally</b>	PROJECT NUMBER	<b>B12</b>
SCHOOL	Green Mountain Union MS/HS	GRADE	<b>7</b>
TEACHER	Karen Surma		
PROJECT TITLE	<b>"Are more Domestic Cats Right or Left Pawed?"</b>		

### ABSTRACT

My project is 'Are more Domestic Cats Right or Left Pawed?' I predicted that more cats would be Right pawed. I put a jar with catnip and cat treats in front of the cat and saw which paw they used to scoop out the treats or knock the jar over with. I found out that more cats are Left pawed. Contradictory to my hypothesis. This means that more cats tried to scoop out the treats and catnip out with their left paw or tried to knock over the jar with their left paws. This proves my hypothesis wrong.

NAME(s)	<b>Chris Messer</b>	PROJECT NUMBER	<b>S10</b>
SCHOOL	South Burlington High School	GRADE	<b>10</b>
TEACHER	Curtis Belton		
PROJECT TITLE	<b>The Quality of Implicit and Explicit Memory Over Time</b>		

### ABSTRACT

Purpose: To assess the quality of implicit and explicit memory over the period of a month.

Hypothesis: My hypothesis is that the graph for the explicit tests will be negatively exponential, though at what slope I can not say. However, the implicit memory graph will increase in a linear relationship.

Procedure:

Picture I.D. Test (explicit)

- 1.○First, show a pre-determined set of 15 pictures to the subjects.
- 2.○Then, mix 10 of those pictures into a second set of 25 pictures and ask the subjects if they have seen any of the pictures before.
- 3.○Score the subjects on how many of the first set pictures they recognized out of the number of first set pictures present in the second set
- 4.○Repeat this test once a week for four weeks, each time changing the pictures and order of the second set.

Mirror Drawing Test (implicit)

- 1.○Take a piece of paper and pencil and give to the subjects.
- 2.○Ask them to draw a random pattern such as a star, only looking at their hands and paper in a mirror
- 3.○Score the drawings on a 1-10 scale, 1 being the worst and 10 being the best, based on how close the drawing was to the original pattern.
- 4.○Repeat every week with a new pattern.

NAME(s)	<b>Matthew Messier</b>	PROJECT NUMBER	<b>P55</b>
SCHOOL	Mount St. Joseph Academy	GRADE	<b>10</b>
TEACHER	Michael Spatzer		
PROJECT TITLE	<b>Solar/Fuel Cell Vehicle and Sun Trap Garage</b>		

## ABSTRACT

Our increasing reliance on expensive energy resources for transportation, work, heat, and light is a problem. My hypothesis is: Are fuel cell and solar power viable alternatives for fueling future cars (transportation)? Yes, my Solar/Fuel Cell Vehicle works. It moves, the wheels turn, the electric motor ran off solar and or fuel cell energy. It runs on economic energy (free fuel) sun and water.

The Sun Trap Garage enhanced the recharging and energy generation of the car. I used a magnifying sheet as a garage/ Sun Trap for the model car and increased the solar cells efficiency by 11 to14 percent.

I was able to demonstrate that the model will work. Applying a fuel cell for storing the suns energy for later use as electricity for work or to run the electric motor/car. The fuel cell separates hydrogen and oxygen, which I stored in tanks for later use. I can't wait for the next sunny day to do further testing on the fuel cell from sun energy.

It appears that this is a closed circuit, as gas and water are converted back and forth. This is similar to the water (hydration) cycle of our earth. The car has no harmful emissions because it is being operated by sun and water.

NAME(s)	<b>Lauren Mihan</b>	PROJECT NUMBER	<b>B13</b>
SCHOOL	South Burlington High School	GRADE	<b>10</b>
TEACHER	Curtis Belton		
PROJECT TITLE	<b>The ACL Study: Males vs. Females</b>		

## ABSTRACT

The study I will be conducting is in relation to an injury of the ACL ligament. I want to compare the anatomical differences between males and females; my question I will be addressing is, What physical variables exist that may determine the susceptibility between males and females for an ACL injury? I hypothesize that females will be more prone to the injury. Because of differences in hip structure and dynamic muscular control, I believe that I can collect data to prove this correct.

○I will be using twenty subjects, ten of which are male and the remaining ten female. All will sign the appropriate waivers and get the necessary permission in order to participate in my study.

○I will conduct two studies testing the Q-Angle/hip structure of both males and females. The first will be a simple measurement of the physical angle using a goniometer. The second is a box-jump test in which my subjects jump off a 12 inch box. I will record the way they land and give them a score for the position of their knees after landing, either pinched in or out.

○The last test I will have my subjects perform is a balance test. It tests proprioception5, or the brain's ability to identify where its body parts are in space, an important factor in the event of an injury. In this test the subject will be asked to stand on one foot for thirty seconds, repeated on both legs and with eyes closed. With this a score will be calculated based on the number of times the subject lost their balance.

○No conclusions have been reached at this moment; however, I plan to configure some type of statistical conclusions based on my data and averages of the scores I collect.

NAME(s)	<b>Keegan Mitchell</b>	PROJECT NUMBER	<b>S11</b>
SCHOOL	Renaissance School	GRADE	<b>7</b>
TEACHER	Kate Van Kirk		
PROJECT TITLE	<b>Cell Phones: Inattention Blindness</b>		

### ABSTRACT

Does talking on the cell phone distract drivers? Every day we pass people on the road who are talking on their cell phones and don't seem to be paying a lot of attention to what's going on around them. Through my research, I discovered that it is called inattention blindness. Whether they are on a hands-free phone or hand held, the reaction times seem to be equal and there is evidence to show that people can be looking directly at something, such as a billboard, and not really see it.

Before I began the research, I predicted that talking on a cell phone is a distraction, and I suspected that the inattention blindness causes crashes and near crashes. My experiment would show that while people are talking on their cell phone, they wouldn't be able to concentrate on another task at the same time.

To show an example of inattention blindness, I took a picture with many details and asked someone to look at the picture at the same time that I was asking them simple questions on the cell phone. After I completed the questions, I would remove the picture and ask them to recall as many details as they could remember. I would then give them another picture and allow them the same amount of time, undistracted, to look at the picture, and after, I would again ask them to recall the details.

The results were less impressive than I had predicted, but everyone that I tested recalled more details when they were not distracted by the cell phone conversation. I had expected the people that were not distracted to have much better recall, but my experiment showed that there is a definite distraction when they are talking.

NAME(s)	<b>Patrick Morales</b>	PROJECT NUMBER	<b>B14</b>
SCHOOL	Northfield Middle/High School	GRADE	<b>11</b>
TEACHER	Cynthia Tomczyk		
PROJECT TITLE	<b>The Effect of Creatine Monohydrate on the Mass of Mice</b>		

### ABSTRACT

Creatine or methyl guanidine- acetic acid is a natural substance that is found in mainly skeletal muscles in the body. This chemical is made up of three amino acids which are methionine, arginine, and glycine. Creatine serves as energy during short, explosive exercises. All creatine stored in muscles can be depleted within a matter of 60 seconds. Because there are very small supplies of creatine within the body there has been a manmade substance created called creatine monohydrate. Since creatine is made in the body it is safe to use as a controlled substance. The effect of creatine monohydrate on the human body is an increase in muscle mass and efficiency. In mice and rats the substance causes an increase in muscle mass and bone density. There are no negative affects of creatine monohydrate mainly because it is a natural substance made in the body.

○The purpose of this experiment is to use given varied amounts of creatine monohydrate to groups of mice and measure any increase in the weight of the mice. Because creatine monohydrate increases muscle mass and bone density the weight of the mice with the most creatine monohydrate will show the most increase in weight over many weeks.

NAME(s)	David Morin	PROJECT NUMBER	C17
SCHOOL	Windsor High School	GRADE	12
TEACHER	Jennifer Townsend		
PROJECT TITLE	Strengthening Teeth		

## ABSTRACT

The purpose of my project was to determine the pressure force a human tooth could withstand before shattering. After finding the correct amount of pressure force, I would coat the teeth with tooth sealants to see if the human teeth could withstand more pressure force. My hypothesis was that the teeth could withstand more pressure force after the addition of tooth sealants. I would coat 2 teeth with one substance 10 times. I have 4 different sets of teeth. One set of two with no coating, which was my control. Another set of two teeth with a coating of super glue, another set of two teeth with polyurethane, and another two set of teeth with nail polish. I will then set them underneath my "Tooth crusher" and allow pressure force to crush them by dropping a plate on the tooth at a fixed distance. Record the distances, record the amount of mass, and calculate the amount of pressure force by using the equation  $\text{Force} = \text{Mass} \times \text{Acceleration}$ . Calculate the amount of force and compare results. The result of my experiment was that the super glue allowed the tooth to withstand the most pressure force when compared to the polyurethane and nail polish. The super glue made the tooth over 60 percent stronger, and the nail polish made the tooth only 15 percent stronger. The polyurethane had no affect on it. Also, the tooth fragments were much larger. The sealants that were applied to the tooth prevented the tooth from shattering into smaller fragments. The conclusion of my experiment is that dental sealants do in fact work. People aren't wasting their money on paying for sealants to protect their teeth. They allow the tooth to be more durable and stay cleaner because there is a coat of a substance around it, preventing infection.

NAME(s)	Jonathan Murray	PROJECT NUMBER	P10
SCHOOL	Fair Haven Union High School	GRADE	11
TEACHER	Jesse Roberts		
PROJECT TITLE	Wind Tunnel design		

## ABSTRACT

I've always been interested in aeronautics and aerodynamics, and after last year's project (testing drag on balsawood planes in a wind tunnel) I became intrigued in this field of physics. I wanted to test if the ratio from the compression, diffuser, and testing stage affected the velocity of the air going through the testing area of a wind tunnel. To test this I built several different Eiffel style wind tunnels (10 and one control (smallest being two feet in length and largest being six feet in length) and measured the velocity in the testing area in three different fan speeds (low, medium, and high). The fan was set so it would suck the air through the wind tunnel, because if it were to be reversed then a vortex of air is formed and the motion of the air wouldn't be a constant. My hypothesis was that a 2:1:2 (compression: testing: diffuser) ratio would have the greatest velocity, I believed that if the wind tunnels compression and diffuser stages were to be symmetrical then the air would flow through the testing stage with the highest velocity. I also hypothesized that the ratio of the diffuser to the testing stage didn't affect the velocity because it was after the testing portion. This was rejected; the highest velocity ratio was 1:1:3, and that the diffuser had a huge impact upon the results. The data shows that with a shorter compression and a longer diffuser, higher velocities can be obtained.

<b>NAME(s)</b>	<b>Celena O' Brien, Emily Boucher, Makayla LeDuc</b>	<b>PROJECT NUMBER</b>	<b>GP09</b>
<b>SCHOOL</b>	<b>Christ the King, Burlington</b>	<b>GRADE</b>	<b>7</b>
<b>TEACHER</b>	<b>Vidula Srivastava</b>		
<b>PROJECT TITLE</b>	<b>Maple Trees Maple Syrup &amp; Global Warming</b>		

### ABSTRACT

The purpose of our project is to show that Global Warming is effecting maple syrup production. We hypothesized that Global Warming is effecting maple syrup production. Variables such as winter temperature, snowfall, and season duration should effect the way plants metabolize sugar.

To perform this research we looked up common topics and highlighted the main points in each paragraph. We got a list of local maple syrup farmers in Vermont, and did a survey consisting of Global Warming and maple syrup production questions. We later took that information and combined it with our research to for a conclusion.

We found that our hypothesis may or may not be true. It all depends on how you look at it. Sixty-percent said they have seen and earlier season, 75 percent have seen a change in the amount produced, 75 percent believe in Global Warming and 25 percent believe Global Warming is effecting their syrup production. You see the statistics, you decide!

<b>NAME(s)</b>	<b>Rachel Orr</b>	<b>PROJECT NUMBER</b>	<b>B15</b>
<b>SCHOOL</b>	<b>Fair Haven High School</b>	<b>GRADE</b>	<b>9</b>
<b>TEACHER</b>	<b>Ben Worthing</b>		
<b>PROJECT TITLE</b>	<b>Light Up Calves</b>		

### ABSTRACT

Light up Calves was a product of my hypothesis; calves will be more attracted to a lighter feeding bucket, eat better, and stay healthier because their nutritional intake is greater, reason being they are diacromatic animals.

To do this I grouped twenty newborn calves in to four groups. A light group, a dark group, a light and dark group, and a control group. I gathered and recorded weight and height of individual calves as they were born. At each feeding I observed which color bucket they preferred. Once a week I would tape the calves for weight and height changes. I averaged each group and graphed the results.

After three months of observations my results were that calves preferred the light colored buckets compared to darker colored ones. The calves stayed healthier and grew better. My conclusion to this experiment would be to encourage farmers and dairies to feed calves using lighter colored buckets to optimize their growth, future production, and the future of their dairy herd.

NAME(s)	<b>Ian Patch</b>	PROJECT NUMBER	<b>P56</b>
SCHOOL	Mount St. Joseph Academy	GRADE	<b>10</b>
TEACHER	Michael Spatzer		
PROJECT TITLE	<b>The CO2 Emission Levels Using Shaded Pole Motors versus Using Electrically Commutated Dire</b>		

### ABSTRACT

The purpose of my experiment to find an energy efficient way to cut back on the amount of CO2 emissions produced by electrical power generation in the United States. The Electrically Commutated DC motor or ECD motor is a motor built for refrigeration purposes and is said to perform twice as well as the Shaded Pole motor which is in most of the refrigerators in use (Agimotors.com). I will first test and see how much better an Electrically Commutated DC or ECD motor performs than a Shaded Pole motor. The ECD motor is said to be twice as efficient when moving cold air and uses less electricity to operate. With the results from my test I will then go on to use that data with the number of refrigerators per household number in the United States from the US Census Bureau. Using that, I found the original amount of CO2 being produced, then find the newly projected CO2 emissions if every household in the United States (The Green Guide online) started using these new motors. My hypothesis is that the ECD motor will live up to its standards of being twice as efficient as the shaded pole motor, and will cut back on one quarter of the total CO2 emissions caused by refrigerators alone. In conclusion my hypothesis was correct and that the ECD motor cut back on the average CO2 emissions from refrigerators alone by 84.9% based on my calculations (The green guide, and the national census bureau). The ECD motor did how ever perform as was stated in using less electricity to operate than the shaded pole motor, and also cut back on CO2 emissions by about 2/3 with refrigerators alone.

NAME(s)	<b>Dylan Patrie, Jake Sargent</b>	PROJECT NUMBER	<b>GP04</b>
SCHOOL	Weathersfield Middle School	GRADE	<b>8</b>
TEACHER	David E. Lambert		
PROJECT TITLE	<b>Catapults: Distance vs. Accuracy</b>		

### ABSTRACT

Jake's Experiment: Which catapult would shoot the object the farthest; Cabulus, Lugar, Ballistae, and Donkey. Data I gathered before my experiment led me to believe that Cabulus would shoot the object the farthest. My hypothesis was Cabulus would throw the object farther than the other three catapults because it had a longer and stronger throwing arm. I repeated my test process to get ten trials for each of the four catapults.

Results for my project were averaged so here are the numbers: 509 cm for Cabulus, 431 cm for Ludgar, 83 cm for Donkey, and 50 for Ballistae. Cabulus did throw the object the farthest so my hypothesis was supported

Dylan's Experiment: My problem is which catapult shoots the most accurate, Ludgar Ballistae, Cabulus, and the Donkey.

When I was researching my project found out that Ludgar was designed to shoot up and over walls. My hypothesis was if Ludgar was designed to shoot up and over walls then it must be the most accurate.

I bought four targets, some chocolate syrup, and lug nuts. I shot four shots and watched/marked where they landed. After that I put the target down and shot the bullets at it. I measured where it landed and jotted it down in my notebook. I did these trials forty times plus sixteen times to tell where to put the target.

The results were that Ludgar got 25.2 cm. on average from the center of the target, Cabulus got 22.0 cm., Donkey got 17.7 and the Ballistae got an average of only 15.3 which is great.

My Conclusion was that my hypothesis was not supported because Ludgar was the worst accurate with an average of 25.2 cm. away from the target.

Basically, if you wanted to storm a castle from far away and were planning a long siege you would use Cabulus which was constructed on-site and didn't have the ability to move. It did heavy damage, and was somewhat accurate for a trebuchet. Ludgar mirrored Cabulus but was a little less accurate and couldn't shoot as far but it was somewhat portable. Ballistae was the most accurate but really doesn't shoot all that far so they used them on ships, closer combat, and most of all they used them to break down doors on castles.

NAME(s)	<b>Kendra Pillsbury</b>	PROJECT NUMBER	<b>G06</b>
SCHOOL	South Burlington High School	GRADE	<b>10</b>
TEACHER	Curtis Belton		
PROJECT TITLE	<b>Extreme Weather Conditions</b>		

### ABSTRACT

For my project I will be comparing the changes in temperature, rainfall, and snowfall in Vermont over the last 50 years. I will be comparing these category's data to the country's data. I think that there will be a significant change in temperature throughout the years that will show global warming. In the past 50 years 4 of the 12 hottest years were between 2002 and 2005. And I think that this was also true for Vermont. In the past years we have had more and more Indian summers, which is when it continues to stay warm until much later in the year then normal. This year in the past month of October when it should have been about 50 degrees or colder and it has been about 65 degrees every day. Last year in January of 2006 it was very warm all of January which is usually our coldest month of the year, this would suggest global warming. My goal is to prove that it is happening scientifically. I will take the average temperature (high and low) and precipitation(rain and snow) for each year and compare them on a graph and see if global warming is happening in Vermont and see if yearly world highs were symmetrical with highs and lows in Vermont over the past 50 years.

Another part of my project will be on extreme weather conditions in Vermont besides temperature. I will plan to compare the average rainfall and snowfall for the past 50 years. I think that the weather conditions in the state of Vermont has increased a lot in the past 50 years. This can be determined by comparing average rain and snow fall over a long period of time. I am choosing to compare over 50 years, in an attempt to prove that global warming is happening in Vermont. I am also trying to prove what a big problem it is and ways we can solve it.

NAME(s)	<b>Vishnu Premsankar</b>	PROJECT NUMBER	<b>P11</b>
SCHOOL	St. Francis Xavier School	GRADE	<b>7</b>
TEACHER	Mrs. Mary Ellen Varhue		
PROJECT TITLE	<b>Hot Colors</b>		

### ABSTRACT

Purpose: The purpose of my experiment was to find out which colors absorb more light. I wanted to research this because I was curious about the powers of light.

Procedure: First I wrapped seven 6.5 oz Gerber bottle with construction paper. The colors I used were red, orange, yellow, blue, violet, green, and black. Next I filled the bottles with 150ml of water. Then I drilled a small hole into the tops of the bottles. This was large enough to fit a thermometer. Then I took a 100 watt bulb and attached it to the top of a lamp stand and placed it horizontally on a table. Then I placed a bottle covered in construction paper in front of the lamp. The distance from the bottle to the lamp was 150mm. I then recorded the initial temperature. After on hour I checked the temperature of the water. I recorded the results. I repeated this experiment for all of the other colors.

Results: My results were that red, orange, and yellow absorbed less light than blue, green, violet and black.



NAME(s)	<b>Tyler Purinton</b>	PROJECT NUMBER	<b>P16</b>
SCHOOL	South Burlington High School	GRADE	<b>10</b>
TEACHER	Curtis Belton		
PROJECT TITLE	<b>Mice Metabolism and Junk Food Effects</b>		

## ABSTRACT

The purpose of this experiment is to see how the skipping of breakfast and consumption of junk foods affects the behavioral and physical aspects of house mice (*Mus Musculus*). Also, I will see how the results are related between the two experimental groups.

Metabolism is the sum of all of the chemical reactions that take in and transform materials from the environment. The ability of a person's body to be able to directly eliminate excess material determines the speed of their metabolism. Junk food is food with limited nutritional value. Common characteristics in junk food are high sodium, sugar, calories, and saturated fats. Eating these foods in excess will cause weight gain.

For my procedure, I will take nine mice and place them in separate cages. There will be one control group and two experimental groups. Each group will consist of three mice. The control group will be fed water, seeds and grain for all meals. The second will be fed junk foods for all meals, specifically foods with high sugar content. The final group will skip breakfast every day. I will average the weights of the mice every other day to find a mean weight that I can use to represent each group. I will also test behavior by recording how many times they break the gridlines of a cage during five minute intervals. Finally, I will record basal metabolism. I will average the basal metabolic rates and record them in a table.

I predict that there will be a high weight gain for the junk food mice, as well as a high amount of energy due to sugar content. I also believe that there will be a smaller, yet still significant weight increase for the mice that skip breakfast. These mice will most likely have much less energy than the junk food mice. The control mice should gain a bit of weight due to a better supply of food than at the pet shop, yet not as much as the experimental groups.

NAME(s)	<b>Katy Ranaldo, Emily Ferraro</b>	PROJECT NUMBER	<b>GP10</b>
SCHOOL	Mater Christi School	GRADE	<b>7</b>
TEACHER	Ms. Michelle Donlon		
PROJECT TITLE	<b>Mountains vs. Lakes</b>		

## ABSTRACT

This experiment tested whether precipitation and air temperature vary predictably at different elevations and near lakes in winter. One hypothesis was more snow would fall in higher elevations. The other hypothesis was that warmer temperatures would be recorded near a lake.

Research suggests that snow falls in greater amounts near a large body of water due to convection caused by the temperature differences between the cold land and warm lake. Lake-effect snow falls in a band that is widest along the shoreline. The warmth and moisture of the lakes can also increase the amount of snowfall over nearby land masses. Air temperatures near the lake will be lower in the summer and higher in the winter.

Materials used were thermometers, buckets, yard sticks, and Ph test strips. Thermometers were taped to yard sticks, which were taped to the inside of the buckets. One bucket was placed near Jay Peak. The other was placed near Lake Champlain. Data was collected three times daily for fourteen days.

Air temperatures near Lake Champlain ranged from 10 to 30 degrees Fahrenheit while air temperatures near Jay Peak ranged from -4 to 34 degrees Fahrenheit. Lake precipitation ranged from 0 inches to 2 1/4 inches. Mountain precipitation ranged from 1/4 to 5 inches. The Ph ranged from 6.0 to 6.5 in both locations. Both hypotheses were proven correct. The air temperature was warmer near the lake and colder near the mountains and the snowfall was greater near the mountains.

NAME(s)	<u>Samuel Reinhardt</u>	PROJECT NUMBER	<u>P12</u>
SCHOOL	<u>Hinesburg Community School</u>	GRADE	<u>8</u>
TEACHER	<u>Stephanie Konowitz</u>		
PROJECT TITLE	<u>The Strength of Electromagnets</u>		

### ABSTRACT

Electromagnets can be extremely powerful. From pulling trains to launching satellites, they have an almost unlimited potential. I wanted to know how quickly an electromagnet can pull larger objects compared to smaller ones, so I decided to do this experiment. I found out that Sir Isaac Newton would play a large part because of his rules for inertia and momentum. Momentum would keep the larger balls going, while inertia would make it hard for the larger balls to start. For my experiment, I made my own electromagnets, made a track with the electromagnets over it and ran three different sized balls through the track. I found that the largest ball completed it the fastest while the smallest ball completed it the slowest. This happened because the largest ball had the most metal to be pulled by the magnet and it had a lot of momentum.

NAME(s)	<u>Leslie Rogers, Sara Muguira</u>	PROJECT NUMBER	<u>GP05</u>
SCHOOL	<u>Green Mountain Union MS/HS</u>	GRADE	<u>7</u>
TEACHER	<u>Karen Surma</u>		
PROJECT TITLE	<u>Horses and what they prefer!!!</u>		

### ABSTRACT

Our topic is about what treats do horses prefer. We were trying to find out what treat horses like the most. We thought that the carrots would be the most popular. We tested the treats more than once. Then we found out that the Racer was the most preferred treat. So we found out that the horses like the racer the best. Our methods we used were that we would put a halter on one of the horses. Then that horse would be tested with all the treats. And we would repeat that step until all of the horses have been tested. Our results were like the ones above - we found out that the horses liked the Racer the most and that the least liked treat was the cereal. Our results are important for people who would like to figure out what treat their horse would like to eat.

NAME(s)	David Rolnick	PROJECT NUMBER	M02
SCHOOL	Home School	GRADE	11
TEACHER	Julia Rolnick		
PROJECT TITLE	Subspace Intersection: Multidimensional Representation of Graphs		

## ABSTRACT

A simple graph  $G$  is a  $(d,e)$ -subspace intersection graph, or  $(d,e)$ -SI graph, if and only if there exists a bijective function  $f$  from  $V(G)$  to some set of  $e$ -dimensional affine subspaces in  $\mathbb{R}^d$ , such that for  $v, w \in V(G)$ ,  $f(v)$  intersects  $f(w)$  if and only if  $v \sim w$ . Each such set of affine subspaces is termed a  $(d,e)$ -SI representation of  $G$ . We denote a graph lacking  $(d,e)$ -SI representations a  $(d,e)$ -void graph. For various  $(d,e)$ , we partially classify the  $(d,e)$ -SI graphs. We isolate small “core graphs” lacking  $(3,1)$ -SI representations, thereby defining certain classes of  $(3,1)$ -void graphs and potentially providing groundwork for a complete classification of the  $(3,1)$ -SI graphs. Second, we prove the existence of  $(n, n-2)$ -void graphs for all  $n \geq 3$ , suggesting a more general technique for proving the existence of  $(d,e)$ -void graphs for each  $(d,e)$ . Finally, we generalize a proof of Laison and Qing to demonstrate the equivalence of the sets of  $(2e+k, e)$ -SI graphs for given  $e$  with  $k$  varying over  $\mathbb{Z}^+$ .

NAME(s)	Sean Salimi, Nick Cefarello, Ryan Kennelly	PROJECT NUMBER	GP03
SCHOOL	Christ the King School Burlington	GRADE	8
TEACHER	Mrs. Vidula Srivastava		
PROJECT TITLE	Bottled Water vs. Tap		

## ABSTRACT

Most people think that bottled water is cleaner than tap water. We think that bottled water is just as clean as tap water most of the time. We wanted to test this ourselves by comparing leading suppliers of bottled water to our very own Burlington tap water.

We ran our tests using state-of-the-art water testing kit that included testing the water for PH, hardness, chlorine, nitrates, nitrites, lead, and pesticides. We also tested Burlington tap for these variables.

Our results were we would be inclined to drink tap water over bottled water, if it weren't for the convenience issue.

NAME(s)	<b>Robert Tyler Sanborn</b>	PROJECT NUMBER	<b>S12</b>
SCHOOL	Mount St. Joseph Academy	GRADE	<b>10</b>
TEACHER	Michael Spatzer		
PROJECT TITLE	<b>Can Conversation Improve Memory? (The Effect of Social Interaction on Memory)</b>		

## ABSTRACT

Philosophers such as Plato and John Locke have long assumed that man is a social animal. Yet it has not been determined why man needs to socialize and why socialization has become an integral part of human society. My research aimed to determine the effect of social interaction on memory. This study operated around the premise that memory can be divided into short and long term and that socializing created the optimal environment for subjects to successfully recall information over a period of time. This knowledge was key in the formulation of my hypothesis: if subjects interact socially prior to taking a mental examination, their rate of memory recall and thus test performance should be higher than the control group. To test this conjecture, two groups of subjects were given four minutes to study a fifteen question, memory based study guide and then were broken up into their assigned activity. The social interaction group engaged in conversation, while the academic activities, or control group completed a Sudoku or word search. After the allotted time period had expired, subjects completed the mental examination. The most intriguing piece of evidence can be supplied by the arithmetic mean, in which the social interaction group scored slightly higher than the control group. However, this difference was rendered insignificant by the t-Test and resulted in the rejection of my research hypothesis. A possible explanation for my findings is that the low number of trials coupled with the natural wide range of human ability made it harder to achieve a significant difference. Still, the results gained through this study can serve as a building block to finding the rationale behind man's need to socialize and conversation's effects on memory capacity.

NAME(s)	<b>Christian Scanlon</b>	PROJECT NUMBER	<b>P13</b>
SCHOOL	St. Francis Xavier School	GRADE	<b>7</b>
TEACHER	Mrs. Mary Ellen Varhue		
PROJECT TITLE	<b>Bi-Metallic Strips</b>		

## ABSTRACT

My project is testing to see which bimetallic sample set will work the most effectively and display the greatest change in accordance to the temperature. My specific question is; Which materials respond the most rapidly and predictably to temperature variation?

○I chose this project because it looked very interesting and it sort of jumped out at me. I hope to learn how a thermostat works, what thermal expansion is, and the certain metal combinations that can predict temperature.

○I hypothesize that the bimetallic combination of steel and aluminum will display the greatest change in accordance to the temperature because steel is the hardest metal that has an average thermal expansion rate and aluminum's durability is greater than that of zinc, which I think will not be able to take a high level of heat. There is a caveat that could potentially change my data. There will be 4, 1/8 in steel rivets to bind the two samples together which could warp the strip while expanding.

○My basic procedure is as follows.

- 1.○Have the metals set to specific dimensions.
- 2.○Match the samples into 2 sample combinations with no combinations matched twice or with itself.
- 3.○Set the strips in a freezer to keep them cooled.
- 4.○Set up a two-clamp combination to hold the strip, a dial indicator, a laser thermometer, a stopwatch, a MAPP gas torch. Turn on all objects and record all results.

The bimetallic combination of zinc and nickel displayed the greatest change and the highest deflection.

NAME(s)	<b>Joshua Scaralia</b>	PROJECT NUMBER	<b>C04</b>
SCHOOL	Mount St. Joseph Academy	GRADE	<b>10</b>
TEACHER	Michael Spatzer		
PROJECT TITLE	<b>The Effect of Sodium Chloride on Carbon Dioxide Absorption in Water</b>		

### ABSTRACT

The purpose of this experiment was to test how salt concentration in water affected how much carbon dioxide the water was able to absorb. Based on my prior research, I hypothesized those mixtures with more salt concentration would absorb more carbon dioxide than those mixtures with less carbon dioxide. I tested distilled water, a 2% salt mixture, a 3.5% salt mixture, and a 5% salt mixture. According to my first and third trials, this hypothesis was proven correct. The first trial showed that mixtures with higher salt concentration absorbed more carbon dioxide. My third trial showed that mixtures with more salt absorbed more carbon dioxide as well, but these results did not stack like the ones in the first trial. And in the second trial, the 2 % salt mixture had the greatest carbon dioxide mean and the 3.5% had the lowest mean of carbon dioxide. My hypothesis that higher concentrations of salt in water would increase the carbon dioxide absorption of the water was somewhat proven by the data because the 0 % salt mixture had the least average amount of carbon dioxide absorbed and the 3.5% salt mixture had the greatest average amount of carbon dioxide absorbed.

NAME(s)	<b>Benjamin Smith</b>	PROJECT NUMBER	<b>B17</b>
SCHOOL	Mount St. Joseph Academy	GRADE	<b>10</b>
TEACHER	Michael Spatzer		
PROJECT TITLE	<b>The Effects of Bread Preservatives on Bacteria</b>		

### ABSTRACT

I decided to do my experiment because I was curious as to if the preservatives we use in our bread is effective or not and how much is needed in order for it to be effective. My hypothesis is if you use the preservatives Propionic Acid, Sulfite, and Metabisulfite on the bacteria of Bacillus cereus, then the larger concentration would do better than the smaller. For my experiment I used 9 Petri dishes and put Tryptic Soy Agar mixed with 200mL of water into the Petri dishes. Then after the agar had turned into a gel like material I put the broth with bacteria on the agar. Then I made 3 different concentrations of each preservative and gave 3 trials each. Then I dipped sterilized paper disks in the preservative then placed them in the Petri dishes and let them sit for 4 days before looking at my results. In the end my hypothesis was supported and also the larger concentration was better than the smaller. I concluded that propionic acid was the most effective of the preservatives, Sulfite had some effect, and metabisulfite had no effect on the bacteria at all.

NAME(s)	Rebeka Spencer	PROJECT NUMBER	C18
SCHOOL	Weathersfield Middle School	GRADE	8
TEACHER	David E. Lambert		
PROJECT TITLE	Which material is more efficient against hypothermia in different conditions?		

### ABSTRACT

For my project I tested Which material is a more efficient insulator against hypothermia in different conditions? The conditions that I was testing my materials in were 1. out of water, dry; 2. out of water, wet; and 3. submerged in freezing temperature water (my pond).

During my research I found out that polyester fleece dries much faster than wool. But both cotton and cotton flannel dry faster than polyester fleece and wool.

In my hypothesis I thought that polyester fleece would take the longest time to go from 98.6 degrees Fahrenheit to 85 degrees Fahrenheit in out of water, dry conditions. I also thought that wool would take a longer amount of time to go from 98.6 degrees Fahrenheit to 85 degrees Fahrenheit in out of water, wet conditions. And last of all I thought that wool would be a more efficient insulator against hypothermia in submerged conditions.

In my procedure, I basically took two liter bottles and wrapped them with different materials. Then I would time how long it would take for the water inside the bottle to go from 98.6 degrees Fahrenheit to 85 degrees Fahrenheit. After doing all my tests I found out that wool took the longest time to lose heat in submerged conditions beating polyester fleece by one second. Then looking at my results I found out that polyester fleece was the more efficient material to wear in out of water, wet conditions. Wool was the most efficient material to wear in out of water, dry conditions. After I averaged all the different tests of each fabric I figured out that polyester fleece would be the over all most efficient material. Wool was the most efficient material in submerged conditions, polyester fleece was the most efficient material in out of water, wet conditions, and wool was the more efficient material in out of water, dry conditions. This means that my hypothesis was supported for the submerged tests but was not supported for the out of water, wet and out of water, dry tests.

NAME(s)	Gretchen Tarrant	PROJECT NUMBER	S13
SCHOOL	Mater Christi School	GRADE	7
TEACHER	Michelle Donlon		
PROJECT TITLE	He vs. She- Spatial Differences Between the Sexes		

### ABSTRACT

The purpose of this experiment was to test different genders' accuracy based on immediate memory. Subjects were given three seconds to study three alike targets in a controlled environment and then asked to place three objects onto each of the different targets while blindfolded. The hypothesis was that if both genders were tested on their average spatial accuracy based on short-term memory then males would do better because they are usually more coordinated for the reason that they develop gross motor skills earlier than girls, so their spatial skills would be presumably better.

Accuracy was determined by equally testing the two genders in a controlled environment. Each sample was given directions but was not told the purpose of the experiment. They were led one at a time to a chair with their eyes closed. Once the subjects were prepared they were given three seconds to open their eyes and study the targets. After this they were given three identical objects and asked to place each one where they remembered each of the different targets to be.

The final result was that boys did better by a small margin even though there were statistics against them. The boys' average off target was 1.35 inches and the girls' average off target was 1.75 inches. There were small variables that were not controlled however which could have affected the data, these variables being human based. One example of this is emotions.

The conclusions of this project are that boys are generally better at spatial awareness based on short term memory in a ratio of sixty people ages 10 years old to 13 years old. Applications in the real world could be athletic spatial awareness, and walking in the dark without hitting into objects based on short-term memory.

NAME(s)	Erin Thompson	PROJECT NUMBER	C19
SCHOOL	Manchester Elementary Middle School	GRADE	7
TEACHER	Mr. Diedrich		
PROJECT TITLE	Which cleaning product prevents the most bacteria?		

### ABSTRACT

The Purpose of this project is to learn about bacteria and find out how to prevent it. I picked this project because it seemed really fun and interesting, and I would get to do this fun experiment. I also chose this experiment because I thought I would learn a lot and I did.

My procedure was making agar and letting it harden so that I could collect bacteria samples and let them grow. While I collected the bacteria I put one of my three cleaning products on half of the Petri dish. Then I let it grow for five days and each day I measured how much bacteria was prevented each day. I then would just keep letting it grow. I had three different cleaning products and I did two trials.

The data I collected showed that Purell prevented 73% of the bacteria grown, the Bleach prevented 74% of the bacteria grown, and the Lysol prevented 65% of the bacteria grown.

In my conclusion I found that Bleach prevented the most bacteria, and would be best to use. Although you probably would not want to clean your house with bleach. Purell was a close competitor and showed that 73% of the bacteria is prevented with Purell. Even with that Bleach is still better at preventing bacteria.

NAME(s)	Ryan Thornton	PROJECT NUMBER	C20
SCHOOL	St. Francis Xavier School	GRADE	7
TEACHER	Mrs. Mary Ellen Varhue		
PROJECT TITLE	O-Mazing Acid		

### ABSTRACT

Purpose-The purpose of my experiment was to find which orange juice had the most vitamin C. I was testing three different orange juices: carton, fresh squeezed, and concentrated. I thought that concentrated orange juice would have the most vitamin C.

Experiment-I made a Cornstarch-Iodine solution that changes to the color blue and I added that to the orange juice. The vitamin C in the juice reacts with the iodine solution and the solution turns clear. The clearest solution has the most vitamin C.

Conclusion-Of the three orange juices I tested, the fresh squeezed came in first, the concentrated juice came in second, and the carton juice came in third. My hypothesis was incorrect, but I did learn which orange juice had the most vitamin C.

NAME(s)	<b>Corey Tillson</b>	PROJECT NUMBER	<b>P14</b>
SCHOOL	<b>Windsor High School</b>	GRADE	<b>10</b>
TEACHER	<b>Jennifer Townsend</b>		
PROJECT TITLE	<b>Conductivity of water based solutions</b>		

## ABSTRACT

The purpose of my project was to determine which water based solution was the most conductive and yielded the most voltage. Of the solutions tested; acid solutions, base solutions, salt solutions, and pure water, I hypothesized that the ten percent salt solution would yield the most voltage and be the most conductive.

After compiling background information, I found out that for an electric current to be passed through a solution, there must be ions. I also found out that the higher the concentration of ions, the more electricity the solution can yield. Substances that dissolve into a high concentration of ions, like salt, are more conductive. Substances that produce a lower concentration of ions, like vinegar, are not as conductive. This is why I picked salt as the most conductive for my hypothesis.

To test my hypothesis, I conducted two experiments, with multiple trials, for each solution. My solutions were ten percent solutions of ammonia, HCl, sulfuric acid, salt, vinegar, and one hundred percent tap water and de-ionized water. To test the amount of voltage each solution could yield, I passed a current from a AAA battery through each solution and measured the voltage. I then averaged out the results for each solution. To test conductivity, I placed each solution under a conductivity test and recorded the brightness of the light produced. Through the experiments, I found that the salt solution yielded much more voltage than the other solutions and also produced a significantly brighter light in the conductivity test than the other solutions. Therefore, I concluded that my hypothesis was correct and a salt solution is the most conductive and will yield the most voltage.

NAME(s)	<b>OLIVIA TISDALE</b>	PROJECT NUMBER	<b>B18</b>
SCHOOL	<b>MOUNT SANIT JOESPH ACADEMY</b>	GRADE	<b>9</b>
TEACHER	<b>MICHEAL SPATZER</b>		
PROJECT TITLE	<b>THE EFFECT OF TEMPERATURE ON ENZYME ACTIVITY</b>		

## ABSTRACT

The purpose of this experiment is to find out if different temperatures affect the reaction time of the enzyme Catalase in breaking down hydrogen peroxide. This is a similar situation to what is found in our bodies. My hypothesis is that the warmer the hydrogen peroxide gets, the longer it takes for the chemical reaction to happen.

The enzyme, Catalase, interacts chemically with hydrogen peroxide to break it down. It causes H<sub>2</sub>O<sub>2</sub> to change into water, H<sub>2</sub>O and oxygen, O<sub>2</sub>. A potato based Catalase solution will be mixed with hydrogen peroxide at various temperatures. The speed of the change will be recorded for data, along with the temperature of the hydrogen peroxide. The relationship of the time the chemical change takes will be related to the temperature of the hydrogen peroxide.

I used a stop watch to time how long it took from when the disk hit the bottom of the beaker until it rose to the top. I repeated this 4 more times so altogether I had 5 trials at 0 degrees Celsius.

I used this procedure with four other temperatures ( 10, 20, 30, 40 degrees celsius) so altogether I had 25 trials, five each at the different temperatures.

Five trials were done for five different temperatures of hydrogen peroxide. During each trial the enzyme Catalase is combined with hydrogen peroxide which is brought to for each of five trials to 0, 10, 20, 30, 40 degrees Celsius. The chemical reaction time is measured in each trial. The mean time is then related to the temperature. The variables are temperature (independent) and time (dependent), because the time it takes for the peroxide to change depends on the temperature of the peroxide, after the Catalase is put in.



NAME(s)	Stephanie Traverse	PROJECT NUMBER	B19
SCHOOL	Fair Haven Union High School	GRADE	12
TEACHER	Mike Schwaner		
PROJECT TITLE	Red vs Black		

## ABSTRACT

I have shown dairy cattle since I was four years old and have also been involved in 4-H since I was eight, because of this I have a strong interest in the dairy cattle industry and was able to use my experience to formulate my hypothesis. I chose to study the butterfat of Holsteins because they are the only one of the six major dairy breeds to have a red and a black variation of the breed. Through my experiences with 4-H and showing, I became acquainted with the Glen-Mar Dairy farm. Although they do not have the large number of cows that some of the other farms in my area, I admire the way they care for their animals. This also could be the possible source of one of my errors because everyday they feed 85 cows a TMR (Total Mixed Ration) that includes 400lbs of baleage, 100lbs of dry hay, 1200lbs of bunk haylage, 1200lbs of bag halage, 3000lbs of corn silage, 172lbs of corn meal, and 1800lbs of grist (a blend of ground grains) at 27% protein. This ensures that each cow can eat her fill and not a designated amount that has the potential of leaving a cow hungry. This practice promotes happy and healthy cows that produce the optimum amount of milk.

○ With permission from Glen-Mar Dairy, I took a 16-ounce sample from six red & white Holsteins and six black & white Holsteins. In the two groups of six I had a two-year-old, a three-year-old, a four-year-old, a five-year-old, an eight-year-old, and a ten-year-old from each group. I did this for the months of October, November, and December. Each sample was put into an electric butter churn until butter was visible. Each sample is then strained to separate it from the buttermilk and then the sample is put into a petri dish and weighed. For display purposes I put the three month average for each cow in a petri dish. To calculate the percentage of butterfat I divided the weight of the butter sample by the weight of the milk sample. I took the butterfat percentage results and made graphs for each month. I also used the farm's DHIA records to make graphs of the daily milk production of each cow. My samples were taken on the same day that the DHIA samples were taken.

○ My hypothesis was not supported by the data I collected. The black & white Holsteins produced a higher butterfat percentage than the red & white Holsteins did. The most surprising aspect of my project was that the black & white Holstein did in fact produce more butter because prior experiments showed me that the red & white Holstein produced a considerably higher amount of butter.

NAME(s)	Wyatt Traverse	PROJECT NUMBER	P57
SCHOOL	Fair Haven Union High School	GRADE	9
TEACHER	Ben Worthing		
PROJECT TITLE	Fresh to Fermented		

## ABSTRACT

○The project was to find out what produces more heat during the curing stage, haylage or silage. Heat energy can be used to make electricity. As cow manure heats in a pile it is being use to make electricity, so this project was to see what else can be used for energy on the farm and by testing which one makes more heat, hay or corn. The hypothesis was, if a sample of chopped hay and a sample of chopped corn are each placed into their own breeding sleeve to simulate being in a plastic silo tube, then the corn sample will produce more heat during the curing process as it changes into silage.

It takes about three weeks for fresh cut hay or corn to ferment and became haylage or silage. Fresh chopped corn and fresh cut grass was put in the freezer. Later when it was time to do the testing, the hay and corn was packed into breeding sleeves. It was like making mini silo tubs like the big long plastic tubes used on the farms, but on a small scale. As it cures I took the temperature to answer my question to see which one gets hotter.

The hypothesis was not supported by the data that was gathered. It was proven wrong. The average temperature for the haylage was hotter than the silage. Hay generates more heat during the fermentation stage than corn. After the fermentation stage is over, the temperature of the silage and haylage went back to approximately the same temperature that it started with.

NAME(s)	<b>Kelsey Watkin</b>	PROJECT NUMBER	<b>B20</b>
SCHOOL	South Burlington High School	GRADE	<b>10</b>
TEACHER	Curtis Belton		
PROJECT TITLE	<b>Peak Performance Levels</b>		

## ABSTRACT

Question: Once athletes reach their peak performance level (athletic capability), will they continue to perform at that same intensity after the season, or will they start to decrease in performance quality?

Hypothesis: I believe that once the athlete discontinues their exercising habits, they will slowly decrease in peak performance level.

Procedure:

Test #1: Aerobic Endurance

Test planned to calculate an athlete's aerobic endurance

Procedure:

1. Have athlete step on and off a 12-inch step at a constant pace for three minutes straight.
2. Immediately after stepping take heart rate, by counting pulses for one minute.
3. Compare results to previous results.

Test #2: Sit and Reach

Measures flexibility in the hamstring and lower back muscles.

Procedure:

1. Have athlete sit on the floor with the soles of the feet positioned flat against the box shoulder width apart.
2. Tester should then hold the knees of the athlete to enforce stability.
3. Have athlete place hands on top of each other (palms facing down).
4. Athlete should now reach as far forward as they can, making sure hands stay positioned along measuring tape.
5. Have athlete take three practice reaches before recording the final distanced reached.
6. Compare results with previous results.

Test #3: 40 Yard Dash

Measures strength and power

Athlete should improve their time after every testing.

Procedure:

1. Have athlete sprint as fast as they can for 40 yards.
2. Record initial speed in table.
3. Compare times to previous times.

NAME(s)	<b>Billy Weaver</b>	PROJECT NUMBER	<b>P58</b>
SCHOOL	Mater Christi	GRADE	<b>8</b>
TEACHER	Michelle Donlon		
PROJECT TITLE	<b>Hydrogen: Fuel of the Future</b>		

## ABSTRACT

My goal was to determine if raising the temperature and salt concentrate in salt water would affect the rate of hydrolysis. My hypothesis stated that if I change the temperature and salt concentrate in water, then a higher salt concentrate and temperature will produce more hydrogen because NaCl has ions, which are good electrical conductors, and because when water is heated, the bondage between molecules is loosened. To test this, I built a water splitter that separated hydrogen from oxygen using two electrolytes wired under a 1L container of salt water. To measure the hydrogen produced I measured the volume of a test tube before going through the electrolysis process, then submerged the tube in water, above the negative electrode. I then plugged an AC/DC adapter into a power outlet that was connected to the two electrodes, starting the hydrolysis process. The hydrolysis proceeded for 10 minutes. I then removed the test tube from the container and measured it again. I repeated this process twice for a 10 °C, 20 °C and 40 °C climate with 1 tsp of NaCl per 1L, and a ½ tsp, 1 tsp and 1 tsp NaCl concentrate per 1L at a constant temp of 20 °C. My results were that at 10 °C, 20 °C and 40 °C produced an average of 12.5mL, 14.25mL and 23.5mL of hydrogen respectively. The experiments with a ½ tsp, 1 tsp and 1 tsp per liter salt concentrate produced an average of 3.25mL, 10.5mL and 14.25mL of hydrogen respectively. My results match my hypothesis.

<b>NAME(s)</b>	<b>Caroline Weaver</b>	<b>PROJECT NUMBER</b>	<b>B21</b>
<b>SCHOOL</b>	<b>South Burlington High School</b>	<b>GRADE</b>	<b>11</b>
<b>TEACHER</b>	<b>Curtis Belton</b>		
<b>PROJECT TITLE</b>	<b>Prevalence of Human Papilloma Virus in Young Vermont Women: Implications for the HPV Vac</b>		

### ABSTRACT

The purpose of this experiment is to determine the prevalence of HPV in three at-risk populations in Vermont, including 13-18 year olds, 19-24 year olds, and 25-30 year olds. Human papillomavirus (HPV) is one of the most common sexually transmitted diseases in the world. HPV includes over 200 strains of the virus, more than 30 of which are sexually transmitted. Although many types of HPV do not have any symptoms and will resolve on their own, certain strains may lead to cervical cancer. A vaccine for preventing cervical cancer has been clinically released to the public in the last year. It has been recommended that all young girls receive the vaccine in hopes that they will prevent the further development of HPV and possibly cervical cancer. The vaccine is given in a sequence of 3 shots, and has been proven to last up to 4-5 years. The vaccine includes HPV-6, 11, 16, and 18. Due to the recent release of the vaccine I became interested in human papilloma virus. The current estimation is that 80% of all sexually active female teens are infected with HPV, with 82% prevalence in leading to cervical cancer. This fact and the discovery of a vaccine made me want to compare the number of HPV infected individuals in 3 groups to determine how many people will benefit from the vaccine.

There are certain ways to classify abnormalities observed in the cervical cells; ASC-US and ASC-H. ASC-US stands for atypical squamous cells of undetermined significance. This is when the squamous cells do not appear normal, but doctors are unsure as to what the changes may mean. These abnormalities may or may not be associated with HPV, but additional testing can determine whether HPV is present. ASC-H stands for atypical squamous cells cannot exclude a high grade squamous intraepithelial lesion. This means that the cells do not appear normal, but doctors are unsure as to what the changes mean. Unlike ASC-US, this classification may indicate a higher risk of the cells resulting in a precancerous diagnosis.

<b>NAME(s)</b>	<b>David Wood</b>	<b>PROJECT NUMBER</b>	<b>C21</b>
<b>SCHOOL</b>	<b>South Burlington</b>	<b>GRADE</b>	<b>10</b>
<b>TEACHER</b>	<b>Curtis Belton</b>		
<b>PROJECT TITLE</b>	<b>Carcinogens in water bottles</b>		

### ABSTRACT

In this lab of heating and freezing we need to perform several tests that could possibly help to find out some information. These tests would be needed for heating, freezing, and testing the water before and after for carcinogens and bacteria or chemicals that may be in the water. We would also need to test the plastic before and after to see if before the tests of heating and freezing, if they have any bacteria or carcinogens, and after, if any have formed or if any have come off the plastic. To make a table or graph for this lab, it would probably look like this:

Test Type   Fiji   Aquafina   Poland Spring   Dasani   Vermont pure  
 freezing temp  
 Heating temp  
 Test on water  
 before  
 Test on water after

I would put the information from the tests into the boxes. For the materials part of this lab, I will need several bottles of water from each kind. Also we will need a lab and the equipment in it to perform some of these tests. To do this lab we first need to perform the before tests on each bottled water. Then we would heat it and freeze it and test both the plastic and the water for any carcinogen. Record the data and it's done.

NAME(s)	<u>Megan Wooster</u>	PROJECT NUMBER	<u>B22</u>
SCHOOL	<u>Fair Haven Union High School</u>	GRADE	<u>9</u>
TEACHER	<u>Ben Worthing</u>		
PROJECT TITLE	<u>Can Your Ears Play Tricks On You? Whether Or Not Your Ears Can Fool You Into Believing</u>		

### ABSTRACT

If it were tested to see if the semicircular canals send correct messages to your brain after you stop spinning, the semicircular canals can fool you into believing that you are still spinning. This is true because when you spin around and then stop abruptly the fluids in your inner ear will continue to swoosh around in your semicircular canals. Inertia causes the fluids to continue their path of movement which causes you to feel dizzy. But if you were to let the fluids stop gradually then your dizziness level with decrease greatly.

Basically the task was to spin volunteers around in an office chair. They were run through various trials; spin with gradual stop, Eyes open ears plugged, spin with quick stop. Eyes closed and ears plugged, and then spin with quick stop. Eyes open and ears unplugged. In these trials it was tested whether or not the volunteer could determine the direction they were going during and after the spin. The data was recorded by seeing which direction their thumbs were pointing.

In conclusion, the fluids in your inner ear will continue to spin, resulting in dizziness, but only with a quick stop. When you stop gradually, the fluids slowly stop and you aren't as dizzy because the fluids swishing around is what makes you feel like you are in motion.

NAME(s)	<u>Allison Zengilowski</u>	PROJECT NUMBER	<u>S14</u>
SCHOOL	<u>Hinesburg Community School</u>	GRADE	<u>7</u>
TEACHER	<u>Stephanie Konowitz</u>		
PROJECT TITLE	<u>Do Dancers have Better Memories?</u>		

### ABSTRACT

I wanted to figure out if dancers have a better memory than people who don't dance. Dancers think of the steps in combinations as words. The sequence of steps then could be considered as sentences. This way it is easier to remember a large number of steps in the combination. Also repetition helps for dancers to remember the different names of the steps and how the movements connect with the names for them. To test the dancers and non-dancers, I gave them a test with 20 letters, numbers or pictures on it. I then gave them one minute to memorize as many letters, numbers, or pictures as they could. For the pictures test, the non-dancers remembered more, but both the dancers and the non-dancers had the same amount of objects remembered for the numbers test. The dancers remembered more than the non-dancers on the movement test, which was not surprising. The non-dancers remembered more objects on the picture test. For the letters test, the dancers did remember more than the non-dancers by an average of about 2 objects remembered. My results were not as clear as I would have hoped they would be, because the dancers only remembered slightly more objects than the non-dancers in some of the tests. Overall the test results were very close together of who remembered more, the dancers or the non-dancers. Through this project, I learned that dancers do have a slightly better memory than people who don't dance.

<b>NAME(s)</b>	<b>Marta McBean</b>	<b>PROJECT NUMBER</b>	<b>G07</b>
<b>SCHOOL</b>	Brattleboro Union High School	<b>GRADE</b>	<b>12</b>
<b>TEACHER</b>	Mike Auerbach		
<b>PROJECT TITLE</b>	<b>The Impact of Climatological Variation and Tree Health on Maple Sap Production in SE Vermont</b>		

### ABSTRACT

The research was conducted in Dummerston, Putney and Brattleboro Vermont. The field work was an analysis of 50 to 75 maple trees growing under similar conditions within a commercial sugar bush located in Southern Vermont. Annual sap production was compared to growth patterns in the maple trees as recorded in the tree's growth rings and historical climatological data. By comparing sap production for years where the trees exhibit similar growth patterns, trends in sap production can be established independent of a tree's vigor during the growing season. The purpose of the research was to use annual tree growth as a constant so it can be proven that sap production is correlated to climate change. The variables were sap production, climatological data and tree health.

To assess tree health within the sugar bush soil chemistry, soil type, the diameter of the tree were determined. Climatological data was primarily be accessed as records of the freeze thaw cycles in the spring and the amount of rainfall during the summer (the principal season for growth). The historical sap production data is on record at the University of Vermont's Procter Maple Research Center. To evaluate the growth of the maple tree, core samples were taken to analyze growth rings. This analysis allows assessment of good growth years. Since the samples were taken from trees within the same sugar bush the good growth years should be the same for each tree.

<b>NAME(s)</b>	<b>Maggi Roper</b>	<b>PROJECT NUMBER</b>	<b>B23</b>
<b>SCHOOL</b>	Green Mountain Union High School	<b>GRADE</b>	<b>8</b>
<b>TEACHER</b>	Allan Garvin		
<b>PROJECT TITLE</b>	<b>Caterpillars Catching Rays</b>		

### ABSTRACT

Before a caterpillar becomes a butterfly it has to go through stages called metamorphosis. Metamorphosis is usually an undisturbed process, but as we know the Earth's temperature is increasing drastically. This brings up the question: Does temperature affect butterfly metamorphosis, and if so in what ways? My hypothesis is that butterflies in a higher temperature environment will increase the speed of metamorphosis, and butterflies in a lower temperature environment will slow down the speed of metamorphosis. This was tested by putting three identical butterfly environments in three different temperatures, one warm, one normal, and one cold. All the butterflies in the warm environment hatched before any of the chrysalises in the normal environment, and before any of the caterpillars in the cold environment even turned to chrysalises. These results showed that heat sped up the metamorphosis of butterflies.

NAME(s)	Majorie Munroe	PROJECT NUMBER	S07
SCHOOL	Green Mountain Union HS	GRADE	8
TEACHER	Allan Garvin		
PROJECT TITLE	Lying Languages		

### ABSTRACT

Since ancient times it has been believed that when someone tells a lie their body undergoes a physical change, showing their deceit. This is what brought me to the question: Does body language tell if person is lying? My hypothesis for the experiment was that body language could tell if the person was lying. I tested this through a series of simple tests that allowed me to pick up on the lies of my test subjects. I was careful to observe every move they made while under the interrogation of the tests. My results showed that body language was ninety percent accurate in showing if a person was lying. This meant that the old myth was mostly true. Observing body language could pick up on a person's lie for a large portion of the time.

NAME(s)	Mark Harwood	PROJECT NUMBER	S15
SCHOOL	Green Mountain Union HS	GRADE	8
TEACHER	Allan Garvin		
PROJECT TITLE	Is Beethoven Best?		

### ABSTRACT

Parents have always wanted for their children to listening to Classical music, saying that it makes for better memory and an overall better student. If this is true, how would other different types of music, and even listening to no music compare? My hypothesis was that listening to Classical music would improve the memory of a student, based on many studies done by other professionals. I tested this by having a student listen to music while studying ten objects on a page for one minute. They would come back five minutes later, listen to the same song, and write down as many objects as they could. My results showed that, excepting one special case, while listening to Rap music, the most objects were remembered. These results mean that the next time you want to study for a test, maybe you should set down Beethoven and pick up the 2 Pac.

NAME(s)	<b>Logan Little</b>	PROJECT NUMBER	<b>B24</b>
SCHOOL	Green Mountain Union HS	GRADE	<b>8</b>
TEACHER	Allan Garvin		
PROJECT TITLE	<b>It's A Bird</b>		

## ABSTRACT

My topic is on the avian sense of sight and how it works. I was trying to find out what type of birdseed birds like the most. My hypothesis was that the oil-sunflower seeds would be the favorite. To do this I put out five different containers of seed. Then every day I weighed how much of it was gone. I found that the oil-sunflower seeds did go first. Meaning that they are the favorite. In conclusion birds like the oil-sunflower seeds the most. Thus proving my hypothesis correct

NAME(s)	<b>Jasmine Currier, Chasity Hoose</b>	PROJECT NUMBER	<b>GP14</b>
SCHOOL	Green Mountain Union HS	GRADE	<b>8</b>
TEACHER	Allan Garvin		
PROJECT TITLE	<b>Need to Think? Take a Drink</b>		

## ABSTRACT

The topic of our research is memory. The question at hand is, which drink causes the greatest decrease in memory? Rockstar Energy Drink will cause the greatest decrease in memory. We ran through three tests, blocks, words, and numbers with six people. We used four different drinks to test them, Rockstar, Gatorade, milk, and water. After recording all of the test scores we averaged all of the Rockstars together, then all of the milk, Gatorade, and water. Then we came to a conclusion, Rockstar is the drink that decreases memory the most.

NAME(s)	<b>Anna Brown</b>	PROJECT NUMBER	<b>C07</b>
SCHOOL	Green Mountain Union HS	GRADE	<b>8</b>
TEACHER	Allan Garvin		
PROJECT TITLE	<b>Please Don't Freeze</b>		

## ABSTRACT

I tested different materials to discover which was the best insulator. To do this, I filled four small jars with 40 °C water. Then I tested silk, cotton, fleece, wool, and sheepskin, when they were both wet and dry, to see which retained the most heat. Without any insulator at all, the water ended up about ten degrees. When the materials were dry, sheepskin was by far the warmest. Silk came in last, nine degrees colder. When the materials were wet, wool was the best insulator. Silk was still the worst. So when it is cold and wet, don't wear silk, or you will regret it. Wool or sheepskin are the best choices to keep warm.

NAME(s)	<b>McKala Benson, Melanie Thompson</b>	PROJECT NUMBER	<b>GP15</b>
SCHOOL	Green Mountain Union HS	GRADE	<b>8</b>
TEACHER	Allan Garvin		
PROJECT TITLE	<b>Boys vs. Girls</b>		

## ABSTRACT

There's always been the fight between boys and girls to determine who really is better when it comes to their coordination. Boys tend to say they're better while girls always shoot back saying that they're the better ones. Which gender is better? Does it really affect their hand-eye coordination? When we performed an initial experiment to form our hypothesis, we had to admit that the boys did significantly better; thus hypothesizing that the boys have better coordination than the girls. So we performed four tests; the throw and catch test, drop and catch test, drop and hit test, and the red square computer game. The boys did a better job on every test. This means that the boys in our 8th grade class have better hand eye coordination than the girls.



NAME(s)	<b>Emily Guerra, Jessica Ralston</b>	PROJECT NUMBER	<b>GP16</b>
SCHOOL	Green Mountain Union HS	GRADE	<b>7</b>
TEACHER	Karen Surma		
PROJECT TITLE	<b>Which Soda Will Pump Your Heart?</b>		

## ABSTRACT

For our science fair project we focused on caffeine and how it affects your body. Our question to answer was which soda of our choices would raise your pulse the most. Our hypothesis was that Sunkist would raise your pulse the most in ten minutes. To do our project we took 8 peoples average pulse. Then gave them one of the sodas of our choice. We then checked their pulse after 5 minutes after consuming the soda then again after 10 minutes after consuming the soda. Then we put the data on a spreadsheet and found the average raise in each soda. In the end we found that Mountain Dew raised your pulse the most in 10 minutes and Sunkist raised your pulse the second highest. In conclusion our hypothesis was wrong and Mountain Dew out of Coke, Pepsi, and Sunkist raised your pulse the most. Our mistake was that Sunkist had more sugar and Mountain Dew had more caffeine, in the end caffeine will have more of an affect. Sunkist gave a quick burst in the first five minutes, but then went back down.

NAME(s)	<b>Gabriel Allen</b>	PROJECT NUMBER	<b>B25</b>
SCHOOL	Main Street Middle School	GRADE	<b>8</b>
TEACHER	Eli Rosenberg		
PROJECT TITLE	<b>Music in the Heart</b>		

## ABSTRACT

My science fair project tries to define whether music affects your heart rate or not, and what kinds of music make your heart beat faster or slower.

My hypothesis was that heavy metal music (“metal”) will make your heart beat faster than jazz, but jazz will make it faster than classical.

In my experiment I played music to each person being tested for 30 seconds and than measured there heart rate for 30 seconds. I tested them on one classical song, one jazz song and one metal song.

I found that for the majority my hypothesis was right, although there were some outliers. They may have been disturbed or distracted by other things than the music while they were being tested, or they may just have an opposite reaction than the majority.

All in all I can say that louder and faster paced songs can raise your heart rate, and often will.

NAME(s)	<b>Matt Cecere, Natty Crane</b>	PROJECT NUMBER	<b>GP17</b>
SCHOOL	Main Street Middle School	GRADE	<b>7</b>
TEACHER	Eli Rosenberg		
PROJECT TITLE	<b>Energy in a Marble Roller Coaster</b>		

## ABSTRACT

Energy in a Marble Roller Coaster is a project in which we measured potential and kinetic energy in a marble roller coaster. We wondered how the different marbles would have more or less energy and thought that the larger the marble, the less energy. We made a bumpy ramp out of Styrofoam tubing cut in half and wood for supports. On a computer, we used the program Datastudio to measure velocity. After finding the velocity of three different marbles at five different points along with other measurements, we found the potential and kinetic energy. We discovered that marbles had more potential energy at high points and more kinetic energy at low points. By discovering the energy, we could possibly have gained knowledge in aerodynamics. This makes us wonder how they get certain vehicles to have good aerodynamics...

NAME(s)	<b>Mary Cain</b>	PROJECT NUMBER	<b>C08</b>
SCHOOL	Main Street Middle School	GRADE	<b>8</b>
TEACHER	Eli Rosenberg		
PROJECT TITLE	<b>Poppin' Problems</b>		

## ABSTRACT

It's come to my attention that theaters have to choose different oils to use for popping popcorn, so I am testing 5 different oils to see which one pops the fastest. As a side to that, I'm testing quality, quantity, and of course- flavor! The oils I am using are vegetable oil, olive oil, peanut oil, canola oil, and coconut oil. Many theaters use coconut oil, but I'm not positive it's the best- My hypothesis is that vegetable oil will have the best flavor, because it could replace butter. I think it will pop fast because of the high temperatures it is use to and pop a lot also. I've also heard that it is very healthy as well.

To do this experiment, I popped popcorn using the same amount of kernels, salt, and oil each time with every oil separately. I used the third batch (because by then, the machine is completely warmed up and the temperature is steady), and timed how long it popped. I measured the amount of popped corn for each oil and had testers who described texture, size, color, and flavor right after it was popped and a day later. Then I researched every oil for health benefits and even more information.

After my data was finished, and after I researched the health and more on each oil, I noticed that each oil had some positives and some negatives. I took the oil that had the most positives and the least negatives. That oil turned out to be peanut oil!

The flavor of the popcorn was good, hot and the next day, 97% of kernels popped, the color, size, texture, scent, and health effect (including the small percentage of saturated fats), makes peanut oil the best oil for theaters.

NAME(s)	<b>Patrick Schlott</b>	PROJECT NUMBER	<b>P15</b>
SCHOOL	Main Street Middle School	GRADE	<b>8</b>
TEACHER	Eli Rosenberg		
PROJECT TITLE	<b>Foxhole Radios: Fact or Fiction</b>		

### ABSTRACT

In World War II, POW's were left without a way to receive messages via a radio for reasons like knowing the weather, messages from base camp, etc. So they came up with a way to devise a radio receiver using only the resources that were available to salvage: spare wiring, shrapnel, and fragments of crashed airplanes.

The purpose of my Science Fair project is to see if the radios these prisoners of war built actually worked as well as regular ones. My hypothesis is that they worked, but not as well as the regular-built radios. I thought this because if the GI's in World War II claimed that they built ones with the diode replaced with house-hold items, you'd think that if it did work, it wouldn't work as efficient.

Procedure summary: In my procedure, I built a radio and tested it under two different wirings. First, I used a green LED as the diode (sometimes called a detector), did three trial runs, and recorded the data for all eight tuning taps. After that was completed, I replaced the LED with a flame-oxidized razor blade and a pencil lead. I also recorded the data in a chart. Key Results: For the regular diode: 23.98 mA\*. Results for the POW radio: 19.47mA\*.

To conclude, the data I collected supported my hypothesis statement; It showed that it was correct.

NAME(s)	<b>Anthony Barrows</b>	PROJECT NUMBER	<b>P16</b>
SCHOOL	Main Street Middle School	GRADE	<b>7</b>
TEACHER	Eli Rosenberg		
PROJECT TITLE	<b>How to Extend a Wireless Network</b>		

### ABSTRACT

Have you ever experienced a problem where you just settled in to your hammock with your laptop, the smoothie that's fresh out of the blender, and two hours worth of emails to respond to, and you have no wireless connection? Are you frustrated because the guy at your local electronics store claimed to have sold you the router with the longest range? Well, I may have a relatively simple and cost effective solution to your problem.

I have a hypothesis which states that I can make a parabolic reflector that will control, focus, and potentially expand the range of all short-band wireless signals. The reflector is made out of a sheet of cardboard covered in aluminum foil, attached to a curved piece of Styrofoam. The curve is what creates the parabola in order to have a focal point of the signal.

The idea behind the reflector is that when a traditional router broadcasts a signal, it is omni directional, or will go in all directions. Placing a parabolic reflector behind the antenna makes for a focused signal, depending on which direction the antenna is facing. I created the antenna, and listed the details on how to do so in the procedure. I attached the antenna to my router and tested the signal strength in rotation segments of 10 degrees, taking five readings at each rotation. I then made a table of my data including each angle tested, and the five tests per angle. After that I made a scatter plot of the average percent of signal strength, with degrees on the x-axis, and percent on the y-axis. As a result of my data, the averages of the test percents decrease in value relatively consistently which means that the focal point of my antenna successfully focused the signal. Also, not only did the antenna focus the signal, but it amplified it from 60% to 75.2%.

NAME(s)	<b>Marley Carlomagno</b>	PROJECT NUMBER	<b>G08</b>
SCHOOL	Main Street Middle School	GRADE	<b>7</b>
TEACHER	Eli Rosenberg		
PROJECT TITLE	<b>Sugar &amp; Ice</b>		

## ABSTRACT

NAME(s)	<b>Talon Birns</b>	PROJECT NUMBER	<b>G09</b>
SCHOOL	Manchester Middle School	GRADE	<b>8</b>
TEACHER	Alexandra Rella		
PROJECT TITLE	<b>Going Green</b>		

## ABSTRACT

○My project had two goals: to find out what ordinary people could do to save energy and resources, and to find out which type of insulation worked the best (reflectics, fiberglass, soil, or none).

○The way the type of insulation was determined to be the best was by a test.

○First, I made some small wooden boxes, with thermometers in them. Next, I filled some larger cardboard boxes with each type of insulation I was testing. I left the box with no insulation in the open air.

○I then had to conduct my research. That was easy, because every one is scared of Global Warming now.

○From my Data Analysis, I learned that the soil was the best type of insulation. It held in the most heat, and released the least heat.

○There are many ways for ordinary people to help the environment. Some of them are turning off the lights, taking shorter showers, and washing more clothes per load. This project benefits the world by showing people how to reduce their carbon footprint.

<b>NAME(s)</b>	<b>Karla Burns</b>	<b>PROJECT NUMBER</b>	<b>B27</b>
<b>SCHOOL</b>	<b>Manchester Middle School</b>	<b>GRADE</b>	<b>8</b>
<b>TEACHER</b>	<b>Alexandra Rella</b>		
<b>PROJECT TITLE</b>	<b>How Our Olfactory System Works</b>		

### ABSTRACT

My project was to discover how your sense of smell works, where our scent preferences come from, and the accuracy of your sense of smell. I wanted to find out if we are born with a template of smells that we like or dislike. I also wanted to find out how we receive our preferences, and how to change them. Another thing that I researched was if the accuracy of our sense of smell differs depending on age and gender.

○To conduct my experiment, I researched information. I also tested 5 girls and 5 boys. To do this I had each person smell 10 canisters and guess which seasoning was inside. Once I tested everyone, I averaged the total score of the number of seasonings each gender guessed correctly.

○I discovered that scent molecules are trapped in the nasal cavity and perceived and sent to the brain. Our preferences for scents are based on associative learning, developmental factors, cultural differences, expectations/verbal illusions, and genetics. I also found out that your gender and age affect the accuracy of your sense of smell. My hypothesis was partially correct. I was incorrect thinking that men had a keener sense of smell than woman. But I was correct that olfactory receptors capture scent molecules. My project can benefit the world because people will know to be appreciative of their sense of smell.

<b>NAME(s)</b>	<b>Nicholas Casey</b>	<b>PROJECT NUMBER</b>	<b>C22</b>
<b>SCHOOL</b>	<b>Manchester Middle School</b>	<b>GRADE</b>	<b>8</b>
<b>TEACHER</b>	<b>Alexandra Rella</b>		
<b>PROJECT TITLE</b>	<b>Which Homemade Glue will hold more Weight?</b>		

### ABSTRACT

This project was to test 5 different varieties of homemade glues and if they can hold a certain amount of pressure. I started off with a recipe from familyeducation.com and altered it with different amounts of liquids. My goal for this project was for the glue to withstand 25 Lbs. All the thick materials that I used in the glue made it seem possible.

I got my recipes and started testing. I had 5 different glues to test: ¾ water; 2/3 water; ¾ milk; 2/3 milk; and 1/3 water with ¼ milk. I chose to alter the water to milk because one of the ingredients (white vinegar) curds and thickens the mix so I thought that it would help.

Too small an amount of liquid dried out the glue, and too much liquid caused it to have difficulty.

My question turned out to be true. It is possible to create glue that withstood 25 Lbs. My hypothesis was correct. I thought it was possible from the beginning because of the thick materials like corn syrup and cornstarch. This project will benefit the world for lower class families; if they cannot afford to buy glue they can make this homemade glue.

NAME(s)	Claire McLeish	PROJECT NUMBER	C05
SCHOOL	Manchester Middle School	GRADE	8
TEACHER	Alexandra Rella		
PROJECT TITLE	Pasteurization and the Process of Making Apple Cider		

### ABSTRACT

The purpose of this experiment was to discover what the most popular apple cider was. The different ciders were made from Gala, Macintosh, Granny Smith apples, or combination of the three. Another purpose was to find out what pasteurization is and to find out how someone can make their own homemade cider.

The first few procedural steps to make the ciders were to cut up one type of apple into pieces, to put the pieces into a food processor, then blend then up. After that, (using a pillow case) I squeezed the pulpy substance and put the juice into jars. After waiting 3-4 days, I stuck a tube into the bottle and into an empty pan and sucked on the tube. The juice flowed from one to the other. The last step was to pasteurize the juice. For the experiment procedure, I poured a bit of each type of apple cider into 20 cups and had test subjects rate it 1-5 (1 being that the person couldn't stand the taste and 5 being he/she loved it).

After testing, I found the average scores for each apple type. Macintosh cider got an average score of 4.5, Granny Smith cider score was 3.5, Gala had 3.1, and the Combination cider was 4.3.

My answer to the question was that Macintosh cider was the most popular. Pasteurization is the heating of something to 131-158 degrees Fahrenheit so that there won't be any harmful bacteria or microorganisms in it.

NAME(s)	Rachel Murphy	PROJECT NUMBER	S16
SCHOOL	Manchester Middle School	GRADE	8
TEACHER	Alexandra Rella		
PROJECT TITLE	Which do people prefer: Regular Foods or Healthy Alternatives?		

### ABSTRACT

The goal of this project was to discover if people prefer original foods or healthier counterparts by taste, research healthy foods, and create a healthy lifestyle to follow.

For my experiment, I tested ten students to determine if individuals prefer, by taste, original foods or their healthier counterparts. My experiment foods were 2% chocolate milk vs. chocolate Silk "milk", chocolate chips vs. carob chips, sugar cookies vs. Splenda cookies, breaded chicken nuggets vs. breaded soy protein nuggets, and spaghetti vs. spaghetti squash. For my research, I utilized the Internet and cookbooks, reviewing healthy recipes, grocery store chains, and other nutritional information. For my management plan, I interviewed vegetarians and nature food storeowners.

In my experiment, the total number of votes for the original foods was 39.5 and the healthier counterparts' total vote was 10.5. In my research, I learned new, healthy recipes, and ascertained that, from 1989 to 1993, the sales of healthier counterparts were greater than original foods' sales. I also achieved my goals by providing information for incorporating nutritional food choices and becoming a healthy vegetarian.

My project demonstrated that individuals prefer, by taste, original foods rather than their healthier counterparts. My hypothesis was invalid because I predicted that individuals favor, by taste, healthier counterparts, when in truth, individuals prefer, by taste, original foods. This project benefits the world because it can and should motivate food producers to create better-tasting healthy foods, and people can use my findings to eat healthier.

<b>NAME(s)</b>	<b>Margaret Schroeder</b>	<b>PROJECT NUMBER</b>	<b>B26</b>
<b>SCHOOL</b>	<b>Manchester Middle School</b>	<b>GRADE</b>	<b>8</b>
<b>TEACHER</b>	<b>Alexandra Rella</b>		
<b>PROJECT TITLE</b>	<b>The Process of Fermentation in Grapes</b>		

## ABSTRACT

My project was the process of fermentation. The foremost purpose of this project was to experience the full course of fermentation. I used my new knowledge and applied it to making wine from a wine kit from wineexpert.com. I took a vat of grape juice and sealed it off with a bung and airlock. Then, I added yeast, bentonite, and metabisulphite.

The ingredients above were used to emit carbon dioxide; except the yeast, the main chemical that affects fermentation. The yeast extracts sugar from the grape juice and turns it into alcohol. Then, the yeast, using the sugar as energy, expels carbon as waste. The wine can't be exposed to oxygen so you place a bung and airlock (a tube twisted in a "U" shape filled with water) on top of the vat so that the carbon dioxide can escape, while keeping the grape juice from oxygen.

I discovered that fermentation is a long complicated process. It involves lots of chemical reactions. Although the easiest way to understand this is this explanation: the yeast cells take the sugar in the grape juice and turn it into energy, which causes the sugar to turn into alcohol. My hypothesis was not so complicated. I thought that fermentation had to do with heat, but I learned that this was not valid. My project benefits the world because it helps people understand the complexity of fermentation, which people have used for centuries.

<b>NAME(s)</b>	<b>Giselle Veve</b>	<b>PROJECT NUMBER</b>	<b>B28</b>
<b>SCHOOL</b>	<b>South Burlington High School</b>	<b>GRADE</b>	<b>10</b>
<b>TEACHER</b>	<b>Curtis Belton</b>		
<b>PROJECT TITLE</b>	<b>Affects of Red Bull on the Human Body</b>		

## ABSTRACT

Energy drinks have affects on the human body in many different ways. I am going to test how Red Bull affects the human reaction time, blood pressure, and heart rate. The human subject will be tested for reaction time, blood pressure, and heart rate before they drink the Red Bull, 5 minutes after, 10 minutes, and 15 minutes after consuming one can. 25 people will be tested on how it affects them differently. Another 25 people will be tested with a controlled drink that has almost all the same components as Red Bull without the caffeine (Gatorade). This will show how the caffeine has either a big or small affect on the human body. I will also observe the people who naturally drink energy drink, to the people who do not normally drink them. This experiment will hopefully educate people how energy drinks affect the body.