

NAME(s)	Ethan Lawrence	PROJECT NUMBER	M01
SCHOOL	Green Mountain Union Middle/High School	GRADE	7
TEACHER	Mrs. Surma		
PROJECT TITLE	How Efficient are Power Lines?		

ABSTRACT

My project was, basically, to test out some copper wire's efficiency by shocking various lengths of wire with alternating volts. I wanted to find out how efficient power lines were.

○So, I gathered data by shocking various parts of a 5-meter long wire, alternating with 4.5 and 3 volts, attempting to be able to graph the amount of energy lost, with the amount of volts and the amount of meters playing together to help make a 2-variable formula.

○I ended up with some strange results. I deduce that there was a problem with the volt meter. You see, every number I got was larger than the actual volt input. However, this number did fluctuate as I tampered with length and voltage in a way that may suggest the volt meter is giving results that may be read as inversely proportional.

○Nonetheless, the data presented suggests that there is definitely a percentage of volts lost. From problems with the volt meter, and potential human error (none in particular, but let's just say it wasn't perfect.) I will rough - estimate that the amount of energy lost per meter is something like 1/5000, 2000 on the denominator there.

○Any information already known on the subject would be very appreciated

○Note that I have yet to come up with a formula. After I use a more accurate volt meter I should have some solid data, rather than just speculation.

NAME(s)	Aya AL-Namee	PROJECT NUMBER	G01
SCHOOL	South Burlington High School	GRADE	11
TEACHER	Curtis Belton		
PROJECT TITLE	The different levels of total suspended solids in water from different environments		

ABSTRACT

Total suspended solids (TSS) are organic and inorganic solid materials that suspend in the water. It is listed as conventional pollutant in the United States clean water act. Having high consternation of TTS in water makes the water warmer, which means less Oxygen is going to dissolves in the water, and limit the life of plants and animals in the water. For my research, I took samples of water from different streams: Potash Brook (urban site) and Snipe Island Brook (agricultural site). I used filters to separate the solids from the water and then weighed it and saw how much we have in milligrams for one liter of water (mg/L). My original hypothesis was that the agricultural site (Snipe Island brook) would have high level of TSS in the water samples because it didn't have any catchment basins. It also was surrounded by stones that could end up in the stream due to the run off process. For the urban site (Potash Brook) it would have low level of TSS because, it had catchment basin, and lack of small stones around the banks of the stream. I collected samples over the summer and at the beginning of winter when we had snow and rain storms. After taking eleven samples from both sites I started analyzing my data. For Snipe Island Brook, the level of TSS was significantly higher than Potash Brook, especially during storm events. This explains why Snipe Island didn't have any vegetation in the stream itself or small fish. Proving this, I now hope we can do something about this problem and stop the water pollution.

NAME(s)	Garrit Anderson	PROJECT NUMBER	C03
SCHOOL	Rutland High School	GRADE	11
TEACHER	Dawn Adams		
PROJECT TITLE	Luminol Reactions Involving Chemiluminescence		

ABSTRACT

Ever wonder how crime scene investigators find dried up blood, not seen by the naked eye, in crime scenes? It is done by the astounding and unique compound, called luminol. Luminol has been effectively used in crime scenes to locate blood for more than 40 years. It is an amazing compound that produces a reaction, when mixed with the right substances, to locate the iron in the hemoglobin in blood. When the iron is detected, the solution glows a bright blue color known as chemiluminescence, which allows investigators to discover the blood. This experiment will investigate the effect of temperature on the brightness of chemiluminescence (light energy) a luminal reaction it emits. The procedure contains three beakers that each have the same amount of materials, but have different temperatures of water. One beaker has hot water, another cold water, and the last is room temperature water, which is the control. Four trials are to be completed, and every material stays constant throughout the trials; therefore, there is only one variable being tested, water temperature. The dependent variable is the brightness and the independent variable is the water temperature. The results produced, show that the luminol reaction changed colors instead of brightness. Each beaker of solution had a different color. For the majority of the trials, cold water was light green, room water was aqua, and the hot water was dark green. Since the solutions changed colors, there has to be a reason why. There is a trend with different temperatures of solutions turning to different colors, which means a possible connection can be made. Cold water yields a slower reaction because the solution produces lighter colors, while hot water has a faster reaction because the solution produces darker colors.

NAME(s)	Mary Anderson, Abby Hart	PROJECT NUMBER	GP01
SCHOOL	Green Mountain Union Middle/High School	GRADE	7
TEACHER	Mrs. Surma		
PROJECT TITLE	Back 2 Back, Beat 2 Beat		

ABSTRACT

The purpose of our project was to find out if a person's pulse rate increases while listening to music. Our prediction was that when people are listening to music their heart rate will increase because normally people get energized when listening to music. To explore this hypothesis we randomly chose a group of middle school students to see if their heart rate increased while listening to music. Before the experiment we taught the students how to take their pulse. We had each student take their own pulse before and after the five songs. We gave them enough time for their heart rate to go back to normal after each song. We found that the student's heart rate went up while listening to music. We could apply the results of this project to real life by saying, when you're working out you will burn more calories when you listen to music on an iPod. Also in a hospital, if a patient is ill, and they need to raise their heartbeat, you should play music in the room.

NAME(s)	Patrick Asselin	PROJECT NUMBER	P21
SCHOOL	Homeschool	GRADE	8
TEACHER	Jean C. Asselin		
PROJECT TITLE	Pipe Insulation		

ABSTRACT

Purpose: To learn which pipe insulation provides the best resistance to heat coming off pipes and whether or not a non-commercial insulation can outperform a commercial insulation.

Hypothesis: I think that the fiberglass pipe wrap will do the best in the hot water experiment.

Procedures: I used fiberglass tubing, foam tubing, fiberglass pipe wrap, vinyl foam pipe wrap, plastic bags, a sweater, packing peanuts, men's wool suiting, and the control (nothing) for pipe insulation. I took one of the nine insulators and installed it on copper piping. Next pour 4000 ml of water that is 120 degrees Fahrenheit into the pipe. Put a cap on both ends of the pipe, but have a hole in one of the caps that is 3/16" wide. Place a small ball of plumbers putty on top of the hole in the cap and push the probe of a thermometer through the putty and into the hole. Record the temperature of the water in the pipe after every ten minutes for two hours. Repeat these steps for each insulation

Results: My results disproved my hypothesis. The men's wool suiting did the best, surpassing all commercial pipe insulations. The control expectedly did the worst, but the worst insulation was the vinyl foam wrap. These results probably came about because the men's wool fabric was wrapped around the pipes so much that it was thicker than any of the other of the insulators. If I ran that experiment again and used less suiting it probably would have had a lower score. The vinyl foam wrap was only 1/8 of an inch thick, but even with its reflective cover it couldn't insulate well. Maybe with a second layer the vinyl foam wrap would do better.

NAME(s)	Ashley Austin, Courtney Pollard	PROJECT NUMBER	GP20
SCHOOL	Green Mountain Union High School	GRADE	8
TEACHER	Allan Garvin		
PROJECT TITLE	Memorize This		

ABSTRACT

Memory is connected to how you remember things, like studying. This leads to the question; does remembering something hands-on easier than, seeing it visually? While using colored blocks you learn to see all aspects of the pattern. Therefore, we hypothesized that the hands-on pattern will be easier. We first put a pattern on a piece of paper in front of the person, they then had one minute to memorize the pattern, after one minute of waiting, we timed the person on how long it took them to draw it. We then did the same with a hands-on pattern. After averaging them out, the hands-on pattern was easier. This means that it took the least amount of time to draw.

NAME(s)	Emily Austin	PROJECT NUMBER	B33
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	Music and Heart Rate		

ABSTRACT

Your heart rate is the number of times your heart beats per minute. However, your heart rate is always changing. Many things can affect your heart rate, from running up the stairs, to hearing you have a big test tomorrow. Anything physical will change your heart rate, whether it's speeding it up while exercising, or slowing down while sleeping. But emotions will also change your heart rate. Some emotions, like anger or fear increase your heart rate, while things like depression and sadness lower it. What I would like to find out is whether music has any effect on the rate at which your heart beats. Music is a part of our everyday life, and comes in all types and tempos. I want to see if slow tempos will slow your heart rate and if fast tempos will speed it up. To answer my question, I asked 20 people to volunteer to listen to 2 songs and have their heart rate tested to see if there is any change. The songs were both classical, so that no words were involved, one being a very slow tempo, and the other being a fast one. Each person came and sat down until their heart reached a low point, which would be considered their resting heart rate. Then they listened to one of the songs and had their heart rate taken again to see if there was any change. This happened with both songs for each person. I am predicting that it is true that slow tempos decrease the heart rate, or at least keep it close to the resting heart rate, and that fast tempos will increase that heart rate.

NAME(s)	Elizabeth Backus	PROJECT NUMBER	G02
SCHOOL	South Burlington High School	GRADE	11
TEACHER	Curtis Belton		
PROJECT TITLE	Erosion control and water quality after Bartlett Brook cleaning		

ABSTRACT

Bartlett Brook runs from Shelburne into South Burlington before reaching Lake Champlain. A section just upstream of Allen Road was littered with debris from an old farm dump. Old cars and appliances were removed last spring leaving muddy exposed banks susceptible to erosion. This spring, appropriate vegetation will be planted on these banks. Sediment as a measurement of water quality can be measured in stream samples to determine if the erosion is being controlled. This study will be investigating if the control of erosion on the Bartlett Brook stream bank can be accomplished by planting appropriate vegetation and thereby measuring sediment quantity in the stream before and after the vegetation grows in the banks. Samples will be collected of the brook in the early spring when native vegetation is still dormant and again after the new plants have grown. Locations will be chosen for a variety of water samples from the brook in the region of the cleanup, downstream, and control samples upstream of the cleanup site. Samples will be collected from each location from two different types of flows. One will be when the stream has been settled down at least three days after it has rained, and the other will be during or shortly after a significant rainfall when the flow is higher since more erosion occurs when flow is higher. Water quality by sediment load will be determined by a lab through UVM or the State of Vermont Department of Health or possibly will be measured directly by allowing the water to evaporate and measure the sediment remaining or by passing the sample through a fine filter and measure the sediment collected.

NAME(s)	Josh Bank	PROJECT NUMBER	P01
SCHOOL	Green Mountain Union High School	GRADE	8
TEACHER	Allan Garvin		
PROJECT TITLE	Snowboard Flex		

ABSTRACT

Snowboarding is a sport that many people love and want to learn about. I am trying to figure out if the flexibility of a snowboard effect its agility. I think the more flex the board has the farther it will go. To solve this question I first found out how much flex each board had. Then I sent the snowboards down the hill and measured how far they went. My results show that the snowboard A went the farthest. This means that a snowboard with medium flex goes the farthest.

NAME(s)	Chester Barber	PROJECT NUMBER	P22
SCHOOL	The Renaissance School	GRADE	6
TEACHER	Eve Dubois		
PROJECT TITLE	Solar Concentration		

ABSTRACT

The question I investigated was if sunlight being concentrated onto a solar panel would be more efficient than just having a solar panel just facing toward the sun, and if it was, how much so. I thought that the sunlight being concentrated onto the solar panel would be more effective, because more light would be reflected onto the solar panel.

First I took a flexible piece of wood, wrapped it with tin foil, and tied a rope around it so if you pulled on the end of the rope, the board would bend. Before testing the rig with a solar panel, I put a piece of paper in front of the concentrator, and found the side facing the concentrator had significantly more light being concentrated onto it than the side just facing the sun by seeing how bright each side was.

I then proceeded to test with a solar panel. First I held it toward the sun, then toward the concentrator and kept track of how much electricity it produced. I discovered that even when it was partially cloudy and the light had gone through a window, the concentrator made the solar panel produce 10% more electricity than otherwise.

In my first outdoor test, the solar panel just facing toward the sun created .3 more volts than with the concentrator. One of the things making it not work well was the fact that the wind made the tin foil bulge, so I tested the next day. I also brought an umbrella to block the wind. Unfortunately, it still made less electricity using the concentrator by .3 volts. I tried bending the board more so and found that with the concentrator, it created .35 more volts than before, thus making .05 more volts than having it face toward the sun.

NAME(s)	Patience Bearse	PROJECT NUMBER	C04
SCHOOL	Weathersfield School	GRADE	8
TEACHER	David E. Lambert		
PROJECT TITLE	Do Different Additives in Cow Manure Increase Its Level of Methane?		

ABSTRACT

The problem to investigate in this experiment is "Does the level of methane in cow manure increase with additives?" These additives are carrot peelings and mashed banana. Biogas is a combination of carbon dioxide, methane, and hydrogen. In most cases, manure is used to create a renewable fuel. It is processed into this fuel by putting the manure in an air-tight holding tank. The manure is stored in water to help the fermenting process for twenty-one days. The gas collected from the fermented manure is then taken and processed into an energy that can be used in cars and homes. I chose this project because I wanted to learn more about renewable, alternative energy.

○ In this experiment, the "holding tank" is a plastic, twenty-ounce bottle and the gas collector is a balloon which is duct-taped to the top of the bottle opening.

In my hypothesis for this experiment, I predicted that the trial with the mashed banana would create the most gas and expand the balloon the most.

○ To conduct this experiment, one hundred grams of cow manure is placed into three, twenty-ounce bottles, and are filled with distilled water, capped with a balloon, and secured with duct tape. These same steps are repeated but instead of using one hundred grams of cow manure, the amount is split into two of fifty grams of carrot peelings and fifty grams of cow manure. These three bottles are again topped with distilled water and capped with a balloon and duct tape on each one. These last steps are repeated three times but with mashed banana. The procedure is then repeated to have the best results to configure a sensible average.

○ The major observations taken during this experiment were that there was no smell. This was because the bottles were sealed to prevent escape of gases.

NAME(s)	Tecate Beaumier	PROJECT NUMBER	C05
SCHOOL	Avalon Triumvirate Academy	GRADE	6
TEACHER	Amanda F. Gifford, Administrator		
PROJECT TITLE	Odd oxidation		

ABSTRACT

Oxidation is when oxygen and a metal combine. Carbon Dioxide is released during oxidation. Iron oxidizes faster in the presence of electrolytes and even faster when in combination with low pH. Water has a pH of 7. Orange juice has a pH of 6. Milk has a pH of 7.2. Iron is used often in cooking pots and storage containers, so understanding how iron oxidizes will help you not lose what you are cooking or storing.

In this experiment the oxidation effects of water, milk, and orange juice on iron nails were tested. The water caused oxidation on the nails, the milk and orange juice did not.

It is believed this experiment was faulty because of the natural impurities of tap water and because the milk spoiled. It is also possible that the rust blended in with the color of the orange juice.

When shipping these things long distances, iron containers would be unwise, or should be treated to make them rust resistant.

NAME(s)	Lihu Ben-Ezri Ravin	PROJECT NUMBER	G03
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	The Effect of Road Proximity on Soil and Snow pH		

ABSTRACT

The quality of soil and precipitation has a very large effect on the environment. Poor soil can mean the death of many, if not all, organisms in an ecosystem. One measure of soil and precipitation quality is pH. While there are some organisms which are adapted to acidic or alkaline soils, large changes in the acidity of an organism's environment can be devastating. For my study, I attempted to find the effect of a road on the pH of its surroundings. I first went to three different roads with similar amounts of traffic. I then took samples of both snow and soil at 1m, 10m, and 50m from each road and tested the pH of all the samples. My hypothesis was that both the soil and snow would get more acidic as proximity to the road increased, because runoff from the road would be acidic, and therefore make the snow and soil around it more acidic. So far, my results have proven me wrong. While the differences are very slight, all three roads show a slight tendency towards a more alkaline soil pH nearer to the road, and a neutral pH farther from it. However, the differences are too small to lead to any definite conclusions as of now. The results of the snow pH testing showed similar results as the soil testing, but have an even smaller difference between the snow close to the road and the snow far away from it. My data, thus far, are inconclusive.

NAME(s)	Maia Bertrand, Delaney Thomas	PROJECT NUMBER	GP18
SCHOOL	Hinesburg Community School	GRADE	7
TEACHER	Stephanie Konowitz		
PROJECT TITLE	Color Memory		

ABSTRACT

The purpose of this experiment was to find out if you would remember bright colors better than dark colors, and if that was true teachers would highlight important facts in bright colors so students would remember them. Because bright colors stand out and dark colors don't and since you tend to remember things that stand out the best, our hypotheses was that the bright colors would be remembered the best. We had people memorize numbers. Half of them were highlighted so that the background was bright yellow and the backgrounds of the others were grey. After distracting them we had them recite the numbers in the correct order. The hypothesis was correct. The average score for the bright background was 61%, the average for the dark background was 48%. In the follow up experiment we would test more people and in a quiet area. Instead of making the backgrounds bright or dark we would make the numbers bright or dark.

NAME(s)	Victoria Bespalov	PROJECT NUMBER	B34
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	Splenda and Sugar on Fruit Flies		

ABSTRACT

Splenda, or sucralose, is a zero calorie sweetener, or sugar substitute. It can be used in beverages, desserts, syrups, baked goods, canned fruits, dairy products and condiments. All artificial sweeteners have had problems that appear to be connected to multiple sclerosis, diabetes, lupus, and other degenerative diseases. Problems that affected some people after eating Splenda were weight gain, sleep disturbances, sexual dysfunctions, and an increased risk of cancer.

Fruit flies, or *Drosophila melanogaster*, are attracted to ripened or fermenting fruits and vegetables. They usually aren't greater than 2.5 millimeters long, which are the females, and males are slightly smaller. They have red eyes, yellow- brown body color, and transverse black wings on their back. Fruit flies are similar to humans because of their genetic code. About 75% of known human diseases have a match in the genetic code of fruit flies. They are also being used to study things like immunity, diabetes, cancer, and drug abuse.

NAME(s)	Daniel Biebuyck	PROJECT NUMBER	C06
SCHOOL		GRADE	10
TEACHER	Deb Hathaway		
PROJECT TITLE	How much vitamin C islost under light?		

ABSTRACT

The purpose of this science experiment was to compare how light bulbs of different wattages affect how much vitamin C is lost from orange juice. People should care because if they don't get enough vitamin C, they could become sick. If people leave their orange juice out in the light, it could lose some of its vitamin C and people would not get as much of it when they drink the orange juice. If orange juice is exposed to a stronger light bulb (a light bulb of a higher wattage) then vitamin C in it will break down more than if it exposed to a weaker light bulb. There were equal amounts of orange juice poured into different cups and placed under light bulbs with different wattages for two hours each in the first trial, and for four hours each in the second trial. After that, each of the cups was titrated with indophenol to compare the amount of vitamin C that was still in the cups. The conclusion of this experiment was that the higher wattage light bulb would make the orange juice lose more vitamin C.

NAME(s)	Brittany Bissonette	PROJECT NUMBER	S01
SCHOOL	Hinesburg Community School	GRADE	8
TEACHER	Stephanie Konowitz		
PROJECT TITLE	Childproof: Fact or fiction		

ABSTRACT

A child's brain is grown differently, depending on what kind of food that the child is given, it increases the IQ of the child therefore it would be easier for them to open the containers. Also 75% of the child's brain is grown in their first 6 years of life so that means that the children have a larger brain at a younger age. So children's brains are all very different. None are the same. This experiment was designed to determine if age impacted the ability to open childproof containers. Four medicine bottles were given to each child. They were then given 30 seconds to open each container, depending on the child, they would either open it or not open it.

The results of my experiment were positive. I thought that the older the child is, the easier it would be to open the containers. My data showed that it was true. Although each child opened the container at about the same time, the older children seemed to be able to open it quicker than the younger kids. Also, the younger children seemed to get more frustrated about the situation than the older kids. This shows that the older kids also have more experience and knowledge to be able to open the containers. So, childproof containers do in fact work. This explains why older children are more able to open the containers than the younger children, because they have more knowledge, and childproof only works on a certain age group.

NAME(s)	Haley Bliss	PROJECT NUMBER	B35
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	The Ability of Music to Induce the Relaxation Response in Adolescents		

ABSTRACT

New research in the field of music therapy is showing the profound effect that music has on the body and the psyche. Music is now being used to ward off depression, relieve pain, and help cancer patients. It has been proven to affect breathing and heart rate and to physically relax the body by inducing the relaxation response. For my research I decided to test the effect of slow relaxing music on the body by measuring respiration rate, heart rate, and blood pressure. I had 20 test subjects with six trials per subject. My original hypothesis was that the subject's blood pressure, heart rate, and respiration rate would lower from their resting rates more significantly after sitting while listening to music than while sitting silently. For the control of the experiment, I took each subject's blood pressure and heart rate immediately after sitting down, and measured their respiration rate for 30 seconds. After 1 minute of sitting in silence, I took their respiration rate again, and after 2 minutes I took their blood pressure and heart rate again. I repeated this trial three times with each subject. I repeated this process for the experimental trials, except that after taking the respiration rate for the first time; I had them listen to the relaxing song instead of sit in silence. I also repeated the experimental trials three times with each subject. To analyze my data, I will average the changes in blood pressure, heart rate and respiration rate in both my control trials and my experimental trials. I will then compare the control data to the experimental data and determine whether the difference in the averages is significant. From this I will determine whether my results support or refute my hypothesis.

NAME(s)	Leah Bodin	PROJECT NUMBER	P23
SCHOOL	Green Mountain Union High School	GRADE	8
TEACHER	Allan Garvin		
PROJECT TITLE	Wind Power: Is Bigger Better?		

ABSTRACT

Windmills are an important source of alternative energy, but have often been avoided because of their size. This led me to wonder, does size affect the efficiency of a windmill? My hypothesis was that the size would in fact not affect the efficiency of a windmill. I tested this by determining how much mass windmills of different sizes could lift. My results showed that with low and medium wind speeds there was not much of a difference in efficiency. But with high wind speeds, the windmills grew more efficient with size. This showed that unless someone lives in an area with high wind speeds, multiple smaller windmills would work almost just as well.

NAME(s)	Blake Bohlig	PROJECT NUMBER	B36
SCHOOL	Rutland High School	GRADE	11
TEACHER	Tim Gilbert		
PROJECT TITLE	Do Longer Toes Make Faster Sprinters?		

ABSTRACT

My science fair experiment was to answer the question, Do longer toes make faster sprinters? I hypothesized that people with longer toes would be able to sprint faster because having longer toes would allow them to keep in contact with the ground for a longer amount of time, therefore giving the sprinter more momentum û a key to running fast. I conducted my experiment by first gathering about thirty runners from the track team, so that they were all trying equally hard to sprint and they all had about equal athletic ability. Then, I had them sprint a 55-meter dash. Finally, I recorded the time, in seconds, that it took each runner to complete the dash and the toe length of each runner, in inches from the base of the longest toe to the tip. I found out that as the time decreased (or a speed increased), generally, the length of the runner's toe was longer. The line of best fit on my graphed proved that the belief that longer toes make faster sprinters was true, for the slope is negative, which means the faster the runner, the longer toe length.

○All in all, I concluded that people with longer toes are able to sprint faster. There were a few instances in my experiment where a shorter toe belonged to a faster sprinter. These few outliers, I deemed, were due to experimental error of all sprinters not being at the same point in their training and the events that happened to the sprinter that day such as injuries or personal events. In the majority of the cases however, my hypothesis proved correct and is supported by my data and charts.

NAME(s)	Curtis Bourque	PROJECT NUMBER	P02
SCHOOL	Rutland High School	GRADE	11
TEACHER	Susan Ponto		
PROJECT TITLE	The Ups and Downs of Skateboarding		

ABSTRACT

For my science fair experiment, I conducted a test to see whether or not foot placement affects the height of a skateboarder's ollie. I hypothesized that the best method would be the traditional method of foot placement. The traditional way to ollie is by placing the rider's front foot in the middle of the board and the back foot with the maximum amount of coverage as possible on the tail. This would be my control.

To do this experiment, I used a skateboard and a thirty inch high measuring board. I tested nine over all foot placements. This included three variables for each foot (front and back) and all possible combinations. I used video to capture the height of my jumps for each trial to try to be as accurate as possible. I ran repeated tests to allow for an average to be calculated.

Upon reviewing my results, I concluded that the traditional placement, on average, is the best way to go about performing big ollies on one's skateboard. From doing this experiment I learned that many popular beliefs towards skateboarding techniques can work and may permit a rider to get succeed in their ollie, but the traditional way is much easier and more efficient.

NAME(s)	Matt Bouvier	PROJECT NUMBER	S02
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Mr. Curtis Belton		
PROJECT TITLE	Subliminal Messaging		

ABSTRACT

People have been interested in subliminal messaging since 1897 when Doctor E.W. Scripture wrote The New Psychology which was the first real text that talked about and explained what subliminal messaging is. A subliminal message is a very subtle message that is unnoticed by the conscious mind and is absorbed by the subconscious. In 1957, the famous experiment done by James Vicary gave the nation a big scare because according to Vicary's results, by flashing words for 3/1000's of a second, which is too fast for the human eye to pick up, people will do whatever the words say. Later he admitted that he forged his data, but it didn't stop the government from banning any kind of subliminal messaging in advertising or television. In my experiment I will have 50 test subjects to test whether or not the subconscious mind can comprehend the connotation of words, positive, negative, or neutral. I will flash words on a screen one at a time at 3/1000's of a second. The subjects will, after every word, record whether they thought the word was positive, negative, or neutral. While analyzing the data, I will look for clear results that the subconscious can pick up the connotations of words without the conscious mind noticing. I will use the T-test to determine a positive or negative result.

NAME(s)	Brendan Bucksbaum	PROJECT NUMBER	B37
SCHOOL	Rutland High School	GRADE	11
TEACHER	Mr. Gilbert		
PROJECT TITLE	Will position of the wrist aid in the strength of the hand		

ABSTRACT

○The purpose of the experiment was to determine which position of the wrist would aid in the strength of the hand. My hypothesis was that the neutral position would be the strongest position. My reasoning was that in the neutral position the muscles have a greater potential for contraction. I used a dynamometer to help measure fifteen subjects in all three positions. I needed to measure it three times in each position for each subject in order to make sure of the results. I finally concluded that the neutral position was the strongest of the positions. However I was surprised by the extension position. I thought the extension (60 degrees up) was going to be the weakest of the three positions but it was flexion (60 degrees down). This was surprising because when thinking about the experiment and the muscles of the arm I remembered the arm muscles should be stretched out the most in flexion and contracted the most in extension. The results of my experiment helped me make a second conclusion that a contracted arm muscles is stronger than an elongated muscle. The experiment was extremely fun and others should try it especially if they are interested in a medical field.

NAME(s)	Maria Burt, Alex Duval, Michael Gose	PROJECT NUMBER	GP04
SCHOOL	Fair Haven Union High School	GRADE	10
TEACHER	Michael Schwaner		
PROJECT TITLE	Honey I Shrunk the Fries		

ABSTRACT

Osmosis is the diffusion of water through a somewhat permeable membrane. More specifically, it is the movement of water across a semi-permeable membrane from an area of low solute concentration to an area of high solute concentration. This is a physical process in which a solvent moves, without input of energy, across a membrane, separating two solutions of different concentrations. Osmosis releases energy, and can be made to do work. As our project we studied the existence of osmosis in potatoes. Potato osmosis may not seem like an important or interesting concept to study, but as we did this experiment we found it enjoyable because we were learning about something that we had never investigated before. As biology students, this project was important because it involved the process of discovering whether or not a certain concept existed in a particular organism. Therefore, the problem we attempted to solve was whether or not osmosis exists in potatoes. Upon beginning the project, we hypothesized the existence of osmosis in potatoes. In order to complete this experiment, we followed a procedure that involved measuring our potato slices (commonly referred to as french fries during the course of our project) first, letting them soak for a period of time, and then measuring the potatoes again after soaking. Our variable was the amount of salt in the water solutions our french fries were soaking in. The answer to this problem simply was that osmosis does in fact occur in potatoes.

NAME(s)	Jonathan Buzzell	PROJECT NUMBER	C07
SCHOOL	Hinesburg Community School	GRADE	7
TEACHER	Stephanie Konowitz		
PROJECT TITLE	The Egg Crusher		

ABSTRACT

There is a difference in what commercial chickens are fed and what organic chickens are fed. The difference is that the commercial chickens have growth hormones and steroids added to the feed so the eggs shells are softer than the organic eggs are. These drugs help the chickens produce eggs at a faster rate then an organic chicken. This experiment was put together to figure out if the organic eggs are harder to break because they don't have drugs injected into them and drugs in their food. An egg, either commercial or organic was placed under my egg breaking mechanism. I then added weights until the egg broke. I did this 10 times for each type of egg. The results how that the commercial eggs are harder to break because they don't have any drugs directly injected into them or any drugs in the food they eat.

NAME(s)	Stephanie Carmichael	PROJECT NUMBER	B01
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	Test for Toxicity in Soil		

ABSTRACT

Road Salt is a common solution for de-icing roads in Vermont. Many plants are salt intolerant, including lettuce. These plants can die if they come in contact with too much road salt. For my experiment, I decided to collect sample from three different areas that would have come in contact with salt. For my two controls, I used both distilled water and distilled water mixed with road salt for a salinity of seven part per thousand. I collected the sample form Lake Champlain at Oakledge Park, Twin Oaks Terrace, above Potash Brook and a storm drain located on Hayes Avenue. My hypothesis is that the plants watered with the distilled water and the water form the lake will grow the most and the healthiest plants. Also that the plants watered with the water I collected from Twin Oaks Terrace and the storm drain will cause the plants to grow but not be as healthy or tall. Finally, I hypothesize that the plants watered with the salt solution of seven ppt will not grow at all. I planted five pots for each test site and control. For each test site, two plants were watered with distilled water until they germinated and then were switched to the water sample I collected. While the other three from the same group I watered with the sample I collected immediately. For my controls, I watered three plants with distilled water from the beginning then after they germinated I switched one to the salt water solution. The other two plants I watered with the salt water solution form the time they were planted. So far, the data I have collected shows that part of my hypothesis was correct. The two plants that I watered with the salt water solution from the beginning did not germinate.

NAME(s)	Thomas Clayton	PROJECT NUMBER	P24
SCHOOL	Hlnesburg Community School	GRADE	8
TEACHER	Stephanie Konowitz		
PROJECT TITLE	Watts Going On		

ABSTRACT

Energy efficiency is using less energy to provide the same level of energy service. This experiment was designed to determined if my house or my grandparents house had more efficient appliances. The outcome might help find out what kinds of appliances use less energy and if so what brand they are. A Watt meter was used to measure the amount of energy used in various appliances in two different households. The same type of appliances were used in each household although they varied in brands and size:TV, Dehumidifier, Clock/Radio, and a Computer. The Watt meter was hooked up for an hour and then the amount of energy used was collected from the Watt meter.

The amount of energy usage was very easily found that my family's appliances use much less energy than my Grandparents. My family uses 29.5 cents less per hour if all the five appliances were on, then my Grandparents spend. My five appliances wattage use per hour was about 60% less than my Grandparent's house. From this I concluded that new appliances use less energy than older less efficient appliances.

NAME(s)	Emily Coffin, Sunny Drescher	PROJECT NUMBER	GP16
SCHOOL	Hinesburg Community School	GRADE	7
TEACHER	Stephanie Konowitz		
PROJECT TITLE	Align with Spine		

ABSTRACT

It is a proven fact that yoga balls improve posture by aligning your spine correctly because your spine is connected to your brain. Also, if your spine is misaligned, it can lead to muscle spasms and other brain defections. This experiment was designed to determine whether or not good posture affects visual memory. The outcome may help students score better on a test if they are sitting with better posture.

We asked a few students to take a memory test consisting of studying 20 pictures of commonplace items for about a minute and then trying to remember as many as possible by writing them down. Half of the students sat on desk chairs and the other half sat on yoga balls, trying to keep the best posture they could. Then we repeated the experiment as necessary.

Our results showed that when the students sat on a yoga ball, the average score for all of the students that we tested on the memory test was 47.25% while the students sitting on desk chair remembered about 46.9%. Although this isn't a huge difference between the two categories, it was very beneficial for some grades but not all (we tested 3-6 graders). When we separated the results by gender, sitting on yoga balls seemed to help girls more than boys. We agree that sitting on a yoga ball improves visual memory because our results confirmed that.

NAME(s)	Alix Cohen	PROJECT NUMBER	C08
SCHOOL	Rutland High School	GRADE	11
TEACHER	Dawn Adams		
PROJECT TITLE	Water is Water is Water		

ABSTRACT

This project measures the Total Dissolved Solutes (TDS) of six different types of spring, well, and purified water using a TDS meter. The hypothesis states that spring water will contain the highest amounts of total dissolved solids. Given the results, spring water had the highest TDS of 127.42 ppm. Well water had a TDS lower than that of spring water, however not significantly lower with a TDS of 102.91 ppm. Finally, purified water had a total average TDS of 40.28 ppm. The hypothesis is accepted because spring water had the highest TDS of the types of water. This is due to the way that the spring water is processed. Spring water has the highest level of TDS for it spends the most time in the ground. Spring water is cleansed by the rocks, dirt and other natural substances in the ground where it spends most of its time. Well water still spends time in the ground but is taken directly from far below the ground's surface. It still spends time collecting these inorganic molecules but does not travel through sediment picking up more inorganic molecules. For purified water, the water is purified to remove the molecules that attach to the water which leads to a lower TDS. Determining the amount of TDS in water samples is important because the lower the TDS, the more hydrating to the cells. However, higher the TDS, the more minerals the water contains and many people believe leads to a different, deeper taste. This experiment allows one to look at water in a completely new manner seeing the chemical makeup of what they are drinking and what else is in it.

NAME(s)	James Collins	PROJECT NUMBER	P04
SCHOOL	Rutland High School	GRADE	12
TEACHER	Deb Hathaway		
PROJECT TITLE	Arson and acoustics		

ABSTRACT

For over one hundred years, there have been records of the possibility that sound waves could be able to extinguish fire. It started with Irish scientist John Tyndall in the late 1950's, and had continued to be tested today by a variety of programs and universities and even the popular Mythbusters show. The intent of this project was to test this hypothesis with more common household sound equipment, rather than specialized equipment. A subwoofer built for use with home computers was used, and music was played at two candles from it at the highest volume possible. Along with the movement on the flame, also recorded were the qualities (in bit rates) and each song's relative power in what the University of Georgia study had decided was the most effective frequency range. The candles were never extinguished, and there was no apparent correlation between quality or power in the chosen frequency range. However, the movement of the flame did show that sound waves do have an effect on fire. This shows that using sound waves to extinguish fire is a definite possibility in the future.

NAME(s)	Shannon Collins	PROJECT NUMBER	P03
SCHOOL	Mater Christi School	GRADE	8
TEACHER	Ms. Michelle Donlon		
PROJECT TITLE	Catapulting Spheres		

ABSTRACT

The purpose of this experiment was to prove that by changing the angle of a launch, the distance a plastic ball travels would fluctuate. The hypothesis stated that the ball would travel the farthest when launched from the smallest angle. Background research showed that a similar project had been done by throwing different types of balls at a target. The experimenters covered the balls in crushed chalk to measure exactly where the ball landed.

The chalk method was to be incorporated into the procedure of this project, but having volunteers view the landing point of the ball was much easier. Minor adjustments had to be made during the testing process. A protractor was taped to the edge of the launch to determine its angle. The protractor had to stay at the same location every time and the individual had to read the protractor consistently at eye level.

The plastic ball was launched five times from each of the four angles and the distances the ball traveled, measured in inches, were observed. Two outliers from each angle were removed to verify accurate results and the remaining three trials were averaged so a conclusion could be made.

The outcome of the experiment showed that the hypothesis, which declared that the ball would travel farthest with the smallest angle, was true. At the smallest angle of the launch, the compression of the spring was greater and created more force; therefore, the ball went farther than from any of the other angles.

NAME(s)	Emily Comstock	PROJECT NUMBER	P05
SCHOOL	Green Mountain Union High School	GRADE	8
TEACHER	Allan Garvin		
PROJECT TITLE	The Sound of Music		

ABSTRACT

A clarinet player's reeds are vital in order to play good music. The question is though, which reed out of Traditional Vandoren, trained (or broken in) Traditional Vandoren, Rico Royal, or trained Rico Royal reeds produces a better sound? Vandoren reeds are expensive and French, while Rico's are cheap, American, and recommended for beginners. For those reasons, I hypothesized that the trained Traditional Vandoren reeds would produce a better sound over the regular Traditional Vandorens, Rico Royal, and trained Rico Royal. To test this, judges scored each reed by comparing it to another reed from a different type. In the end, the untrained Rico Royal reeds were the most preferred and Vandoren's were the least. This proves that the regular Rico Royal's had the best sound, and that the expensive French reeds were not as good as believed.

NAME(s)	Ty Connaway, Carrie LeBeau	PROJECT NUMBER	GP12
SCHOOL	Christ the King Burlington	GRADE	7
TEACHER	Mrs. Srivastava		
PROJECT TITLE	Is It Hot Or Not		

ABSTRACT

In our experiment, we tested which insulation would be better for conserving heat within a home. In proceeding with this project, we discovered the properties that insulation contains, and that damage the environment.

To do this, we built two models of a house: one with Styrofoam Insulation and the other with Batten Insulation. We tested them in two runs, and found the Styrofoam is better for heating than the Batten.

The environment is the main problem in inventing different substances with unusual chemicals. When we did some research, we came to the conclusion that the Batten Insulation is better for the environment than the Styrofoam Insulation because the Batten Insulation can be more likely to decay in the ground, while the Styrofoam would be expected to stay its present form.

All in all, new creations have the potential to pollute the environment in some way. Even when the costly house insulation works better, the less expensive one may be to some extent better for the environment, according to our findings.

NAME(s)	Kyle Cooke	PROJECT NUMBER	B15
SCHOOL	Main Street Middle School	GRADE	7
TEACHER	Daisy Williams		
PROJECT TITLE	How many colonies of germs and bacteria are present in school water obtained from various		

ABSTRACT

Students may expect school water to be clean, but is it? This experiment studied the question of how many dangerous bacteria colonies were present in the school drinking water and the pH levels as compared to purchased bottled water.

Water was collected from three sources within the school using sterile containers. The water was tested for potentially dangerous bacteria by mixing the water from each source with solution from an EPA approved professional water testing kit. After waiting the required 48 hour incubation period, the bacteria colonies were counted using the human eye and verified by a volunteer assistant. The pH level was also tested using a test strip from the same testing kit.

There were zero colonies present in any of the school water sources and zero in the bottled water as well. The pH levels of all water sources were 7.

I can conclude that the school water and bottled water contained no dangerous bacteria and is within the preferred pH level for taste and corrosion prevention. Research indicates that pH levels do not present a health hazard but does affect taste. Levels greater than a pH of 7 affect taste and lower than 7 may present a corrosion issue. The test kit did not specify an all-inclusive list of bacteria colonies that were able to be detected therefore, I am not able to conclude with absolute certainty the water is completely bacteria free, only that it is safe to drink.

NAME(s)	Leah Cunningham	PROJECT NUMBER	S03
SCHOOL	Green Mountain Union High School	GRADE	8
TEACHER	Allan Garvin		
PROJECT TITLE	Buy Local: Organic vs. Nonorganic Foods		

ABSTRACT

The difference between organic foods and non-organic are quite distinct. Can people really tell the difference between organic and non-organic foods? People who eat organic foods on a regular basis will be able to tell the difference between the two foods better than anybody else. In a taste test, with twenty-two people, they tasted two different foods; one being organic and the other non-organic. They were then asked which one they alleged to be organic. The fact that only a few people actually eat organically made my results rather biased, and not follow my hypothesis. The result being that those who ate organically got the same average of foods identified correctly as those who don't.

NAME(s)	TJ Dellipriscoli, Ian Browning,	PROJECT NUMBER	GP06
SCHOOL	Main Street Middle School	GRADE	8
TEACHER	Daisy Williams		
PROJECT TITLE	The effect of temperature on the explosion of dry ice bombs.		

ABSTRACT

The purpose of this project is to teach people about how Carbon Capture and Storage could save our environment. We decided to pick this topic because it is an important topic today because of the situation that our environment is in. Our main focus was on the possibilities of the coal beds that methane and CO2 are being stored in exploding and harming the safety of human and nature. To simulate these results, we used 50 ml of dry ice in 8 ounce bottles placed into 26 cups of water that was a certain temperature and timed how long it took methane to explode at six different temperatures. We thought that a higher temperature will cause a quicker explosion. In our results, the higher water temperatures caused a quicker explosion. For each temperature increase, the time it took to explode decreased. Our times were 240 seconds, 184 seconds, 135 seconds, 121 seconds, 98 seconds, and 87 seconds. As you can see, the difference in the times started to decrease. Our hypothesis was supported because it did take less seconds to explode at higher temperatures. This happens because of the melting of the dry ice into a gas that expands the plastic bottle. This data is very helpful to carbon capture and storage engineers who need to know the right depth for the coal beds to go underground. If they are too close to the core or mantle of the earth, the methane will get heated up rapidly and cause major destructive forces.

NAME(s)	Nevil Desai	PROJECT NUMBER	G04
SCHOOL	Fredrick Tuttle Middle School	GRADE	6
TEACHER	Mr.Belton		
PROJECT TITLE	Effect of motor oil on a plant		

ABSTRACT

My experiment was the effect of motor oil on a plant. The main question was if motor oil effects the germination of the plant. Motor oil kills the germination so the plant cannot grow or stay healthy anymore. Other liquids go straight to the bottom of the plant leaving no effect, but motor oil goes to the bottom also soaking the roots. Instead of sucking up water it sucks up motor oil. The chemicals then go into the plant and make the germination process stop. When a new seed is drenched with oil it will die but a tree would have a chance because the outer layer is stronger and only sucks in water. If someone cleans it before the motor oil goes into it then it will live. Most of this wouldn't happen because cars which leak leave a long trail of motor oil. When it rains the water will pick it up. Then the oil will go to the lake, polluting the lake and plants that are in the stream. Once this happens the plants will stay polluted with motor oil and will keep soaking the stream with it. As you can see motor oil affects a plants germination process and even a full grown tree. The average amount of motor oil that goes in a plant from a downpour is about a one fourth of a cup which can kill a plant in a matter of days. Hydrocarbon fraction is the main source of death in the plants germination because this with other chemicals act as source of a liquid but the plant thinks its water when it is really killing it. In conclusion when a plant is poured with an amount of motor oil it will not germinate.

NAME(s)	Pooja Desai	PROJECT NUMBER	B16
SCHOOL	South Burlington High School	GRADE	11
TEACHER	Curtis Belton		
PROJECT TITLE	The Effect of Injecting Stem Cells into Cadaveric De-cellularized Lungs		

ABSTRACT

Cystic Fibrosis and Emphysema are two of the most common fatal lung diseases in the world today. Along with Pulmonary fibrosis, these diseases all have no cure and are a leading cause of death for people all over the world. They all cause difficulty breathing and ultimately lead to lung failure and death. Although they can be monitored and there are treatment options, there is no approach that can cure these diseases. If the patient is healthy enough there is the option of having lung transplantation. The problem with lung transplants is that there will never be enough lung donors to meet the current and future transplantation needs. With an increase in lung transplantations in the past few years, there simply aren't enough lungs to go around to all of the patients. I hypothesize that new lungs can be created by injecting stem cells into de-cellularized cadaveric lungs. The de-cellularization process will remove the antigens responsible for immune rejection. If the de-cellularization process is conducted correctly, the lungs will maintain their original structure, their extracellular matrix, their protein composition, and their pulmonary vascular network. By inserting embryonic, adult, or induced pluripotent stem cells into the de-cellularized lungs, my prediction is that functional lung tissue can be produced. I will be using mice lungs for my experiments. Protocols from the University of Vermont will be used to correctly dissect, de-cellularize, and re-cellularize the lungs. The lungs will also be mechanically ventilated using a FlexiVent device (a device that expands and contracts the lungs). This ventilator will reenact breathing and will apply certain amounts of pressure in the lungs. If this hypothesis is correct these results can be used to potentially create a limitless supply of donor cadaveric lungs for transplantations.

NAME(s)	<u>Margie DesLauriers</u>	PROJECT NUMBER	<u>P06</u>
SCHOOL	<u>Green Mountain Union High School</u>	GRADE	<u>8</u>
TEACHER	<u>Allan Garvin</u>		
PROJECT TITLE	<u>Alternative Building Materials vs. Wood</u>		

ABSTRACT

My Topic is Alternative Materials vs. Wood. Can alternative materials hold as much weight as pure wood? My hypothesis was that the half pressed sawdust/half plastic piece, would be the strongest piece. I put the weight into the bucket that was hanging from the material. Then I measured the deflection from the weight. My results were that the cedar wood was the strongest piece. The results mean that my hypothesis was not correct and that cedar wood was the strongest and that alternative materials can hold the same amount of weight as wood but, with a greater amount of deflection.

NAME(s)	<u>Fleur Diambou</u>	PROJECT NUMBER	<u>C09</u>
SCHOOL	<u>St. Francis Xavier School</u>	GRADE	<u>7</u>
TEACHER	<u>Mrs. Mary Ellen Varhue</u>		
PROJECT TITLE	<u>Staining</u>		

ABSTRACT

Purpose:
To see if baking soda, vinegar or detergent would best remove stains.

Hypothesis:
I thought that the detergent would remove stains the best.

Procedure:
I put half a teaspoon of ketchup on 7 squares of cotton. I left all the stains undisturbed for 24 hours. Then I put a teaspoon of detergent on 2 of the stains, 2 teaspoons of vinegar on 2 of the stains, 2 teaspoons of baking soda on 2 of the stains, and finally 2 teaspoons of water on the last stain. I waited 15 minutes. Next, I scrubbed each stain 5 times lightly. Then I repeated these steps using ink, grape juice and mustard. Then I compared all 28 squares to see which one had removed the stains the best.

Results:
I found that the detergent washed three out of four of the stains the best. I also found out that vinegar is the weakest stain remover.

Conclusion:
My hypothesis was half right because I said that the detergent would wash all stains the best, but it only washed 3 out of 4 stains the best.

NAME(s)	Mike Divis	PROJECT NUMBER	P07
SCHOOL	Rutland High School	GRADE	11
TEACHER	Susan Ponto		
PROJECT TITLE	Tennis Racket Physics		

ABSTRACT

Tennis is a passion of mine. That is why the physics interested me. My hypothesis for this experiment is that the middle of the racquet will be the best place for a good bounce. This is because the strings are much looser and the sides seem to be stiff. When, the ball hits the sides it always goes dead.

My procedure was to take a tennis racquet and tape it to a table or chair. In which I would drop the 3 different types of ball, on the four main areas of the racquet. Which, I would then measure heights with a yardstick.

I discovered the bottom was the best place for a perfect bounce. The middle seemed like the obvious place for its tension. But, the bottom has a dampener and the vibration thatÆs caused makes the ball hit much smoother. The ball types differed by 2-3 inches. If hit right, could change a match.

In conclusion, my experiment seemed very successful. I found that the ôsweet spotö is the bottom of a racquet. And ball types can make a minor difference. The type of science this would go under is ôphysicsö for the motion aspect of hitting or dropping the ball with the racquet. People who play tennis might be more aware of the right place and how a ball type can make a difference. In the future I could test different racquet styles as well and see if that makes a major difference.

NAME(s)	Alex Duchac	PROJECT NUMBER	B17
SCHOOL	The Renaissance School	GRADE	5
TEACHER	Eve Dubois		
PROJECT TITLE	DNA: What Part Of A Plant Has The Most DNA?		

ABSTRACT

Some scientists believe that the negative aspects of genetically modified food (GM), such as allergic reactions, antibiotic resistance, and cross pollination with industrial and pharmaceutical crops, outweigh any positive aspects. No one knows the long term effects on the body from consuming it. I hoped to discover what part of a plant or egg had the most DNA, thus the most GM DNA. My hypothesis was that within each tested organism, the seeds or yolk would contain the most DNA, because each seed has to have all the information to build an entirely new plant. For the celery, I thought the leaves would contain more DNA than the stalks; for the apple and pumpkin, that the flesh would have more DNA than their skins; for the egg, that the albumen would have more DNA than the shell.

For my experiments, I tested celery, apples, eggs, and pumpkin. Both the apple and pumpkin were each separated into flesh, skin, and seeds. The celery was separated into leaves, stalks, and seeds. The eggs were separated into yolk, albumen, and shell. Each part was liquified, and a salt, soap, and water mixture was blended in. The mixture was filtered into a test tube. DNA was isolated by adding denatured alcohol, which caused it to clump and become visible. The resulting DNA for each experiment was measured by holding the test tube against a metric ruler.

My testing has proved my hypothesis correct. The seeds of each plant have yielded the most DNA, the skin of the pumpkin and the shell of the egg, the least.

My experiments show that consumers who are worried about the effects of GM foods might want to avoid purchasing GM seeds and nuts. Because the celery leaves also showed higher amounts of DNA, GM leaves such as lettuce and greens should also be avoided.

NAME(s)	Kilian Dundas	PROJECT NUMBER	B18
SCHOOL	Rutland Highschool	GRADE	11
TEACHER	Tim Gilbert		
PROJECT TITLE	A Feast For Yeast		

ABSTRACT

In this experiment I wanted to test what environment would be best for growing yeast. To test this I put yeast in bottles that contained different environments, such as baking soda, sugar, and flour. I then added warm water. Once the ingredients were put into the bottles I then covered the top with a balloon. After each half hour for two hours I measured the diameter of the balloon to see which balloon was the biggest. This showed me which environment worked the best with the yeast. The bottle with the biggest balloon would be having the strongest reaction inside it which is what would show which environment was the best to grow yeast in. The more carbon dioxide being let off the better the reaction. I thought that the flour would be the best environment for yeast to grow in because the yeast would break it down into sugar and there were other ingredients in it among the sugar that would help with the reaction. This hypothesis was incorrect. The sugar in fact helped the yeast grow better. This was because the flour probably had other things in it stopping the yeast from growing than if it just had sugar. Some problems I ran into were the balloons leaking and spilling ingredients while I was putting them in the bottles. The spilling of the ingredients probably changed the results a bit but no drastic changes took place. If I did this experiment again I would probably duct tape the bottoms of the balloons around the mouth of the bottles to make sure they didn't leak. Also I would probably use a wider range of test ingredients to have more variety in my tests.

NAME(s)	Hannah Dusharm	PROJECT NUMBER	C10
SCHOOL	St. Francis Xavier School	GRADE	8
TEACHER	Mrs. Mary Ellen Varhue		
PROJECT TITLE	See The C		

ABSTRACT

○Vitamin C is one of the most important vitamins in the world. People need it for their health therefore it is essential in your daily diet. My project question is, Which vegetable/ fruit juice has the most amount of vitamin C? My hypothesis was that the freshest orange juice would have the most amount of vitamin C over the orange juice from concentrate. I said this because oranges are known for having vitamin C and because sometimes when frozen, things tend to lose their flavor and nutrients. To do my experiment I started by laying out cups, in rows of four. Each row had 1 type of juice. I started with one row and added a starch substance. Then I added drops of iodine and started counting until the liquid turned black. I did this for all of the juices, and then took an average of the amount of drops for each juice type. My controlled variables were the amount of starch solution added, type of cups and the amount of juice added. The manipulated variables were the type of juices used. And lastly the responding variable was the amount of iodine drops needed to turn black. My hypothesis turned out to be wrong; the juice from concentrate took more drops than the freshest juice. This could have been because of many reasons. Maybe during the production extra vitamins were added, knowing that some nutrients would fade.

NAME(s)	Cody Eaton	PROJECT NUMBER	B38
SCHOOL	Fair Haven Union High School	GRADE	9
TEACHER	Nathan Morris		
PROJECT TITLE	Ask A Cricket: What Is The Temperature?		

ABSTRACT

The question I was answering was if the rate of crickets' chirping increased with the temperature and whether a person were able to figure out the temperature based only on the rate of local crickets chirping. The Farmer's Almanac gave an equation to find the temperature depending on how many cricket chirps you hear in a set amount of time and I was testing the validity of this equation. My hypothesis was that if I increase the temperature around the crickets then the rate of their chirping will increase and that the Farmer's Almanac will be generally correct. For my actual experiment I set up a cricket container on a chair in front of the oven (after measuring the temperature in on the chair) and recorded the cricket chirp rate, then I would move the chair a bit farther from the oven and repeat the steps, I did this several times and a few times in front of the refrigerator. I found that my hypothesis was correct, the rate of cricket chirps did increase with the temperature in a fairly linear fashion. My results were very close to the Farmer's Almanac's, although they were a little off because the Almanac's was for the amount of crickets that would be around on an average summer day, but the slopes were relatively the same.

NAME(s)	Zachary Eaton	PROJECT NUMBER	P08
SCHOOL	Fair Haven Union High School	GRADE	9
TEACHER	Mr. Morris		
PROJECT TITLE	5 Speed Homopolar Auto Shift Motor		

ABSTRACT

○The 5 speed auto shift homopolar motor is what I will be creating. This motor uses magnetic fields, electrical conductors, and gravity. These forces and properties will enable me to recreate an automatic transmission. If you change the battery, think engine size, will the device up shift faster and spin faster, recreating acceleration and speed? I believe that a larger battery will counter the magnet more and make it spin faster, increasing vibration and allowing an up shift to take place at shorter intervals. I also expect the motor to spin faster at top speed also.

○This device consists of a bent coat hanger, a AA battery, a neodymium magnet, a copper wire, and 5 magnetic coins. The magnet attaches to the bottom of the battery, negative terminal, and arrange the coins from smallest to largest under the magnet. The battery is then hung from the top of the bent coat hanger. The copper wire is wrapped in coils around the coat hanger, hanging down to the newly assembled motor. When the wire touches of the coins, this completes an electrical circuit. It simulates a motor by spinning at different rates at different coins. It works like gears in a car, bigger the coin; the slower, the smaller the coin; the faster.

○I found this project gave me enough results to prove my theory correct. A lithium battery caused the motor to make revolutions quicker, and the gravity/vibrations concept also worked. The device spun much faster at the smallest coin than that of the 2nd and 3rd smallest. I could not get the motor to spin consistently on the 4th and 5th coins, however. To enhance this project I would add a drive shaft to rotate tires caused by the revolutions of the motor.

NAME(s)	Samuel Edwards-Kuhn	PROJECT NUMBER	C11
SCHOOL	The Renaissance School	GRADE	6
TEACHER	Eve Dubois		
PROJECT TITLE	Love Your Fruit		

ABSTRACT

○How can I make fruit ripen faster than it usually does, and once it is ripe, how can I keep it there for as long as possible? That was the question I was investigating during my experiment. After I had learned more about a fruit's ripening process, I was able to make my hypothesis.

○I predicted that the fruit would ripen fastest in a closed off, insulated area with other fruits. In an insulated area, the ethylene that makes the fruit ripen would stay in the fruit, exposing the fruit to much more ethylene than if it was in an open space. Also, combining fruits would produce even more ethylene, speeding up the ripening process.

○I also predicted that the fruit would stay ripe in water. Gases are less dense than water, and ethylene is a gas. The ethylene released by the fruit would not concentrate around the fruit, because the ethylene would just travel on top of the water.

○First, I tried to make fruit ripen faster. I put the fruit wherever I had planned it would go and with other fruits if I planned it that way. For example, some fruits are just out on the counter and some are under leaves. I checked on the fruits every 24 hours, and recorded what was happening to them. Once one fruit was ripe, I did not take it away from the other fruits because that might have made a difference in the outcome.

○Then, I tried to keep the fruits ripe. I put the fruits either under water or outside in a very open-air place, and recorded their developments daily.

○I do not know my results yet, as all my scenarios have yet to be tested. So far, though, different fruits are behaving differently in different places.

NAME(s)	Angela Elcan	PROJECT NUMBER	B19
SCHOOL	South Burlington High School	GRADE	10
TEACHER			
PROJECT TITLE	Where Have Your Hands Been?		

ABSTRACT

Every day there are many people that don't wash their hands after using the bathroom. This obviously spreads germs and can contaminate everything that's touched. On the other hand, some people go through the motions for washing their hands but what they're doing isn't effective. Not washing hands, or not washing them well enough after using the bathroom can leave traces of Escherichia Coli on your hands. E.Coli can be a very dangerous bacterium that can reproduce to dangerous numbers quickly. E.Coli comes from feces and can make you very ill. I am testing to see what temperature of water is most effective for removing a strand of E.Coli off of a plastic model hand. Also, I measured how long it takes for the water to warm up or cool down at my high school. Once my data are collected I will conclude how long one should wait before putting your hands in the water. I will survey random students around my high school to see if people wait the most effective amount of time before washing their hands. My hypothesis is that water at 38°C will wash off the most bacteria. After washing with just water, soap will be added to see if even more bacteria are removed.

NAME(s)	Liam Fagan	PROJECT NUMBER	P25
SCHOOL	Rutland High School	GRADE	11
TEACHER	Dawn Adams		
PROJECT TITLE	MPG Under Heat		

ABSTRACT

○The reason for doing this project is to reveal what gas mileage to expect when traveling, and how to make traveling cost less. By seeing if the use of the heater causes reduced gas mileage, one can figure out the most efficient way to travel. This project looked to see if using the heater brought down gas mileage. To investigate this, the car used, a 2008 Toyota Prius, was driven at 45 miles per hour, 55 miles per hour, and 65 miles per hour with the heat on and repeated with the heat off. The results show that using the heater does bring down gas mileage, and the drop caused by using the heater decreases as speed is increased. At 45 miles per hour, the car got 60.6 miles per gallon (m.p.g.) without the heater and 57.8 m.p.g. with the heater. At 55 miles per hour, the car got 53.7 m.p.g. without the heater and 51.7 m.p.g. with the heater. At 65 miles per hour, the car got 46.6. m.p.g. without the heater and 45.5 m.p.g. with the heater. This project allows one to decide whether his or her own comfort is worth the sacrifice of gas mileage and the EarthÆs environment.

NAME(s)	Lindsay Fairbrother	PROJECT NUMBER	C12
SCHOOL	Weathersfield School	GRADE	8
TEACHER	David E. Lambert		
PROJECT TITLE	Which Soaps Remove the Most Oil Mass Out of Water?		

ABSTRACT

Which soaps will take oil mass out of water the best? Before I formed my hypothesis, I learned a few things about oil and water. I learned that oil will float on top of the water in layers because it is less dense. I researched what the soaps should do when mixed, and I also researched why getting oil out of water is so important. ○My hypothesis was that Dawn would get the most oil mass out of the water. In my experiment I took oil and massed it in a container, after massing the container. Then I added a certain amount of water and massed it. Then I added the certain amount of soap and massed it. I then dragged three coffee filters through the container, and tried to get as much water as I could out of the mixture. Then I massed the mixture again and subtracted to see how much oil was removed. I did this five times for six different types of soaps, and then did just water as a control group. ○As I was doing my experiment I observed many things. One thing I observed was that with Dawn after using it and dragging the coffee filters through it, much of the yellowish color of the oil was gone. I also observed that the Shampoo was the best at covering up the strong smell of the oil. I also noticed that if you stirred the soap and oil and water together more than you did in a different trial, that it didnÆt change the results, or make a difference. ○My results were that Dawn removed the most oil at, 4.2 grams on average. Then Tide came in next by removing 2.98 grams on average. Then Axe with 2.1 on average, then Equate with 1.9 grams, then Cascade with 1.14 grams, then Cleaning Shampoo with .5 grams.

NAME(s)	Sabrina Farmer	PROJECT NUMBER	B02
SCHOOL	Mater Christi School	GRADE	8
TEACHER	Ms. Donlon		
PROJECT TITLE	How Much Rock Salt Is Too Much		

ABSTRACT

How much rock salt is too much and will kill a plant? The purpose of this project was to discover how much rock salt would kill a plant. The hypothesis made was If plants are grown in various amount of rock salt then only the plants grown in a half gram of salt or less will be able to grow.

Research for this project showed salt has a negative effect on plants. The chlorine and sodium in the soil and are taken in through the plant roots. The chlorine sticks inside the leaves and harms the plant's ability to transfer food.

The procedure required twenty-eight pots to be filled with thirty grams of soil. The next step was measuring out the salt with a triple-beam balance. The final step of the procedure was measuring the plants with two tablespoons of water.

The plants with one and a half grams of salt or less were able to grow. The plants without salt affecting them grew a substantial amount more than the other plants. The plants with two grams or more in their soil could not grow.

This project showed that salt has a negative effect on plants. The largest amount of salt the plants could tolerate was one and a half grams. The hypothesis was incorrect because the plants could grow in more than a half gram of salt. The project was successful in finding the average amount of salt that would kill a plant.

NAME(s)	David Fischer	PROJECT NUMBER	C13
SCHOOL	Pacem Learning Community	GRADE	8
TEACHER	Pam Watts		
PROJECT TITLE	Coloring Evaporation		

ABSTRACT

The purpose of this project was to test if water dyed certain colors would evaporate more quickly than others. This project contained two experiments. In the first, the water was evaporated in an oven; in the second, the water evaporated naturally. The hypothesis was that the water would evaporate at different rates based on color.

The first experiment used different colored water in measuring cups, including one filled with clear water for a control. The colors examined were blue, green, purple, and yellow. These cups were put on a tray which was placed in an oven that had been preheated to 350 degrees Fahrenheit. The water was taken out, measured and photographed at each ten minute interval. After 40 minutes, the red water, along with the regular water, had evaporated 18 milliliters, while the other colors had evaporated only 10 milliliters. A logical conclusion that can be drawn from this information is that the color red somehow absorbs heat more than other colors. Another possible reason is that the impurities in the red dye are smaller than those in the other colors, resulting in less of an increase of evaporation rate. Also, the oven could have been hotter in certain places.

In the second experiment, the measuring cups were placed on a windowsill, where they were allowed to evaporate naturally. The water is checked every day at 8:30 pm. Please note that this experiment is not yet finished, and that the results will be in the project.

So far, the results have not been decisive. I expected that the colors would evaporate differently because some colors absorb more energy than others.

NAME(s)	<u>Jenna Flint</u>	PROJECT NUMBER	<u>B39</u>
SCHOOL	<u>St. Francis Xavier School</u>	GRADE	<u>7</u>
TEACHER	<u>Mrs. Mary Ellen Varhue</u>		
PROJECT TITLE	<u>Memory Madness</u>		

ABSTRACT

○The purpose of my experiment was to find out if people have a better visual memory or auditory memory. I thought that the majority of people would have a better visual memory than auditory memory. I thought that because I think it is easier to remember a face than lyrics to a song. ○

I took thirty index cards and made thirty random number sequences, with ten numbers on each card from a range zero to twenty five. I then gave fifty people a visual memory test and an auditory memory test. For the visual memory test I took a random number sequence card and showed it to the participant for thirty seconds. Then I had them recite the alphabet and repeat the numbers they saw. For the auditory memory test I took a different random number sequence card and read it to them three times. Then they recited the alphabet and then told me what they heard. Then I recorded the scores of how many numbers my participants could remember. ○

The results of my experiment are that my hypothesis was right. The majority of people have a better visual memory than auditory memory. Forty one people had a better visual memory, five had a better auditory, and four had the same.

NAME(s)	<u>Ashley Frizzell</u>	PROJECT NUMBER	<u>B03</u>
SCHOOL	<u>South Burlington High School</u>	GRADE	<u>10</u>
TEACHER	<u>Curtis Belton</u>		
PROJECT TITLE	<u>The Effects of Mulch on Plant Growth</u>		

ABSTRACT

Topsoil is the outermost layer of soil, where there are many beneficial nutrients for plants. Sometimes mulches are used for a variety of landscaping and agricultural purposes in addition to topsoil. When placed on top of soil, it provides protection from soil erosion, retains water, prevents weeds, and protects the plant's root systems. Organic mulches eventually decompose and add much-needed nutrients, whereas inorganic mulches (such as rubber) last much longer but don't give back nutrients. For my study I potted bean plants in topsoil with natural, colored, and rubber mulch, and plain topsoil as the control group. Each plant was watered so that they had a sufficient source of tap water (without being overwatered). My original hypothesis was that natural mulch would contribute to the most plant growth meaning the tallest height, largest beans, and greatest health. The order would then proceed to colored mulch, topsoil, and rubber mulch, because it wouldn't give back any nutrients. I planted five pots for each group, and each day of the experiment I measured the height of the plants and their blossom or pod length. By analyzing this data, and comparing each plant for specific checkpoints throughout the experiment, one would be able to determine which plants are thriving more than others. The data I have collected thus far indicates that mulch indeed benefits plants' growth. Those with colored or natural mulch produced bean pods with a larger size. However, plants in rubber mulch were much shorter and produced smaller, more underdeveloped beans this was also the case with plants in only topsoil. These data support my hypothesis that other mulches would benefit the plants more than topsoil alone, which is where plants concentrate their roots in the outside world. However, rubber mulch does not benefit the plants any more than the control.

NAME(s)	Rachel Gagnon	PROJECT NUMBER	B04
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curt Belton		
PROJECT TITLE	The effect that UV light-of an intensity that can penetrate openings in the ozone-has on V		

ABSTRACT

Ultra Violet light has been known to kill skin cells of humans with excessive exposure, causing sunburns. If a hole in the ozone were to occur above Vermont, the exposure would magnify to extreme proportions. If all the UV light were to escape into the lower atmosphere humans would sustain very harmful burns, but what would happen to the local crops? In my experiment I planted green bean plants- a common Vermont crop. For the experimental group I will run a high intensity UV light- commonly used in low quantities to kill dust mites-over the plants for 5 minutes each day, over 5 times the recommended amount for killing mites. After creating my experiment, I hypothesized that the plants exposed to UV light would have stunted growth, and cell damage. After 3 weeks of repeated exposure I have seen preliminary results: the plants in the experimental group were generally shorter and some had brown edges on the leaves. So far, UV light has shown to effect plant growth and development.

NAME(s)	Allyssa Gamelin	PROJECT NUMBER	G05
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Mr. Curtis Belton		
PROJECT TITLE	Comparing the Water Quality of Upper and Lower Reaches of Rivers		

ABSTRACT

Water is the most important resource for humans and animals for food, irrigation, personal hygiene, recreation, and industry. Poor water quality can be hazardous to humans and animals depending on what kind of bacteria or other contaminants that might be in it. Knowing about your local body of water can keep you safe and healthy as well as help you find ways to keep it clean. For my study I tested the water quality index for the upper and lower reaches of the Winooski, Lamoille, and Missisquoi rivers. These tests included dissolved oxygen, pH, nitrates, phosphorous, turbidity,temperature, total solids, E.Coli, and BOD. At each location, the waters either had about the same numbers in terms of data or they had outliers. After comparing and analyzing the data I noticed my initial hypothesis was correct; water close to the sources of the rivers are healthier than the water in the bottom reaches closer to the mouth. All three rivers had healthy numbers for phosphorous and good pH levels in the upper reaches that were better than the lower reaches. These data can be used to help resolve point and nonpoint pollution.

NAME(s)	Sabrina Gerdes	PROJECT NUMBER	B05
SCHOOL	Northfield Middle High School	GRADE	11
TEACHER	C. Tomczyk		
PROJECT TITLE	The Effect of Gibberellic Acid on the Performance of Phototropism on Kidney Bean Plants		

ABSTRACT

Two experiments were conducted to find the results of how additional plant hormones affect plant growth, I found how the additional hormone amounts affect the operations plants would naturally perform, such as tropisms. In my first experiment gibberellic acid was added to 20 bean plants in a concentration of 0%, 25%, 50%, and 75% and the height was measured as the plants grew through cardboard constructed mazes with a 3in. by 3in. hole cut into the top to test the effect of gibberellic acid on plant tropisms. In the second experiment I tested the gibberellic acid's affect on plant height without the cardboard mazes to see if it really was altering the effect of the tropisms. I found the 75% gibberellic acid caused the plants to have the least change in growth overall. The plants with a 75% concentration had an overall percent change in height of 213.6% and the highest percent change was 400.0% for the 50% concentration. When the plants were grown through the maze, the same patterns persisted; the highest percent change was at the 50% concentration. The results of both of the experiments made it clear that the 75% gibberellic acid reduced the growth of plants. In each experiment the height of the plants was measured on a daily basis as well as a small amount of the plant hormones that were added to each plant. The gibberellic acid did not affect the plant's response to light, and as the gibberellic acid increased the plant height also increased in all tests except for the 75% concentration.

NAME(s)	Jonathan Girard	PROJECT NUMBER	B40
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	Wii Exercise Using a Videogame		

ABSTRACT

The United States has been trying to promote good health and fitness. There are a lot of nutrition plans that claim they work, and fitness plans. One of the most interesting products out there for weight loss and fitness is the Wii Fit videogame, made by Nintendo. One of the main causes for childhood obesity is lack of physical activities, mainly caused by sitting in front of the television for too long. What is neat about the Wii Fit is that instead of hopelessly trying to pry kids and adults away from the entertainment center, it just supplements inactivity (sitting and just watching) with physical activities such as running, muscle building workouts, yoga etc. Just how fit is the Wii Fit? Does the Wii Fit get your heart going as much as the comparable real world exercise? In my experiment, I compare the blood pressure and heart rate of human test subjects exercising with the Wii Fit, with the same subjects performing the exercises in a normal work out area, without the Wii Fit. To do this, each test subject had to perform 3 workouts on the Wii Fit. Each work out went for 5 minutes. At the end of 5 minutes, the blood pressure and heart rate are recorded. Once all three workouts are completed using the Wii Fit, the same procedure was repeated but this time done without use of the Wii Fit. Once the data was taken for all of the test subjects, the data using Wii Fit was averaged, and the data not using the Wii Fit was averaged separately. Once graphed, the contrast between the control group (without Wii Fit) and experimental group (with Wii Fit) would be shown.

NAME(s)	Austin Goddard	PROJECT NUMBER	G06
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	The Difference in Degredation Of Bioplastic and Petroleum Plastic		

ABSTRACT

Plastic products have been piling up in landfills for some time. The estimated time it would take to biodegrade one of the bags is 500 to 1000 years. Bioplastic bags were created to end this problem by using starches to create a biopolymer instead of using petroleum. For my experiment I tested petroleum based plastic and bioplastic bags. I cut the handles off of the bags and then cut the bags along the seam to create two flat pieces of plastic. I then weighed each of the pieces of plastic as I labeled the bags to keep track. Next I created a mixture of dirt, food products such as bread and bananas, Earthworm septic treatment, and vegetable juice. I first placed the handles into the containers with some of the composting mixture and then I added the bags in. I had a total of eight bioplastic bags in one container and eight petroleum plastic bags in the other. Each week I removed two pieces of plastic from each container, cleaned them with water, and weighed them. At the end I hung weights off of the bag handles to perform a strength test. The data I have is only showing slightly faster degradation of the bioplastic bags versus the petroleum plastic bags though I still have more testing to complete.

NAME(s)	Chloe Golanka	PROJECT NUMBER	B06
SCHOOL	Main Street Middle School	GRADE	
TEACHER	Daisy Williams		
PROJECT TITLE	The effect of increased levels of carbon dioxide on plant growth.		

ABSTRACT

The purpose of this project was to measure plant growth with varying amounts of carbon dioxide. My hypothesis was that increasing amounts of carbon dioxide would affect plant growth. The key points in my procedure were observing the plant growth with the different levels of carbon dioxide and taking measurements daily. Water, light, soil, and temperature all remained constant during the growth period. The key results of my experiment were that plants did in fact grow faster in the early stages of the experiment. In conclusion, understanding the relationship between the environment and plant growth can have tremendous benefits in agriculture. Farmers can use experiments of this nature to increase the quantity as well as the efficiency of future crop development.

NAME(s)	Rebecca Goldberg	PROJECT NUMBER	G07
SCHOOL	South Burlington High School	GRADE	11
TEACHER	Curtis Belton		
PROJECT TITLE	Comparing Phosphate Levels In Streams Between Urban and Forested Areas		

ABSTRACT

While a sufficient amount of phosphorous is vital to stream organism's lives, too much can be very harmful. The blue-green algae blooms can be toxic to humans and animals and can block sunlight from entering through the water's surface. Knowing how phosphorous gets into bodies of water is important in the process of controlling runoff. When I test Potash Brook, located in an urban area, and Snipe Ireland Brook, located in a forested area, I hypothesize I will see that Potash Brook contains more phosphorous. After confirming this, one can know what areas to control and monitor the most. With a pair of sterilized waders and three sterilized bottles, I will stand in the water with the stream flowing towards me and collect three samples from each site. Then, I will transport the samples to UVM where the phosphate levels can be determined. After organizing my data, I will be able to see which body of water actually has the highest phosphate level. In addition, I have been observing the different buildings and construction around my sites, which will help me see if those become factors. Stream temperature measured with a thermometer, flow measured with a timer and a stopwatch, and depth measured with a meter stick are also data that I will also observe the relation to. In conclusion, I expect to see Potah Brook, in the urban area, to have higher phosphorous levels, as supported by preliminary data.

NAME(s)	Nick Grasso, Breton Schwarzenbach	PROJECT NUMBER	GP09
SCHOOL	Brattleboro Union High School	GRADE	12
TEACHER			
PROJECT TITLE	Fecal Coliform In the West River		

ABSTRACT

Our goal for our research along the West River, a tributary of the much larger Connecticut River watershed, was to correlate the effects of human impact to the ecological health of the river. Through the growth of E. Coli colonies, and tests for nitrates, dissolved phosphate, dissolved oxygen and turbidity we drew relationships between our results and observations regarding the condition of the watershed. The locations of our test areas along the river were determined by their proximity to roads, agricultural activity, popular swimming holes and human settlement. Our testing began in early summer of 2009, and continued through fall of the same year. In this first test, we were really able to grasp the effect that the weather and climate would have on our results. Our first tests were performed after a torrential rainfall for several days, so it was an incredible indicator as to our final synthesis. We concluded that the fecal coliform levels of the water were directly correlated with their relative location to human settlements, and in turn the overall health of the river was affected. When runoff from settlements and farms was introduced into the water due to rain and other extenuating circumstances, we noticed a definite increase in the E. Coli levels, and this produced relative low levels in dissolved oxygen, which is a prime indicator for health.

NAME(s)	Ian Greenbaum	PROJECT NUMBER	B41
SCHOOL	<u>South Burlington High School</u>	GRADE	<u></u>
TEACHER	<u>Curis Belton</u>		
PROJECT TITLE	<u>Gatorade and Athlete Performance</u>		

ABSTRACT

Before the invention of Gatorade, athletes who performed under rigorous, hot or the combination of the two conditions would lose sweat as a means to cooling the body. Although this is good for the body, at the same time the body is losing electrolytes and expending energy. Gatorade was created in response to the 1965 Florida Gator football team, because it supplies electrolytes and carbohydrates (for energy). For my study I determined how much Gatorade affects a person's performance during a rigorous, hot, or a combination of both situations (when a person is losing sweat). Since it was winter I could not obtain a hot setting easily, so I decided to go for a rigorous situation. Thus, I decided to have my applicants practice, and then I tested their performance with a two mile run at the end of their practice. One day I had them drink water (as a control) and the other day (exact same practice as the first) I had them drink Gatorade (experimental group). I hypothesized that on the days when the applicants drunk Gatorade they would have better times than on the days when they drunk water. I found the average time each day (for the Gatorade day and the water day) then compared the two. I also ran this test two more times after the first. The practices were not identical. In compensation for this I kept the practice the same for each trial (each trial had two practices and two runs that were exactly the same). I compared the average time from the Gatorade day and the water day, and did two more comparisons for the other two trials. Preliminary data shows a performance enhancement when using Gatorade.

NAME(s)	Hunter Griffin	PROJECT NUMBER	S04
SCHOOL	<u>Avalon Triumvirate Academy</u>	GRADE	<u>7</u>
TEACHER	<u>Amanda Gifford</u>		
PROJECT TITLE	<u>Music Memory Madness</u>		

ABSTRACT

This is an experiment to test if music affects people's ability to recall memory. The results are flawed because of too many variables and no control. People have reported that music helps them concentrate. This test was hard to get accurate result on because little is known about the human brain, another problem was that there was only a handful of subjects at my disposal making it was hard to get accurate results. The results of this experiment showed that when people were listening to music while studying the picture they had a wider range of results. While the people that were not listening to music had more concentrated and higher scoring results. My hypothesis was that: People will find it easier to score higher on the test if there is no noise. My hypothesis might have been correct but the results were flawed. I used two different pictures and a different test for each picture, however, I used different genres of music with no control for each test subject.

NAME(s)	Caroline Hall	PROJECT NUMBER	G08
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	Snow Depth's Effect on Soil Nitrogen		

ABSTRACT

It is said by Vermont farmers that a good thick snowfall that lasts the winter will yield a better crop in the spring. The theory behind this is that snow insulates the ground enabling greater production of nitrogen, a necessary nutrient for plant life. The bacteria that make nitrogen available to plants are more productive in warmer temperatures. These temperatures should occur under a layer of snow. For my study I compared soil nitrogen levels in 3 control and 3 experimental plots. My control plots remain exposed to cold temperatures while the state of the experimental plots was allowed to fluctuate accordingly with weather patterns of snows and thaws. To prevent snowfall on the control plots and to also not insulate the ground I built a structure like a table only one foot off the ground. My hypothesis was that the experimental plots covered by snow would contain higher nitrogen levels than the control plots. At my testing location I recorded an average temperature each week while testing. When I took my soil samples each week I measured ground temperatures and depth of snow which I recorded along with the weekly precipitation. I will analyze nitrogen levels at my six testing plots and compare them with temperatures and precipitation to conclude if snow insulates the ground enough to raise nitrogen levels. The data should support the hypothesis that ground insulated by snow has higher nitrogen concentrations than the un-insulated ground.

NAME(s)	Henry Harder	PROJECT NUMBER	P09
SCHOOL	Henry Harder	GRADE	5
TEACHER	Eve Dubois		
PROJECT TITLE	The Mystery of the Airplane Wing		

ABSTRACT

○Do you ever wonder how a big heavy hunk of metal like an airplane could ever fly? Or how that big floppy thing on the side called a wing makes the plane fly? If you want to know, youÆve come to the right place, because thatÆs what IÆve found out.

The questions I explored in my project were:

How does the wing create lift?
 How does the shape of the airfoil affect the amount of lift it creates?
 How does the shape of the airfoil affect the stability of the wing?

I designed and tested four different wings to answer these questions.

○Since the airplane wing has a very complex design, I hypothesized that the longer the chord, and more gradual the curve of the wing, the more lift it will create. I thought this because in order for the wing to work, it needs to be aerodynamic. When something is aerodynamic, the air flows easily around it. If the upper and lower camber is more gradual, it is more aerodynamic.

○To make the cross section of my wings, I followed many steps. First I designed the wings on the computer. Then, I confirmed the dimensions, and printed them out. After all that, I put the wings together using tape. To test them, I held them 11 inches in front of a fan, with fishing wire. I measured the lift by using a yardstick to see how high above the fault line the wings went. The fault line is straight ahead. I recorded all my data and analyzed it to get my results and conclusion.

○In my tests, I found out that the civilian wing works best. Only one of my designs was as stable as the civilian wing, but it did not get much lift.

NAME(s)	Phoebe Harris, Leroy Storey-Hall, Joshua Thompson	PROJECT NUMBER	GP13
SCHOOL	Pacem Learning Community	GRADE	7
TEACHER	Pam Watts		
PROJECT TITLE	One Solution to Homelessness		

ABSTRACT

In 2007 more than 1800 Vermonters were without a home, a third of them children (Charnoff). We all decided that homelessness was important and one of our advisors knows a homeless person who is looking for a more permanent shelter, so we started to design houses that would help the homeless. The problem was that we needed to design a house that was small, movable, and foldable, but it couldn't be TOO airtight so the homeless wouldn't suffocate. It will also be easy to customize for any person, discreet and appealing to live in. Of course it will be warm and will be within zoning regulations. We will also be making a blue print for the house and giving it to the homeless. We made many designs but finally decided on a model that is like a mini house, but only an eight by four foot shelter. We also decided on a design scheme which is that we have basically four pieces 4x8, 4x4, 4x4x4 equilateral triangle, and 8x8x4 isosceles triangle that are easy to put together in different ways. During this project we talked a lot about researching ways for building, we asked for donations of materials, did a lot of calculating the dimensions of the model we're going to build, and running a survey to see who would be willing to let a homeless person live on their land in one of these shelters. After we build the model we will test the model for strength, water proofness, and other things like that.

NAME(s)	Abby Harvey	PROJECT NUMBER	B20
SCHOOL	Mount Saint Joseph Academy	GRADE	9
TEACHER	Timothy McCue		
PROJECT TITLE	Can UV Radiation Effect and Mutate E. Coli Bacteria?		

ABSTRACT

The question that my project is trying to solve, is, "Can UV Radiation Effect and Mutate E. Coli Bacteria?" Or more precisely, can exposure to small doses of UV radiation over time create a mutated strain of E. Coli that is resistant to UV radiation? My hypothesis is that it can. I think that after I expose the culture of sub strain MG1655 E. Coli to structured doses of UV, then I will be able to control the amount of culture growth through the length of the dose.

I believe that I will be able to expose different plates from the same strain of bacteria to different amounts of light, and therefore I will be able to take the plate that still has growth after the longest period of time, and repeat the process over and over until I create a resistant strain.

Through an E. Coli Stock Center at Yale University, I was able to obtain the strain MG1655, which is proven to have the most resistance against UV light. Initially I received it in a stab culture, and I then grew it in broth medium to multiply the cultures. I then plated it on an agar plate, and exposed a plate to each of the following, 5, 15, and 30 seconds, 1,5,10, and 15 minutes, and 15 minutes with the Petri dish lid on. After having incubated the plates for 48 hours, I found growth on the 5, 15, and 30 second plates. Since the 30 second plate had been exposed for the most amount of time and still had bacteria on it, I isolated those cultures and grew them again, and continued to expose them to intervals of 5, 10, 15 and 30 seconds.

NAME(s)	<u>Sean Healey, Andrew Gadbois</u>	PROJECT NUMBER	<u>GP10</u>
SCHOOL	<u>Christ the King Burlington</u>	GRADE	<u>8</u>
TEACHER	<u>Mrs. Srivastava</u>		
PROJECT TITLE	<u>Grass vs. Trees: The Battle for Carbon Dioxide</u>		

ABSTRACT

Our experiment was intended to determine whether an environment supporting grass would be capable of removing as much carbon dioxide from the atmosphere as an environment supporting trees. If this was the case, then grass could be used as a cheaper, faster, more accessible means of reducing carbon dioxide levels in the atmosphere. In order to test this, we constructed two sealed glass terrariums, sealing them off with silicone caulking and packing tape. One tank contained newly grown grass and another contained young trees; both were provided with equal amounts of soil and light. Also inside each aquarium was a carbon dioxide monitor. We sealed off each tank consecutively, taking measurements every half hour. However, in both tanks, carbon dioxide levels began rising immediately, and continued to do so throughout the time frame of the experiment. The tank containing grass produced the most carbon dioxide by far, but the trees also raised the carbon dioxide levels. This was an unexpected result, so we put together a third tank containing only dirt in order to determine whether decomposition of the soil was responsible. However, although the soil did produce some carbon dioxide, it did not generate enough to account for the higher levels observed in the presence of either grass or trees. The trees and grass themselves not only failed to sequester carbon dioxide, but ended up producing carbon dioxide instead. This result shows that the environment works on a far more complicated level than one might think, and that simply planting trees or grass might not be an effective solution to global warming. However, further experimentation should be conducted.

NAME(s)	<u>Emily Herschel</u>	PROJECT NUMBER	<u>C14</u>
SCHOOL	<u>Weathersfield School</u>	GRADE	<u>8</u>
TEACHER	<u>David E. Lambert</u>		
PROJECT TITLE	<u>How Permanent are Permanent Markers?</u>		

ABSTRACT

I chose to investigate which solvent removes permanent marker from a painted board best. Before I formed my hypothesis I had to learn a few things about my experiment for example I learned which solvents were most recommended. My hypothesis was that I think the Mr. Clean Magic Eraser will remove the marker best because when I researched how to remove permanent marker this was one of the most recommended solutions. Also Mr. Clean Magic Eraser is a popular product and obviously it must work or no one would recommend it. I think the other products might work, but they will take more time, labor, and more of the product to work.

What I did during my experiment was apply a line of black Sharpie permanent marker to the painted board. Then I put all the solvents in bowls and took a q û tip and applied the solvent for five seconds per trial. I tested each different solvent four times. Then I compared the amount of marker left to the scale I created to measure the amount of ink remaining. Then I recorded the data.

While doing my experiment I observed that none of the solvent removed the paint off the board. I also observed the solvents that did work started working immediately.

My hypothesis was not supported by my data because rubbing alcohol and hair spray removed more marker than the Mr. Clean Magic Eraser did. Although the Mr. Clean Magic Eraser did remove 56.25% of the marker the other things removed more of it.

If I had to do my experiment over again I probably would have tried using more types of solvents and testing it more than I did, and maybe applying the solvents for a longer period of time.

NAME(s)	Emma Hoser, Casie Walton	PROJECT NUMBER	GP03
SCHOOL	Green Mountain Union Middle/High School	GRADE	7
TEACHER	Mrs. Surma		
PROJECT TITLE	Why Do Animals Do That?		

ABSTRACT

For our 7th grade science fair project, we tested animals with different sounds to see how they would react. We chose this topic because we both have animals and have seen them do some odd things and wanted to know why. Our hypothesis was when we tested these sounds on the chickens they would act skittish and scared. We thought the cats would be cautious and aware, and the dogs would come to almost any noise. We thought this because dogs tend to do things without thinking, cats normally think about what they will do before acting upon it, and we have seen the way chickens act around humans and believe they would act the same to a noise that is abrupt. How we thought to approach our procedure was to pick five different sounds (a clap, kissy noise, beep, yell, and food shake.) Then we tested each individual animal in a quiet space, three times to each sound. Then recorded how they reacted. We found that our hypothesis was mostly true, there were a couple of times when an animal acted slightly differently than we expected, such as when the chickens came to the food shake and were calm during the yell. So overall our hypothesis was very close, and we learned that animals do things for a reason and they are not always what you expected.

NAME(s)	Lexie Huntley, Elise Huntley	PROJECT NUMBER	GP08
SCHOOL	Homeschool	GRADE	7
TEACHER	Claire Huntley		
PROJECT TITLE	Do Stoneflies and Mayflies respond to total phosphorus levels?		

ABSTRACT

Purpose: Is there a relationship between the presence of oxygen sensitive Macroinvertebrates and the level of Total Phosphorus in streams? Ephemeroptera and Plecoptera Macroinvertebrates are sensitive to the presence of available dissolved oxygen. Excess Phosphorus depletes dissolved oxygen. Hypothesis: Increasing amounts of Total Phosphorus present in the streams will have an inverse effect on the populations of Ephemeroptera and Plecoptera Macroinvertebrates. Procedure: As participants in the Vermont EPSCoR Streams Project, we performed the following steps:

- òòSampled two stream sites: 1. Green Mountain National Forest stream
- 2. Rural/Urban stream.
- òòSampled Total Phosphorus twice a month, the samples were tested at UVM.
- òòDuring the sampling period, we collected macroinvertebrates from four riffles in each stream.
- òòòUsed a random sampling method to choose specimens to identify.
- òòAnalyzed our Macroinvertebrates using the Guide to Aquatic Invertebrates of the Upper Midwest, a Stereoscope, and the assistance of the biology department at St. MichaelÆs College.
- òòCompared the Quantities of Ephemeroptera and Plecoptera to the Total Phosphorus in each stream site.
- òòTotal Phosphorus was our independent variable and the total population of Ephemeroptera and Plecoptera Macroinvertebrates was our dependent variable.
- òòAnalyzed the concentrations of our chosen variables in selected rivers participating in the Streams Project
- òòUsed SpearmanÆs Rank Correlation and Regression Analysis to test our hypothesis mathematically

Principal Findings: Our tests showed a strong inverse relationship such that as Total Phosphorus entered the Eutrophic stage, the percentage of Ephemeroptera and Plecoptera in the streams decreased.

NAME(s)	Madi Huntley, Cassie Call	PROJECT NUMBER	GP02
SCHOOL	Green Mountain Union High School	GRADE	8
TEACHER	Allan Garvin		
PROJECT TITLE	Energy Kick		

ABSTRACT

Our project was seeing if healthy or unhealthy food gave you the most energy throughout the day. Our hypothesis was that unhealthy food would give you the most energy, because it had more sugar in it. But, we learned from our research that healthy food should give you the most energy, because it does not have energy high and lows. To test our hypothesis we had ten people eat healthy for one weekend, we made them lists of food to eat. On Friday they had to write down their energy level to begin with then they had to start eating healthy. On Sunday, the last day of them eating healthy, they had to fill out a test. This test asked them they're energy level (1-10), emotional level, tired level, how much sleep they got, and academic questions. Then we had them eat unhealthy the next weekend and asked them the same questions. From our research, we found that healthy food gives you the most energy and the best academic results but also makes you the most tired. This is important to know because many people want to have the most energy throughout the day, and to do so they will want to eat healthy.

NAME(s)	Grace Iasilli	PROJECT NUMBER	B21
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	Effectiveness of Mouthwashes in Removing Bacteria		

ABSTRACT

There are over 1 billion types of bacteria in your mouth, including both aerobic and anaerobic bacteria. Mouthwashes are used for whitening teeth, curing bad breath, removing plaque and most importantly, destroying bacteria. In this experiment, I will be testing different types of mouth rinses and determining their effectiveness at removing bacteria in your mouth. I will base the effectiveness of these mouth rinses at the ability to keep bacteria from growing after being placed in an incubator for 10 days. I hypothesize that the mouth rinses with alcohol in them will be the best at removing bacteria from your mouth. I will be my only subject for this experiment. I will either sterilize cotton swabs for this, or test the amount of bacteria on clean swabs to make sure I don't confuse bacteria from my mouth with bacteria that was already on the swab. In the morning, before eating or drinking anything, I will swab my mouth with a clean cotton swab and rub that swab on a new Petri dish. I will then rinse with a mouth rinse and again swab my mouth with a clean swab, and rub that on another new Petri dish. I will continue this process every morning, until I have used all of the mouth rinses. I will be conducting this in the morning, because that will be the time where the bacteria have collected the most. By completing this experiment, I will hopefully determine what mouthwash or rinse will be most effective for removing bacteria.

NAME(s)	<u>Alyssa Jeffer</u>	PROJECT NUMBER	<u>B22</u>
SCHOOL	<u>South Burlington High School</u>	GRADE	<u>10</u>
TEACHER	<u>Curtis Belton</u>		
PROJECT TITLE	<u>Bacteria Meats the Heat</u>		

ABSTRACT

Thousands of people get food poisoning every year from harmful bacteria on their uncooked food. Microorganisms such as Escherichia E coli and Salmonella, which are found in the digestion track of warm blooded animals, can cause illness to humans when ingested. It is also important to not contaminate foods, because most of the food- borne illnesses reported are by contamination. Microorganisms can be killed by cooking meat properly, that is why it is important to know how long and at what temperature certain meats should be cooked to make sure there are no harmful microorganisms that could cause illness on the food you eat. My hypothesis for my project is that the amount of bacteria will decrease at each increment as the temperature of the meat increases and that it will take more than forty minutes for all bacteria to be killed on the surface and inside of the meat. The procedure of this experiment includes taking three ounces of raw ground beef, I will then swab the meat before basting the meat in a bacteria broth that is also mixed into the meat. The swab is used to streak the agar plate to determine if any bacteria are on the meat. Then I will baste the meat with a bacterial broth, swab again and place in the oven for twenty minutes at 350. After twenty minutes I will remove it from the oven and swab again for the amount of bacteria present, and repeat three times with twenty minute increments, allowing four minutes to take the temperature of the meat and swab for bacteria. I will use this procedure multiple times to collect a respective amount of data. The agar plates will be placed in an incubator for further inspection and bacteria count.

NAME(s)	<u>Katey Johnson</u>	PROJECT NUMBER	<u>P10</u>
SCHOOL	<u>South Burlington High School</u>	GRADE	<u>10</u>
TEACHER	<u>Mr. Belton</u>		
PROJECT TITLE	<u>Testing the Strength of Hair</u>		

ABSTRACT

Hair is made of different amino acids held together by peptide bonds. Those bonds can be broken by heat and moisture. The color of hair comes from melanocytes which are found near the hair bulb. The distribution of melanocytes creates the overall color of hair. I will be testing how the texture and color affects hair strength. To begin I will gather hair of all the same thickness and lots of different colors and textures, I will examine the strands under the microscope to sort them by thickness then I will test the strength of each hair strand. I will then determine how the color and texture of hair can affect the strength of hair. I believe that the brown hair will be stronger than any other color hair because of the organization of the melanocytes. I also think that the curly hair will be weaker than the strait hair because of the strength of the bonds.

NAME(s)	Ethan Jones	PROJECT NUMBER	C15
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	An Apple a Day Keeps the Doctor Away		

ABSTRACT

Ever since the beginning of major apple production around the world, farmers have needed a way to store and test their apples. They do this to keep them fresh from the time of picking to until their consumption. I hypothesized that storing the apples in the refrigerator would keep its firmness and sugar to starch ratio stable until it was time for them to be eaten. The sugar to starch ratio is an important part of the picking, because the pickers don't want too much of the sugar to be converted to starch because this changes the flavor of the apple. I tried to determine this by storing sets of five apples under different conditions. The sets were stored in: Tupperware containers, Ziploc bags, a refrigerator, a freezer, and the control were stored at room temperature. Once a month I tested one apple from each set to see if the general firmness and starch to sugar ratio had changed. My results showed no change in the sugar to starch ratios, because I picked late in the season. However a change was present in the firmness of the apples. As a result I had insufficient data to answer my original hypothesis.

NAME(s)	Jordan Kazmierczak	PROJECT NUMBER	B07
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Mr. Curtis Belton		
PROJECT TITLE	Predatory Responses of <i>Philodendron cordatum</i>		

ABSTRACT

Throughout history the common philodendron has experienced predation and parasitism, an issue shared by all living things. Plants, since they are living things, could wilt or perish as a result of an attack. This study focused on the injury responses of *Philodendron cordatum* to a simulated long term attack of *Biosduvali* scales (*Diaspis boisduvali*). After designating control subjects and splitting the test subjects into two groups, I performed a simulated attack on *P. cordatum* by creating circular holes on twenty five percent of the leaves using a standard paper hole punch and created tears in twenty five percent of the leaves using standard scissors. My initial hypothesis was that the group with holes in the leaf surfaces would have the greatest response to the simulated attack because those plants had lost surface area; which plays a vital part in photosynthesis. Since the other test category lost no surface area, it would not be affected and would continue growing in similar fashion to the control subjects. On completion of the testing period, the data will be analyzed based on the response that *Philodendron cordatum* exhibited toward the given attack. According to previous research, a reasonable conclusion is in agreement with the hypothesis that the test group with holes in the leaf surface would yield the greatest response to the attack.

NAME(s)	Lauren Kelley	PROJECT NUMBER	B23
SCHOOL	Hinesburg Community School	GRADE	8
TEACHER	Stephanie Konowitz		
PROJECT TITLE	Whirls and Swirls and Ridges, Oh My!		

ABSTRACT

The ridges on our fingertips improve the amount of vibration made for us to interpret. These vibrations are our sense of touch. Also the swirls make it so that no matter how our fingers are positioned they will receive the vibrations. Plus they help us to grip objects. Whether the patterns are more apparent in our mother's prints or father's is yet to be decided. Fingerprints from the right hand were taken from my family members. These prints were scanned, blown up and compared to each other. The results were unanimous about which parent affected their child's more. The first child's set of fingerprints matched every single print from the mother's set. While the second child (myself) matched 3 from the mother's set. I think this might be because when a child starts to develop things like it's fingerprints and nails, it is a fetus within the mother. Overall the child's fingerprint patterns came mostly from the mother.

NAME(s)	Sean Keogh	PROJECT NUMBER	B08
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	Seed Germination		

ABSTRACT

Seeds are a miracle of life, and all of them start with a common beginning, germination. Germination is the beginning of the embryo growing into a mature form. Many different variables are included in the start time of germination and the rate at which it happens. For my study I tried to isolate one of those variables by freezing half of the sunflower seeds for 4 weeks. I then recorded data to see if that would affect germination in any positive or negative way. My original hypothesis was that it would affect the start of germination due to the freezing making the dormancy longer and thus taken longer for seed to begin germinating. I grew the seeds standing up so the roots would grow with gravity, just like they would in real life. I data I would be collecting would include length of roots, number of roots, size of seed, and overall healthiness. I anticipate my data to support my hypothesis and show even more affects the freezing will have.

NAME(s)	Iskandar Khan	PROJECT NUMBER	P26
SCHOOL	Mater Christi School	GRADE	8
TEACHER	Michelle Donlon		
PROJECT TITLE	The Unsung Brightness		

ABSTRACT

Are LED lights really more efficient than Incandescent Lights? If true, then when an equal voltage current is applied to both an incandescent light and a LED, the LED will be more efficient because it uses less energy to create light.

Being ôgreenö is important to our world today. We should use new technologies that help us reduce our carbon footprint and help our environment, such as more efficient lighting sources. Compared to incandescent lights, LED's don't lose power as heat, use less power to make brighter light, are smaller, longer lasting, and more durable. Wall plug efficiency (WPE) is the ratio of optical output power and electrical input power. It can be used to compare the efficiency of lights.

To compare the efficiency of a LED vs. an incandescent light bulb, we needed to compare their average WPE's. Three circuits were used. Two circuits were built to apply a constant 12V current to a LED and to an incandescent lamp, respectively. The third was the light detection circuit with a light-to-voltage converter mounted high on a testing structure. The incandescent and LED lights were lighted below the light-to-voltage converter to measure their output power (i.e. brightness) using a digital voltmeter. The relative average WPE of the light tests was calculated and compared.

Tests proved LED's are brighter and used less energy to make light. Comparing the WPE's of both lights showed the LED was 5 times more efficient. Electricity is used everyday, and we need to use it responsibly.

NAME(s)	Neharika Khandavalli	PROJECT NUMBER	B24
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	The Effects of Water Purification Methods on Bacteria level		

ABSTRACT

Bacteria, along with viruses and protists, are the main contaminants in water that's found in several freshwater ecosystems. These unicellular organisms make up much of the earth's biomass. There are types of bacteria that are beneficial to humans; however, some of these pathogenic prokaryotes pose a great threat for humans by causing dangerous diseases. In order to get rid of these pathogens, I decided to test water that's infected with Escherichia Coli through various purification methods. I performed five different water purification methods: boiling, a micro-porous water filter, sedimentation, chlorination, and the iodine tincture method. My original hypothesis states that the sedimentation filtration method will be the most effective in removing the greatest number of bacteria due to its extremely small pore size. In my initial steps, I had to make a few Petri Dishes with nutrient agar and also prepare some nutrient broth for the bacteria to grow on. After incubating the broth, I made the bacteria subculture by mixing a sample of E.Coli in it. For each test, I streaked a Petri Dish with the unpurified water sample and I also streaked a Petri Dish with the purified water sample. I then compared the percent coverage between both the samples to determine the degree of purification. Using the photographs I took and the results generated from my experiment, I decided to analyze the data, prior to comparing it to my hypothesis. With the data collected thus far, the boiling test generated results that illustrate the greatest degree of purification. However, I have not completed my data collection at this point, and therefore am not sure of the outcome of the problem due to inconclusive results.

NAME(s)	Abbe Kind	PROJECT NUMBER	P27
SCHOOL	Mater Christi School	GRADE	7
TEACHER	Ms. Donlon		
PROJECT TITLE	Solar Panel Portions		

ABSTRACT

Is the output from a solar panel proportional to the exposed area of the panel? The Hypothesis for this experiment is - If a solar is covered 25%, 50% and 75% then the panel will produce proportionally less energy. From the background research, what was learned is that electrical energy could be produced from a solar panel when it is exposed to sunlight. Also that the simple things like shade, leaves, dirt and even bird scat can reduce the output of a solar panel. To test this, a solar panel, a sunlamp, a shade, a fan, a light bulb and a multi-meter were mounted on a wooden platform. The procedure included measuring the voltage and current of the solar panel with a certain amount of shade and at different times of the day. For each % shade and for a certain time of day, data was recorded that voltage and current for three identical experiments and calculated the average. Based on the results, the hypothesis "The output of a solar panel is proportional to the % of shade covering the panel" was wrong. The output of a solar panel is disproportional to the % of shade. For a horizontal shade, the output varies significantly because the shade covers each of the three panels as it is moved. For a vertical shade, the output varies, but it is more consistent because the vertical shade covers all three panels with equal shade.

NAME(s)	Stephanie Knockenhauer, Melanie Drummond	PROJECT NUMBER	GP17
SCHOOL	Green Mountain Union High School	GRADE	8
TEACHER	Allan Garvin		
PROJECT TITLE	Can You Remember That?		

ABSTRACT

Memory is something we use everyday. Our topic question is asking what color of text will be the easiest and hardest to remember. We believe that black will be the easiest to remember because it stands out and draws more attention to the mind. We are going to use a 10 letter word sequence and a 10 number sequence. After waiting 1 1/2 minutes, we ask what the test subject remembers, after studying the paper for 10 seconds. The amount of words and numbers correct is recorded out of the total amount on the sheet. In result, green turned out to be the easiest to remember for the testers for the sentences. Black, along with tan was the hardest for the testers to remember which was completely the opposite of what was expected. For the number sequences, black turned out to be the easiest to remember for the testers. Averaging the two colors for each test together, green turned out to be the over all easiest to remember for the testers. We believe, that using these results, color does not affect your ability to remember something. The averages were overall so close together that there was no clear pattern that one specific color or shade is the easiest to remember.

NAME(s)	<u>Will Kunin</u>	PROJECT NUMBER	<u>B25</u>
SCHOOL	<u>South Burlington High School</u>	GRADE	<u>10</u>
TEACHER	<u>Curtis Belton</u>		
PROJECT TITLE	<u>Bread Mold Growth</u>		

ABSTRACT

Bread is a staple food in almost every diet and is also one of the oldest prepared foods in the world. Bread was first made during the New Stone Age, by combining water and ground up cereal grains to make a grain paste that is then cooked. For my study I will take seven different types of bread and put each in a Ziploc bag. I will monitor each for 2 weeks and record observations on a daily basis. I wanted to determine whether the best tasting bread will grow the least mold, the highest density bread will have the least mold, and whether gluten or non gluten breads will have the least mold. The different breads will consist of one homemade containing gluten, one homemade without gluten, a store bought bread without gluten, and four other different store bough breads. All of these breads are similar in that they have no preservatives, so itÆs a level playing field for mold growth. To determine the amount of mold on each piece of bread, I will construct a 3 by 3 grid with nine squares and place it on both sides of the bread. I will compare mold growth between different pieces of bread out of 18 cubes. To find density, I will use formulas on rectangular prisms of each bread. To find the best tasting bread twenty people will carry out a blind taste test with 1cm by 1cm cubes of bread without crust and fill out a survey. From my recent studies, I believe the least dense bread will have the most mold because it is more porous and non gluten bread also because it has more ingredients. I am still unsure on how taste affects bread. I hope to learn more about mold growth characteristics on bread.

NAME(s)	<u>Amy Lawliss</u>	PROJECT NUMBER	<u>B42</u>
SCHOOL	<u>South Burlington High School</u>	GRADE	<u>10</u>
TEACHER	<u>Curis Belton</u>		
PROJECT TITLE	<u>Does Music Affect the Human Heart Rate?</u>		

ABSTRACT

It is known that outside forces affect heart rate. An example of this is when you watch a scary movie. As the music gets louder and something pops out at you, you jump and suddenly your heart rate goes up. My experiment is to determine if different styles of music affect the human heart rate. My hypothesis is that fast tempo music will increase the human heart rate and slow music will decrease the human heart rate. I'm testing ten boys and ten girls of different ages. I plan on doing all my tests in the same room so that the lighting, quietness, etc. will remain consistent. I am also planning on doing all my tests at the same time of day so that it becomes a controlled part of my experiment. I am testing my participants by having them sit in a quiet room for five minutes, then finding their pulse on their wrist to calculate their resting heart rate. I will then play a fast tempo song using speakers. My prediction is that their heart rate will increase after listening to the fast tempo song. After the song is over, I will find their heart rate again. Next, I will play a slow, classical song. In doing this, my prediction is that my participantÆs heart rate will go down. I have completed this test on some of my participants already. I have analyzed my data and so far, my data supports my hypothesis, meaning the fast tempo song has increased each personÆs heart rate, and the slow, classical song has decreased each personÆs heart rate. Thus far, I have concluded that music does affect the human heart rate.

NAME(s)	Theophila Lee	PROJECT NUMBER	B26
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	Detection of Caspase 3 in Human Lung Cells after Treatment with Acrolein		

ABSTRACT

Acrolein, a toxic chemical found in cigarette smoke, diesel exhaust, and smokestacks, is thought to potentially cause cell apoptosis (or cell death). Apoptosis occurs upon the activation of the protein Caspase 3 (C3). The purpose of this experiment was to determine whether or not acrolein was a factor in cell apoptosis. The experiment was comprised of 3 groups of human epithelial lung cells, strain HBE1: A control group (no acrolein), a 2 hour group (100 micromolar of acrolein for 2 hours) and a 24 hour group (100 micromolar of acrolein for 24 hours). The cells were first prepared so that they were in 3 vials of cell solution with equal concentrations of protein, but of course exposed to acrolein for different time periods. Then, an SDS-PAGE was run in order to separate the thousands of different proteins in the human lung cells from the one we wanted, Caspase 3. The gel was then cut in half: One half was used for a Western Blot, with a technique called electroblotting. The necessary antibodies specific for C3 was then added, as well as a chemiluminescent substrate for an X-ray film. The other half was soaked in a Comossie blue dye to bring out the protein, scanned, and enclosed in plastic. There are many different pieces of evidence to support the hypothesis: there are distinct differences between the control and 24 hour group in terms of cell size and confluence, when you look at the gel you could see substantially less protein in the 24 hour than the 0 hour, and the Western Blot showed the precursor Caspase was decreasing, which leads to the conclusion that the active Caspase (responsible for cell apoptosis) is increasing. This evidence shows that acrolein is indeed a cause of Caspase 3 activation in human lung cells.

NAME(s)	Andrew Lemieux	PROJECT NUMBER	P28
SCHOOL	Champlain Valley Union High School	GRADE	11
TEACHER	Glenn Fay		
PROJECT TITLE	Reducing Phantom Power		

ABSTRACT

A burning issue in today's society is the problem of energy efficiency. Most people haven't considered curtailing the amount of energy their electronics use while they are in standby, even though it is a large portion of our energy use.

My project is about saving energy by using two different methods to reduce phantom power loads. Phantom power refers to the power that many electronic devices use while they are in standby mode and not properly turned off. The first method is to turn off the power strip that the devices are plugged into. The second method is to use a smart strip. A smart strip is an advanced power strip that uses a master device to control power output to all the other outlets on the strip. If the master device is off, there is no power to the other plugs.

I predicted that by using a power strip to cut off power to the devices, five percent of the power would be saved over plugging the devices into the wall. I predicted the same with the smart strip. To test this hypothesis I used a power monitor to measure power usage of a TV, Xbox 360, stereo system, PS3, and a television antenna together over a 24 hour period. For each trial I turned the TV on for 4 hours and the Xbox on for 2 of those hours. This simulates the average use of the television and Xbox in an American home. The results of the experiment showed that a smart strip uses only 78 percent of the power that devices plugged directly into the wall use. Simply flicking the switch on a regular power strip reduces energy usage by 35 percent. By turning off the power strips that our electronics use, America could save 4 billion dollars.

NAME(s)	Dustin Lewis	PROJECT NUMBER	B43
SCHOOL	Fair Haven Union Highschool	GRADE	10
TEACHER	Ben Worthing		
PROJECT TITLE	Angle Of The Knee That Has The Most Tension On The Patella Ligament		

ABSTRACT

In this project talks to you about what angle of the knee that has the most pressure on the patella ligament. The hypothesis states if the knee was at hundred-fifty degrees would put the most pressure on the patella ligament because catchers have a lot of knee problems and that's the angle of the knee is at when there playing. There was a model knee built for this project. The model of the knee was built out of wood hinges, spring, U-track, a guitar tuner, and a nylon guitar string. After testing the hypothesis with a wooden model knee; the hypothesis was supported. The angle of the knee that had the most tension of the knee was hundred-fifty degrees. The tension varies on the flexion of the knee. When the knee is a zero degree flexion it has no tension. The tension didn't start to increase in till the knee was after forty-five degrees. To figure out how to test the tension would need to find the spring constant, the spring constant is $F = -kx$. F stands for mass times gravity, x stands for stretch subtract no stretch. To find what angle of the knee had the most pressure or tension, the first step done is move the knee to the angle you wanted to. Then take a caliper and measure how far the spring stretched.

NAME(s)	Madeline Limanek, Alexis Avonda	PROJECT NUMBER	GP07
SCHOOL	Christ the King School, Burlington	GRADE	7
TEACHER	Mrs. Srivastava		
PROJECT TITLE	Can The Ground Bring it Down?		

ABSTRACT

- Our project is based on using groundwater to cool a house through a geo-exchange system.
- We would pump groundwater (50 degrees Fahrenheit) into a coil in the house. The water went through the coil back into the ground. There was a fan next to the coil, causing the cold air to come out from in between the coiled pipes.
- The cold air flowed into the room, while the water absorbs the warm air. The air finally cooled down the temperature in the room to around a comfortable 72 degrees Fahrenheit.
- We took a 90 degree room and in two minutes had the temperature down to 72 degrees Fahrenheit using a geo thermal system.
- Therefore, the system properly worked without using an energy inefficient compressor, which proved our theory.

NAME(s)	<u>Qianyue Liu</u>	PROJECT NUMBER	<u>B27</u>
SCHOOL	<u>South Burlington High School</u>	GRADE	<u>10</u>
TEACHER	<u>Curtis Belton</u>		
PROJECT TITLE	<u>Triclosan in Dishwashing Liquids</u>		

ABSTRACT

Triclosan is a disinfectant chemical that is the key active ingredient in many household products, mainly soaps and dishwashing liquids. Triclosan is defined as an antimicrobial pesticide that is used to destroy or restrict bacterial development. It is registered by the EPA (Environmental Protection Agency) like all other pesticides, and is regulated as a bacteriostat. This means that triclosan suppresses the growth of bacteria, but doesn't destroy them all completely. For my study I tried to discover if antibacterial dishwashing liquids containing Triclosan are more effective than the ones that don't. I used two different brands of antibacterial soaps containing 10% triclosan and two non-bacterial soaps to wash four aluminum baking sheets fully coated with baked on grease. My hypothesis was that the anti-bacterial dishwashing liquids will not be more effective at cleaning but more effective at eliminating bacteria. With each liquid I measured how many square centimeters of grease there was left after one minute of cleaning and the total time it took to clean the whole sheet. I also swabbed each sheet for bacteria before and after cleaning and counted the amount of bacteria colonies that grew on each agar dish. If the petri dish from the antibacterial liquids contained an equal amount of colonies as the non-antibacterial, then my hypothesis would be wrong. If the total time it took to clean the sheets with non-antibacterial soap is less than the liquids containing triclosan, then my hypothesis will be proven correct. According to the data thus collected so far the antibacterial soaps are actually more effective than the liquids without triclosan at eliminating bacteria because there are more bacteria colonies growing in the non-antibacterial soap's petri dishes. There is a total of 27 colonies in both the antibacterial dishes combined and a total of 32 colonies in the non-antibacterial dishes.

NAME(s)	<u>Sara Locke</u>	PROJECT NUMBER	<u>C16</u>
SCHOOL	<u>Weathersfield School</u>	GRADE	<u>8</u>
TEACHER	<u>David E. Lambert</u>		
PROJECT TITLE	<u>Safety First:: The Right Attire for a Campfire</u>		

ABSTRACT

The problem I studied was what type of fabric would burn the fastest? I also studied "How many calories are there in a certain fabric?" The fabrics I used were nylon, wool, polyester and 50% cotton/ 50% polyester. When I was researching before I started my experiment, I found out that wool was like a "flame retardant" type of material. I also found out that flammability could be measured in many different ways. The most commonly used ones are ignitability, sustainability, combustibility, and consumability. Ignitability is to measure how long it takes the item to catch on fire. Sustainability is when you measure the time after the item was light on fire to when it stops burning. When there is no flame left. Combustibility is measured in many ways. One way to measure it is to see how much energy was released. Another way is to see how high the flame got. Consumability is how much of the item is left after you light it on fire. The two methods I used were consumability and sustainability.

My hypothesis was that wool would be the slowest burning fabric and that nylon would be the fastest burning fabric. I also thought that wool would produce the most heat and nylon would produce the least.

My main procedure for the flammability test was to attach the fabric to the stand and light it on fire. I would time it until it stops burning. Then record the results. This would occur for each fabric. My main procedure for the calorie test was to place the fabric under the calorimeter and light it on fire. After it stops burning, placing the temperature probe in the water and record the data. This occurs with all the fabrics. I was using fabric that was 5 inches by 5 inches. My main observations were that nylon and polyester burnt very fast. There was a lot of after burn for those two fabrics. The 50% cotton/ 50% polyester fabric burnt fast but it also burned very thoroughly. There was no fabric left after it was done burning.

My hypothesis was half supported because wool didn't produce the most heat, 50% cotton / 50% polyester did. Wool produced the least amount of heat out of all the fabrics. This part of my hypothesis was not supported but on the flammability side it was.

NAME(s)	Sara Lovett	PROJECT NUMBER	B44
SCHOOL	Rutland High School	GRADE	11
TEACHER	Dawn Adams		
PROJECT TITLE	Bugs on Drugs		

ABSTRACT

○This experiment investigates how drugs affect heart rate in Daphnia. The chosen substances for this experiment are alcohol, nicotine, caffeine, and adrenaline (epinephrine). The hypothesis is, if daphnia are exposed to alcohol, nicotine, caffeine, and adrenaline and solutions, then the heart rate of the daphnia will increase, with the adrenaline solution increasing the most. To test this hypothesis, a Daphnia is examined under a microscope. The heart rate of the Daphnia in the control, water, is determined by counting the heart beat of the Daphnia for 30 seconds, records the data, then multiply that number by two to produce the beats per minute (bpm). The experimenter repeats this process for the nicotine, caffeine, epinephrine, alcohol solutions. Given the results, the hypothesis is accepted for some of the conjectures about the substances such as nicotine, adrenaline, and caffeine. For the other substance, alcohol, the hypothesis was rejected because the heart rate of the Daphnia decreased with an average of 164.6, which is a 49% decrease compared to water. The hypothesis was also rejected because the adrenaline solution did not increase heart rate the most out of the 4 substances because while the average was 367.6 beats per minute while influenced by adrenaline, increasing by 14%, the caffeine solution increased the heart rate to 525 beats per minute, which was a 63% increase. Nicotine increased the heart rate about 23%. The hypothesis is rejected because adrenaline did not increase heart rate the greatest, caffeine did. This may be because caffeine exhibits all of the symptoms that nicotine and adrenaline do, and therefore, the heart rate of caffeine overtook adrenaline and nicotine. Over time, substances that raise heart rate cause many medical problems including heart palpitations and heart diseases.

NAME(s)	Pierrette Lumumba	PROJECT NUMBER	C17
SCHOOL	St. Francis Xavier School	GRADE	8
TEACHER	Mrs. Mary Ellen Varhue		
PROJECT TITLE	Apples to Liquids		

ABSTRACT

The purpose of my science fair project was to figure out which liquids could preserve apples the longest. I hypothesized that the more acidic the liquid I used, the better it would preserve the apple slices. In my experiment the things I kept the same were the Petri dishes, the amount of liquid, and the same place where I conducted the experiment. In my experiment my manipulated variables were the different types of apples and liquids that I used. I controlled the constant variables by using the same amount of liquid in the slices. I dipped three different types of apples in five different liquids and then observed them to see which apples had the least amount of browning. The results of my experiment seemed to prove my hypothesis to be correct. My results make sense because by research I learned that acidic drinks are sourer, and therefore they can preserve fruits and other things, such as apples. If I were going to do this experiment again in the future or expand on this experiment I would use a greater variety of apples and more drinks.

NAME(s)	Twyla Marr	PROJECT NUMBER	B09
SCHOOL	Rutland High School	GRADE	11
TEACHER	Tim Gilbert		
PROJECT TITLE	Dirty Snow: The Effects of De-Icing Agents on Growth		

ABSTRACT

Winter roads in Vermont are often treated with salts as de-icing or anti-icing agents. These treatments can adversely affect the growth of plants and other organisms in the areas surrounding the roads, thus becoming a detrimental aspect to the environment. In this experiment, I collected snow samples from wetland areas in Hubbardton, Vermont (one woodland and three roadside locations), as well as used a control of well water and three salt solutions at 1 percent concentration (NaCl; MgCl₂ plus NaCl; and CaCl₂) to test their effects on the growth and development of mung beans sprouts. After applying appropriate rinses of solutions (8 samples for each variable) to the beans for five days, the conclusion was drawn that solutions at 1 percent salt concentration deterred growth by about 3.0 cm in comparison to the control and all four snow samples. The beans watered with the snow samples and the control water grew at similar rates to each other. The implications are that, while the snow in this experiment showed no harmful effects, higher concentrations of the three studied de-icing salts should be avoided. Detrimental concentrations of salts could be of particular concern in areas where walkways or parking areas are repeatedly treated. While this experiment was conducted on plants to avoid harm to animals, the question is raised as to what the effect of similar concentrations might have been on developing roadside amphibians. In the future, further testing could be done, such as increasing the testing time-frame or expanding the variables to include other test sites.

NAME(s)	Alicia McCormick	PROJECT NUMBER	G09
SCHOOL	St. Francis Xavier School	GRADE	8
TEACHER	Mrs. Mary Ellen Varhue		
PROJECT TITLE	The Dirt on Dirt		

ABSTRACT

The purpose of my experiment was to determine which type of soil would serve as the best natural barrier to agricultural runoff. My experiment had two parts; I wanted to find out what kind of soil absorbed the most water, and what kind of soil absorbed the most nutrients from the water/fertilizer solution. I hypothesized that the clay/dirt mixture would absorb the most amount of water in the tests, and that the sand would absorb the least amount. For the second part of the experiment, I hypothesized that the white sand/dirt mixture would absorb the least amount of nutrients in the tests, and that the topsoil/dirt mixture would absorb the most. Throughout the experiment I had to take great care to control my variables. For my experiment I placed different soils in a 7cm diameter PVC pipe and then put 1 cup of water containing fertilizer into the hanging pipe. I recorded the amount of liquid that ran through the pipe and the time it took. I also measured the amount of nitrates and phosphates in the liquid before and after running through the soil. My results show that I was correct in both my hypotheses about the absorption of water but I was incorrect in my hypotheses that the white sand would absorb the least amount of nutrients, and topsoil would absorb the most. I believe my results are correct because of the research I did while examining my results. The particle sizes of the soils affect the permeability of the mixture which my results suggest occurred. I answered my research question at the end of the experiment, but I still have many questions concerning it. This experiment has definitely made me curious about further experimentation in this area.

NAME(s)	Kayleigh McDonnell	PROJECT NUMBER	B45
SCHOOL	Rutland High School	GRADE	11
TEACHER	Deb Hathaway		
PROJECT TITLE	Horse stride in relation to height		

ABSTRACT

○In my experiment I tested to see if the height of a horse has any relation to the length of stride. In all of my previous experience I have found that the taller the horse the longer the stride and vice versa. For example that is why hunt seat horses are taller so they can travel fast and more accurately to jumps and obstacles. While western horses are smaller so they can have quick fast strides to work cattle. My hypothesis was that the horse's height will have an affect on the length of stride that particular horse has.

○I tested and measured 20 horses trotting in hand at an average of 7 MPH. The horses all ranged in height and discipline which would give me an accurate range of data. I measured the distance from hoof print to hoof print of the horse's front hooves. I found that my tallest horse, standing at an enormous 17.2 hands, did in fact have the longest stride of 50.25 inches. And my shortest horse, 15.0 hands had the shortest stride of 32 inches. I graphed all of my horses on a bar graph, and it is clear to see that there is a clear decrease in stride as the height decreases. This proves my hypothesis correct, the height of a horse will affect the length of stride.

○Although my experiment was successful I would have changes a few things. All of the horses tested ranged in age and physical health. Also some horses were warmed up or stretched out while others were not. All of these factors could have had an influence on my results. If I were to redo this experiment I would take these differences into consideration more and be sure my test subjects were more closely related in age and physical health.

NAME(s)	Keli McLellan	PROJECT NUMBER	B10
SCHOOL	Northfield Middle High School	GRADE	11
TEACHER	C Tomczyk		
PROJECT TITLE	The Effect of 1, 2, and 3 teaspoons of Vermiculite in 6 ounces of Soil on the Height of Be		

ABSTRACT

○Plant growers and gardeners alike are always seeking easy and safe ways to cut down on the amount of time it takes plants to grow; vermiculite is a healthy way to improve soil conditions which will improve plant growth. Within a series of three experiments of testing soil compaction in bean plants, this project helped determine what amount of vermiculite shows the best results in plant height. In testing the hypothesis, the more vermiculite used in soil, the taller the plants will grow, until a certain amount of vermiculite begins to disturb the nutrients in the soil, I collected data by measuring thirty-two plants that consisted of four different amounts of vermiculite in five day intervals. Various amounts of vermiculite were added to organic soil to alter its density and reduce soil compaction. In total, thirty-one plants survived in a total span of sixty days. The results supported my hypothesis because two teaspoons had the highest average growth in height compared to the control of no vermiculite, one and three teaspoons of vermiculite. The plant height when using two teaspoons average was 118.26 centimeters, this is about twenty centimeters over the average of zero vermiculite that averaged 88.93 centimeters. The plants with two teaspoons of vermiculite were also greater than one teaspoon with 116.54 centimeters and 108.46 centimeters with three teaspoons. In addition, the results showed that the control of no vermiculite had the lowest average in the height of the plants. The outcome of all the plants demonstrates that the more vermiculite the greater the height of the plant, until a certain amount starts decreasing plant height.

NAME(s)	Kurt McNamara	PROJECT NUMBER	C18
SCHOOL	Avalon Triumvirate Academy	GRADE	7
TEACHER	Amanda F. Gifford		
PROJECT TITLE	Sink or float		

ABSTRACT

Alcohol and water are mixed, and then oil is dropped in to see where it floats. It is hypothesized that more alcohol will make the oil float and more water will make the oil sink. Glass beakers, vegetable oil, water, and rubbing alcohol were used. This method for getting oil to form spheres and float on water could be used for cleaning oil spills in the ocean.

When the water and alcohol were present in equal amounts, the oil formed spheres beneath the surface of the solution. When more alcohol was added, the oil formed spheres lower in the solution.

More alcohol causes the density of the solution to decrease, so the solution does not hold the oil up. The hypothesis was not supported because the opposite result occurred. The density of alcohol is 720 gm per ml. the density of oil is 800 gm per ml. In my experiment, I used tap water. The density is 1,000 gm per milliliter.

NAME(s)	Rosalie McNamara	PROJECT NUMBER	G10
SCHOOL	Green Mountain Union Middle/High School	GRADE	7
TEACHER	Mrs. Surma		
PROJECT TITLE	Decomposable Duct Tape		

ABSTRACT

For my science fair project, I tested to see if Duct tape was decomposable. People use Duct tape for anything and everything, from odd jobs to artistic projects and I wanted to know what kind of an impact it had on the earth. I used three different types of tape for this and three different variables. My hypothesis was that the jar with the electrical tape in the jar with the water would start a decomposing process before the others.

For the project I had three different tapes to test, Duct tape (made my intertape) Duck Tape, and electrical tape. I used water, dirt and sand as variables. I set three jars aside, putting In a cup of dirt in each jar, a different piece of tape, a half a cup of sand, and then another half a cup of dirt. I repeated this step for the next three jars, but instead of sand, I put a cup of water. I put a cup of dirt in the last three jars, the tape, and then another cup of dirt.

In the amount of time I had with this project, none of the tape started decomposing. However, It did change my hypothesis. If any were to decompose in the next one hundred years, I would say the electrical tape with the water would start before any of the others.

NAME(s)	Meridith Messier	PROJECT NUMBER	P29
SCHOOL	Rutland High School	GRADE	11
TEACHER	Dawn Adams		
PROJECT TITLE	Insulation Nation		

ABSTRACT

Insulation effects people everyday- it is inside of houses, schools, stores, hospitals, and virtually all buildings. The purpose of insulation is to prevent temperature changes between walls; if a room is heated insulations will keep the heat within the house; if a house is cool insulations will keep the heat outside of a house. Insulation is the barrier that maintains a house's temperature. When insulation is no longer used, though, it goes to waste. New, eco-friendly insulations have been made that can be recycled after use. The hypothesis states that if tested for resistance to temperature changes, eco-friendly denim insulation will perform as well as traditional types. To test this hypothesis, two fiberglass insulations were used along with the cotton-fiber denim insulation to see their resistance to heat. Each insulation type was placed into a compartmentalized cube and heated the entire cube for five minutes. The temperature was measured with a laser thermometer. After heating, the temperature was recorded every minute for five minutes to see if the heat would transfer through the insulation or go back into the environment. For analysis, this temperature compared to the starting temperature. On average, type one (pink foam), type three (denim), and type four (fiberglass) acted similarly slightly increasing in temperature after five minutes of heating. For the five minutes post-heating, those three insulations decreased in temperature, reverting to the original start temperature. Type Two (foil-faced) acted very differently. On average, it increased in temperature until 3 minutes post heating when it began to lower, never reaching its starting temperature of 19.0 C again. The hypothesis was accepted because the cotton insulation performed as well as the two fiberglass insulations and it performed better than the foil-faced insulation at resisting changes to temperature.

NAME(s)	Laura Mumley	PROJECT NUMBER	S05
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curt Belton		
PROJECT TITLE	Visual and Auditory Learning		

ABSTRACT

Information can be presented to people in different ways. Sometimes, if it is given in certain ways, it is retained better. Other times when it is given in a different way, it is not easily remembered. For this study, I would like to determine if information that is presented both visually and orally is retained better than if it were presented just visually or just orally. I will also look to see if pictures are more effective in portraying information than just printed words. My hypothesis is that information presented both visually and orally is better retained than if it is presented just visually or just orally. To test that, I made five videos. Each video presented information in a different way. The subjects will watch these videos and after each one, will take a written test to see how much they remembered. The data that I've collected so far seems to show that information that is presented both visually and orally is not retained better than information that is presented just visually or just orally. Also, my data suggests that pictures are remembered better than printed words alone.

NAME(s)	Ryan Murphy	PROJECT NUMBER	B46
SCHOOL	Green Mountain Union Middle/High School	GRADE	7
TEACHER	Mrs. Surma		
PROJECT TITLE	Beat to Beats		

ABSTRACT

My project was about looking at the affect that heavy metal music has on increasing your blood pressure and pulse rate. I chose this topic because I like music and I wanted to find out if there were some types of music that could be bad for your health.

My hypothesis was that your blood pressure will rise when you are exposed to heavy metal music.

○I knew that in order to see if there was an increase in blood pressure I needed to take it before exposure (baseline) and then after exposure. So my methods included, taking a baseline blood pressure and then exposing the subject to two minutes of heavy metal music and then retaking their blood pressure.

○My first subjects were my family members and then I went to the Heritage Deli and asked people to participate. I wanted to get at least 10 subjects and ended up with 15. My conclusion is that my data did not support my hypothesis. The blood pressure did not significantly rise when listening to music.

○At first I thought the only variable was the exposure to the music but I came to realize there were several other variables that I didn't think about. Such as, background activity, someone's prior health issues (medicine), cell phone ringing, interruptions, physical activity just prior to test, and a person's ability to relax.

○If I were to further investigate this topic I would focus on blood pressure or pulse but not both. I would conduct the experiment in a more controlled environment to reduce variables and would make sure to ask about medicines someone might be taking that would interfere with the results. I would also allow time for relaxation prior to taking the baseline and extend the length of time to 3 minutes. I don't think 2 minutes of exposure was enough,

NAME(s)	Michael Napolitano	PROJECT NUMBER	M02
SCHOOL	Rutland High School	GRADE	11
TEACHER	Tim Gilbert		
PROJECT TITLE	Which Programming Language Performs the Fastest?		

ABSTRACT

People use applications on their computers that are written in a variety of different programming languages. Some of the system-level programs are most likely written in C, while a card game may be written in Java. Each programming language has positives and negatives, Java makes it easier to write nice applications with a Graphical User Interfaces (GUI), while C is more focused for low-level system work. One reason for this distinction is speed. After completing this project, I knew that this was true, C had a tremendous speed advantage over Java, especially in important system level operations like File Manipulation. My goal in doing this experiment was to find out which programming language produced the fastest programs; my initial hunch was C. I did this by writing five sample programs in four different languages that each tested a certain aspect of the language, and comparing the execution speed. I then compared the five programs speeds in each language to find which was the fastest. I noticed that Java was consistently ~.0030 seconds slower than some of the other languages, so I decided to add another category of application, which was just a blank program. After testing the blank programs, I found that it takes Java significantly longer to startup, but once it is started it performs as well as the others. Therefore, I used this group as my control, and for my final data, subtracted the control time. This gave me much more understandable and realistic times. In the end, I found that C performed the best out of the tested programs in every single category. I contributed this to the fact the C is compiled, and more "low level" and isn't as sophisticated as the other languages. I found that Java was the second fastest in three out of the five categories.

NAME(s)	Evelyn Needham	PROJECT NUMBER	B28
SCHOOL	Hlnesburg Community School	GRADE	7
TEACHER	Stephanie Konowitz		
PROJECT TITLE	Shape and Solutions		

ABSTRACT

Yeasts are small single celled fungi. They are capable of fermenting carbohydrates into alcohol and carbon dioxide. Yeasts are often used in breads, alcoholic beverages, and as a source of vitamins and proteins. Some yeasts have been used to generate electricity in microbial fuel cells, and produce ethanol for the biofuel industry. In the process of baking bread or making alcoholic beverages yeast are exposed to many solutions. In some cases, like baking bread, the yeast cells cause the bread to rise, but when heated beyond a certain point in the oven the yeast cells die. This experiment was designed to determine if yeast cells shapes would change when exposed to different solutions.

To perform my experiment I began by growing yeast cell colonies in two petri dishes filled with trypticase soy agar. Once the yeast cells were a fair size I used a transfer pipet to move a single yeast cell colony from one of the petri dishes to containers with a milliliter of each solution. Once the yeast cell colonies were exposed to each of the solutions I transferred some of each solution and put it on a clean slide. I stained the content on the slide with crystal violet staining solution, and let the slide dry, at room temperature, for thirty minutes. When the time was up I examined the slides under a compound light microscope. I counted the number of the yeast cells that changed shape, and the number that didn't.

The appearance of the cells exposed to each solution differentiated from each other greatly. The cells exposed to tap water did not change at all. However, nearly all the cells exposed to vinegar formed translucent rings around all the individual cells. Also, one fourth of the cells exposed to alcohol shriveled.

NAME(s)	Evan Nolting	PROJECT NUMBER	B47
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Cutis Belton		
PROJECT TITLE	The Effects of Exercise on the Human Body		

ABSTRACT

Physical Fitness is a big part of life for every person. To stay healthy we are told that we need to stay physically active and get a daily-recommended 60 minutes of exercise everyday. However, does exercising really even affect your body? For my science experiment, I decided to take 12 subjects and over the course of 2 months, I would have them lift weights and do a variety of exercises including cardio and flexibility training and see if these ex and see if these exercises make a difference in how much of each they can do. I believe that the exercises will help them. Some of the specific exercises we do are benching, squats, dead lift and a mile run. For the flexibility, there are different stretches that can be measured to see how good you are at them. At the beginning of the experiment, before and working out, we do a pre-test to see how much of each exercise each subject can do. Then at the end of the 2 months, we will do a post-test to see if they have improved or stayed the same or even declined in the amount they could. After around a month of subjects, working out I can already tell from the data that for some people there is a large jump in the amount they can and they have improved very well, but for some other subjects it looks like they have reached their peak and have not improved very much.

NAME(s)	Miranda Orcutt	PROJECT NUMBER	S06
SCHOOL	Mater Christi School	GRADE	7
TEACHER	Michelle Donlon		
PROJECT TITLE	Money, Motivational or Not?		

ABSTRACT

Can the likelihood of a person participating in an experiment be affected by the prospect of receiving one dollar? This question inspired this science project. The theory is, if someone is offered a dollar to participate in an experiment, then that person is more likely to participate than if they were not offered a dollar. Research done referred to how money motivates, altruism, curiosity, and Maslow's Hierarchy of Needs, a theory dividing five basic human needs into ascending levels of value. Two scripts were written for testing the two groups of people-one for those offered a dollar and one for those who were not. These and paper with columns to separate the data from each group were attached to the clipboard.

○Females, between the apparent age of twenty and sixty, were asked in various shopping centers to determine their dominant eye. The subjects' answers, observations about their behavior, if money was offered, and the testing location were recorded. After testing forty-five subjects, surprising conclusions were reached. Overall, twenty subjects consented to the experiment and twenty-five subjects declined. For those offered money, eight accepted and fifteen refused. For those not offered money, twelve agreed and ten disagreed. Interestingly, more subjects offered money declined than those who were not. Sometimes, it seemed like offering money to the subject insulted them, triggering immediate rejection. Consequently, if someone is offered a dollar to participate in an experiment, then that person is not more likely to participate compared to not being offered a dollar.

NAME(s)	Piper Oren	PROJECT NUMBER	G11
SCHOOL	Mater Christi School	GRADE	7
TEACHER	Ms. Donlon		
PROJECT TITLE	Still Just The Sun?		

ABSTRACT

The question was, does the color and material of the solar still effect how much fresh water is distilled? The hypothesis for this project was, if four solar stills, made of different materials and of different colors such as, metal, plastic, glass and black, clear or frosted white are set in sunlight then, the metal bowl will distill and produce the greater amount of fresh water. The background research for this project included learning more information about accumulators, solar energy and how solar stills distill salt water into fresh water. The methodology used for this project was to set up the four solar stills and place them in direct sunlight for same period of time. The data collected indicated that the metal solar still achieved the greatest amount of fresh water at 0.37 mL, the black-walled plastic bowl accumulated 0.16 mL, the glass still 0.15 mL, and the plastic, frosted white colored still 0.12 mL. The result, therefore, is that the metal still is the most effective in producing fresh water. The highlights were discovering that the Vermont winter sun in below freezing temperatures did not produce a sufficient amount of water to measure and using photo heat lamps as a substitute for the sun resulted in melting of the saran wrap covering and the plastic collector cups and therefore the loss of data in the second trial. Background research regarding the higher absorption rate of the color black versus the color white or clear, led to the conclusion that a black metal still would produce the greatest amount of distilled water.

NAME(s)	Warren Ouellette	PROJECT NUMBER	C19
SCHOOL	The Renaissance School	GRADE	6
TEACHER	Eve Dubois		
PROJECT TITLE	Oobleck: Cornstarch and Water		

ABSTRACT

○I am testing whether cornstarch and water has the same reaction as cornstarch mixed with other liquids. The liquids I am mixing with the cornstarch are root beer, apple juice, vinegar, and water, of course! The reason I am using those liquids to compare with water is because root beer and apple juice both contain some amount of water. Vinegar contains very little water, so that would be interesting to test.

○My hypothesis is I think cornstarch mixed with the other liquids won't have the same reaction as cornstarch and water. I chose this hypothesis because root beer and apple juice contain other ingredients which may interfere with the water in the drink trying to mix with the cornstarch. Vinegar has very little water which means the water may not even mix with the cornstarch.

○I found the results by dropping a rock from 36" (1 yard) into a bowl of the mixture. I did this four times for each mixture. I used a timer to time how long it took for the rock to sink into the mixture. Out of the four trials for each mixture, I found the average time.

○It turns out my hypothesis wasn't correct. The root beer was actually gooier than the cornstarch and water mix. It was almost a solid substance which may be caused by the other ingredients in the root beer (carbonation, sugar, corn syrup). The apple juice and the vinegar were very watery compared to the cornstarch and water mix.

NAME(s)	Hillary Palmer	PROJECT NUMBER	C20
SCHOOL	Hinesburg Community School	GRADE	8
TEACHER	Stephanie Konowitz		
PROJECT TITLE	Chew, Chew!		

ABSTRACT

Presently, the United States is having a recession and even the inexpensive things are important to watch for. A common consumer product is gum and not many people know whether sugar free gum flavor lasts longer than regular. This experiment was designed to find which gum's flavor lasted longer and would be the better value to buy. The outcome may explain why regular gum is less expensive. Different flavors of both sugar free and regular gums were chewed by different subjects and the time of how long the flavor lasted was recorded. Though regular gum has more sugar, it did not last longer. Sugar dissolve when in water, this explains why the pieces of regular gum are so big because the sugar dissolves with saliva. From this I concluded that the reason sugar free gum is a big more expensive is that the flavor lasts longer, there are more pieces in a pack, and it is better for you since there is no sugar and is recommended by the ADA (American Dentist Association).

NAME(s)	Zachary Pena	PROJECT NUMBER	C21
SCHOOL	Rutland High School	GRADE	12
TEACHER	Deb Hathaway		
PROJECT TITLE	Permeate That!		

ABSTRACT

The purpose of this project was to find which plastic wrap had the best permeability and would prevent the most moisture lose to wrapped foods. In turn finding which plastic wrap would be the best to wrap foods in; one could spend less money on buying plastic wrap that they thought was the best at keeping their food fresh. The hypothesis was that the best plastic wrap to keep food fresh would be the big name brand GLAD. This was because if they had so many products they must have something working for them. Upon doing the project it was found that a different story had happened. Ten beakers were filled; two beakers for each plastic wrap brand, that were filled with 5mL of water for eighteen days. The beakers sat in a cardboard box everyday for eighteen days. After the eighteenth day, no water was lost from either of the ten beakers of water. All beakers were still filled with 5mL of water with no sign of evaporation or condensation; none did a better job then the other holding water over a period of eighteen days. The conclusion was, you can buy any type of plastic wrap name brand or not, they will all work just the same to preserve your food. Changes that could be made in future attempts of this project could be: to test the plastic wraps in different room temperatures or in the refrigerator, where the speed of molecules moving around would be effected by the temperature change

NAME(s)	Madison Perrin	PROJECT NUMBER	B48
SCHOOL	South Burlington High School	GRADE	
TEACHER	Curtis Belton		
PROJECT TITLE	The Effect of Energy Drinks on Heart Rate		

ABSTRACT

Energy drinks are becoming a large part of American culture today. They are known to contain high amounts of caffeine and sugar. Caffeine is great for providing a quick burst of energy, but has a negative effect on health. One of these negative effects is the heightening effect on heart rate. For my study, I wanted to see how much of an effect energy drinks have on a person's heart rate. I will compare the heart rate of somebody who has consumed an energy drink to that of someone who hasn't. I believe the person who has consumed an energy drink will have a higher heart rate over a period of two hours. I will choose subjects who are between 14 and 18, and I will perform the test after a certain meal, one that is consistent and will not affect the data. The time of day will also be consistent. Each person will have their heart rate measured four times, one control, three experimental, except the two control subjects, who will receive four control readings, with no caffeine involved. Average heart rate will be recorded, and these averages will be compared to find trends in heart rate. If the control group has a lower reading than the experimental group, then we will know that the caffeine in energy drinks is affecting heart rate. If there is a significant difference between the two control and experimental readings, then the negative effect will be shown.

NAME(s)	Hannah Potter	PROJECT NUMBER	S07
SCHOOL	Green Mountain Union High School	GRADE	8
TEACHER	Allan Garvin		
PROJECT TITLE	Who Are You?		

ABSTRACT

Police lineups are a handy tool to solving crimes, showing an eyewitness a lineup and asking to identify the criminal can help Crime Scene Investigators solve part of the mysteries involving crime. Which kind of police lineup is more accurate, sequential or simultaneous? When the test subjects look at the sequential lineup they will point out the correct criminal. I will show my test subjects a picture of one person. A week later I will show my test subjects a sequential and simultaneous lineup (this will have the original criminal in it) and ask them which one is the criminal. After running my tests, my hypothesis was proved incorrect, the simultaneous lineup was more accurate. Ages thirteen through fourteen had better results than adults, and female test subjects also had better results than male.

NAME(s)	Elise Prehoda	PROJECT NUMBER	P11
SCHOOL	St. Francis Xavier School	GRADE	7
TEACHER	Mrs. Mary Ellen Varhue		
PROJECT TITLE	Awesomeness in the Arctic		

ABSTRACT

Purpose: To find the shelter that best protects an animal from harsh Arctic climates.

Hypothesis: The leaves and sticks (representing a burrow) will do the best.

Procedure: I took three cups and filled them up three quarters of the way with 95° F water. I put them in a bigger bag with animal body coverings aka down and insulated them with the shelters leaves (a burrow of leaves), woodchips (the inside of a tree), and snow (an animals last resort). Then, I put the first bag in the freezer. Five minutes later, the second (I made sure that it was still 95 degrees) then, the third five minutes after that. After one half hour, I took them out in the same five minutes after the other order. Then I measured their temperatures. I put them back in. After another half hour I tested took the temperatures again. In total, they were all in the freezer for two and a half hours. I did two trials of that.

Conclusion: I found out that wood chips were the best insulator. I believe this happened because the wood chips were packed together the closest. If I were to do this again, I would do it on a more advanced level. Something that I think affected my results was that when I would open the freezer, to take one shelter out, warm air would come in.

NAME(s)	Gurkiranjit Kaur Rattu	PROJECT NUMBER	B49
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	What Insect Pests Hate: Comparing A Commercial Pesticide to Organic Pesticides		

ABSTRACT

Gardeners and farmers tend to face many problems while growing their crops. One major problem would be insects. 70 million households and 900,000 farmers use commercial pesticides to solve the problem of insects. Unfortunately, commercial pesticides have been known to be harmful to the environment and to humans. For my project, I wanted to determine which type of pesticide is more efficient in getting rid of insects, commercial or organic? The pesticides that are used in this experiment are Sevin commercial pesticide, garlic juice, lemon juice, and rotten eggs. The insects that are used in this experiment are ants, aphids and fruit flies. There are 36 plants being used in this experiment, 18 pansies and 18 violas. There were two parts to this experiment. The first part of the experiment was to see how the insects reacted to the commercial and organic pesticides in constructed environments made of Petri dishes. I will count how many bugs are close to the pesticide and how many bugs aren't close to the pesticide. For the second part of the experiment, I want to see how the insects will act in a more natural environment with the pesticides. The data collected will be how many insects are in each plant and some observations taken in the experiment will be the conditions of the plants. My hypothesis is that the lemon juice will attract the most insects because ants, aphids and fruit flies like things that are sweet and the insects will stay away from garlic juice, rotten eggs, and the commercial pesticide because of their foul smells and help the pansies and violas grow more productively.

NAME(s)	Allison Resnick	PROJECT NUMBER	P12
SCHOOL	Rutland High School	GRADE	11
TEACHER	Dawn Adams		
PROJECT TITLE	Under Pressure		

ABSTRACT

To test the affect of the specific heat capacity, a manometer was used to measure the pressure. A bottle with a liquid was place in a pot of boiling salt water. This bottle had a set of tubes connecting it to the manometer. Every thirty seconds the change in height on the manometer was recorded. This height could be converted to pressure by a simple calculation. This would determine the amount of pressure over time, so the faster the height increases, the more efficient it would be. It is important to keep the entire situation the same except for the liquid. This means the same amount of liquid in the bottle, the temperature of the salt water the same the whole time, and the manometer must not be changed throughout the experiment. The hypothesis was rejected. The liquids used were water, apple cider vinegar, milk and white wine. The white wine had the lowest specific heat capacity, followed by the vinegar, then the milk, and then water. The results were that white wine did have the highest pressure reaching the maximum height of the manometer at three minutes, but milk was next with four minutes opposed to vinegar. Vinegar was third with thirteen minutes and water was last with fourteen and a half minutes. There was an external factor with the milk, however. The milk formed a creamy layer on the top, and so it through off the pressure because it was not a gradual release of pressure. The vapor was trapped and then it burst through. The other liquids, however, followed the theory. This means that in a solar thermal system, a liquid with a lower specific heat should be used instead of water.

NAME(s)	Emily Ringquist	PROJECT NUMBER	S08
SCHOOL	Fair Haven Union High School	GRADE	9
TEACHER	Nathan Morris		
PROJECT TITLE	Fake Book		

ABSTRACT

The internet and technology in general is a rapidly progressing element in all high school students lives. Internet safety and awareness is now being taught to students at younger ages. As sites such as AIM, twitter, and Facebook become prominent in students lives we begin to wonder what information really can be, safely, put onto the internet. How safe do students think they have to be? How safe are they really being? And, do students understand the importance of keeping personal information, personal?

○To research this I came up with an experiment. I was interested in seeing how many Fair Haven Union High School students would accept a facebook friend request from a stranger, simply because they claim to go to the same school. To do this I created a fake facebook person, Jenna Anderson. I then took a stratified systematic sample, meaning I randomly selected 72 FHUHS students and sent friend requests to them. I made sure I took the same percentage from each grade level to keep my results more random.

○By conducting my experiment of seeing how many students at FHUHS will accept a friend request from a stranger simply because they claim to go to the same school, we can learn how safe students really are being on the internet, if internet safety should be greater stressed and simply bring awareness to students about the online decisions they make.

○My data was collected from a sample of students out of the entire FHUHS student population, this means that I can create a confidence interval, predicting the actual amount of students who would accept a stranger for a friend on facebook. ○Therefore my data shows that 57%-79% of all the FHUHS students who have a facebook would accept a stranger as a friend, knowing nothing more than the fact that they claim to go to FHUHS.

NAME(s)	Alicia Rokes, Jordan Stewart	PROJECT NUMBER	GP21
SCHOOL	Green Mountain Union Middle/High School	GRADE	7
TEACHER	Mrs. Surma		
PROJECT TITLE	No Snooze You Lose		

ABSTRACT

We did this specific project idea because we wanted to find out how long you need to sleep to get the best grade on a test. We thought that this was important because then students would get the correct amount of sleep needed to do well the next day at school. Our hypothesis was that the students with the most sleep would improve and the students with the least sleep would see a decrease in their grade. Our conclusion was that our hypothesis was half correct. We were right that the kids with the most sleep improved. Although the students with the least amount of sleep or no sleep also improved. We had a lot of fun with this project and found it very interesting.

NAME(s)	Michel Rovner	PROJECT NUMBER	B29
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	Purification and Isolation of Acetylated Tubulin from Cultured Cell Colonies		

ABSTRACT

Microtubules are very thin, very long tracks made up of tubulin subunits that act as the roadways for transporting biomolecules inside of nerve cells. Scientists have found however that not all tubulin is the same. These different populations can perform slightly differing tasks such as directing traffic to different areas of the cell. This process is important because many diseases that are neurodegenerative such as Alzheimer's, ALS, and Huntington's disease are thought to occur because of defects in neural transport. One way to be able to know if the tubulin is different is by Post Translational Modifications to the tubulin have occurred. While this can help differentiate the types of tubulin, the affects that come about from PTM's such as acetylation are hard to study because the microtubules that are procured are usually from brains of certain animals. While there is tons of acetylated tubulin in the brain, there is also many other non-acetylated tubulin and other non-tubulin proteins and structures in it as well. To overcome this clutter, we hypothesize that populations of acetylated microtubules can be purified from cells in a culture medium with TSA which stops deacetylation of tubulin. To do this you must first purify the tubulin from the cell. Using Cos Cells, we went through a process of polymerizing and depolymerizing tubulin while taking either the pellet or the supernatant. After procuring the tubulin, we then started using two drugs on the tubulin: HDAC6 which deacetylates tubulin and TSA which renders HDAC6 useless and therefore inhibits deacetylation. So far though, there have not been sufficient amounts of acetylated tubulin to start working with the acetylation level changing drugs.

NAME(s)	Fathima Sameen	PROJECT NUMBER	B30
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	Level of phosphorus vs. growth of Cyanobacteria		

ABSTRACT

Cyanobacteria are photosynthesizing bacteria that acquire their energy through photosynthesis. They grow during the summer in shallow waters that are rich in nutrients like nitrogen and phosphorus. The presence of excess nutrients can be caused by runoff from urban areas, excessive use of high phosphorus in fertilizers, and from manure. This causes an increase in plant and algae growth. For my study, I tried to determine whether the level of phosphorus had an effect on the growth of Cyanobacteria from taking water samples from agricultural, forested, and urban sources. I took 3 samples (agricultural, forested and urban,) from each of the nine areas in central western Vermont. The streams and rivers are all part of the Lake Champlain Basin which has a known phosphate loading problem. My original hypothesis was that the higher the level of phosphorus the greater the growth of Cyanobacteria; of the 3 sampling categories, I hypothesized that the agricultural area would yield the greatest growth with urban next and forest last. To test this, I will put 10 ml of the Cyanobacteria culture in each water sample and will then wait to see how much growth has occurred in each sample. Each sample will also be tested for phosphate to possibly show a correlation between the quantity of phosphorus and Cyanobacterial growth. The sites will be revisited and sampled in the spring to determine if phosphate levels and Cyanobacterial growth are seasonal.

NAME(s)	Darrell Sarnowski	PROJECT NUMBER	P13
SCHOOL	Rutland High School	GRADE	11
TEACHER	Deb Hathaway		
PROJECT TITLE	Bend A Nail		

ABSTRACT

The experiment Bend-A-Nail consists of finding out the different strengths of different types of nails. My father is a carpenter so the idea was set in place because he is always using many different nails for different job. Seven nails were tested in this experiment the nails were, Concrete nail, Tico nail, Framing nail, Sheeting nail, Galvanized Decking nail, Roofing nail, and Siding nail. Each nail had five test ran upon them. Using a torsion bar which allows you to see how many foot pound of pressure an ideam is being placed under. The hypothesis stated that the Tico nail would be able to with stand the most amount of pressure out of all seven nails. The end results proved that the Concrete nail was able to withstand the most amount of pressure. The weakest nail was proven to be the Siding nail. The experiment taught a lot about nails, and makes a person realize the important of which type of nail need to be used on a project of building. The experiment went well with no unexpected problems. If the experiment was done again later in time a recommendation would be to have a better Torsion bar that could withstand, and read more than 150 foot pounds of pressure.

NAME(s)	Elizabeth Sartorelli	PROJECT NUMBER	S09
SCHOOL	Mater Christi School	GRADE	7
TEACHER	Ms. Donlon		
PROJECT TITLE	Which teaching method is most effective for boys and girls?		

ABSTRACT

The question for this project is which teaching method is most effective for boys and girls. The hypothesis is If one tests first grade students with an activity versus verbal, then the boys will learn the activity better than the girls. The background research for the project showed the best way to teach boys is through an activity, and the best way to teach girls is verbally. Verbal is easier for girls because their reading and writing skills develop sooner than boys. The procedure for this project is, to gather a group of fifteen students and divide them by gender. The group of children recites two phrases. One phrase, the children learned by saying it repeatedly, and the other phrase they learned by doing an activity. To collect data for this project, the boys and girls learned the first phrase by saying it aloud with the class. Then they were individually tested on the phrase by saying it alone. For the activity the children threw a beach ball to each other and when a student caught the ball they would recite the second phrase. The result for this project is that the girls excelled in the verbal and activity test. The boys struggled in both tests, trying to remember the phrases. An interesting result is that one boy got the activity phrase correct, and four girls got the activity phrase correct. The average result for girls in the activity: 90 percent, boys: 75 percent. For the verbal, girls: 85 percent and boys: 71 percent.

NAME(s)	Grace Schillinger	PROJECT NUMBER	P14
SCHOOL	Christ the King School	GRADE	6
TEACHER	Mrs. Wright		
PROJECT TITLE	Which Materials Hold Heat the Longest?		

ABSTRACT

The purpose of my experiment was to find out which materials hold heat the longest. I used water, air, salt, sand, and paper as my materials. I measured the materials using a thermometer, I used degrees Celsius. I put all of the materials in cups and in a bucket, under a light for 30 min. I then took the bucket out from the light and tested the materials after 5 min., 10 min., and 30 min. I found out that water held heat for the longest amount of time.

NAME(s)	Kristen Schumacher, Carolyn Snell	PROJECT NUMBER	GP05
SCHOOL	Christ the King School, Burlington	GRADE	7
TEACHER	Mrs. Srivistava		
PROJECT TITLE	Natural Plastic Make it and Break it		

ABSTRACT

Our science experiment tested the possibility of making natural plastic stronger than it already was. We assumed that the plain natural plastic would be the strongest, but we were very wrong.

○We had a hard time testing as we had no idea how much weight the bars of plastic could hold. To begin we hung 100 gram weights from them, but soon we realized this was not enough. The first testing, done about a week after the plastic was made, went much faster than the others. Most of the plastic broke with about three pounds of weight. However, with another week it got stronger. Every piece could hold eight-point-eight pounds for a full minute! The strongest type, the lint and sawdust sample, could hold 14 pounds! Unfortunately, it seemed as if some of our pieces may not have been completely sound and when we retested that piece of plastic it snapped on impact. This is probably due to a slight mistake in the making or molding of the plastic sample itself û although we would need more testing to be sure. Even though it is wonderfully strong it is not a practical resource yet.

NAME(s)	Keegan Sheere	PROJECT NUMBER	G12
SCHOOL	Green Mountain Union High School	GRADE	8
TEACHER	Allan Garvin		
PROJECT TITLE	Filtering Oil From Water		

ABSTRACT

The experiment that I carried out through this project was determining different ways of filtering water. I was trying to find a natural material that filtered oil out of water the most efficiently. I did this by making oily water and then running it through a funnel that was filled with one of my natural materials (pine needles, sand, and dryer lint). Then, after the water was filtered, I then ran it through a turbidity tube to measure the cloudiness of the water. In the end, the dryer lint filter the most oil out of the water.

NAME(s)	Veronica Sioss, Lucy Terrien	PROJECT NUMBER	GP11
SCHOOL	Christ the King, Burlington	GRADE	7
TEACHER	Mrs. Srivistava		
PROJECT TITLE	Raindrops Keep Falling on My Head.....Ouch!		

ABSTRACT

In our project we wanted to see the different levels of hardness in rainwater and how it affects appliances if you have well water.

First, we collected rainwater samples from around the country, and tested them with a pH and gH (hardness)kit. Then we found our results and compared them to our hypothesis.

We found that some towns such as Springfield, V.A., had a higher level of gH because it is located by Washington D.C., a large city. In our research we discovered that hard water does affect your appliances, but not your health.

NAME(s)	Dahlia Somers	PROJECT NUMBER	G13
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	Soil Erosion		

ABSTRACT

○Soil erosion is a serious threat to agriculture in developing countries. Farmers use the method of bench terracing to decrease erosion. The main causes of soil erosion are rain, wind, and freezing/melting. Many farmers use the method of bench terracing to decrease erosion. For my study, IÆm attempting to determine the effectiveness of bench terracing by creating simulations of rain, wind, and freezing/melting on slopes that are terraced, not terraced, thickly vegetated, and more sparsely vegetated. There will be a total of three tests, one for each element. These tests will have four containers that hold wheatgrass growing in a mixture of thirty percent gardening soil, twenty percent organic compost and fifty percent peat moss with a layer of stones coving the bottom. Each framed container has the dimensions of approximately 53 x 23 x 30.5 centimeters; they will be subjected to rain, wind and freezing/melting. Dirt that has eroded will be collected and weighed after the tests have been completed. The slopes without terracing are to be used as controls, and the wheatgrass grown in different thicknesses will create differences in erosion. The more wheatgrass there is the less soil erosion will occur. I anticipate that bench terracing will make a significant difference; that water will cause the most erosion, while freezing/melting shall cause the least.

NAME(s)	Julia Song, Leroy Storey-Hall, Joshua Thompson	PROJECT NUMBER	GP19
SCHOOL	Pacem Learning Community	GRADE	8
TEACHER	Pam Watts		
PROJECT TITLE	Lucid Dreaming		

ABSTRACT

Lucid dreaming has been practiced for more than one thousand years by Tibetan Buddhists in a form of meditative Dream Yoga. However, it has only come to the attention of scientists fairly recently. It occurs when a person is asleep and dreaming, and suddenly realizes that they are in a dream. Usually, with this realization comes the ability to control oneÆs dream self, as well as the dream. The goal of this project was to have at least some of the òlab ratsö (fellow students and teachers who volunteered to be a part of the experiment) achieve lucidity while dreaming through the most recommended methods. These were practicing reality checks, yoga and/or meditation before bed, and WBTB, or wake-then-back-to-bed. The hypothesis was that most lab rats would achieve lucidity or near-lucidity at some point, but not on a regular basis. For experiment 1, all of the people participating were assigned a certain method to try and asked to record their dreams. Through that, four out of the six reached near-lucidity or lucidity. For experiment 2, participants will try to lucid dream using the meditation/yoga method, which participants decided was the best mix of effectiveness and convenience. The conclusion of experiment 1 was that the hypothesis was near correct; 4 out of the six participants had at least one lucid or near-lucid dream. Not enough data has been collected from experiment 2 for any conclusions so far.

NAME(s)	Kelsey Soto	PROJECT NUMBER	C22
SCHOOL	Rutland High School	GRADE	11
TEACHER	Tim Gilbert		
PROJECT TITLE	Onion Breath?		

ABSTRACT

○For my experiment I wanted to see what toothpaste brand or other variables worked better on getting rid of onion breath. To test this I ate one tablespoon of chopped onions and had people rate my breath on a scale of one to five. Then I would brush my teeth for one minute so that it was even amounts of brushing time each test. Then I would wait for five minutes before I had them rate my breath again because onion breath always smells better right after brushing and I did not want that. I would repeat this several times with the different variables.

○I discovered that Colgate was the best at getting rid of the onion breath. Although was the best, it did not get rid of the onion smell completely. I also discovered that males and females tested a little different from each other. They both like Colgate the most but the percentages were higher for the females than males. The percentage for the people that would either pick Colgate or Crest was the same for both male and females. If I were to do this experiment again I would test more people and try more toothpaste brands, I would also test to see if there really is a big difference between males and females.

NAME(s)	Kayla St. Marie	PROJECT NUMBER	B11
SCHOOL	St. Francis Xavier School	GRADE	7
TEACHER	Mrs. Mary Ellen Varhue		
PROJECT TITLE	Smoke N Spinach		

ABSTRACT

Purpose: The purpose of my science fair experiment is to investigate the effect of sulfur dioxide in air on the growth of plants.

Background Information: Sulfur dioxide is a colorless gas that can affect the environment through acid rain. Sulfur dioxide can be formed when a substance containing sulfur such as matches is burned.

Hypothesis: If the amount of matches containing sulfur increases then the amount of change done to the spinach leaves will increase.

Procedure: I took my spinach leaves and I cut them in half, placing 5 halves inside 5 Petri dishes and the other halves close to the originals. After that, I put on my goggles and I struck a match. I continued striking matches so that I had 5 matches in the 5th Petri dish. Next I let the spinach sit with the matches for 1 hour and when the hour was up I recorded any change in the spinach leaves on a scale of 1-10. I reset the timer for 4 hours. After the 4 hours was over I once again recorded any change in the spinach leaves that I saw. Then I repeated steps 6-11 five more times so that I had a total of 5 trials. I performed a follow up experiment using only the material in the tip of the match.

Conclusion: My results were inconclusive. I think this happened because there were a lot of problems including the amount of carbon from the match stick that could have affected my results. My follow up experiment did show some effect on the leaves from the sulfur dioxide. However, further testing must be done.

NAME(s)	<u>Kelly St. Marie</u>	PROJECT NUMBER	<u>G14</u>
SCHOOL	<u>St. Francis Xavier School</u>	GRADE	<u>8</u>
TEACHER	<u>Mrs. Mary Ellen Varhue</u>		
PROJECT TITLE	<u>Pick Up The Slick</u>		

ABSTRACT

Oil spills are a realistic issue our world faces from time to time. By knowing what substances can be used to clean up these accidental occurrences, we are saving our environment, possibly whole eco-systems from harm. My research question was, "What products are most efficient in the cleaning of oil when using varied water temperatures?" I hypothesized that when utilizing warm water; natural products will be more effective than they would have been in colder water temperatures, and that man-made absorbents will be the most efficient of the products tested despite the water temperature. The controlled variables for this experiment are the size of the pan, amount of each product, and the same time span for each experimental process. The manipulated variables are the products being used and the water temperature. Lastly, the responding variables are how much oil each product absorbed when using warm water, and when using cold water. For this experiment I took a certain amount of each product and placed it in an oil and water combination for thirty minutes. After thirty minutes I removed these products from the mixture to an empty pan to allow evaporation. I averaged the two test trials for each water temperature and calculated how much oil had been absorbed per gram of the product. I can conclude that my first hypothesis was correct, the polypropylene pads proved to absorb a large amount of oil in both of the varied water temperatures. I was proven wrong when I stated that natural products would absorb more oil when utilizing warm water. All the products except for the Cedar Bedding and Litter proved more effective in colder water temperatures. In conclusion I believe that I did answer the question I set out to, but complications along the way might have affected the answer.

NAME(s)	<u>Julia Stacom</u>	PROJECT NUMBER	<u>B50</u>
SCHOOL	<u>Rutland High School</u>	GRADE	<u>11</u>
TEACHER	<u>Dawn Adams</u>		
PROJECT TITLE	<u>Music and Blood Pressure</u>		

ABSTRACT

The practice of music therapy attempts to make music effective from a health standpoint. It is said to be effective in the treatment of patients with Alzheimer's disease, although it is known that music cannot reverse the disease or slow the destruction of brain cells. Music therapy combines music and health to improve the lives of people with diseases such as Alzheimer's. It does more though than just simply make a patient happy. This experiment tests the effect that music therapy has on a person's blood pressure. The hypothesis states that a person's favorite music would cause their blood pressure to decrease and their least favorite music would cause the person's music to increase. To test this hypothesis, the test subject would lie on a bed while their blood pressure was recorded gathering baseline data. Then, their favorite music was played and their blood pressure recorded after the music finished. The blood pressure was recorded after their least favorite music finished playing. From the results, the hypothesis is accepted. Overall, when subjects listened to their favorite music their blood pressure decreased and when they listened to their least favorite music their blood pressure increased. Specifically, the average difference in systolic and diastolic blood pressure and pulse/minute after people listened to their favorite music were all negative.

NAME(s)	Jason Stockett	PROJECT NUMBER	P15
SCHOOL	Homeschooled	GRADE	9
TEACHER	Robert Stockett		
PROJECT TITLE	An investigation of a Non-contacting Magnetic Braking System		

ABSTRACT

The purpose of this project is to evaluate a magnetic braking system for vehicles. Mechanical brakes work by making physical contact, which eventually wear away the pads and drum or disc, and have to be replaced. A system that does not wear out would be beneficial. A Magnetic Braking System uses a rotating disk, which must be a conductive metal like aluminum or copper, and magnets. The magnets cause eddy currents inside the disk, which create induced magnetic fields that oppose the direction of the spinning disk.

○The apparatus consisted of an aluminum disk, representing the brake disk, mounted on an axle. The disk was rotated by wrapping a string around a pulley, which was also mounted on the axle. The string was connected to a hanging weight that supplied the force for turning the disk. First I measured the acceleration of the falling masses when no magnetic field was applied. Then I measured the constant velocity of the falling mass when the magnetic field was applied. From that I calculated the braking force vs the angular velocity of the disk. Finally, I accelerated the aluminum disk with the falling masses and then quickly applied the magnetic field. This caused the disk to stop in about 2-3 seconds.

○Future work would include seeing if this would work for a vehicles. Additional work would include testing this with electromagnets instead of permanent magnets.

NAME(s)	Flora Su	PROJECT NUMBER	C02
SCHOOL	South Burlington High School	GRADE	11
TEACHER	Curtis Belton		
PROJECT TITLE	The Effect of Heat Treatment on Calcium Lactate Crystallization on Cheddar Cheese		

ABSTRACT

Calcium lactate crystallization on Cheddar cheese is a plague to the dairy industry. Appearing as white specks on the surface of the cheese, most consumers reject cheeses with the crystals, mistaking them for unwanted microorganisms, such as mold. Much research has been conducted to discover a method to eliminate or prevent calcium lactate crystallization, but no solution has been found. Based on previous experimentation, it was observed that temperature seemed to influence the crystallization process. The purpose of this experiment was to test a method of heat-treating Cheddar cheese to imitate the effect of exposing cheese to room temperature (21 degrees Celsius) before long-term storage in a refrigerator (1 degree Celsius). It was hypothesized that the heat-treated cheese would experience less crystallization than untreated cheese. The effect of surface roughness on crystallization was also measured in terms of percent crystal coverage for each sample of cheese. Two separate groups of cheese packaged at two different tightnesses were used to conduct the experiment. After cutting and packaging the cheese samples, the control group was immediately placed in a refrigerator set at zero degrees Celsius. The experimental group was heated in a moist oven at 100 degrees Celsius for five minutes before being packaged and stored at zero degrees Celsius. Photographs of each sample were taken and analyzed at two-week intervals using MetaMorph Image Analysis. Results show that the effect of the heat treatment significantly decreased calcium lactate crystallization, which supported the hypothesis. Generally, the effect of surface treatment on crystallization was significant as well, which supported the results of previous tests. The heat treatment also caused the number of discrete crystal regions to be significantly lower. Based on these results, it can be concluded that the heat treatment could be a potential solution to prevent calcium lactate crystallization for processors.

NAME(s)	Brendan Sullivan	PROJECT NUMBER	G15
SCHOOL	Christ the King, Burlington	GRADE	8
TEACHER	Mrs.Srivastava		
PROJECT TITLE	Oil Slick		

ABSTRACT

In my experiment, I learned the efficiency and ecological applications of oil cleaning methods. In a series of trial runs, I learned that the gauze pads had the highest levels of absorbency and, surprisingly, the cracked corn was the least efficient. In the case of environmental impact, the sawdust and cracked corn were equal in their environmental impact - ten to one. On the other hand, polypropylene pads had the most destructive impact on the environment. Polypropylene and oil are attracted to each other because they are both made of carbon and hydrogen. Oil and water are made of different things; therefore, they are not attracted to each other. I think the oil will be easily absorbed by the polypropylene material because it floats on water and easily absorbs oil. The results show that I was wrong in my above theory because the polypropylene cloth was the second to last absorbency-wise. The corn is a natural element; therefore, I felt it would have the smallest effect on the environment. I found through my online research that this theory is true. In the end, I feel that companies should use sawdust because it is a natural element and the second most absorbent.

NAME(s)	Stephen Terry	PROJECT NUMBER	P16
SCHOOL	Avalon Triumvirate Academy	GRADE	10
TEACHER	Amanda Gifford		
PROJECT TITLE	Guiding Light		

ABSTRACT

Lasers are useful to the world because of how they can help people see in smoke or in a collapsed building. A flashlight produces light by releasing light particles. A light bulb heats the wire in the bulb then forces out the light particles. Laser particles are contained in a reflective cylinder. When an electron hits another electron just right, that electron emits another light particle, without disturbing the first one. Laser particles have a much higher density. Flashlight particles have a weaker density.

I think a laser will go through smoke better than a flashlight. A flashlight's light will probably not go through smoke because the flashlight's light will widen when you get farther away. I expect this to happen because of how the flashlight has a different light.

I shined a laser and a flashlight through smoke to find out which one goes through smoke better.

I notice that when the laser went through, the beam was very straight and clear through the smoke. I noticed that when the flashlight went through, the beam was wide with a dim light through the smoke.

I got my answer and it was that a laser went through smoke more efficiently. I think it happen this way because of how the flashlight has a different light than the laser. I had no errors. I think this happens because of how the laser's light has photons that are more bunched together. A flash light has photons that are spread apart.

NAME(s)	Lea Thali	PROJECT NUMBER	B51
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	Effects of Sound and Strategy on Short-Term Memory		

ABSTRACT

Short-term memory (STM) allows limited amounts of information to be recorded for periods of less than one minute. However, with active effort such as repetition, information can be retained for longer. STM capacity is measured by the number of items of information that can be retained when presented only once. The average STM capacity is 7+- 2 items, so between 5 to 9 items, but memory can be influenced by several factors such as attentiveness, motivation, emotional state, and context. Memory capacity can be improved by making a conscious effort to repeat and learn information, having an interest in the information, and creating ôrecall indexesö, memorizing context along with the information. For my study, I tested the effects of irritating sounds on short-term memory. I also tested if memorization strategies can actually improve results. Subjects did three trials where they tried to remember objects that they saw on a tray. They looked at fifteen objects on a tray for 20 seconds and then waited 10 seconds, before trying to recall as many objects as possible. For the first trial there were no distractions and there were no strategies given. This is the control group. During the second trial a soundtrack of irritating sounds played. Before the final trial the subjects were taught techniques for better memorization. The first trials of individuals will be averaged together, as will the second and third trials. These will then be compared statistically, as will the difference in trials between boys and girls.

NAME(s)	Emily Tornquist, Jessi Farrar	PROJECT NUMBER	GP22
SCHOOL	Green Mountain Union High School	GRADE	8
TEACHER	Allan Garvin		
PROJECT TITLE	Rhythm Schism		

ABSTRACT

Our topic was testing which gender (male or female) has better rhythm. This brings up our question: Which gender has better rhythm? We think that females will have better rhythm than males. We tested each participant on ten different beats, to see if they could repeat, and keep a steady beat. Then we averaged the total percent correct for each gender, and then figured out which gender had a higher percent average correct. Females have better rhythm, as they got an average of 88% correct, while males only had 83% correct (on average). This means that the girls that we tested had a greater ability to keep a steady beat, and repeat a simple beat.

NAME(s)	Angela Trombley	PROJECT NUMBER	C23
SCHOOL	St. Francis Xavier School	GRADE	8
TEACHER	Mrs. Mary Ellen Varhue		
PROJECT TITLE	Tears or No Tears		

ABSTRACT

Onions are one of the most frequently used vegetables in the world. That's why it's important to know how to deal with them, without eye irritation. I based my project on finding out which cutting method works best. By doing this, I had to find a way to block the sulfuric acids from reaching the eye. I hypothesized that soaking the onion in cold water for 10 minutes would work better than the rest. I had to manipulate the amount of eye irritation, the methods, and the people, to get the response of the amount of irritation. I controlled the type of onions, and the materials used. I worked with two volunteers and myself. Each person had to chop nine different onions, with nine different methods and estimate on a scale from 0-10 the level of irritation. In between each method, we would take a 10 minute break for the eyes to readjust, so that was the fumes of the onions wouldn't add up and confuse the results. The methods were, using a sharp knife, using a dull knife, holding your breath while chopping, soaking the cutting board and knife in vinegar, and cutting while the onion runs over water, chilling the onion 30 minutes, soaking cold water and soaking in hot water. My results showed that chopping onions under running water resulted in the least irritation. I think this is because of two reasons, one being water soaks in the network of onion cells, therefore dulling the sulfuric-acids, and two, the running water blocks the acids from reaching the eyes.

NAME(s)	Taylor Truax, Madison Noonan	PROJECT NUMBER	GP04
SCHOOL	Christ the King	GRADE	6
TEACHER	Mrs. Srivastava		
PROJECT TITLE	Chemical or Green		

ABSTRACT

Have you ever stained your clothes? People have used all types of stain removers to take care of this problem. Some are safe for the environment and others are not. Which one to choose?

Our project was to find out if "green" stain removers worked better than the chemical stain removers.

We took five stain removers and did three repeats. We poured a teaspoon of wine in five different places on a shirt. We then, sprayed each stain remover on all the different spots of wine stains. We put it in the wash with no detergent and waited to see what happened. In the end, Ecover, a green spray, and Shout, a chemical remover, had the same results in each run. We then, tested it against each other and found out that Ecover worked better.

After these results came in, we discovered that Ecover was the best stain remover out of the five stain removers we used in our experiment. Not only did Ecover worked better at removing the stains, but Ecover is safer for our environment. We are now trying to persuade people to buy Ecover instead of other stain removers.

Our project has helped us realize that there other safer alternatives for removing stains. Mothers can easily remove the stains off their kids' sport clothes while at the same time using an eco-friendly product that works very well.

NAME(s)	Amanda Tucker	PROJECT NUMBER	C24
SCHOOL	Fairhaven Union High School	GRADE	9
TEACHER	Ben Worthing		
PROJECT TITLE	Trying To Cook A Cookie Evenly Without Burning The Bottom		

ABSTRACT

I tested which tray will be the best way to cook a cookie evenly without burning or undercooking the bottom (meaning the bottom is not white or black, and the middle is not hard or gooey). I tested an aluminum tray, a stainless steel tray, steel non-stick pan, pampered chef pizza stone tray, and an insulated cookie sheet (also known as an air bake cookie sheet)?

If the cookies are set on an aluminum tray, a stainless steel tray, steel non-stick pan, pampered chef pizza stone tray, and an insulated cookie sheet, then the insulated cookie sheet will be the tray that does cook the cookies evenly, but does not burn the cookies. The reason why I think the insulated cookie sheet will not burn the cookies is because:

- Most cookie sheets are designed for the heat to hit the tray then the cookie, but in the insulated cookie sheet the heat hits the bottom of the cookie sheet. The heat then hits the middle of the tray which is air that acts as a barrel (meaning that the air separates the two metals, the top and bottom). Then the heat hits the top part of the tray that has the cookie sit on top of it (designed in hope of not burning the cookie and cooking it evenly)

- In the process of not burning the cookie on the insulated tray it should bake the top part of the cookie just as much as the bottoms, so it bakes evenly all the way through without burning, making a perfectly good cookie.

My Hypothesis was correct with having the insulated tray being the best cookie. I think this happened because of the specific heat of the trays. The specific heat is the amount of heat that is needed to increase the temperature by one degree Celsius ($\text{Heat added} = \text{specific heat} \times \text{mass} \times \text{change in temperature}$). The specific heat is made up between temperature and heat. Heat energy is transferred into a temperature difference. An example in my experiment is having a warm cookie with a high temperature and a cold cookie with a lower temperature. Or this also could have a warm tray and high temperature and a cold tray with a low temperature. Specific heat answers the question of how much will the temperatures of an object increase or decrease by the gain or loss of heat energy.

NAME(s)	Catie Tyrell, Muriel Chase	PROJECT NUMBER	GP15
SCHOOL	Green Mountain Union High School	GRADE	8
TEACHER	Allan Garvin		
PROJECT TITLE	You Won't Slip if You Have Traction		

ABSTRACT

Our topic is about how to keep our roads safe. The question that we were eager to find out was, what substance provides better traction for our wintery roads? We had thought that road salt would deliver better traction by the end results. By testing this, we slide a tire down an icy surface and measured that one had the best traction. The road salt had better traction when stopping, but for starting road salt was the worst. When it came to starting, cat litter was the best. So what this all means is that when you start your car, it takes less traction to have cat litter on your road, but when you are stopping it is easier for road salt.

NAME(s)	Maya Urbschat	PROJECT NUMBER	B12
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	The Effect of Various Water Purification Systems on Plants		

ABSTRACT

Chlorine is the most common agent for water purification. It is used in most towns' water systems, but recently towns have been switching to chloramine, a chemical that consists of chlorine and ammonia. In the past, chloramine has been shown to be harmful to fish and kidney dialysis patients and chlorine is extremely toxic in its gaseous form, so I was curious whether water treated with chlorine or chloramine was harmful to plants. To test this question I grew four groups of pea plants, each watered with one of the following: Burlington tap water, South Burlington tap water, well water from the Northeast Kingdom, and water from Potash brook. My hypothesis was that the plants watered with well water would grow the best because the water was exposed to fewer chemicals than the water used for the other groups. I measured the height of each plant every day for six weeks, and plan to average the daily growth for each plant and compare the average growth of the four groups with a t test. Thus far the tallest plants have been in the well water and Potash Brook groups, though the South Burlington group was more consistent and so may average a better growth rate.

NAME(s)	Anisha Vadehra	PROJECT NUMBER	B31
SCHOOL	South Burlington Highschool	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	Defeating Bacteria		

ABSTRACT

○You might not see it, but there are millions of bacteria on your hands right now. Just touching a door knob, or typing on the keyboard transfers many bacteria onto and from your hands. To prevent getting sick from all the bacteria, you need to wash your hands with soap or use hand sanitizer. There are plenty of different kinds of hand soaps and hand sanitizers that get rid of bacteria from your hands. But, which brand is the best? There are different brands of hand sanitizers and hand soaps that have different ingredients. For my project I bought many different kinds bacteria killing agents such as, Purell, Dial, or Equate. The bacteria I used was E. Coli, mixed with a broth culture. Instead of using my own hands, I used latex gloves as a substitute for hand soaps. For my control I first swabbed my latex gloves to see the bacteria that was already on my gloves. Then I swabbed E. Coli on my gloves, and used different soaps to wash my glove. For hand sanitizers I swabbed bacteria in a agar plate, and placed small pieces of hole punched paper with the hand sanitizer substance and placed it into the agar plate to see how well each brand of hand sanitizer works. The control for hand sanitizers was a piece of hole punched paper without any hand sanitizer substance. In my results I expect to find a good brand of soap or a sanitizer that keeps everyone safe from getting sick.

NAME(s)	Tyler VanDyk	PROJECT NUMBER	P17
SCHOOL	Hinesburg Community School	GRADE	7
TEACHER	Stephanie Konowitz		
PROJECT TITLE	Bouncy Light		

ABSTRACT

Solar panels are a widely used piece of technology the converts light to energy. Whether you need to power your calculator or your house, solar panels are very useful and though mostly used to convert sunlight they can also run off artificial light and reflected light. This experiment was designed to see if solar panels would run as well on reflected light as direct light. It might be nicer to hide a big clunky solar panel and use reflected light to power it, than leave it out in the open if it works just as well. I created a box that would allow me to hit a solar panel with direct light or reflected light without letting any other light hit it. I hit the solar panels with direct light for a time period and then recorded how much energy it produced, and repeated with the reflected light. I confirmed that reflected light did work on solar panels but, it didn't work nearly as well. It produced much less energy. I guess you're going to have to deal with the big clunky solar panel in the open.

NAME(s)	Margaux von Buren	PROJECT NUMBER	P20
SCHOOL	Mater Christi School	GRADE	7
TEACHER	Michele Donlon		
PROJECT TITLE	Warning: Tornadoes at Work		

ABSTRACT

○The question this analysis inquired was: will a tornado created inside a vortex tower using vents to funnel the air generate more wind energy than one with the air not funneled? The hypothesis for this project was: if a tornado were created inside a vortex tower using vents to funnel the air, then it would produce more wind energy than a tornado created without funneled air. The background research consisted of the subjects Atmospheric Vortex Engine, the Solar Updraft Tower and tornadoes in nature.

○The procedure for this experiment was tested on three different designs: Model A, B, and C. Each model uses a different layout to distinguish if a man-made tornado would be as powerful as one with laminar airflow. The test began by warm air rising up a cylinder and creating a convection current. Smoke was blown into one vent in order to distinguish the airflow. To see which design would be most efficient in wind strength, a pinwheel was placed at the top and each rotation counted. For the collection of data, each model was evaluated separately. Each process had three different trials, which were averaged to produce reliable results. While data was being collected, observations were also made and recorded. In conclusion, the hypothesis for this experiment proved incorrect. Model A (20 rotations) and C (24 rotations) both created tornados but their averages were far lower than Model B's (33 rotations with laminar airflow).

NAME(s)	Kevin Wang	PROJECT NUMBER	B13
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	Can Water do the Work? An Investigation into the Effectiveness and Viability of Hydroponi		

ABSTRACT

The major purpose of this project was to determine if a hydroponics system would produce measurably higher plant yields, in both height and dry biomass, as compared to conventionally soil-grown plants. The original hypothesis was that the hydroponics system would indeed produce higher yields.

The term hydroponics comes from the Greek words hydros and ponos, meaning water and labor or work, respectively. It is the growth of plants without soil, usually with another growth medium, in which all necessary nutrients are supplied by a nutrient solution.

The experiment was conducted by planting garlic in two groups, a control and an experimental. The control group was planted in regular fertilized soil, and the experimental group was planted in the hydroponics system, in which an aerated nutrient solution was pumped to the roots. Conditions such as light and temperature were kept the same between the two systems. After approximately two weeks, the first harvest was taken, heights were measured, and the plants were labeled and oven-dried. Then, their masses were measured using a Mettler balance. At the end of this experiment, the complete root systems will be harvested to determine if one group yields in significantly greater root growth, once again in both length and dry mass.

Garlic was planted at two different times; as of now each group has been harvested once. Preliminary statistical analysis indicates that the hydroponics system in general does produce higher yields, in both mass and height. However, whether these yields are statistically significant is not yet conclusive. T-tests on the data to date have yielded somewhat conflicting results, with some results rejecting the null hypothesis and other accepting it. When the experiment is completed the project is expected to provide more conclusive conclusions based on a more comprehensive statistical analysis.

NAME(s)	Zach Ward	PROJECT NUMBER	B32
SCHOOL	Northfield Middle High	GRADE	11
TEACHER	C. Tomczyk		
PROJECT TITLE	The Effect of 0.02, 0.04, 0.06, 0.08, and 0.1 milligrams of Sodium Benzoate, Propionic Aci		

ABSTRACT

○This lab tested the effect of sodium benzoate, ascorbic acid, and propionic acid (from .02mg to .1mg) on the amount of time it took a loaf of bread to visibly mold. My major hypothesis is both that as the amount of preservative in the bread increases, the length of time it resists mold growth will also increase, and that over all, the efficacy of the preservatives will increase in order of popular use (ascorbic acid being found rarely, if ever in bread, sodium benzoate more commonly in more processed 'gas station' food, and propionic acid being the most ubiquitous of the three). My overall finding supported this hypothesis. The following is the amount of time it took the loaves to mold over thirty days: 0mg of propionic acid took 12 days, 0.02 grams took 15.5 days, 0.04 grams took 22 days, 0.06 grams took 24.5 days, 0.08 grams didn't visibly mold within thirty days, 0.1mg didn't mold within thirty days. 0mg of sodium benzoate took 12.5 days, 0.02 grams took 16 days, 0.04 grams took 22 days, 0.06 grams took 25 days, 0.08 grams didn't visibly mold within thirty days, 0.1mg didn't mold within thirty days. 0mg of ascorbic acid took 10.5 days, 0.02 grams took 12.5 days, 0.04 grams took 16 days, 0.06 grams took 20 days, 0.08 grams took 25 days, 0.1mg didn't mold within thirty days. In each experiment, as the amount of preservative increased the amount of time it took the loaf of bread to visibly mold tended to increase. While all three of these preservatives perform the task of mold inhibition sufficiently, sodium benzoate is the most effective, propionic is, by a hair, the second most effective, and ascorbic acid is the least effective of the three.

NAME(s)	Joshua Wasilewski	PROJECT NUMBER	P18
SCHOOL	Christ The King School	GRADE	7
TEACHER	Amy E. Wright		
PROJECT TITLE	Baseball Aerodynamics		

ABSTRACT

For my experiment, I wanted to determine if the spin a pitcher puts on a baseball affects its speed and distance. I predicted the 2-Seam Fastball will go the fastest and will reach a distance of 60ft. Then the 4-Seam Fastball will go the second fastest and will reach a distance of 60ft. Lastly, the Curveball will be third fastest and a distance between 57ft and 58ft. Materials needed are 1 speed baseball(It tells you how fast you throw), 1 pitching mound and home base(60ft apart), 1 tape measure, 1 catcher, 1 chart showing you how to throw a 2-Seam Fastball,1 chart showing you how to throw a 4-Seam Fastball, 1 chart showing you how to throw a Curveball, 1 chart to show speed and distance, 1 person to graph and measure, 1 display board, and 1 computer

I observed the 2-Seam fastball, 4-Seam Fastball, and Curveball in my experiment. My experiment consisted of taking these 3 pitch forms, and seeing if the spin on each pitch had any affect on the speed or distance. As shown in my table, you can see the 2-Seam Fastball ranges from 38mph-53mph. These pitches were thrown by me. The average speed was 44.4 mph. For the 4-Seam Fastball,as shown in my table, I observed a majority of the pitches were over 50mph. The pitches range from 42mph-59mph. The average speed was 51.3mph. Both the 2-Seam Fastball and 4-Seam Fastball has a distance of 60ft. For the Curveball, I observed that it mostly stayed in the high thirties to the medium forties. The speed ranged from 35mph-50mph. The average speed was 41.8mph. What I observed about the distance was that each time I threw the Curveball, it never reached 60ft, it reached in between 57ft and 58ft.

NAME(s)	Sydney Watkin	PROJECT NUMBER	B14
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Curtis Belton		
PROJECT TITLE	Is Organic a Quick Start?		

ABSTRACT

Compost is very important when it comes to plant growth. Compost improves soil structure, texture, and aeration, along with adding beneficial organisms to the soil. I decided to conduct an experiment that determines which kind of compost simple plants will grow healthier in; organic, non-organic, or commercial/non-organic. I planted six marigold plants in each kind of compost and recorded their healthiness and height throughout the time period of the project. Before i started the project I thought that the organic compost would work the best but after examining the plants after they've started growing my hypothesis is incorrect. The commercial/non-organic compost surprisingly has the best result thus far into the experiment. Organic may sound good, but commercial/non-organic works the best.

NAME(s)	Christa Weaver	PROJECT NUMBER	S10
SCHOOL	South Burlington High School	GRADE	10
TEACHER	Mr. Curtis Belton		
PROJECT TITLE	Marketing and it's Effect on Human's Decision Making		

ABSTRACT

Over the years, humans have become more focused on the cost of items rather than focusing on the quality of them. We assume that the higher the price and publicity the product gets, the better the quality or flavor that it has. For my study, I have run four water taste tests to see if bottled water is really better than South Burlington local tap water, and whether we really need bottled water in our economy. My lab consists of a two part testing process using the four types of water: Fiji, Dasani, Poland Springs, and South Burlington tap water. I have run two blind taste tests and two open taste tests with a combination of either all four samples of water, or all four samples filled with tap water. My hypothesis is that marketing has an influence on the human decision making process. (After completing all four water tests, my hypothesis was supported with the data from the open taste test. All samples were filled with tap water, but were labeled Fiji, Dasani, Poland Springs, and Tap water.) My test subjects preferred the tap water labeled Fiji over the tap water that was actually labeled Tap Water. This shows that advertising has warped human's perception of quality. The results of the other three tests also show that Fiji, the more expensive and highly advertised water, was preferred over the ordinary free local tap water. I executed my four tests at a variety of locations including swim meets, department stores, and sporting events to ensure diversity in my test subjects. The age range for my test group is also very broad. The data that i have collected show that my hypothesis was correct and that bottled water is not a necessity in our society.

NAME(s)	Wilhelmina Weggler	PROJECT NUMBER	C25
SCHOOL	Northfield Middle High School	GRADE	11
TEACHER	C. Tomczyk		
PROJECT TITLE	The Effect of Microwave Radiation on the Concentration of Vitamin C		

ABSTRACT

Have you ever wondered if the food you put in the microwave comes out exactly the same? Or if the food's nutrients are affected by the radiation and you are no longer eating the nutrient-filled broccoli you put in the microwave? I wanted to test whether or not this happens. If I put vegetables or any types of food in the microwave will the vitamins and nutrients be destroyed and depleted? In order to test this experiment I used a Vitamin C test in which I calculated the vitamin C content in juices. I tested orange juice to determine the percentage of vitamin C after being exposed to various amounts of microwave radiation. I exposed the juice to three, six, and nine minutes in the microwave and then added the juice by drops to 10 mL of 2,6-dichloroindophenol solution until the dark blue color turned clear amber. Then I used the equation $((\text{drops standard})(\text{concentration standard}) = (77 \text{ drops})(n \text{ mg of vitamin C}/100 \text{ mL of orange juice}))$ to calculate the vitamin C content in the juice. During the experiment I found that when the orange juice was exposed to the various times of radiation the vitamin C content did not change. Each time it took exactly seventy drops to turn the 2,6-dichloroindophenol solution a clear-amber color. And after the calculations were completed, the vitamin C content was 41.4 mg/100 mL. This occurred for each trial showing no change in the amount of vitamin C. So, microwave radiation had no affect on the concentration of vitamin C in orange juice.

NAME(s)	James Wells	PROJECT NUMBER	C26
SCHOOL	St. Francis Xavier School	GRADE	7
TEACHER	Mrs. Mary Ellen Varhue		
PROJECT TITLE	Water and Its Qualities		

ABSTRACT

Project Purpose: I wanted to test the purity of tap water in several Vermont communities and compare it to different brands of bottled water. I chose this project because bottled water manufacturers have been influencing people to drink bottled water because it is more pure. I wanted to find out if this was true.

Hypothesis: I think that out of the towns of Waterville, Essex Junction and Winooski, Vermont that Waterville will have the cleanest water. Overall, I believe that the bottled water will not be any more pure than the tap water from Waterville but it will be more pure than the water from Essex Junction and Winooski.

Procedure: I tested tap water from three different communities, Waterville, Essex Junction, and Winooski, and I tested three bottled waters, Aquafina, Poland Spring and Dasani. I tested each for pH, alkalinity, copper, iron, hardness and chlorine. Five test samples were taken on different days and the results were averaged.

Results: Waterville had the cleanest tap water while Aquafina had the cleanest bottled water. Waterville and Aquafina were very similar in testing.

Conclusion: Both of my hypotheses were correct. Waterville did have the cleanest water and bottled water was not any cleaner than the Waterville samples. Overall I found the water quality in all three communities very good and you can have faith in your tap water.

NAME(s)	Joshua Wolfstein	PROJECT NUMBER	P30
SCHOOL	The Renaissance School	GRADE	6
TEACHER	Eve Dubois		
PROJECT TITLE	Burn Burn Burn		

ABSTRACT

Do you burn wood in a fireplace? Do you burn wood pellets? Most people don't, but even fewer people burn grass pellets. For my science fair project I am asking how wood pellets and grass pellets compare as energy sources.

I think that the grass pellets will burn better than wood pellets because grass (like paper) is very thin and might burn quickly, and efficiently.

I weighed an empty 16 oz. glass cup. I filled the glass cup (4 in. tall, approximately 13 in. in circumference) to the top and weighed the filled cup. I subtracted the weight of the cup to determine the weight of the pellets to be burned. I then put the pellets into the metal box, used 4, 23 x 24 in. sheets of paper for kindling and lit the fire!

I measured the temperature of the fireplace glass door every 2 minutes, and recorded the resulting temperature until it returned to room temperature.

I repeated this procedure for each type of pellet (2 wood, 2 grass - 4 times in total). The resulting temperatures were entered into a spreadsheet, and graphs of the burn time vs. temperature determined.

Both grass and wood pellets had similar burn temperatures and both returned to room temperature in a similar time frame. They varied slightly, but the grass was clearly not what I had hypothesized.

With a little more research, I found that wood pellets and grass pellets produce similar heat outputs in BTUs (British Thermal Units) per ton of pellets (within 5% of each other). I also determined that the average cost of a ton of wood pellets was approximately \$250 and the grass pellets were similarly priced in this region.

NAME(s)	Alden Woodard	PROJECT NUMBER	P19
SCHOOL	Avalon Triumvirate Academy	GRADE	7
TEACHER	Amanda F. Gifford		
PROJECT TITLE	Shocking		

ABSTRACT

Static electricity on a large scale could be used to charge and power batteries. Static electricity can go through things such as paper. Paper is available in many weights, from 10g/m² to 385g/m².

Quarter inch sized pieces of paper were put in pie pans; different pans were used for each weight of paper. Plastic wrap was put over the pie pans. Rubber bands were stretched over the pie pans to keep the plastic wrap tight. A balloon was blown up to create static electricity. The balloon was touched to the plastic wrap.

The tissue paper jumped around in the pan. The graph paper was observed to move around in the pan. Copier paper moved a little bit in the pan. Construction paper twitched in the pan. Card stock did not move. The weights of the different papers affected the static electricity going through it.

This project was repeated 20 times with the same results. The hypothesis, that tissue paper would jump higher than the other papers, was supported.

NAME(s)	Whitney Woods, Rachel Martel	PROJECT NUMBER	GP14
SCHOOL	Green Mountain Union High School	GRADE	8
TEACHER	Allan Garvin		
PROJECT TITLE	Solar Transfer		

ABSTRACT

Solar power is a cleaner and more efficient alternative to fossil fuels, which provides less CO₂ into the atmosphere. This brings up the question: Does the atmosphere, clouds and pollution affect solar transfer? Our hypothesis is that the atmosphere, clouds and pollution will affect solar transfer. We measured the current generated by the solar panel in different atmospheric conditions. We tested this by shining a light through the atmosphere (plastic wrap), pollution (saw dust), and clouds (water vapor) to the solar panel. Our results showed that the atmosphere, clouds and pollution do affect solar transfer from the Sun to Earth.

NAME(s)	<u>Jiaqian Xie</u>	PROJECT NUMBER	<u>C01</u>
SCHOOL	<u>Mount Saint Joseph Academy</u>	GRADE	<u>11</u>
TEACHER	<u>Timothy McCue</u>		
PROJECT TITLE	<u>Production of Aspirin from Esterfication reaction</u>		

ABSTRACT

The project is the result of making aspirin in laboratory. Aspirin is known as a common analgesic drug. We will use salicylic acid and acetic anhydride to make it. Then we will purify and analyze the aspirin.

The synthesis of aspirin is classified as an esterification reaction(a substitution reaction in which alcohol reacts with acetic anhydride to form an ester). We will discuss its purity and difference comparing to the aspirin that can be purchased in a store. During synthesis, there are certain factors that might affect our product's purity, like temperature, pH,etc.

First we put 2g salicylic acid with 5 ml acetic anhydride, there will be an esterfication reaction. We add 5 drops sulfuric acid as catalyst since our primary product is not pure. We will then use the melting point and a chemical test to determining its purity. Since there might be salicylic acid left out, we will add 5 ml iron(III) nitrate solution to test the salicylic acid.

NAME(s)	<u>Kathleen Young</u>	PROJECT NUMBER	<u>C27</u>
SCHOOL	<u>Mater Christi School</u>	GRADE	<u>7</u>
TEACHER	<u>Michelle Donlon</u>		
PROJECT TITLE	<u>Feeling Full? It's the Fiber</u>		

ABSTRACT

○The question for this project was, δWill cereal with more fiber keep you full longer than cereal with less fiber?δ In response to the question, the hypothesis was, δIf different cereals are dissolved in a stomach acid-like substance, then the Grape Nuts will dissolve the slowest because they have the most fiber.δ

○The background research for this project was all done on the computer. Many important facts were gathered including that a test had been done by the Consumers Union of the United States and it stated that CapNCrunch was the worst cereal for kids.

○The procedure for this project was divided into three parts. First, the cereal was prepared by being crushed with a meat mallet to the consistency of chewed food. Then, the stomach acid solution was prepared by dissolving a Betaine Hydrochloride pill (found at most drugstores) in 260 milliliters of water. For the set up, nine bowls were set out and the cereals were measured.

○The data collection was simple. First, the cereals were poured in, a stopwatch was started and observations were made over five hours. This replicated the time between breakfast and lunch. Then, the cereals were ranked in order from most to least dissolved at the five hour mark.

○Some conclusions made were that CapnCrunch did not dissolve the fastest but, they were the most dissolved at five hours. The Grape Nuts were the least dissolved and tied for slowest therefore proving that cereal with more fiber keeps you full longer.

NAME(s)	Nureen Wohl	PROJECT NUMBER	B52
SCHOOL	Champlain Valley Union High School	GRADE	
TEACHER	Glenn Fay		
PROJECT TITLE	Resting Heart Rate in Active Women		

ABSTRACT

My project tested the hypothesis that active women in older age groups will have a higher resting heart rate (RHR) than their younger counterparts due to stress and health problems that come with age. The materials included: human subjects (active, dancing women of all age groups), signed permission slips for those under the age of 18 and a pencil and paper to record my findings. I sat the subjects down and instructed them not to move or talk for ten minutes in a peaceful environment. Their pulse was then measured for ten seconds and multiplied by 6 to find the RHR. At first the results appeared to be random, but after averaging the RHR for each individual age, I found that the resting heart rates did not depend on age. In conclusion, either my hypothesis was incorrect or errors have swayed the data. For instance, self measuring is not 100% accurate, the age range was relatively small and the level of activeness could vary.