



# **64th PITTSBURGH REGIONAL SCIENCE & ENGINEERING FAIR**

## **STUDENT PROJECT ABSTRACTS**

**APRIL 4, 2003**



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**Note:** Due to processing time constraints, some abstracts were omitted and others were limited to the purpose of the research. Omissions should not be considered as a negative reflection on the student or their project.

## JUNIOR DIVISION – CONSUMER SCIENCE

Project Number: JCS001

Grade: 6

Title: Germ Alert

Abstract: Is anti-bacterial soap more effective in cleaning hands than regular soap?

The purpose of such an experience would be to provide information about the effectiveness of regularly labeled and antibacterial labeled soaps to consumers who purchase such soaps based solely on advertisement and labeling. I hypothesized that anti-bacterial soap would clean hands better than regular soap because of how advertisers have marketed each type of soap. My hypothesis was incorrect. The procedure I followed was to rub on a hand washing potion that would indicate the effectiveness of the soap used to wash each pair of hands. After applying the potion, each pair of hands was washed with an antibacterial soap for a designated time and then the same procedure was done using regular soap for the same designated times. After rinsing and drying, each pair of hands was put under a UV lamp. Hands are very clean when there is no remaining fluorescence. Bright spots show areas where germs are left behind to glow. The results of my experiment was that regular soap cleaned hands just as effectively as the antibacterial soap. In conclusion, it was proven that washing your hands with warm water and regular soap for at least 30 seconds was very effective in killing germs on your hands.

Project Number: JCS002

Grade: 6

Title: Which Diaper Holds The Most Water?

Abstract: The purpose of this experiment is to determine which diaper holds the most amount of water.

Project Number: JCS003

Grade: 6

Title: Robots

Abstract: My science fair project will be on how robots will help us in the future and what they can do and what they are doing to help us. This will be done with research and Lego robotics systems.

Project Number: JCS005

Grade: 6

Title: The Real Quicker Picker Upper!

Abstract: The purpose in choosing this project is to determine if Bounty Paper Towels is the "Real Quicker Picker Upper?" I want to verify if the Television advertisements for this brand is correct.

Project Number: JCS006

Grade: 6

Title: Batter Up

Abstract: My question is "What type of softball bat is better to use for hitting a ball farther, a wooden bat or an aluminum bat? In my hypothesis I stated that the aluminum bat will hit the ball farther because wooden bats are usually heavier and harder to swing than aluminum bats. In my experiment I used two bats, the first was a 26 ounce aluminum bat and the second a 26 ounce wooden bat. I also used a softball, a rope to hang the bats, and a swing set used to hang the bats off of. I also used a tape measure to see how far the balls went when hit. My procedure was to first hang each bat from the swing set. Next I dropped the ball and the bat at approximately the same time so they would make contact. I then measured the distance the ball





## JUNIOR DIVISION – CONSUMER SCIENCE

Abstract: Most drain cleaners can be a fast and easy problem solver for clogged drains. This experiment's intent was to determine which chemical drain cleaner works the fastest. A plumbing apparatus was made with clear tubing so that the drain cleaners could be seen working to clear the clogs. This action was timed. It was determined that Liquid Plumr was the most efficient of the drain cleaners, however, in time, all resumed water flow. Future work is planned in updating the apparatus by increasing the pipe size to better simulate actual home conditions.

Project Number: JCS017                                  Grade: 6

Title: Putting out the Fire Within: Which Antacid works the Best?

Abstract: The purpose of this experiment is to determine the effectiveness of various commercially available antacids in their ability to neutralize stomach acid. An equal volume of Gavison raised the pH more than any other brand: Gavison (pH 6), Maalox (pH 4), Mylanta (pH 3), Giant Eagle (pH3), and Riopan (pH4). The concentration of active ingredients was lowest for Gavison and the recommended dose was the highest for Gavison. Gavison is the most effective antacid at neutralizing stomach acid, This showed my hypothesis was incorrect, not all antacids are equal in neutralizing stomach acid.

Project Number: JCS018                                  Grade: 6

Title: Does Music Affect Breathing?

Abstract: The intent of this experiment was to see if music affects breathing. I had my subjects close their eyes and listen to two minutes of jazz, polka, pop, Gospel, classical, and reggae music. As they listened, I counted the number of times they breathed. I found that music has a greater effect on the younger people and almost no effect on the adults.

Project Number: JCS019                                  Grade: 6

Title: Effective Calcium Tablets

Abstract:

Project Number: JCS020                                  Grade: 6

Title: Longest Lasting Battery

Abstract: The purpose of my experiment was to determine which common battery lasts the longest and is the strongest over time. The tests used two different procedures. The life test was performed using a battery in a flashlight and recording how long it took for the bulb to stop shining completely. As for the strength test, I used a 1.5-volt motor with a wheel and hung small weights on the wheel edge. By comparing how much weight the motor could lift I could test the strength over time. Then I repeated this after running the batteries down in the flashlight.

Project Number: JCS021                                  Grade: 6

Title: Which Chocolate Melts The Fastest?

Abstract: The purpose for doing this experiment is to see which type of chocolate melts the fastest using different types of appliances.

## JUNIOR DIVISION – CONSUMER SCIENCE

Project Number: JCS022

Grade: 6

Title: Don't Lose Your Marbles

Abstract: Kevlar is a natural material used to make bulletproof vests. This experiment was done to find out which threading/stringing of Kevlar supported the most weight. Four threadings of Kevlar were tied to a wood frame and attached to a bucket and a spring-scale. The bucket was filled with one-gram marbles until the Kevlar broke, then the data was recorded. This process was repeated until three trials were completed. It was proven that of the four threadings -- knotted, regular, twisted, and braided -- knotted held the most weight.

Project Number: JCS023

Grade: 6

Title: Robotics for Disabled Persons

Abstract: Robots can be useful to disabled persons. In my experiment, I used Lego Mindstorms to create a robot to help disabled people do simple tasks. I built the robot with a special arm that can be used to carry a can of pop. It also has a light sensor to guide the robot to its destination. This robot can be operated by remote control. It should be able to carry any small object to the person who needs it. This robot could be designed so that the average person could afford the cost of obtaining one. I believe that technology is wasted when it is not used because it is too expensive.

## JUNIOR DIVISION – LIFE SCIENCE

Project Number: JLS001

Grade: 6

Title: Lights, Colors, Action!

Abstract: Most people put plants in their house, mostly by windows without knowing if another color could make that plant grow faster. I set five cucumber plants on a table, each under a different light color. Once one plant began to grow, I began recording. After nine days of recording, I found that blue was the color that made the cucumber plants grow the best. Plants exposed to blue and violet light grow faster than those exposed to green and red light. For the future, I would like to see if blue light will still beat violet light.

Project Number: JLS002

Grade: 6

Title: Does the color of the water effect the color of the flower?

Abstract: The purpose of this experiment was to determine if the color of the water would change the color of the flower in that water. I used 10 white carnations, two drops of 4 different color dyes, and 5 vases of water. First I filled the vases with water and put in two drops of color dye into each vase, repeating for each color except one vase. The 5th vase used just plain tap water. After that, I placed two carnations into each vase and then I placed the 5 vases into a sunny area. I watched and recorded my results over a 10 days. I wanted to see if the different color water would change the petals, stems, or nothing at all. My hypothesis was that the flower stems would be effected since they are the part of the flower that carries the water. My hypothesis was incorrect. The flower petals were effected by the colored water.

Project Number: JLS003

Grade: 6

Title: And the Beat Goes On

Abstract:

Project Number: JLS004

Grade: 6

Title: In A Heartbeat

Abstract: My problem was "To what extent does exercise affect the heartbeat rate?" I did this to prove that the heartbeat rate, in fact, rises during physical exercise. My hypothesis was that the heartbeat rate would rise during physical exercise, but not to a serious point. I determined this by taking three girls, while they were settled down, and took their heartbeat rate. Then, one by one had them run in place for one minute. I repeated these steps two more times to make sure the test results were accurate. The results of my tests show that when you exercise, your heartbeat rate will rise, but not to a serious level. Research that I conducted on the heartbeat rate, confirmed that the heartbeat rate will normally not rise to a serious level during normal exercise. My results and research also show that if you want to get healthy or stay healthy exercise more and on a regular basis.

Project Number: JLS005

Grade: 6

Title: Pump It Up

Abstract: My question was "Does exercise affect a person's blood pressure?" I chose this question because some people think exercise raises a person's blood pressure and some people think exercise lowers it. I hypothesized that men would have higher blood pressure than women. I thought this because men are usually larger than women and I thought they would have larger veins, therefore, causing more blood to be pumped through them. My hypothesis was proven incorrect, because all ten women had higher blood pressure than the men. My procedure was I

## JUNIOR DIVISION – LIFE SCIENCE

took ten boys and ten girls separately and took their blood pressure. Next I asked them to each run two laps around a regulation basketball court. Last I took their blood pressures again, I found the difference in the systolic and the diastolic blood pressure before and after they exercises (each person separately). My results and research data show that exercise raises your blood pressure over a short period of time, but lowers your blood pressure over a longer period of time.

Project Number: JLS006

Grade: 6

Title: Now You See It, Now You Don't

Abstract: My initial question was "does vision affect the sense of taste?" I chose this question because I wanted to see how much our taste is affected by what we see. I hypothesized that your sight does affect your taste because people are conditioned to expect a certain taste according to the color of the items eaten or items drunk. My hypothesis was denied, according to my experiment, because 75% of the taste testers picked the correct flavor for the clear drinks. Though they did miss some of the colored drinks' flavors, 81% were correct. I was concentrating on the clear drinks. For my experiment I had eight one liter bottles of clear soda (2 lime, 2 fruit punch, 2 peach, 2 grape). I added food coloring to one of each flavor, corresponding with its flavor. I took all the labels from the soda and coded them with a letter (A-H). I then marked eight dixie cups with (A-H) for each of my six testers (who were all around the same age). I filled each cup with 50mL of soda corresponding with the correct letter on the bottle and the cup. I wrote up a sheet for each taste tester. I followed the sequence of H, E, D, A, F, G, B, C. Each tester started with the same letter. After each sample they were given a drink of water. Their responses were recorded on their sheet. Once all the testers were finished I compiled all the response for each flavor on a seperate sheet. Out of twenty-four response for the clear drinks tasted, six of the testers were incorrect. Out of the twenty-four response for the colored drinks tasted, four were incorrect. I was more concerned with the clear drinks. Though my results show that more were incorrct in naming the clear drink. I feel this experiment could probably have different results depending on how many people are tested.

Project Number: JLS007

Grade: 6

Title: Effect of Fertilizing on Plants

Abstract: The purpose of my experiment was to see if the distribution of fertilizer over time would change the growth of the plant. My procedure was to set up 15 plants for each group (control, and three experimental groups) and prepare fertilizer water with different concentration of fertilizer for the three experimental groups. Then I watered the groups with different amounts of fertilizer and distilled water in-between. The average height for the control was 29.53 cm, Experimental A was 27.15 cm, Experimental B was 31.48 cm, and Experimental C was 18.63 cm. The results of my experiment were inconclusive.

Project Number: JLS008

Grade: 6

Title: Temperature and Catalase Enzymes

Abstract:

Project Number: JLS009

Grade: 6

Title: What Grows in Your Shoes?

Abstract: We wear shoes just about everyday of our lives. This experiment was done in order to find out what grows in your shoes, and which shoe can help keep your feet healthier. Four new different types of shoes were used for twelve hours, and then swabbed samples were spread on petri dishes and placed at room temperature and also in an incubator. It was determined that

## JUNIOR DIVISION – LIFE SCIENCE

yeast and bacteria grew most on the men's loafer shoes. My future experiments may include a larger variety of shoes to be tested.

Project Number: JLS010 Grade: 6

Title: Which Bread Grows Mold The Fastest?

Abstract: I want to complete this project because I want to determine which type of bread not only grows the most amount of mold the fastest but also to determine which brand of bread contains the most amount of moisture.

Project Number: JLS011 Grade: 6

Title: What Else Is On Your BLT?

Abstract: My problem was "Does the type of bread affect the speed of mold growth?" I decided to conduct this experiment because whenever my mom bought bread, it seemed to mold quickly. So I wanted to find out which bread molded the fastest. I tried to determine this by placing one slice of white, wheat and rye inside its own plastic bag. I dropped 1mL of water on each slice of bread to be tasted and placed each bag in a dark box. I repeated this with two more sets of bread and placed these in two more boxes. I placed all three boxes in the basement of my home. My hypothesis was that the wheat and rye would mold faster than the white. My hypothesis was unanswered, but with further testing I found rye bread molded before the white or wheat. The reason I think the bread didn't mold was because the bread was stored in the basement and the cold basement may have slowed down the mold growth. I also think the preservatives used in the baking of bread may have hindered the mold's growth.

Project Number: JLS012 Grade: 6

Title: Which Bread Molds the Quickest?

Abstract: I put 9 different kinds of bread in ziploc bags. I then put a couple drops of water in for moisture because for the bread to mold it needs moisture. I then waited until I saw mold and recorded my data. I wanted to find out which kind of bread molds the quickest. I found out that the wheat roll molded the fastest and the cinnamon raisin, which was my hypothesis to mold the fastest, took the most time to mold.

Project Number: JLS013 Grade: 6

Title: Which Soil Grows the Best Plant?

Abstract: The intent of this project is to see which soil mix is best for growing plants. One pot was filled with organic material and peat moss, a second with a sand/clay mix, and a third with a mix of sand/clay, peat moss and organic material. Fifteen seeds were planted 1/8-inch into each pot and watered with 1/4-cup of water (repeated when soil was dry). The seeds grew the best in organic material and peat moss. No seeds grew in the sand/clay mix.

Project Number: JLS014 Grade: 6

Title: Does Music Affect Heart Rates?

Abstract: The purpose for completing this projects is to determine if different types of music effect heart rate.

## JUNIOR DIVISION – LIFE SCIENCE

Project Number: JLS015 Grade: 6

Title: Liquids Affect on Lima Bean Plants

Abstract: Lima bean plants were great plants for this project. I wanted to see if different liquids would affect how they grow. Each plant was watered with a different liquid every other day for 45 days. My results showed that the plant irrigated with water grew the best.

Project Number: JLS016 Grade: 6

Title: Ah Nuts!

Abstract: The purpose of this experiment is to see if nuts can burn long enough to assist or possibly replace firewood. Three types of nuts were used, almonds, cashews, and walnuts. The nuts were ignited and the pan was held over the flame. Temperatures were taken before and after heating the water. The data recorded was the starting temperature, burn time, and final temperature of the water. I concluded that my hypothesis was wrong because, not only did all three nuts keep a sustained burn, the heat given off was enough to boil water.

Project Number: JLS017 Grade: 6

Title: How Various Waters Affect Plant Growth

Abstract: The purpose of this experiment is to determine which type of water will have an effect on the growth of plants: Tap Water, Saltwater, Purified Water, or Spring Water.

Project Number: JLS018 Grade: 6

Title: The Effects of Beverages on Plants

Abstract: The purpose of this project is to find out if plants would grow better when watered with different types of beverages.

Project Number: JLS019 Grade: 6

Title: Calories And Snacks

Abstract: Potato chips are one of the favorite snack foods for teenagers, and they come in many varieties. The purpose of this experiment was to determine and compare the amount of food Calories in various types of potato chips. The same weight of the chips was burned and in a calorimeter the change in the rise of temperature of the water caused by the burning chip was recorded. The gram calories released by the burning chip was calculated, and then converted to food Calories. The food Calories in each of the varieties was determined and compared.

Project Number: JLS020 Grade: 6

Title: How Does Pollution Effect Plants?

Abstract: I think that the plants with no pollution will grow the best because pollution is poisonous. Ivy is a very easy plant to grow. Ivy plants do not need much water to grow. It should be grown at a temperature higher than 50 degrees Fahrenheit. A 6 - 10 inch pot is a good size pot for most ivy to grow in. My hypothesis was wrong I thought that the plants with no pollution would grow the best, instead they did not grow at all. I think that they needed more time

## JUNIOR DIVISION – LIFE SCIENCE

Project Number: JLS021

Grade: 6

Title: Light Intensity

Abstract: I noticed certain plants in our garden were growing faster this year when compared to other similar plants in prior years. I noticed new branches from a tree extending over our garden creating shade and wondered if this was affecting the plant growth. I wanted to experiment with plants growing under different intensities of light simulating shade in a garden. I planted 9 wheat seeds for each light intensity: 45 watt, 60 watt, 75 watt and 100 watt. Each plant got the same allotted time of light. Chromatography was used to determine which wattage resulted in the best wheat.

Project Number: JLS022

Grade: 6

Title: Is My Research Sound?

Abstract: In doing this project I wanted to find if there was a difference in the growth of three plants to which music is played. Three plants were bought and labeled: A, B, and C. To one plant classical music was played, to another rock music. The third plant was a control that got no music. It was determined that the plant to which classical music was played leaned toward the music; the plant to which rock music was played leaned away from the music. The control plant stood straight up.

Project Number: JLS023

Grade: 6

Title: Where Does Moss Grow Best?

Abstract: Moss grows in some areas of the woods and not in others. This experiment was intended to find out whether humidity, sunlight, and temperature have an effect on the ability of moss to grow. By placing moss in various places in the house that have different sun exposures and moisture levels and controlling the amount of water provided I tried to see whether the moss would grow better in areas of higher humidity. I expected to find that the samples placed in bathroom and the basement would grow better but the results of the experiment were inconclusive. This was because of poor soil quality and excessive dryness in the house.

Project Number: JLS024

Grade: 6

Title: Can you Jumpstart a Jumper

Abstract: Jump roping can be a fun sport for any age, but have you ever wondered if verbal motivation helps you to jump for a longer amount of time? This research was done to see if verbal motivation helps performance during a physical challenge. A subject was told to jump for as long as they could while being given verbal encouragement at different intervals. It was determined that subjects performed at the highest level when given the most verbal motivation. This finding was consistent with the hypothesis of this experiment.

Project Number: JLS025

Grade: 6

Title: Does Your Pulse Elevate Playing Games?

Abstract: The purpose of this experiment is to find out if your heart rate rises to an unhealthy rate while playing PlayStation 2 games.

## **JUNIOR DIVISION – LIFE SCIENCE**

Project Number: JLS026

Grade: 6

Title: The World Of Spiders

Abstract:

## JUNIOR DIVISION – PHYSICAL SCIENCE

Project Number: JPS001

Grade: 6

Title: Investigations in designing solar cars

Abstract: The purpose of the project was to use a scientific and logical way of designing and building solar cars based on the Junior Solar Sprint specifications. As part of the design process, all factors that could affect the performance were identified. Experiments were conducted to test the materials and design of the cars. Also factored was the possible change in venue of the race due to possible inclement weather conditions.

Project Number: JPS002

Grade: 6

Title: How does Adding Salt to Water Effect its Freezing Point

Abstract: The purpose of my experiment was to evaluate the effect of adding salt on the freezing point of salt containing water solutions. My procedure was to take 5 cups of water. Pour 150 mL of water in each cup. To the first cup add no salt, to the second cup add about 5g of salt, to the third cup add about 10g of salt, to the fourth cup add about 20g of salt, and to the fifth cup add about 40g of salt. Then put all 5 cups in the freezer at the same time and check on them every 10 minutes. My data was that cup 1 froze the fastest in 90 minutes, cup 2 froze in 150 minutes, and cup 3 froze in 180 minutes. Cups 4 and 5 did not freeze within the 24 hours. My hypothesis (adding salt to water decreases its freezing point) was correct! Also that the greater amount of salt added the freezing point went down further.

Project Number: JPS003

Grade: 6

Title: Car Oils Synthetic vs. Petroleum

Abstract: I wanted to do a project that my Dad and I could work on together. An experiment that dealt with cars would be a good idea since my Dad is a mechanic and I could learn about cars. We decided to test synthetic and petroleum based oils under cold, room, and hot temperatures in a "free-flow" dump and "restricted-flow" pour method to see which would perform best.

Project Number: JPS004

Grade: 6

Title: What bridge is the safest for cars, trucks and people?

Abstract: State the problem: What bridge is the safest for cars, trucks and people.

Project Number: JPS005

Grade: 6

Title: Generating Electricity from Barometric Pressure

Abstract: Most energy is generated from coal, oil and nuclear reactions. All of these cause pollution, aren't renewable and are expensive. Barometric pressure changes daily everywhere in the world. If it could be harnessed to produce energy, then it would be non-polluting, renewable and free. This experiment shows a method for harnessing the power of barometric pressure to generate electricity. To create the barometric pressure generator, I used a manometer, which is just a U-shaped tube filled with fluid and sealed on one end. The barometric pressure forces the column of fluid up and down in the tube. Next, I floated a magnet in the fluid at the sealed end of the manometer. When the fluid level changed, the magnet moved up and down too. Next, I created an electrical current by wrapping a coil of wire around the sealed end of the tube and connecting it to a voltmeter. When the magnet moved up and down in the tube, it caused a measurable electric current in the coil. I ran the generator for three days. The column of fluid moved 1.5 inches and generated 0,25 millivolts. As a control, the manometer was unsealed and

## JUNIOR DIVISION – PHYSICAL SCIENCE

the generator did not produce any electricity. This project demonstrates the possibility of using barometric pressure to generate energy that is renewable, clean and free. The amount of energy generated was very small, but this design can be easily scaled up to produce useful amounts of energy anywhere in the world including arctic areas and the oceans.

Project Number: JPS006 Grade: 6

Title: Bo Batteries Work Better H, C, or RT?

Abstract: My experiment was to determine if batteries last longer in hot, cold, or room temperature. I chose this experiment because the results can be beneficial to individuals who use batteries in different climates. To perform the experiment, I placed four flashlights in a room temperature environment, an ice bucket, and on top of an incandescent light, and timed how long the batteries lasted. The flashlights lasted longest in the hot climate and shortest in the cold climate. This experiment was a success, and I learned a lot about batteries.

Project Number: JPS007 Grade: 6

Title: Effect of Pressure on Soccer Balls

Abstract: Inflation pressure will affect how far a ball can be kicked. By using same "kick" from a sledgehammer swung from a measured height, three balls were inflated to three pressures and "kicked" three times each across the same surface. The distance the balls rolled was measured. The three "kicks" repeated for the three balls were averaged at each pressure. When inflated at the highest pressure the balls rolled 8 % farther than when inflated at the medium pressure and 18 % farther then when inflated at the lowest pressure.

Project Number: JPS008 Grade: 6

Title: Flying Colors

Abstract: My problem I had to solve was, "What color water evaporates faster?" I did this experiment because I wondered if any color would evaporate faster than clear water. My hypothesis was that the clear water would evaporate first because it had no color added. And this meant there were no impurities. My hypothesis was wrong because the clear and red water evaporated at the same rate. I found this out by placing four glass bowls filled with 100 milliliters of water on a window sill. three of these bowls each had 3 drops of food coloring (blue, green and red). I then measured the water every three days until all the water was gone from at least one bowl. The clear bowl and the red bowl evaporated at the same time. It took a total of eleven days to evaporate. My results show that the color of water does not make a difference in evaporation.

Project Number: JPS009 Grade: 6

Title: Which natural dye is most colorfast?

Abstract: Natural dyes, made from plants, animals and minerals, have been used for centuries to color cloth. Some types of natural dyes contain mordants, which help the cloth absorb the dye, while other dyes require a mordant to be added. In this experiment, natural dyes made from tumeric, blueberries, tea, spinach, grape juice and beets were used to dye cotton cloth, and the dyed cloths were washed five times to see which dye was most colorfast. The results showed that tea was the most colorfast on cotton cloth. This is probably because tannic acid in tea was an effective mordant.

## JUNIOR DIVISION – PHYSICAL SCIENCE

Project Number: JPS010

Grade: 6

Title: Which Battery Really Keeps Going and Going and Going...

Abstract: The purpose of my experiment was to see which commercial battery had the longest life. I chose 5 different brands of commercial brands to compare their durability. The brands were; Energizer, Energizer-Titanium, Duracell-Ultra, Panasonic, and Giant Eagle brand. Of the 5 batteries, Energizer was the longest lasting proving my hypothesis correct.

Project Number: JPS011

Grade: 6

Title: What Material is the Best Insulator?

Abstract: What Material is the Best Insulator? I tested green board, styrofoam, and plastic core. I also tested without insulation because I wanted a base to compare all of the other insulation materials. I hypothesized that the green board would be the best insulator since it had the highest R-Value. The purpose of my experiment was to see what material was the best insulator. The procedures I used were: 1) Select, find, and purchase the materials I would be using. 2) Build my model house for the test. 3) Put the thermometers in so I could measure the temperature. 4) Turn the light bulb on so that I could create heat. 5) Test the materials by measuring the temperature every three minutes for a thirty minute time period. 6) Collect and record all data and form my conclusions. The results I found showed that the green board performed the best with a 7.5 degrees Celcius range while the styrofoam placed second with 4.0, and the plastic core showing a 3.8 degree range. My conclusion is that the green board had the best insulating power.

Project Number: JPS012

Grade: 6

Title: What Material is the Best Insulator?

Abstract: What Material is the Best Insulator? I tested green board, styrofoam, and plastic core. I also tested without insulation because I wanted a base to compare all of the other insulation materials. I hypothesized that the green board would be the best insulator since it had the highest R-Value. The purpose of my experiment was to see what material was the best insulator. The procedures I used were: 1) Select, find, and purchase the materials I would be using. 2) Build my model house for the test. 3) Put the thermometers in so I could measure the temperature. 4) Turn the light bulb on so that I could create heat. 5) Test the materials by measuring the temperature every three minutes for a thirty minute time period. 6) Collect and record all data and form my conclusions. The results I found showed that the green board performed the best with a 7.5 degrees Celcius range while the styrofoam placed second with 4.0, and the plastic core showing a 3.8 degree range. My conclusion is that the green board had the best insulating power.

Project Number: JPS013

Grade: 6

Title: Sugar Crystals: What Makes Them Grow?

Abstract: Crystals are vital in today's high technology world, since they are present in computer chips, watches, and surgery tools. My experiment tests the effect of temperature, evaporation rate, and purity of supersaturated sugar solutions on crystal formation. In eight jars, different amounts of sugar, unflavored gelatin, distilled water, corn syrup, and cream of tartar were boiled and cooled. After 14 observations, 95 days, crystals grown within a thermos were the biggest and fastest growing. Slow evaporation due to small-mouth bottles resulted in the fewest crystals. Crystals grown with corn syrup and sugar were the slowest to develop.

## JUNIOR DIVISION – PHYSICAL SCIENCE

Project Number: JPS014 Grade: 6

Title: Bridge structure & Strength

Abstract: The intent of this project was to determine which type of bridge structure is the strongest. Three index cards and cellophane tape were used to construct three types of bridges: arch, beam, and cable-stayed. Each bridge's strength was tested using counted and bagged pennies as weight measurement. My hypothesis was that the arch bridge would hold the most weight. The structure of the beam bridge was improved by adding a truss structure. Although the cable-stayed bridge was the strongest of the basic bridge types, the addition of "truss" made the beam bridge more rigid and it held more weight.

Project Number: JPS015 Grade: 6

Title: Baseballs Treated vs. Untreated

Abstract:

Project Number: JPS016 Grade: 6

Title: What color absorbs the most heat

Abstract: The purpose of my experiment was to see why so many cars in tropical areas are either silver or white. To do my experiment I had to paint four aluminum plates a flat black, gloss black, flat white, and a gloss white. Next I attached the thermocouple to the aluminum plates, and attached the thermocouple to the voltmeter. Then I measure the beginning temperature of the plates. I turned on the floodlight to take the place of the sun, and I measured the temperature of the plates every ten seconds. In conclusion, the black absorbed more heat than the white.

Project Number: JPS017 Grade: 6

Title: Body Temperature

Abstract: I wanted to know if your body temperature changes between the morning, afternoon and evening. I also wanted to find out if your body temperature changes when you exercise.

Project Number: JPS018 Grade: 6

Title: Burning Down the House

Abstract: My experiment involved the incineration of building products. I chose this experiment because I wanted to inform people about the products of different companies and find which is better for their home. My experiment was fairly easy to accomplish, however there were some obstacles. First I had to find a way to ignite the products. A controlled burning environment built from two grills helped me accomplish that. Once the products ignited, I used a stopwatch to time how long it took them to fully ignite. All of the products burned within five seconds of each other.

Project Number: JPS019 Grade: 6

Title: How health care can be improved using robots?

Abstract: Purpose of my research was to explore different types of application of robots for improvement of healthcare services, what are the pros and cons? Also to understand weather robots can replace doctors and nurses in the near future. Use of robots is helping surgeons to perform surgery from distance. Medical robots also improving success rate of critical surgery.

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However, application of medical robots are still very limited. It is expensive too. Robots will only help a doctor or nurse to do their job better. It will not replace a human doctor or nurse.

Project Number: JPS020 Grade: 6

Title: What's Frosty's Biggest Fear Factor?

Abstract:

Project Number: JPS021 Grade: 6

Title: Balancing the Water

Abstract:

Project Number: JPS022 Grade: 6

Title: Lemongizer Batteries

Abstract: Can three lemons power a digital watch?

I hypothesized three lemons would power up my digital watch. I used lemons because they are quite acidic. After doing some research, I discovered that two lemons have 3.0 volts. A lemon battery is called a voltaic battery, which changes chemical energy into electrical energy. My procedure was to hook up the wires in a series to the lemons. The series did not work so I hooked them up in parallels. After I hooked them up in parallels I added one more lemon. The watch then started. I observed the watch for 32 hours. It ran strong for thirty hours and kept perfect time. The digits on the watch started to fade after 30 hours and did not keep the correct time. After 32 hours the watch stopped completely. In conclusion, my hypothesis was partly correct. The lemons powered up the watch but it took four lemons instead of three.

Project Number: JPS023 Grade: 6

Title: Heat Conductivity of Metal

Abstract: Three different metals(aluminum, copper, and steel) were tested in this experiment to determine which one would conduct heat the best. Ten thirteen-inch pieces of each metal were cut and braided to look like half of a circle.(the metals must be 18-gauge) 1.5 cups of water at 100 degrees C water were retrieved and .3 cups of water at 4 degrees C were retrieved. The ends of the metal were put into each cup. Each minute the metal was tested for 50 minutes and the results were recorded. Copper conducted heat the best proving the hypothesis correct.

Project Number: JPS024 Grade: 6

Title: How does Bleach Affect Teeth?

Abstract: Teeth are a big part in our life. My project intended to tell people which bleaching method works better. I did my project in my home only using tile. On the tile Crest White Strips work the best. My guess that it would vary on teeth's color.

Project Number: JPS025 Grade: 6

Title: How do rockets fly different?

Abstract: My work is intended to see how three rockets fly differently. So I made three types of rockets using pop bottles, corks, foam board and more. Each one was different, even the fuel.

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When I launched the rockets, I first put in the fuel, then the cork, and next the needle from the bike pump and pumped until liftoff. The rockets were labeled A,B,C. A flew 35 feet and the straightest, B flew 18 feet, but corkscrewed left. C flew 14 feet and looped in the air. In future use I will make the rockets lighter.

Project Number: JPS026 Grade: 6

Title: The Link Among Frost, Dew, and Humidity

Abstract: The purpose of this experiment is to show the relationship between dew and frost and how they are both related to humidity.

Project Number: JPS027 Grade: 6

Title: Watt's Up?

Abstract: My question was "Does wattage affect the radiation of heat from a light bulb?" I did this problem because you might want to buy a lower wattage bulb in the summer to keep your house cooler. For winter, you could buy a higher wattage bulb to keep your house warmer and have better light. My hypothesis was that a 200 watt bulb would give off more heat than the 100 and 25 watt bulbs. My hypothesis was correct. The two hundred watt bulb did radiate more heat than the other two bulbs. I put each bulb into the utility lamp that was taped to the top of the aquarium with duct tape. I secured the thermometer to the inside with suction cups. Then, I turned the aquarium upside down onto the Plexi-glass. Next, I turned on the light bulb and electronic timer at the same time. I recorded the temperature at 5 minute intervals for a total of 20 minutes. I repeated each trial using the 25, 100 and 200 watt bulbs. The results showed that the 25 watt bulbs' temperatures in Celsius were 25, 26, 27 and 27. The 100 watt bulbs' temperatures in Celsius were 29, 34, 35, and 37. The 200 watt bulbs' temperatures in Celsius were 37, 45, 49 and 52. My outcome showed that if you want to be warmer in the wintertime you'll get more heat with a higher wattage bulb. If you want to be cooler in the summer, buy a lower wattage bulb.

Project Number: JPS028 Grade: 6

Title: What Objects Can Conduct or Insulate electricity?

Abstract:

Project Number: JPS029 Grade: 6

Title: How Does Salt Effect the Freezing Point

Abstract: The purpose of this experiment is to determine the effect of salt on freezing water. I want to know why people put salt on roads and what it does. I found that the cups of water with salt added froze slower than the cups of water without salt. The cups with salt melted the snow at a faster rate than the cup without salt.

Project Number: JPS030 Grade: 6

Title: Effect of Soundproofing Materials on Intensity of Sound Transmitted

Abstract: Sound is all around us. This work is intended to learn what material provides the best soundproofing. Nine different materials were tested to determine which material provides the largest decrease in sound level. Two different waveforms and 6 different frequencies were tested. It seemed that the 4" foam did better than the other soundproofing materials most of the time, especially at the lower frequencies. At the higher frequencies, it seemed as though the

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blown-in insulation or the 1-3/8" composite did better. Future work is planned to evaluate the material effectiveness with music.

Project Number: JPS031 Grade: 6

Title: How To Create An Anemometer

Abstract: This experiment is being completed because I wanted to know how a meteorologist measures wind speed.

Project Number: JPS032 Grade: 6

Title: Foiling the Point of Boiling

Abstract: It is commonly known that the more salt that is added to a solution, the higher the solution's boiling point is. This work intended to find out if boiling point elevation followed a mathematical pattern. Forty grams, 80 grams, 120 grams, and 160 grams of salt (NaCl) were added to water and boiled. The boiling temperature was measured, recorded, and plotted on a graph

Project Number: JPS033 Grade: 6

Title: Do Heavier Objects Fall Faster?

Abstract: The purpose of this experiment was to determine if objects of different mass but of the same shape fall at the same speed. Plastic eggs, filled with 5 different amounts of quarters, were dropped from a specified height to the ground. The time of the drop was recorded. Each trial was repeated 10 times with eggs of different mass. The average time was calculated. The average time for heavier objects was the same as lighter objects. The conclusion is that objects of the same shape fall at the same speed regardless of their mass.

Project Number: JPS034 Grade: 6

Title: Wacky Waves

Abstract: This project is experimenting on the speed of waves depending on the salinity. A wave tank was built and in it, a wave was made. A wave with no salt, a wave with one pound of salt, and a wave with two pounds of salt were tried in the tank and timed by the computer to determine which wave would go fastest. The wave with no salt went fastest. A future experiment is to see if the temperature effects the speed of the wave.

Project Number: JPS035 Grade: 6

Title: What Are The Best Insulators?

Abstract: The purpose of this experiment is to find which material is the better insulator.

Project Number: JPS036 Grade: 6

Title: The Effect Of Salt On Boiling Water

Abstract: The purpose of this experiment is to determine whether different types of salts will cause a reaction with the boiling temperature of water.

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Project Number: JPS037

Grade: 6

Title: Hear Ye! Hear Ye!

Abstract: My initial question was "Does width, tension, or mass affect the sound travelling through a solid object?" I hypothesized that the thinner the rubber band the higher the pitch. My hypothesis was denied because through my experiment I found the tension was what affected the pitch, not the width. First, I wrapped one of the four rubber bands around a jar opening. Then I twang the rubber band, listened to the pitch and matched it to the note on the piano. I did this for three other rubber bands and recorded all of their notes. For trial two I wrapped the four rubber bands around the jar opening and matched it with the note on the piano. I found in my results that it was not the width of the rubber band that affected the sound, it was the tension. The main note the rubber bands made when wrapped around the jar once was: 1.5mm - A flat, 2.0mm - B, 3.0mm - E, 3.5mm - A flat. The main note the four rubber bands made when wrapped around the jar once was: 1.5mm -C, 2.0mm - D, 3.0mm - Cflat, 3.5mm - A.. So in my results I found that the tension is what makes the different pitches, not the different widths.

Project Number: JPS038

Grade: 6

Title: Do Pennies Change

Abstract: What will happen to six different pennies when they are put into six different liquids.

Project Number: JPS039

Grade: 6

Title: Fast Motors

Abstract:

Project Number: JPS040

Grade: 6

Title: Car Aerodynamics

Abstract: The purpose of this experiment was to figure out the ways aerodynamics effect the speed of cars. I performed a lot of procedures to figure out the answer to the question. First I had to figure out how long I wanted the track to be and all the other dimensions I needed for the track. Another procedure was to send the 5 die-cast metal cars down the track. Each time they went down I used a stopwatch to time it from start to finish. I did that with each car 6 times. The information that came out of that experiment was not accurate enough to get the answer to the question. So, I used a wind tunnel made out of a clear plastic pipe, high-powered vacuum, and a long thin rubber band. The data I collected was the Dimensions and weights of the actual cars and the die-cast metal cars. I also collected the properties of the die-cast metal cars and the dimensions of the track and wind tunnel. Finally I took down the results of the 2 experiments. The conclusions to my 2 experiments were different. The less accurate experiment, the track, conclusions were the Ram, Formula 1 Car, Jaguar, the VW Bus, and the Corvette. The accurate experiment, the wind tunnel, conclusions meet my hypothesis. The results were the Formula 1 Car, Jaguar, Corvette, Ram, and last the VW Bus.

Project Number: JPS041

Grade: 6

Title: Salty Sedimentation

Abstract: The process of sedimentation is when water combines with sand, silt, and clay to form crystals and different layers of rock. This experiment was designed to test the effect on sedimentation of different concentrations of salt in water. Five jars were filled with soil, sand, baking soda and chalk dust. Then water with different concentrations of salt was added to each

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jar, and the jars were shaken to simulate the process. The jars were observed at various times and the data was recorded. Contrary to my hypothesis, the higher the concentration of salt in water, the quicker sedimentation occurred.

Project Number: JPS042

Grade: 6

Title: Gumball softening robot

Abstract: For my project, I built a robot that softens hard gumballs. I did this because it prevents people from hurting their teeth on the gumballs. My robot uses the aid of liquids. I built it out of special robotic Lego sets. It took a long time to finish and perfect, but the results were positive. My robot worked the way I wanted, and I succeeded after many hours. My hypothesis was that I could indeed do it, and I did. My robot was a success, and it softens gumballs perfectly without losing any of the flavor.

Project Number: JPS043

Grade: 6

Title: Scrambled or Safe

Abstract:

Project Number: JPS044

Grade: 6

Title: What Substance Melts Ice Best?

Abstract: This experiment was performed to determine which substance should be used to melt ice in winter. Seven different substances were put on pieces of ice. The melting of the ice was recorded. The substances were also placed in water, and the freezing of the water was recorded. In each case, a control of plain water was used. It was determined that Prestone Driveway Heat was best at melting ice, and canning and pickling salt was best at preventing the water from freezing. If future work was conducted more trials would be done to ensure more accurate results.

Project Number: JPS045

Grade: 6

Title: Can a Lattice Block Sound?

Abstract: This was a study to look for a unique alternative solution to soundproofing a classroom using the principle of lattice structure. My experiment was to see if lattice structure using rubber covered glass/plastic balls, blocked sound better than conventional soundproofing. A buzzer as a variable voltage sound generator was used to create sound. Frequency dampening was then measured for each soundproofing through a corridor. It was determined that for the most part, the light weight plastic balls 1.5 cm apart worked better than conventional soundproofing. Future research would include alternatives and commercial viability.

Project Number: JPS046

Grade: 6

Title: How Temperature Affects Crystal Growth

Abstract: I chose this experiment because I wanted to determine what temperature, whether warm or cold, is good to grow crystals.

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Project Number: JPS047

Grade: 6

Title: Battery Chemical Power

Abstract: Different types of batteries have different chemicals. The experiment was done because toys need batteries. It would be more convenient to have the batteries last longer so they would not have to be charged so often. There are five different types of chemical to test: Alkaline, Carbon Zinc, Nickel, Metal Hydride (NiMH), and Nickel Cadmium (NiCd). Batteries will be put into a flashlight to see which one lasts the longest. In the future, the best battery will compete with different brands, but with the same chemical to make the final decision on which one to use for the toys.

Project Number: JPS048

Grade: 6

Title: Mono Saccharides Detection in Middle Schoolers

Abstract: I hypothesize that the average middle schooler's diet contains high amounts of monosaccharide. Consumption of monosaccharide rich foods will contribute to high incidence of obesity in children. 5% - 25% of children and teenagers are obese. Childhood obesity is on the rise and is the leading cause of diabetes and high blood pressure, in addition to the psychological and social problems. My experiment tests the monosaccharide content of common food items consumed by middle schoolers. With this knowledge students can avoid these foods and reduce obesity in children. My data will be presented later.

Project Number: JPS049

Grade: 6

Title: Which Rocket Flies the Longest?

Abstract: Model rocketry is a fun and exciting hobby. I did this experiment to find out which rocket would stay in flight the longest. Three different rockets were assembled and all but the control rocket had different amounts of weights put in their designated payload areas. The rockets were then launched in a clear field and their flight time recorded. I discovered there is an inverse relation between duration of flight and weight. My hypothesis was confirmed. Using my computer I created the items for my board. Further testing on weight vs. altitude is planned for next year's fair.

Project Number: JPS050

Grade: 6

Title: How Much Can A Helium Balloon Lift?

Abstract: The purpose of this project is to determine how much a helium balloon can lift using paper clips. Paper clips were chosen as the weight because they come in different weights, sizes, and materials such as metal and plastic.

Project Number: JPS051

Grade: 6

Title: Would Cold Water Evaporate Faster than Room Temperature Water?

Abstract: The purpose of this experiment was to determine which container of water would evaporate faster, cold or room temperature. My procedures were: 1) Take two measuring cups and put 300 ml of tap water in each cup. 2) Set the containers in their locations. I used my garage as the cold environment and my dining room as the room with the constant temperature of 68 degrees. 3) Every other day I would check the cups to measure them and take a picture of them. I would then record my data. I did this for 20 days. On day one, I had 300 ml in each cup. By day 10, the room temperature had 249 ml and the cold temperature had 282 ml. On day 16, the room temperature had 218 ml and the cold 270 ml. On day 20, the room temperature had 196 ml

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and the cold water at 263 MI. My hypothesis was correct. The container with the room temperature would evaporate faster.

Project Number: JPS052

Grade: 6

Title: Brittleness of Metals

Abstract: Metals usually become brittle at certain temperatures. This work intended to learn if metals become brittle when they are exposed to cold air. The brittleness was tested by dropping a chisel at a certain height on a sample of metal. The height was measured and recorded. The height measured the impact force on the metal. The overall findings were that metal becomes more brittle when it is exposed to the cold. My outcome was the same as other scientists that had already tested. This experiment can also be done testing various temperatures.

Project Number: JPS053

Grade: 6

Title: What Paper Airplane Flies the Best?

Abstract: The intent of this work was to see what type of paper airplane flies the best. First, I chose five different airplane designs, made them, and then flew them. The plane that flew the best was one of the ones that didn't have bent wings. It flew over twelve feet. I did this project because I think planes are very fascinating and I wanted to know what airplane would fly the best.

Project Number: JPS054

Grade: 6

Title: Does Rubber Make it Better?

Abstract: Concrete is used everywhere. This experiment will be used to find out if rubber can strengthen concrete. It can be helpful to decide which concrete would be the best for building. Three regular mixes will be tested, as well as three mixes with rubber added. Each was recorded. After recording all data, it was determined that the rubber cylinders were actually weaker than the normal ones. The rubber did help the concrete stay in one piece, though. More work might be done to see if other materials make a difference in concrete strength.

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Project Number: MBI001

Grade: 7

Title: Acid Showers Bring No Flowers

Abstract: How does acid affect plant growth? I believe that a plant that is watered with an acidic solution will not grow as well as a plant being watered with a non-acidic solution. I began my experiment by planting several bean seeds in six pots. Two pots were labeled "acid", two "base", and two "plain water". I watered the two pots labeled acid with acid water, the two labeled base with base water, and the other two pots with plain water. Finally, I observed the growth of the seedlings for several weeks, noting which plants sprouted first and which seedlings grew the fastest. After my first attempt, I was unable to prove my hypothesis because not enough plants had sprouted. I repeated my experiment, but got the opposite results compared to my first attempt. I was forced to end my experiment without a conclusion. Because I was unable to answer my initial question, or to prove or disprove my hypothesis, I could not draw a conclusion on the results of my experiment.

Project Number: MBI002

Grade: 7

Title: Bacterial Growth: Hand Gel vs. Soap

Abstract: Hand gels are popular today. The purpose of this experiment was to compare the effects of hand gels and soaps on the growth of bacteria. Two types of bacteria were used, *E. coli* and *B. subtilis*. Using aseptic methods, these bacteria were streaked onto nutrient agar plates. Sterile paper disks were coated with the gels and soaps. These disks were placed on the streaked agar plates, and the plates were incubated at 37 degrees C. The plates were checked for zones of inhibition after 24 and 48 hours. The zones of inhibition were measured, recorded and compared. The soaps outperformed the gels.

Project Number: MBI003

Grade: 8

Title: Do Sunglasses Reduce UV Radiation?

Abstract: The purpose is to determine if sunglasses block UV rays, and if polarized or non-polarized lenses are more effective. Lettuce, bean, and radish seeds were used. There were four groups. Each group contained 10 seeds of each type. The control seeds were grown under standard conditions, group A seeds were exposed to the UV light, group B was exposed covered by a non-polarized lens, and group C was exposed with a polarized sunglass lens. The data was inconclusive, but the trends are sunglasses do block UV radiation, and polarized block the UV rays more effectively than non-polarized. This project helps one to select sunglasses to avoid eye damage due to UV light.

Project Number: MBI004

Grade: 8

Title: Do Water Purity Treatments Affect Amoeba?

Abstract: Throughout history, many travelers and hikers have been troubled by the severe illness Amoebic dysentery, caused by the amoeba *Entamoeba histolytica*. The purpose of this experiment was to determine whether water purification treatments have any effect on *Chaos Carolinensis*, a similar but harmless form of amoeba. This procedure involved adding Potable Aqua and Aqua Mira treatments to separate cultures containing *Chaos*, and observing under a microscope whether or not the *Chaos* was still alive after the recommended amount of time for each treatment. It was concluded that the iodine treatment is more effective than the chlorine treatment.

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Project Number: MBI005                      Grade: 7

Title: Light Variation & Radish Plants

Abstract: This work was intended to find out if different types of light affect the growth of radish plants. Three trays of radish plants were setup under three different types of light (Incandescent, fluorescent, and a grow bulb) surrounded by wood shields. This experiment was conducted for five weeks, the conclusion was the group of radish plants that received light from a grow bulb grew most rapidly to an average height of 10.1 cm. The grow bulb group did perform the best because grow bulbs give off both blue and red light. Future work is planned to determine if these types of light will product rapid growth on other types of plants.

Project Number: MBI006                      Grade: 8

Title: Effect of Sugars on Plants

Abstract: Sugars are often added to plants to help them grow. This project was made to find out if it's true. Plants were watered with liquids containing various sugars. This experiment suggests water is the best for plants, proving that adding sugars do not help. Future experimentation will involve adding different plants and using different nutrients.

Project Number: MBI007                      Grade: 8

Title: The Absorption Rate of Duckweed on Toxins

Abstract:

Project Number: MBI008                      Grade: 8

Title: Electrified Algae

Abstract:

Project Number: MBI009                      Grade: 8

Title: Radish Growth in Sand, Soil or Mix

Abstract: The problem of this project is how will radishes grow best? Different mixtures of sand and soil were used and seeds were planted. There were 24 plants altogether and growth of all plants was recorded. The plants with 100% soil grew the fastest. 100% sand did the worst.

Project Number: MBI010                      Grade: 8

Title: Environmental Factors & Transpiration

Abstract: To determine if different environmental factors affect the rate of transpiration, five groups of plants; a control group, a group with the undersides of the leaves coated with petroleum jelly, the topside of the leaves coated with petroleum jelly, plants in front of a fan, and plants in complete darkness were tested. The mass of each plant was recorded hourly for nine hours. Each plants original mass was subtracted from the previous mass to find the rate of transpiration. The results from greatest loss of mass to least are; the fan group, bottom coated, top coated, control, and darkness group.

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Project Number: MBI011 Grade: 8

Title: Is Mold Affected When Sugar Is Added To Its Diet?

Abstract: This experiment was done to determine if the bread mold *Penicillium Notatum* will grow faster with or without sugar added to its diet. A piece of mold was placed on 18 slices of bread and sprinkled with water, sugar water or diluted sugar water. Containers were covered and placed in a dark space for three weeks. Growth was recorded for three weeks.

Project Number: MBI012 Grade: 8

Title: Symbiosis of Legumes and Bacteria

Abstract:

Project Number: MBI013 Grade: 8

Title: Acidity: Help or Hazard

Abstract: This project tested to see if acid in the pre-soaking process affected the growth of plants. Seeds were presoaked overnight in liquids with different levels of acidity and then planted and left to grow for three weeks. The plants which had been soaked in the least amount of acidity grew the best, greater acidity ones died.

Project Number: MBI014 Grade: 8

Title: Radioactive Hydro/Horticulture

Abstract: I want to see the effects that radiation has on radishes and if there is another difference favoring either hydroponically or soil grown plants. Modify five containers to hydroponics for flood and drain method and the other five to soil. Plant and water seeds in soil; flush hydroponics seeds with nutrient solution and observe all growth. In order of best to worst average growth: 150 Kr, 50 Kr, Control, 500 Kr, 4,000 Kr. Hydroponics plants grew better than soil. Too much radiation can kill, but some is better than none. Hydroponics is better than soil grown in this experiment.

Project Number: MBI015 Grade: 8

Title: The Effect of Cleaners on salmonella Bacteria

Abstract: This project should determine which cleaner would be most effective in killing *Salmonella* bacteria. It was hypothesized that Clorox Bleach would be most effective. Five beads were contaminated with *Salmonella* and were treated with each of the cleaners. The level of growth was recorded in a data book as the results. It was found that Clorox was most effective in killing the bacteria. If you would improve in the future you could count the colonies instead of looking if the *Salmonella* would be killed.

Project Number: MBI016 Grade: 8

Title: DO<sub>2</sub> In Aquatic Ecosystems

Abstract:

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Project Number: MBI017 Grade: 7

Title: Human Hair: Can It Help Grass Grow?

Abstract: The purpose of this project was to see if human hair had any effect on the growth of grass. Measurements of the grass were recorded over a period of one month and the hair was viewed with an optical microscope to see if any changes had taken place. It turned out that hair did seem to help the grass grow better, but no significant change.

Project Number: MBI018 Grade: 8

Title: Too Much Sunlight, Too Much Damage

Abstract: The goal of this project was to learn more about UV radiation. Radish seeds were radiated in containers with a damp paper towel and placed in a dark closet. Radiation time had varied from 0 to 120 minutes for different groups. Measurements of the sprouts were taken after a fourteen day period. Results varied.

Project Number: MBI019 Grade: 7

Title: Effect of Video Games on Pulse Rate

Abstract: Many people play video games. In my project, I tested people from various age groups to find out which video games affected their pulse rate: the sports game, the action game, or the goal-oriented game. I placed each person in a chair, where they played each video game for 20 minutes, recording their pulse every 5 minutes. The results were that while the person played the most action-packed game, their pulse was at its highest. During the goal-oriented game, their pulse was the lowest. Future work is planned to determine if a more violent game affects the pulse rate.

Project Number: MBI020 Grade: 8

Title: Does Color Make a Difference?

Abstract: Purpose: Determine if color affects the amount of food that fish eat. Research has shown that color can affect mood, and I wondered if it would affect eating habits too.

Project Number: MBI021 Grade: 8

Title: Hydroponics Culture Comparison

Abstract: The purpose for this project was to see which media had the best effect on Palms, Dieffenbachia, Philodendron, and African Violets. The media I used were fine washed gravel, Sphagnum moss, and just plain water. I put 2mL of Miracle Grow fertilizer for every two gallons. The fertilizer would help grow the plants faster. First I put together the hydroponics station, which is where the plants will grow, and I glued all of the pipe onto the station. Once the glue dried, I put all of the media in the pipes. Then I planted the plants and let them grow.

Project Number: MBI022 Grade: 7

Title: Cookin' Up Dirt

Abstract: This experiment was done to distinguish which plant grew better, the one which microorganisms or the plant without them.

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Project Number: MBI023

Grade: 7

Title: Caffeine & Maranta Sleep Movement

Abstract: This work was done to discover the effects of caffeine on an organism; specifically, on the Maranta plant. Maranta leaves open and close every day at approximately the same time. A 3% solution caffeine solution was administered to the variable group of plants every day for 15 days. During this time, the plants were observed twice per day, and at those times the number of leaves open and closed was recorded. It was determined that caffeine made the plants stay in the closed position for a longer period of time. Also, it had the effect of causing the stems to be spindly, possibly due to dehydration.

Project Number: MBI024

Grade: 8

Title: Does Protein Affect Plant Growth?

Abstract: The title of my science fair project is "Does Protein Affect Plant Growth". My hypothesis was that the protein-watered plants would grow faster than the regular watered plants. I watered the plants with tap water for the regular plants, and 7.393225 ml of protein dissolved in 236.5832 of tap water for the experimental group. My hypothesis was proven incorrect. The protein water actually choked some of the plants causing the growth to slow down. On the fifth day only 20 protein plants out of the 30 had germinated. In conclusion my hypothesis was proven incorrect.

Project Number: MBI025

Grade: 8

Title: Hydroponics Vs. Soil

Abstract: Currently, there is a controversial issue of hydroponics vs. soil. This work intended to learn if soil would produce healthier plants than hydroponics. Radish plants were grown in each environment and measured. It was determined that soil produced healthier plants. This proved that plants need natural nutrients, not artificial nutrients. Future work would use a different plant or method of hydroponics.

Project Number: MBI026

Grade: 7

Title: Frog Formation Station

Abstract: My interest in recent declines in frog populations and their preservation as bio-indicators was motivation for my project. The purpose of my research was to find out if tadpoles in water, treated with multi-vitamins, would grow bigger and develop faster than those without. I set up two ten-gallon aquariums with filters and plants and put nine tadpoles in each aquarium. The experimental group was given liquid multi-vitamins daily. The stages of development and growth were logged for five months and the data was calculated into graphs. The results showed the group given multi-vitamins grew 52% heavier and 66% longer.

Project Number: MBI027

Grade: 7

Title: Medication and Heart Rate

Abstract: The purpose of this project was to determine and compare the effects of over-the-counter cough medicines have on the heartbeat rate. Daphnia were used in this experiment since they have a transparent body and are frequently used in research. A daphnia and drop of water from the culture were placed in the depression of a slide, and the slide was placed under a microscope. The number of heartbeats per minute of the daphnia was determined. The drop of water was replaced with a drop of cough medicine to be tested. After a minute, the heartbeat rate

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of the daphnia was once again determined. The number of heartbeats per minute was compared. The cough medicines all decreased the heartbeat rate of the daphnia. Cough medicine would have the same effect on people.

Project Number: MBI028                                  Grade: 8

Title: Battle of the Disinfectants

Abstract: Many disinfectants are out on the market to sanitize areas of the home. The purpose of the experiment was to find out which disinfectant out of five had the most effect at producing a zone of inhibition, or kill zone, on different types of bacteria. Paper disks were saturated in a disinfectant and placed inside a petri dish and allowed to work at producing a zone of inhibition. The results showed that Rubbing Alcohol was the most effective overall though sometimes not by too much of a margin. Rubbing Alcohol can be used to clean virtually anything and kill a wide range of bacteria compared to the other disinfectants. Other experiments are needed to test different types of disinfectants and bacteria.

Project Number: MBI029                                  Grade: 8

Title: Sugar vs. Sweetener

Abstract: Artificial sweetener was tested on *Vanessa Cardui* butterflies. Two groups were tested with sugar solution and with sweetener solution. There were two generations and no difference was detected in the first generation, but deformities occurred in the second generation of the sweetener group. The shorter wingspan was probably caused by an imbalance of protein.

Project Number: MBI031                                  Grade: 8

Title: WOW, Watch them grow!

Abstract: This experiment determined whether sunlight, incandescent, and fluorescent lighting has the best effect on grass. I predicted that the grass would grow the best under incandescent. I filled a container with soil and seeds. Then I sprinkled them in each container and with a fork I spread them around. I watered each trial with 2 ounces of water when the soil was dry. I turned the lights on in the morning and turned them off at night. The grass under the fluorescent grew full and bushy; the grass grew tall but not bushy under the sun. This experiment proved my hypothesis incorrect.

Project Number: MBI032                                  Grade: 7

Title: Does Fertilizer Effect the Growth of Plants?

Abstract:

Project Number: MBI033                                  Grade: 8

Title: The Wonderful Water Plants

Abstract:

Project Number: MBI034                                  Grade: 8

Title: Raising Radishes

Abstract:

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Project Number: MBI035

Grade: 8

Title: Which animal, cats or dogs, has the most bacteria in their mouths?

Abstract: Who doesn't love their furry family member, their cat or dog? So wouldn't you love to see your dog or cat live as long as they could? This could be helped by brushing your cat or dog's teeth daily. This is also why I chose to conduct this experiment. I went to owners of dogs or cats and found twenty dogs and twenty cats. The next day I returned to that house and gave them a sterile swab to swab their pet's right canine tooth. The results I obtained confirm that cats have more bacteria than dogs. Although cats had more bacteria, they didn't have more than dogs by much. This could be true for many reasons but one thing is certain, cat and dog owners need to be aware of their pets' oral hygiene to prevent tooth-loss, bad breath, gum disease, or even death!

Project Number: MBI036

Grade: 7

Title: Effect of Low Voltage Electrical Current on Planaria

Abstract: Planaria will be subjected to three different voltages of electricity over a period of 14 days, each increasing the length of time by five seconds. An experimental board was constructed to hold the planaria and a potentiometer was used to adjust the voltage. The planaria were observed with a stereomicroscope. Results were charted.

Project Number: MBI037

Grade: 7

Title: Water Quality

Abstract: Over the years, the government has come to notice that an amount of phosphate applied to plants has made them grow differently. This experiment is to test the plants' reaction to phosphate. Thirty-six wheat seeds have been planted into four different groups that will be watered with four different types of liquids, water with 0% phosphate, water mixed with Sun Light dish washing detergent, water mixed with Electrasol dish washing detergent, and water mixed with Cascade dish washing detergent. The thirty-six plants were watered with the same amount of water. At the end of the growth period, chromatography was done to determine the effects of phosphates on plants.

Project Number: MBI038

Grade: 7

Title: Which Type Bread Mold Grows Fastest?

Abstract: I hypothesized food additives and processed ingredients would slow mold growth. Ten slices each from Onion Dill, Sourdough, and Italian breads were exposed to spores for eight hours. Each sample received three drops of water, was sealed in a plastic bag, and placed in a dark closet. Mold growth was counted using a transparency grid. Onion Dill (no processing or additives) molded the least, Italian (both processing and additives) molded slightly, and Sourdough (processed white flour) grew the most mold. There was no connection between the presence and amount of processed ingredients and food additives and mold growth.

Project Number: MBI039

Grade: 8

Title: Light: The Rays of Life

Abstract: Phototropism is a plant's response to light. The purpose of this research was to determine the effect of phototropism on plant growth. In preparation for this experiment, three Lima bean seeds were planted in rich vermiculite until they reached the required height. Afterwards, three boxes, all of the same size, were spray painted black to prevent any light reflection. Each box had different characteristics in them that the plant would have to adapt to in

## INTERMEDIATE DIVISION – BIOLOGY

order to grow. Data suggests that the plant in box A grew the best because the box was less challenging. The plant didn't have to adapt as much as the plants in boxes B and C.

Project Number: MBI041

Grade: 7

Title: Miracle-Gro: Lite or Regular?

Abstract: It is more beneficial to plants to use a regular fertilizer concentration or less fertilizer more often? This experiment grew *R. sativus* with a regular fertilizer concentration, with smaller more frequent doses of fertilizer and with no fertilizer. On average the group with regular fertilizer concentration did slightly better than the group with smaller frequent doses of fertilizer and both fertilized groups did better than the group with no fertilizer. However, the considerable overlap of the standard deviations shows there is not much difference between the groups. Future work would be done over longer periods of time with different plants.

Project Number: MBI042

Grade: 7

Title: Colored Reflections on *R. sativus*

Abstract: Farmers could use this to make the crop size change to make it less expensive for consumers. I wanted to find out if colored reflections change the way radishes grow. After the germination of the plants red, blue, green, and clear plastics were placed under the plants, they continued to grow, and then after about a month were measured. The data collected showed that a clear plastic would make plants grow tallest.

Project Number: MBI043

Grade: 7

Title: Lima Bean Germination

Abstract: Beans are a food crop from all over the world. This experiment was intended to find what temperature lima beans grow best. Three different areas were prepared for the attempted growth of 36 lima beans. These areas all had different temperatures. The growth of the beans was recorded. It was determined that lima beans grow best in a warm climate. More temperature variation would be added to this experiment if it were to be repeated.

Project Number: MBI045

Grade: 8

Title: Pump It Up

Abstract: This project was designed to find which gymnastics event would work a gymnast's heart rate the hardest. First, I timed on bar routine with a stopwatch for 30 seconds. I checked my heart rate for 15 seconds. I recorded my data and did the same thing on beam and floor, with a 10 minute break in between. I performed five trials with these steps. My hypothesis was proven with this project. Floor was the event that worked the heart rate the hardest. Bars was very close in heart rates, and beam was far behind with low heart rates.

Project Number: MBI046

Grade: 8

Title: Absence of Light on Bean Seedlings

Abstract: Does the absence of light affect bean seedlings? To test this, I placed cups with pinto beans in two different environments: one with light and one without. As the beans grew, their growth was recorded. It was determined that the plant in the light was healthier and greener. Research suggests that plants need light to produce chlorophyll. Future work is planned to conduct experiments testing light intensity or type.

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Project Number: MBI047 Grade: 8

Title: Are Herbal Antibiotics as affective as Mainstream Antibiotics?

Abstract: I conducted this experiment to see whether or not herbal remedies were as effective as the mainstream antibiotics. Three types of herbal remedies and three types of mainstream antibiotics were tested against e-coli bacteria. It was determined that mainstream antibiotics were more effective when tested against e-coli bacteria. Future work would determine if herbal remedies were more effective against different kinds of bacteria.

Project Number: MBI048 Grade: 8

Title: To Fly or Not to Fly

Abstract:

Project Number: MBI049 Grade: 7

Title: Legumes vs N<sub>2</sub> Restoration

Abstract:

Project Number: MBI050 Grade: 7

Title: The Science of Making Yogurt

Abstract: Yogurt is a healthy food that affects many since it is consumed worldwide. People prefer to have yogurt made differently for their tastes. What happens if you add other additives to the yogurt? How does the quality of the yogurt get affected? I performed many tests with different ingredients, varying amounts of culture, different types of milk, and a variety of other variables. I assessed the results by measuring the whey separation, solidity, and pH. I found out that additives make the quality of the yogurt poor and temperature is a major determining factor.

Project Number: MBI051 Grade: 8

Title: Hydroponically Grown Radishes

Abstract:

Project Number: MBI052 Grade: 8

Title: Fingerprints, a Genetic Link?

Abstract: The purpose of this project was to analyze whether a possible genetic link of fingerprints exist through the generations. This project was completed by first, gathering fingerprints from four families through three generations. Those fingerprints were analyzed and graphed. Some seemed to appear through generations, but not all.

Project Number: MBI053 Grade: 7

Title: To Soap Or Not To Soap

Abstract: "To Soap Or Not To Soap" is the title of my experiment and my question is "What is the effect of detergent on the germination of lima beans?" I hypothesized that the lima bean that is watered with water, the control plant, will let the lima bean grow better than the lima bean with detergent because the chemicals in the detergent might kill or stunt the growth of the lima bean.

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What I did was take four lima beans and set them in water until it grew roots. Then I put them in dirt. I watered two lima beans with two cups of water and I watered the other two with two cups of water and a half a teaspoon of AJAX detergent. I watched the lima beans each day and watered them every three days. Once the plants started to grow I would see which ones were growing better. The objects I used to complete this project are, measuring spoon, four plastic cups, AJAX detergent, four lima beans, water and a knife. In the end the lima beans that were watered with just water grew the largest. I hypothesized correctly but the detergent did not kill the plant it just made it take longer to grow. I decided to do this project because I like most beans and it seemed fun to experiment on. This experiment taught me to grow lima beans and that there are two different kinds of lima beans there are stick lima beans, that's what I used, a stick lima bean is when the lima bean grows straight up and down and it needs a stick to keep it from falling over. There is also a bush lima bean; a bush lima bean grows all around just like a bush. I also learned that lima beans are related to green beans, one of the beans that I like. If I were to do this experiment again I would have made sure that I was more careful with the lima beans and that I would measure the lima beans with a ruler each time I watered them and record my measurements so I could have more information about the lima beans. I also would use more than six lima beans so I could get an even more definite decision.

Project Number: MBI054 Grade: 8

Title: Hydroponics

Abstract: The hydroponics system was created to grow spinach plants in the medium of fertilized tap water. This was compared to the growth of spinach plants in a soil medium. Both were exposed to the same light. It was determined that the hypothesis was supported. Spinach plants grew without the medium of soil

Project Number: MBI056 Grade: 7

Title: Plants and Magnets

Abstract: The purpose of this experiment is to determine if new plants are influenced by magnetic forces. To test this, I used four pots and planted 25 wheat seeds in each pot. Then I introduced bar magnets in different patterns, leaving at least one uninfluenced control group in each trial. I treated the pots identically then observed and recorded the numbers of wheat sprouts each day and compared the results. I ran three trials, each with 100 seeds. Small changes were made to each trial to expose the most likely influences. I recorded the data and plotted the results for comparison.

Project Number: MBI057 Grade: 8

Title: Mary, Mary How Does Your Grass Grow?

Abstract: In my experiment, I am trying to find out what would happen if I planted grass in four containers and changed a variable on each. Which plant would grow quicker/higher?

Project Number: MBI058 Grade: 7

Title: A Study of Ethylene Production

Abstract: This study was conducted to determine which fruits would produce the greatest concentrations of ethylene. Chambers were created with paper toweling and plastic bags. Twenty mung seeds were not exposed to ethylene, while a banana, apple, tangerine, and pear were added to seeds in the test groups. The day each seed germinated and the length of the seedlings was recorded and graphed. In conclusion, ethylene did stimulate the growth rate. Furthermore, ethylene's stimulation of the subsequent growth of seedlings proves that ethylene

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could help produce crops for farmers. Bananas produced the greatest ethylene concentration, followed by tangerines, apples and pears.

Project Number: MBI059

Grade: 7

Title: Vitamin C Content

Abstract: Vitamin C is important to maintain a healthy body. Orange juice is a popular source of vitamin C. The purpose of this experiment was to compare the vitamin C content in freshly squeezed, frozen and canned orange juice, and to determine how the vitamin C concentration is affected by leaving the juice in an open container at room temperature. First, prepare a standard vitamin C solution and determine how many drops of tincture of iodine is required to identify 25 mg of vitamin C. Next, determine how many drops of tincture of iodine is required to identify the vitamin C in the orange juices before and after standing in an open container at room temperature for one hour. Calculate the mg of vitamin C as related to the amount of tincture of iodine drops required to turn the solution a blue-black. The freshly squeezed orange juice had the most vitamin C both before and after standing at room temperature.

Project Number: MBI060

Grade: 8

Title: The Effect of Radiation on Plants

Abstract: This experiment was done to see how radiation affected plants. Marigold seeds radiated with four levels of radiation were planted with a control group of seeds. Germination rates were determined and the morphology of the plants was recorded. The germination rate decreased with increasing levels of radiation. The irradiated seeds produced plants that were smaller and had an abnormal leaf color. The irradiated plants also did not survive as well over the two months of growing time. In the future, seeds harvested from the irradiated plants would be grown to determine the effects of radiation on the second generation.

Project Number: MBI061

Grade: 8

Title: Geotropism: The Ups & Downs of Plant Growth

Abstract: The purpose of this experiment on geotropism is to determine the effect gravity has on the growth of plants. Also, to see if changing the angle of the pots that the plants are growing in will have an effect on the direction of growth. To begin this experiment, I planted my bean seeds. After letting them grow, I set several pots at 90 and 180-degree angles and observed how geotropism affected them. I also observed beans seeds placed on a damp paper towel in a plastic bag. My conclusion is that the stems of the plants grew upwards and the roots of the plants grew downwards regardless of position or angle.

Project Number: MBI062

Grade: 8

Title: The Other Garden

Abstract:

Project Number: MBI063

Grade: 7

Title: Do Vitamins Affect Plants?

Abstract: Plants are part of our everyday life; in our homes, schools, offices, even shopping malls. I intended to see if the vitamins people take during their daily lives would help plants grow during their life span. Five of the same plants were used, only four received the same corresponding vitamin with water twice a week, while the fifth plant only received water. Each

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plant was measured (height & width) with each watering. I predicted that Vitamin D would help plants grow the best, but the end results showed that the control plant (water only) grew the most overall.

Project Number: MBI064

Grade: 8

Title: Effect of Inhalants on *A. Domesticus*

Abstract: People do not understand how harmful inhalants can be. I hope to prove that an everyday product can hurt you if you huff. My procedures were to put the chemical on a cotton ball, and place the cotton ball and the dog food in the container with the cricket; time how many chirps chirped in one minute, and time how long the cricket will live. The results of the Wind Song Body Spray really shocked me because the crickets died so quickly. Inhalants can have a big effect on your body and how it works.

Project Number: MBI065

Grade: 8

Title: Bean Cuisine

Abstract: Bean plants are commonly grown in gardens and greenhouses, with water being one of their major sources of nutrients. For my project, I intended to observe how bean seeds would react after being watered with different liquids, opposed to watering them with plain water. Twenty-four bean seeds were planted and six different liquids were tested in four trials. The plants ultimately preferred water to the other substances, with milk being a second choice. If these experiments went into further study, the liquids would be tested for acidity to see if the pH level affected the outcome.

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Project Number: MBS001 Grade: 7

Title: Mice in the Spotlight

Abstract:

Project Number: MBS002 Grade: 8

Title: Are you Still Smart

Abstract: Memory loss is a very common thing in ageing. This project was pursued to find out when the memory loss starts to happen. Ten note cards were looked at for ninety seconds. Then the test subject would do an activity for thirty minutes. Finally the subject would come back and write down what they remembered. The eleven-year-old group had an average of no mist cards. The thirteen-year-old group had an average of two mist cards. The thirty-eight year and forty-five year old groups had an average of five mist cards. This project showed that the younger you are the better your memory should be.

Project Number: MBS003 Grade: 8

Title: Music to My Ears

Abstract: Purpose: Determine if type of music that a person listens to while studying would affect their ability to learn. I became interested in this project because my parents are constantly telling me to turn off my stereo when I am doing my homework. I felt that listening to music actually helped me to study. I used four reading comprehension tests and four types of music. I divided my subjects into groups so that all four tests would be taken in each listening environment. Rock music averaged almost 16 correct; classical averaged 14.5; country averaged 13; control averaged 12.2 correct. Listening to popular music does not seem to interfere with reading comprehension.

Project Number: MBS004 Grade: 8

Title: Petting a Dog and Human Heart Rate

Abstract: I did this experiment because I was interested in doing something with a dog. I wanted to prove that petting a dog would affect a person's health. I used three different age groups for my experiment and took each person's pulse at the wrist. They petted a dog for ten minutes and I took their pulse again to see if it increased, decreased, or stayed the same. My results showed some of the heart rates stayed the same and others decreased. Petting a dog lowers heart rate and blood pressure.

Project Number: MBS006 Grade: 8

Title: Does Music Help You Study?

Abstract: The purpose of my experiment was to see if listening to your favorite music affected your comprehension ability. I predicted someone would do better on a test while listening to their favorite music instead of their least favorite or no music. I had five different people read three different stories while listening to their favorite, least favorite, and no music. Then, I asked them comprehension questions and recorded the data. I found out listening to their favorite music didn't always help them but listening to any music did. I concluded my hypothesis was correct; people did seem to score higher while listening to music.

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Project Number: MBS007 Grade: 7

Title: Do Visual Cues Have An Effect On Short-Term Memory?

Abstract: Memory is an essential need to any person. This experiment was completed to understand if looking at information or listening to information is easier for 6th -8th graders. Ten words were said in a span of thirty seconds. Test subjects then wrote as many words as remembered in thirty seconds. Ten similar but different words were looked at for thirty seconds. Again, test subjects had thirty seconds to write as many words as remembered. The data was recorded by how many words were correct. Audible cues were more effective. However the results were so close that the conclusion is inconclusive.

Project Number: MBS008 Grade: 8

Title: Do You Think Like a Man or a Woman?

Abstract:

Project Number: MBS010 Grade: 8

Title: Batter Up

Abstract: This project tested which size bat hit the ball the furthest. What was done was first you get 3 subjects. They hit the ball off of a tee with the bat. Then you record how far the ball went. The results did not show which bat hit the furthest because the medium sized bat and the large size bat hit the ball the same length. Future work is planned to do more extensive research.

Project Number: MBS011 Grade: 8

Title: The Great Commute Dispute

Abstract: Purpose: Determine if using a cell phone affects the reaction time of teenagers and adults. I became interested in this when I read that scientists found that cell phone users drove badly whether they were holding the phone up to their ears or talking on a hands-free headset.

Project Number: MBS012 Grade: 8

Title: The Effect of Sleep on Test Scores

Abstract: I selected this topic because I thought it would be interesting. I hoped to prove that if a person sleeps longer, they would have higher test scores. After the test subjects signed an agreement and were assigned to their groups, they slept their assigned times, took their tests, and the results were collected. Group A's scores were far better than the others. The scores of all the groups improved on the second test and Group C became very tired and irritable by the last test date. I feel my hypothesis was correct. I proved that Group A had better scores.

Project Number: MBS013 Grade: 8

Title: Effect of Gender on Sense of Smell

Abstract: I selected this topic because I'm interested in seeing the difference between boys and girls. While doing research I found out that women have a better sense of smell than men. I tested by having each test subject smell the lid and identify each scent. The six scents I used were cherry, peppermint, cinnamon, banana, apple, and grape. My results proved girls could smell more accurate than boys.

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Project Number: MBS014

Grade: 7

Title: The Wonders of Flight

Abstract: In aerodynamics there are three forces which act on a glider. They are lift, drag, and weight. Lift is created by air trapped between the bottom of the wings and the ground which pushes up on the wings. Drag is created by friction from air passing over the wings slowing down the plane. Weight is created by the gravity pulling the plane's weight down.

Project Number: MBS015

Grade: 8

Title: Do Colors Affect Your Mood?

Abstract: Do colors affect our moods? This experiment was to test if colors really do affect the way we feel. Students were asked to look at thirty different colored pictures and write down what they felt. It was determined that when they looked at the red paper, they felt excited or mad. When they looked at the blue paper, they felt calm or relaxed. After experimentation, the collected data showed that color did affect the mood of those individuals tested. I would like to further my study by testing a larger sample of individuals.

Project Number: MBS016

Grade: 8

Title: The Subtle Prejudice

Abstract:

Project Number: MBS017

Grade: 8

Title: Musing about Morning Meals

Abstract:

Project Number: MBS018

Grade: 8

Title: The Pressure is On

Abstract: A violent video game increases the player's blood pressure. That was the hypothesis tested in this experiment which was completed to learn whether a violent video game would increase blood pressure. Rising blood pressure indicates a physical change which may have an effect on behavior. Six subjects were tested for this experiment ranging in age from thirteen to forty eight. Each subject had their blood pressure taken at rest, then played the game, then had their blood pressure tested again. It was determined that playing a violent video game increases blood pressure. It is recommended that if this test is completed again, a larger sample should be tested.

Project Number: MBS019

Grade: 8

Title: The Effect of Stress on Performance

Abstract: The purpose of this experiment was to determine the effect of stress on performance. The hypothesis tested in this study is with the addition of stress, subjects will be able to complete tasks more efficiently. The game Perfection was chosen. Students in grades 6-8 were used. A stopwatch was used to measure the amount of time it took for each individual to insert each of the game pieces into the correct slots. Each student completed 5 trials without stress, and 5 trials

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with stress. The stress and non-stress trials were alternated. Preliminary results indicate that with the addition of mild stress subjects are able to complete tasks more efficiently.

Project Number: MBS020 Grade: 8

Title: Learning Made EZZZ...

Abstract:

Project Number: MBS021 Grade: 8

Title: Gum's Not Dumb!

Abstract: Purpose: Determine if chewing gum really will improve memory. I read in Prevention magazine that people who chewed gum were able to recall more words than non-chewers, and I wanted to test this for myself.

Project Number: MBS022 Grade: 8

Title: Subliminal Messages

Abstract: This experiment is about how Subliminal Messages can help people learn. Subliminal Messages are words or pictures that are flashed on a screen so quickly that the eye cannot see them but the brain can remember them. I did this experiment to find out if Subliminal Messages can help people learn. I believe people can be learning while typing a report, doing research on the internet or even playing games.

Project Number: MBS023 Grade: 7

Title: You Learn from your Mistakes

Abstract: Looking back on one's previous errors (and successes) is one of the best ways of learning. Do people learn from their mistakes? The hypothesis was that they would. Worksheets were compiled, and they were to be completed by ten subjects. The worksheets had nineteen uncompleted sequences of letters. Subjects had to pick one of four choices for the ending. But, they couldn't pick just any, they had to pick one that would make the sequence 'abide by the rules'. But the subjects didn't know the rules! They completed the worksheet through trial and error. The results showed that those who tried, improved noticeably. Apparently this learning method is not for everyone. Some people guessed randomly, but others definitely got better. Some even knew rules and some learned subconsciously. This project proves that learning from your mistakes is a valid but difficult learning method.

Project Number: MBS024 Grade: 8

Title: Effect of Vitamin B 12 on Plants

Abstract: My experiment is "How does Vitamin B 12 affect the rate of plant germination?" I used pills not capsules due to the fact that you have got to crush them up and mix them in the soil. I did this experiment because I was curious as to whether Vitamin B 12 had the same effect on plants as they did on humans. In the end I discovered that it did not have a definite effect. My next step would be to try a different amount of vitamins.

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Project Number: MBS025 Grade: 7

Title: How Do Kids Best Retain Info?

Abstract: All children come home with homework and tests to study for. This project is intended to determine exactly which method of studying provides the best results. My project tested 12 girls, ages 10-13. First, giving them three minutes to study a paper with 12 numbered pictures on it. Then, I tested to see how much they remembered. Secondly, I read descriptions of the numbered pictures. Then, I again tested to see how much they remembered. It was determined that studying by sight provides the best results.

Project Number: MBS026 Grade: 8

Title: Learning: Audio Vs. Visual Cues

Abstract:

Project Number: MBS027 Grade: 7

Title: What would you choose

Abstract: If a random number had to be chosen would it really be random or prechosen based on society? Theoretically ten people out of one hundred would choose each number (1-10). This is hypothesized to be untrue. A hundred people were asked to pick a random number between 1 and 10 and they chose it based on birthdays and lucky numbers. Seven was the most popular because of the "lucky seven" in western culture. When the random number generator generated a hundred seven was generated the most, significantly.

Project Number: MBS028 Grade: 8

Title: Mental Stress

Abstract: Birth order changes personality traits. This project was intended to learn if birth order affects blood-pressure and pulse on simple testing. Three tests were given. The color stroop test, where color words are written in different colors, the serial seven test, where the subject counts backwards from 200 by sevens, and the memory recall test, where the experimenter reads digits and the subject repeats them back. It was concluded that birth order does not affect the difference in blood-pressure and pulse.

Project Number: MBS029 Grade: 7

Title: Who has better memory skills?

Abstract: I wanted to test twenty boys and twenty girls to see who has better memory skills. So I made a quiz to give them and to see who can recall the most after studying a paper full of images. They got two minutes to study it. I had two different test to test them on one was a page of pictures and the second one was my variable a doodle test. As I charted my results I found out that the girls had better memory skills. This test help me determine who has better memory skills, Boys or Girls.

Project Number: MBS030 Grade: 8

Title: What Are You Looking At?

Abstract:

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Project Number: MBS031

Grade: 7

Title: Mind Games

Abstract: The purpose of this experiment was to evaluate how the brain reacted to reading colors, words, and symbols based on the Stroop Effect. This project would benefit society as a psychological tool to examine how different types of behaviors interact and affect each other. First, print the testing pages in color and black ink. Next, test the subjects by having them read color ink names and then the words. The experimenter then made observations and recorded time, hesitations, and mistakes. Results showed experimental tests caused more hesitations, mistakes, and greater time results than control tests, which concur with the hypothesis.

Project Number: MBS033

Grade: 8

Title: Right Brain Vs Left Brain

Abstract: The title of my experiment is "Right Brain vs. Left Brain." I gave 30 right-handed people from each group (children, teenagers, adults) a page with words written in different colors. I told them to read the color of the word. Then I counted the number of words that they read correctly. My hypothesis was proven incorrect. The children had an average of 10.72 words correct, the teenagers had an average of 13.18, and the adults had an average of 16.32 words correct. In conclusion, the number of words read correctly increased with the age group.

Project Number: MBS034

Grade: 8

Title: I Can See it in Your Eyes

Abstract:

Project Number: MBS035

Grade: 8

Title: Short-term visual memory

Abstract: The purpose for my experiment was to determine who has better short term memory, males or females. My hypothesis was that females would have better short term memories than males. To test this I had verbally gave seven number (five single digit and two double digit numbers) to a group of boys and girls. The next day, I asked for the students to recall the numbers from yesterday by writing them on a sheet. My results indicated that the females were able to recall more numbers from memory than the males.

Project Number: MBS036

Grade: 8

Title: Sleepy Time

Abstract: The purpose for my experiment was to determine how the amount of sleep affects the frequency of negative behaviors of my younger brother. To complete this project I recorded the hours of sleep my brother received nightly and then had observations recorded about his behavior during school and at home. My conclusion for the experiment is: when my brother received more sleep during the night, his negative behaviors are reduced.

Project Number: MBS037

Grade: 8

Title: Musical Mice

Abstract: The purpose of my project is to determine if the type of music affects the time it takes for a mouse to run a maze. I designed three mazes and laid bedding in each. Treats were placed

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at the end of the maze. The time it took for the mice to complete the maze was recorded with no music, soft rock and hard rock. I found that the mouse ran the slowest with rock music and ran the maze in the least amount of time with no music at all.

Project Number: MBS038

Grade: 8

Title: Music & Personality

Abstract: The purpose of my experiment is to discover if the types of music students were exposed to as a child affects their current personality. I surveyed fifty males and fifty females to determine their music preference and I conducted a personality test on each person. I compared their results of the survey to the test. I concluded that certain types of music do have an affect on a person's personality. I discovered that many feelings and thoughts of students are similar to the music that they did, and still do listen to.

Project Number: MBS039

Grade: 8

Title: The Effect of Age on Color Perception

Abstract:

## INTERMEDIATE DIVISION – CHEMISTRY

Project Number: MCH001 Grade: 7

Title: Fresh Juice vs Vitamin C Content

Abstract:

Project Number: MCH002 Grade: 8

Title: Natural Dyes - Are they colorfast?

Abstract: Natural dyes can be very colorful, but will they run or fade after washing? To test this I made five natural dyes using fruits and vegetables in the red family. Then I dyed 100% cotton muslin and washed the fabric three times, each time cutting off a piece to evaluate the fading. The red onion skins produced a dark color that faded the least out of the other five and if you ever need to dye something they would work effectively.

Project Number: MCH003 Grade: 8

Title: Candles Additives and Burning Times

Abstract: Candles are popular in many homes. The purpose of my project was to prove which combination of the additives stearine and vybar would produce the longest burning and most visually attractive candle. I Hypothesized that the set of candles with twelve times the vybar would have the lowest burn rate. I made and burnt forty candles; then I calculated the average burn rate. It was determined that twelve times the vybar was the best statistically, having the slowest burn rate, but was not as attractive visually. The best combination visually and statistically was double the recommended amount of stearine.

Project Number: MCH004 Grade: 7

Title: Sound Chemistry

Abstract: Ultrasound has many applications including the enhancement of chemical reactions. My experiment tested the effect of ultrasound on the decomposition of potassium iodide to form iodine. The reactions were carried out in an ultrasonic cleaning bath by immersing a reaction flask at different depths in the bath. My hypothesis was that the greatest effect would be located at the deepest depth (7.5 cm). The tests were carried out with and without carbon tetrachloride that enhances the effect of the ultrasound. My hypothesis was incorrect. The maximum effect of the ultrasound was at a depth of 5 cm.

Project Number: MCH005 Grade: 8

Title: Which Will Be The First To Dye?

Abstract: Color is all around us. This work intended to learn if there was a difference between natural and synthetic dye. Five different fruits and vegetables were boiled to extract the natural dyes. Samples of cotton were treated with the natural and synthetic dyes. The samples were washed after the dyeing process to compare colorfastness. It was determined that the fabrics treated with synthetic dyes withstood the wash better than those treated with natural dyes. Future work is planned to test different types of natural color sources.

## INTERMEDIATE DIVISION – CHEMISTRY

Project Number: MCH006                                  Grade: 7

Title: A Search for Alternative pH Indicators

Abstract: The purpose of this study was to determine if plant extracts could be used as pH indicators. Flower petals and vegetables will be pulverized and to form test extracts. Equal amounts of the test extracts will be added to 8 mL of rubbing alcohol to form the test solutions. Hydrochloric acid (pH 2), acetic acid (pH 5), distilled water (pH 7) and sodium hydroxide (pH 14) will be added to the test extracts to determine its ability to identify the pH through a noticeable change in color. All color changes will be recorded and analyzed to determine if the flower or vegetable could function as a pH indicator across the full range of the pH scale.

Project Number: MCH007                                  Grade: 8

Title: Chromatography and Pigment ID

Abstract:

Project Number: MCH008                                  Grade: 7

Title: Effect of Acid Rain on Various Metals

Abstract:

Project Number: MCH009                                  Grade: 8

Title: Fishing for C1 and pH in River Water

Abstract: Water is the source of life on earth, and in Pittsburgh the three rivers supply our needs. My science experiment analyzed the chlorine and pH levels of river water before and after the ALCOSAN water treatment plant. Collection samples were taken on a sunny and rainy day. It was determined that traces of chlorine were detected around the ALCOSAN discharge structure, and the pH of Ohio River water was slightly acidic on a rainy day and slightly basic on a sunny day. Research verifies that rainwater is acidic, and ALCOSAN does discharge .7 – 1.0 ppm chlorine in its cleaned water.

Project Number: MCH011                                  Grade: 7

Title: Drinkable Iron

Abstract:

Project Number: MCH012                                  Grade: 8

Title: Bubble Trouble

Abstract:

Project Number: MCH013                                  Grade: 8

Title: Corrosion of Iron

Abstract: This project was to determine if different pH levels of substances have an effect on the normal corroding process of iron. Nails were tested using five variables: hydrochloric acid, tap water, white distilled vinegar, tonic water and water mixed with baking soda. Nails were massed before, during and after for a period of six weeks. Results were recorded.

## INTERMEDIATE DIVISION – CHEMISTRY

Project Number: MCH014

Grade: 8

Title: Electroplating

Abstract: My purpose is to observe what will happen to copper and silver when they are put through the electrolysis process. The process includes a glass jar filled with water that has salt and vinegar in it. Two wires with alligator clips on each end are attached to a 6-volt battery. The other end is clipped to one copper coin and one silver coin. The coins are then put in the water with salt and vinegar (electrolyte) and timed for 10 minutes. The electric current carries the particles from the copper coin to the silver coin. It makes a thin coating, otherwise known as electroplating.

Project Number: MCH015

Grade: 8

Title: The Spot Stops Here!

Abstract: Carpet cleaners are an effective way of removing carpet stains. This project tested four carpet cleaners to determine which one could remove coffee and wine stains the best. Various carpet cleaners were tested on the stains. It was found that Carpet cleaner A gave the best results.

Project Number: MCH016

Grade: 8

Title: Aluminum in Beverages

Abstract: Alzheimer's disease has been a growing epidemic for many years. Everyone is exposed daily to the aluminum in the environment which could one day lead to Alzheimer's disease. A test strip was placed in three different brands of coffee, cola, water, and tea and the strip was compared to a colored chart. The results of my experimentation demonstrated coffee contained the most aluminum followed by tea, cola, and lastly water.

Project Number: MCH017

Grade: 8

Title: Laundry Discs vs. Detergent

Abstract: Ads for miracle laundry products that clean your clothes without detergent are everywhere. To test one of these products, stained cloths were washed with a laundry detergent alternative, detergent, and water to see if the detergent alternative would clean the cloths as well as the detergent would. Results showed that detergent removed all of the stains and water removed half of the stains. The detergent alternative, which would cost much less per year than detergent, performed better than water but not as well as detergent. The alternative might not be a complete miracle product, but it can still save money.

Project Number: MCH018

Grade: 7

Title: Which Wood Would

Abstract:

Project Number: MCH019

Grade: 8

Title: Effects of Antacids on Waters PH

Abstract: The experiment was designed to test antacids and acid reducers for the amount of acid they neutralize in a set period of time. This was done by placing the antacids and acid reducers

## INTERMEDIATE DIVISION – CHEMISTRY

in a hydrochloric acid/distilled water mixture and measuring the acidity with a PH tester every five minutes. The antacids and reducers ranks from most to least effective in this order. Tums, Giant Eagle store brand antacid, Zantac 75, and Pepcid AC. It was concluded that Tums was the best anti-acid.

Project Number: MCH021 Grade: 7

Title: Growing Salt Crystal Formations

Abstract: Crystals are very beautiful and delicate formations. The purpose of this project is to determine how well salt crystals will grow on different media. Five different media were used on which to grow samples and the height and overall coverage of the samples were measured. It was determined that the samples that were solid, but porous, resulted in larger average height crystals and greatest average coverage due to their porosity and capillary action.

Project Number: MCH022 Grade: 7

Title: Water

Abstract:

Project Number: MCH023 Grade: 7

Title: Quest to See the Invisible

Abstract: Colors are an everyday part of our lives. When we look around we see many different colors. In reality, we see only a few "real" colors. The rest are a mix of colors originating from only a few colors. Using a method called paper chromatography and various colored felt pens, rose flowers, mums flowers and food colors, I confirmed that there are three basic colors, red, blue and yellow. These primary colors did not separate. Other colors separated into two or more primary colors or mixtures. For future work, I will attempt two-dimensional chromatography to further separate the mixtures.

Project Number: MCH024 Grade: 7

Title: Will Detergent Effect Flame Retardent Clothing?

Abstract:

Project Number: MCH025 Grade: 8

Title: Cabbage vs. Onion

Abstract:

Project Number: MCH026 Grade: 8

Title: Water Hardness Vs. Hair Dye

Abstract:

Project Number: MCH027 Grade: 7

Title: Amount of Gas in Various Foods

Abstract: My project was conducted to see which food would produce the most gas when exposed to an atmosphere similar to the digestive tract. Enzymes and acidophilus were added to the food

## INTERMEDIATE DIVISION – CHEMISTRY

product and the amount of gas produced was measured through water displacement. It was determined from my project that cauliflower produces the most gas when in the stomach, followed by beans, cabbage, and then milk. In the future, I would like to test the effectiveness of Beano.

Project Number: MCH028 Grade: 7

Title: Testing the Chemical Oxygen Demand, Ph Turbidity in Tapwater, River, Snow and Stream

Abstract:

Project Number: MCH029 Grade: 7

Title: Analysis: Tooth Whitening Products

Abstract: Many people now want a whiter smile. This experiment was to determine whether professional or over-the-counter whitening products were most effective on stained teeth. Six different whitening products, three professional and three over-the-counter, were tested on coffee, tea, and blueberry stained teeth. These products used two different whitening agents, hydrogen peroxide and carbamide peroxide. The data that recorded showed that Professional Crest Whitestrips, which contained hydrogen peroxide, whitened the best on the three different types of stains.

Project Number: MCH030 Grade: 8

Title: Antacids and ph levels of Lemon Juice

Abstract: Antacids are helpful to your stomach. This project intended to learn which antacid would neutralize lemon juice the fastest. It was hypothesized that Pepcid AC would work the fastest, since it is the most expensive. Three different antacids were added to lemon juice solution. The pH level of the lemon juice was recorded at thirty and sixty seconds. It was determined that the Giant Eagle antacid neutralized the most at thirty and sixty seconds. Future work is planned to determine which effervescent antacid and which chewable tablet neutralizes acid the fastest.

## INTERMEDIATE DIVISION – COMPUTER SCIENCE/MATH

Project Number: MCM001

Grade: 8

Title: Can You Read the Rainbow?

Abstract:

Project Number: MCM002

Grade: 8

Title: Improving Web Search Results

Abstract: This experiment was trying to see if it was possible to change the ranking of a web site on the results from a search on a search engine. The procedure involved determining key words, editing the HTML of the web site in various ways, and then checking to see if the ranking improved. The results included number three, four and other similarly placed results. It was determined that it is possible to increase the ranking of a web site. Future work will apply other methods for improving web search results.

Project Number: MCM003

Grade: 7

Title: Computer Economics Game

Abstract: People like to learn when they are having fun. My project let's them do that with economics. It challenges the players to find the price where the most money can be made, or market clearing price, for six different products. The game uses a series of formulas to calculate sales. Up to four people can play. I intend to add a newspaper screen that provides variables, such as a parade, that effects sales.

Project Number: MCM004

Grade: 7

Title: Digital Imaging of Snow Crystals

Abstract: The most beautiful things in Nature are usually the smallest and most delicate: the spider's web, hummingbirds, snowflakes, and many others. The classic technique of photographing snowflakes was created by W. A. "Snowflake" Bentley in the early 1900's. This project's objective was to determine if 2003 computerized equipment could replicate the results of Snowflake Bentley's antiquated equipment. An Intel Play QX3 student microscope was used to image the snowflakes, electronically capture the data, and store them in an attached Dell laptop computer. Multiple difficulties were overcome in the process, and several good quality images were taken.

Project Number: MCM006

Grade: 7

Title: Magnetic Effects on Hard Disks

Abstract: This experiment determined which magnets do the most damage to hard drives; showing what types of magnets can hurt computers. I used six magnets -- a refrigerator magnet, a donut magnet, a bulk tape eraser, a rare earth magnet, a heat sink magnet, and an electric magnet. I placed a magnet on the hard drive and checked it on my computer. I looked to see if any files were missing and used Norton Utilities to check for corrupted files. Only the bulk tape eraser damaged the hard drive. This experiment shows that not all magnets are harmful to computers.

## INTERMEDIATE DIVISION – COMPUTER SCIENCE/MATH

Project Number: MCM007 Grade: 7

Title: Interactive Racing Application and Solution

Abstract: Create a three-dimensional race simulation using Visual Basic 6.0 by using free software and web resources. In addition, the TrueVision 3D library will be used to process the visual displays incorporated into the simulation. Free software will be used for designing the three dimensional binary space partition, the textures, and for remastering sound files found on the internet. Features such as the speedometer, lap counter, race timer, rear view mirror, the computer-controlled car, collision detection, arcade physics, the keyboard control, and the logic of racing will be developed using my own mathematical algorithms.

Project Number: MCM009 Grade: 7

Title: Unknown Mathematical Patterns

Abstract: Mathematics is very useful today, but gets acknowledged less than some minor topics. I researched number theory, specifically the Pythagorean theorem. I simplified many equations and came up with procedures to produce relatively prime Pythagorean triplets. I soon found a book by Heinrich Tietze that completely solved the Pythagorean problem, which was originally done over 2,000 years ago. As a conclusion, I found two procedures to calculate relatively prime triplets, an equation that relates B and C with A, and the complete solution to the Pythagorean problem. I could investigate further with the distribution of primes and Ramanujan numbers.

Project Number: MCM010 Grade: 8

Title: Processors vs. Computer Speed

Abstract: The purpose was to see if a small change in processor speed makes a large differences in system speed. To set up the experiment, the parts were purchased. The system was set and then the experimenter ran two benchmarks a number of times. Then the processor speed was changed and the tests were ran again. The process was repeated. According to the data, when the speed of the processor was reduced, the computer's speed did not increased proportionally. In conclusion, a slight change in processor speed does not make a large difference in system speed.

Project Number: MCM011 Grade: 7

Title: A Study of Expansions of Pascal's Triangle

Abstract: Pascal's Triangle has been expanded to the third and fourth dimensions, called the Tetrahedron and Super Tetrahedron. This project was conducted to discover relationships and similarities between the three dimensions. To do this, I calculated the Triangle, Tetrahedron and Super Tetrahedron. In calculating the Tetrahedron, I discovered an entirely new method of calculation, more efficient and simple than the addition I had used. The edge of one triangular layer of the Tetrahedron is the corresponding row of the Triangle. These numbers, multiplied by the Triangle in an overlay over the layer, produce the numbers of the Tetrahedron. This method is also true of the Super Tetrahedron. After using it for calculation, I compared the patterns in the dimensions.

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Project Number: MCS001 Grade: 8

Title: Comparing the Effectiveness of Various Mouthwashes

Abstract:

Project Number: MCS002 Grade: 8

Title: Effect of Primer on Bullet Accuracy

Abstract:

Project Number: MCS003 Grade: 8

Title: Is Fast Food Really Fast Food?

Abstract: The purpose of this experiment is to find out if Wendy's or McDonald's have the fastest meal preparation time. To do this project I followed some simple steps. I chose two restaurants I liked to eat at. I took a stopwatch and at least \$10 with me to the restaurants. I ordered the same exact meal of my choosing and timed the preparation. When my full meal was set on the counter, I stopped the watch and recorded the time. I did this at both restaurants for five weeks, at the same time. I have concluded that Wendy's won for the quickest time. This project will help me decide which fast food restaurant to go to.

Project Number: MCS004 Grade: 6

Title: What washing detergent works best on stains?

Abstract: The purpose of my experiment is to find which laundry detergent works the best on tough stains. For my procedure I tested seven different stain fighting products to determine which is best at fighting stains: All loads were machine washed in warm water and instructions were followed with the cleaning products. Each stain fighting product was tested on eight stains: each stain was soaked into a white 100% cotton T-shirt and allowed to dry for three hours before washing with the cleaning products. My hypothesis is I think Clorox Bleach will work the best at removing the stains because it is said to be the strongest product. After conducting my experiment, it seemed that all of the products worked relatively the same, except one... Clorox Bleach was the only one able to remove the stains the best and the T-shirt pieces seemed to be the whitest. The other products were not able to remove the stains, only lighten them. The conclusion is to get your tough stains out, I suggest Clorox Bleach. It worked the best at removing tough stains on whites.

Project Number: MCS005 Grade: 8

Title: Detergent, Is It What It's Washed Up To Be?

Abstract: The purpose of my experiment is to see if homemade detergent cleans better than store bought. To determine this I will take 3 identical t-shirts with identical stains and wash one with store bought and the other with homemade. The third t-shirt will be used to compare the other two t-shirts to see which detergent get more of the stains out.

Project Number: MCS006 Grade: 8

Title: Which Cools the Burn?

Abstract: Heartburn is a problem that occurs in fifty percent of the United States population. This project is meant to find out which antacid will neutralize heartburn most effectively. Twelve

## INTERMEDIATE DIVISION – CONSUMER SCIENCE

different antacids were tested to see which one raised the pH the highest. I thought that Tums Extra Strength would work the best because it contains 750mg of calcium carbonate. Actually Mylanta was the antacid that neutralized gastric juice to the highets level. It contained 700mg of calcium carbonate and 300mg of magnesium hydroxide. If I were to reapeat this project I would test more brands of antacids.

Project Number: MCS007                      Grade: 8

Title: Battling With Bacteria

Abstract:

Project Number: MCS008                      Grade: 7

Title: Which Antacids Are Most Efficient?

Abstract: My project's title is "Which Antacids Are Most Efficient?" Many people suffer from stomach pain, and antacids can help them. However, some don't work very well. I believed that the antacid with the highest ingredient concentration would be most efficient. Lemon juice was placed in a container and an antacid was added. Every five minutes for a 30-minute time period, the acidity was tested. Testing showed that the Tums brand (highest concentration) finished third in testing, disproving my hypothesis, while Pepcid omplete and baking soda were most efficient. This project could help people efficiently relieve their pain.

Project Number: MCS009                      Grade: 8

Title: Calcium Supplements on Bone Loss

Abstract: In this experiment I will try to prove that one calcium supplement is better than another. This way someone that has osteoporosis will be able to buy the one that is the best at preventing bone loss.

Project Number: MCS010                      Grade: 8

Title: Stability of Vitamin C In Brand O.J.

Abstract: Measure vitamin C losses in three orange juices over four weeks.

Project Number: MCS011                      Grade: 8

Title: Are You Really Taking Your Vitamins?

Abstract: Determine if children's vitamins will dissolve in a "simulated stomach." I read that are a waste of money since they do not dissolve and cannot be absorbed into the bloodstream.

Project Number: MCS012                      Grade: 8

Title: "Million Dollar Smile"

Abstract: Toothpaste is an everyday product that everyone is familiar with. This work intended to learn which commonly advertised toothpaste worked best and if the cost had any effect on how well it worked. Five hard-boiled eggs were soaked inside a can of coffee grounds for two weeks to become stained. The eggs were treated with the products and the results recorded. The prices were recorded as well to determine if the most costly toothpaste indeed removed the stains best. It was determined that the PeroxiCare toothpaste worked best. Future work is planned to determine which toothpaste is most effective with stains over a longer period of time.

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Project Number: MCS013 Grade: 8

Title: The Effect of Bearings on Ollie Distance

Abstract: The purpose of my experiment is to find out which bearing affects the distance you Ollie when skateboarding. Three types of bearings of the same ABEC level were used six times. The Lucky bearings did the best at the first distance. The Speed Metal bearings did the best at the second distance. The part that might have affected the distance would have been the friction because of the bearings were not a high ABEC level. It would be interesting to see what the results would be with higher ABEC levels.

Project Number: MCS014 Grade: 8

Title: Which Cigarettes Contain Tar?

Abstract: My experiment deals with the amount of tar in cigarettes. Five brands of cigarettes were tested. I decided to do this experiment because I know a lot of people who smoke. They can see the effects it has on you; maybe it can change their mind about smoking. A smoking device smoked the cigarettes and filtered out the tar. Five trials were done on each brand. The order from least to greatest amount of tar is Salem, Marlboro, Camel, Winston and then Extra Value.

Project Number: MCS015 Grade: 8

Title: Does Golf Ball Composition Affect Putting Accuracy?

Abstract: Three types of golf balls were rolled down a 9.5 cm incline to determine if the composition and balance would affect the way the ball will roll towards the hole. A 2 meter putting mat was used. A second phase was also conducted in which balls were floated in water, Epson salts and jet dry. The golf ball floated to the top and the spot was marked identifying the center of gravity of the ball. The experiment was repeated to determine the effect of center of gravity has on the path of the ball. This experiment is of value to any golfer who wants to lower his handicap.

Project Number: MCS016 Grade: 7

Title: The Effectiveness of Laundry Detergents

Abstract: I wanted to see which laundry detergent would take stains out the best. The laundry detergents I used were Tide Bleach, Cheer, and Downy. I hypothesized that Tide Bleach will remove the stain the best. I took three white pieces of fabric and spilled Kool-aid on the fabric. Then I put the fabric pieces in the washer with each laundry detergent. I found that Tide Bleach removed the stain the best, proving my hypothesis correct.

Project Number: MCS017 Grade: 8

Title: Contact Solutions on *S. Marcescens*

Abstract: Many people wear contact lenses. This project intended to find which contact solution was most effective at killing the bacteria *Serratia Marcescens*. It was hypothesized that Complete would be the most effective because it is a multi-purpose solution. Saline and three solutions were tested. The number of colonies of *Serratia Marcescens* left after treatment was recorded. It was determined that Opti-Free was the most effective and the others varied widely. Research suggests that *Serratia Marcescens* is a "tough" bacteria and resists treatment. A future experiment would be testing on different types of bacteria.

## INTERMEDIATE DIVISION – CONSUMER SCIENCE

Project Number: MCS018

Grade: 8

Title: Temperature Effect on Batteries

Abstract: The purpose of my experiment is to tell whether or not temperature affects how long batteries last. The materials needed are three of the same flashlights, three rooms with three different temperatures around 23 C, 13 C, and 2 C, batteries for each flashlight that are all the same brand, and paper and pencil to record to record results. I put the flashlights in each temperature and watched them every 30-45 minutes to see when they went out. In conclusion my hypothesis was proven correct, the batteries lasted longer in 23 C rather than in the colder temperatures.

Project Number: MCS019

Grade: 7

Title: Stain Stain Go Away

Abstract: This carpet cleaner experiment determined which carpet cleaner cleaned the best on a steak sauce stain set in a white carpet square. The experiment consisted of setting a stain and leaving the stain set for a few moments and then cleaning the steak sauce with each carpet cleaner. No Wet Carpet Cleaner removed the steak sauce easily with scrubbing the stain. The Speedball 2000 Carpet Cleaner did not attempt to remove the stain with scrubbing the stain with full force. Clearly, the carpet cleaners were very different in their ending results.

Project Number: MCS020

Grade: 7

Title: Which product removes stains best?

Abstract: The title of my project is: Which product removes stains best? My problem is: Which stain remover affects stains the most? I hypothesize that the Spray 'n Wash stain remover will work the best. My procedure is put 75 mL of sauce on each shirt. Wait one hour. Follow the directions on the back of the stain remover. Record your results. My scale was One-Clearly Visible, Two-Mostly Gone, Three-Little Remains, and Four-Completely Gone. Clorox Oxygen Action had a one. Spray 'n Wash and Laundry Stain Remover had a three. Shout Ultra Gel had a four and did the best.

Project Number: MCS021

Grade: 8

Title: Turn That Down!

Abstract: Many people are unaware of the dangers that can harm their ears. The question to be solved was which earplug would perform the best by reducing the most noise and which earplug would most closely match its stated rating. Each pair of earplug was tested at four different noise levels. The results showed that foam earplugs are more effective than non-foam earplugs. Later work will involve higher levels of sound and different types of protection.

Project Number: MCS022

Grade: 8

Title: It's A Dirty Job... So Who's Gonna Do it? Are Homemade Cleaners As Effective As Commercial Cleaners?

Abstract:

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Project Number: MCS023 Grade: 8

Title: Which Battery Will Play the Last Tune?

Abstract:

Project Number: MCS024 Grade: 8

Title: Caution: Wet Paint

Abstract: To Determine which type of paint dries fastest. I painted five 4 cm by 5 cm wooden blocks with 10 ml of flat paint. I dabbed the paint with a clean paper towel at regular intervals and measured the amount of paint transferred to the paper towel. I repeated this for the gloss and satin paint. Flat paint dried the quickest in this experiment.

Project Number: MCS025 Grade: 7

Title: What is the Best Cooling for Your PC?

Abstract: People use computers every day. I did this experiment because I feel that people need to have effectively cooled computers otherwise they can become damaged. I did this with a temperature-measuring probe and I tested different types of cooling items. Flat cables are better than rounded cables; having a bottom hard drive fan is better than a front one; a top case fan cools better than a rear one; it is good to have a window on your case; the orb does better than the regular style fan and heat sink. These results express the best methods of cooling.

Project Number: MCS026 Grade: 7

Title: Types of Sticks and Slapshot Speed

Abstract:

Project Number: MCS027 Grade: 8

Title: Best Fabrication for Socks

Abstract: The purpose of this study was to determine the best sock fabrication to retain body heat for outdoor recreational activities. Socks made of cotton, wool, nylon and cotton/nylon blend were purchased for testing. The socks were pulled over a bottle and placed in an ice chest. A digital temperature probe was placed inside the bottle as well as in the ice chest. The interior and exterior temperature was measured at 2 minute intervals and recorded. Once the heat retention of each fabric was determined, the socks were layered to determine whether the order in which socks are layered affect heat retention. The data was analyzed to determine which fabrication and what order of layering was most effective at retaining body heat. The knowledge gained in this project will help outdoor sports enthusiasts select the correct sock.

Project Number: MCS028 Grade: 8

Title: Sticky Situation

Abstract: Glues are used for many projects by people of all ages. This project was intended to learn which type of glue works the best on fabrics. A tee-shirt was divided into four sections. Heart appliques and beads were applied using one type of glue in each section. After washing and drying the shirt, I observed and recorded the number of beads lost and the applique's appearance. It was determined that Aleene's and the hot glue had the best results. Future work is planned to determine if there is a significant difference in the ingredients of Aleene's glue and hot glue.



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The other cleaners varied. One of them, Polident at 5 minutes didn't remove any of the staining. I would like to experiment on dentures made of different materials.

Project Number: MCS035                                 Grade: 8

Title: Battle of the Batteries

Abstract: Batteries are used in many things today. The purpose is to determine which battery will last the longest and is most cost effective. By timing how long each flashlight stayed lite, four flashlights of the same brand and four different brands of batteries were tested. Energizer batteries out lasted the other brands. Flashlights with Energizer batteries stayed lite 31 hours and 26 minutes. Future work is planned to determine if other brands of batteries not tested will stand up to Energizer.

Project Number: MCS036                                 Grade: 7

Title: The Effect of Disinfectants on Bacteria

Abstract: Have you ever wondered if disinfectants really disinfect? The work I did shows the effectiveness of disinfectants on disease-causing bacteria. I spread e-coli on nine Agar plates. Using two disinfectant-socked disks in each plate I tested the effectiveness of each disinfectant against e-coli. I measured the zone of inhibition for two consecutive days. The results of the test indicated that bleach and cleaning products that contain more than 1.1 percent bleach were most effective in inhibiting the growth of bacteria. Other products did not work at all or showed a significantly reduced zone of inhibition when tested.

Project Number: MCS037                                 Grade: 7

Title: Best Grades of Gas for Lawnmowers

Abstract: I did this project based on the octane levels of gas. I conducted this experiment by collecting all the materials that I needed. After that I started with the first type of gas and I took one cup of it and funneled it into the gas tank of the lawnmower. I followed this for the other two gasses. I chose to conduct this experiment because I have a lawn mowing business and I want to find out which is most cost affective. The conclusion of this experiment is that if you want to save money, but have a shorter time cutting the grass then use the Regular (octane 87). If you decide you want to cut grass longer and be done quickest then use the Ultra (octane 94).

Project Number: MCS038                                 Grade: 7

Title: Heartburn: Relieve it or not

Abstract: This experiment tested the effectiveness of six liquid antacid products in neutralizing acid. The procedure involved measuring the amount of acid needed to neutralize an adult dose of antacid. The initial pH of the antacid was measured and recorded. Vinegar was added and the solution was mixed until a pH of 7 was reached. Each antacid was tested three times at room temperature. The results showed that Eckerd Milk of Magnesia neutralized the most acid (44.0 ml) and that three generically equivalent antacids all neutralized the same amount of acid (0.5ml) . The experiment illustrated that liquid antacids neutralize different amounts of acid and that equivalent antacids work the same regardless of the brand name. A future experiment would include running the tests at body temperature to see if the results varied.

## INTERMEDIATE DIVISION – CONSUMER SCIENCE

Project Number: MCS039

Grade: 7

Title: Breathe Friendly

Abstract: This project compared the dissolvability and cost of six breath mints to see which one lasted the longest. A substitute saliva solution was heated to 98.6°F to imitate the human mouth with room temperature water as a control. The experiment was repeated three times and dissolving times recorded. Room temperature water dissolved the mints sooner than the saliva solution. The experimenter discovered that the saliva solution contained sorbitol, which was an active ingredient in the mints that unintentionally slowed down the process by creating a saturated solution. In conclusion, Blitz was found to be the slowest and cheapest.

Project Number: MCS040

Grade: 7

Title: Denture Cleaners vs Bleach

Abstract: I chose to compare different denture cleaners after realizing that my grandmother's denture cleaner was not very effective. Four dilutions of cherry juice, coffee, and turmeric were made. Four plastic teeth were put in 100 percent of each stain and one plastic tooth was put into each of the others. One tooth stained with each dilution was used as control. Three teeth each stained with 100 percent stain were subjected to each cleaning treatment. The plastic teeth were then given a percentage rating. This procedure was repeated twice. My results show that bleach works the best over Efferdent and Polident.

Project Number: MCS041

Grade: 8

Title: Which Disinfectant Works Best?

Abstract:

Project Number: MCS042

Grade: 7

Title: Glowing, Glowing, Gone

Abstract: What is the effect of temperature on the duration of a lightstick? I predicted that the lightsticks will glow from the longest number of hours to the shortest in the following order: cold water, room temperature, hot water

Project Number: MCS043

Grade: 7

Title: The Effectiveness of Dental Bleach

Abstract: The purpose of this experiment is to test four different prescription dental whitening systems against a control. An oral surgeon collected extracted teeth for the study. The teeth were divided into 5 groups of 8 teeth. The teeth were treated with Bravo gel, Nupro gel, Perfecta gel and Polanight. One set of teeth were not treated establishing a control. The teeth were compared to a Dental Shade Guide before, during and after treatment. The results of this experiment could aid someone in choosing a dental bleaching system.

Project Number: MCS044

Grade: 8

Title: Wax It To Max It?

Abstract:

## INTERMEDIATE DIVISION – ENGINEERING/ROBOTICS

Project Number: MER001 Grade: 8

Title: How Much will it take?

Abstract:

Project Number: MER002 Grade: 8

Title: Bridges

Abstract:

Project Number: MER003 Grade: 8

Title: Bridge Power II

Abstract: This project tested to see if mixing materials in a truss bridge would have an effect on the amount of weight the bridge would hold. Six truss bridges were constructed of the following materials: thick balsa wood, thin balsa wood, plastic, and steel wire. As bridge height increased for the same weight, the force of each part decreased.

Project Number: MER004 Grade: 8

Title: The effect of paddle number on speed

Abstract:

Project Number: MER005 Grade: 8

Title: Top Gun

Abstract:

Project Number: MER006 Grade: 8

Title: Keeping You in Suspension

Abstract:

Project Number: MER007 Grade: 8

Title: Ready, Set, Blow

Abstract: My question states "What effect does weight have on an air powered vehicle?" I hypothesized that as the weight on the car increases the distance of the car decreases. I chose this project because it looked like a fun and interesting project. My materials are : (most materials are listed to make 1 vehicle) 4 pins, a few styrofoam meat trays (or styrofoam blocks), tape, 1 flex-straw, scissors, film capsule lids (wheels), a writing utensil (pen, pencil, etc.) small or middle sized round balloon, and a meter stick. Using the ruler, I drew the shape of the body of the car. I inflated the balloon a few times to stretch it out. I inserted the straw into the car. Put the balloon on the top of the straw and taped it on tightly so no air could get through. I then poked the nails in the center of four film caps and placed the wheels on the car. I made a marker to mark the starting line and placed the back tires on it, inflated the balloon and let it go. I then measured the distance from the back tire to the starting line and recorded that information and then repeated the last three steps many times. My hypothesis was denied because when I used small weights the car went further than it did where there were no weights. For instance when I used 5 grams

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the car went 298.2 centermeters and when I used no weights the car only went 98.8 centermeters. But when I used 10 grams the car went a minimal of 0.9 centimeters.

Project Number: MER008 Grade: 7

Title: Shapes Efect Wind Resistance

Abstract:

Project Number: MER009 Grade: 7

Title: Wood Rides the Waves

Abstract: My question is: which of the four woods poplar, basswood, cherry, or Hard maple. In my experiment I tested which of the four woods Poplar, basswood, cherry, or Hard Maple were the most bouyant. I hypothesised that poplar would be the most bouyant to to it's low amt. of volume and density. But I later understood that I overlooked the amt. of moisture and weight were more important.

Project Number: MER010 Grade: 7

Title: How Does The Weight Of A Projectile Affect The Distance Thrown?

Abstract:

Project Number: MER011 Grade: 7

Title: Swim Team Scoreboard

Abstract: Displaying scores during outdoor summer swim meets makes them more exciting for both participants and audience members. A scoreboard for such swim meets needs to be light enough to carry, independent of electrical outlets, and seen clearly across a swimming pool. The original plan was to use six rotary switches (one per digit) and twenty Christmas tree lights per digit. While the rotary switch worked well, there were too many wires and the lights were too dim. It was then decided to break each digit into seven segments using one light per segment.

Project Number: MER012 Grade: 8

Title: Bend and Twist

Abstract: Wood is important to everyday life. These experiments were intended to prove if solid wood is more durable than composite wood when twisting and bending tests are applied. Test bars made of particleboard, plywood, and solid oak wood were twisted and bent by adding weights to the twisting apparatus and the test bar. My experiment proved that oak wood had the best endurance in both tests. Skateboard companies suggest plywood is the best material for the skateboards decks. Different wood materials should be tested against plywood to see which material is the hightest and most durable for skateboard decks.

Project Number: MER013 Grade: 8

Title: Bridge Power II

Abstract: This project tested to see if mixing materials in a truss bridge would have an effect on the amount of weight the bridge would hold. Six truss bridges were constructed of the following materials: thick balsa wood, thin balsa wood, plastic, and steel wire. As bridge height increased for the same weight, the forct of each part decreased.

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Project Number: MER014

Grade: 8

Title: Bridge Over The River: Y?

Abstract: Bridges provide a continuous passage over an obstacle or waterway. This work intended to determine the strongest type of bridge used today in the modern world. Four different bridge designs were built and tested for strength. Sand was used to weigh the bridges down to the point of fracture. It was verified that the truss bridge was the strongest, holding up to nineteen pounds of pressure. Textbooks and related articles suggested that the truss bridge would in fact be the strongest. Future work is planned to determine if triangle composed bridges are indeed the strongest bridge designs.

Project Number: MER015

Grade: 8

Title: Wings

Abstract:

Project Number: MER016

Grade: 8

Title: Concrete vs. The Elements

Abstract: Concrete is used widely all over America. This project was conducted to determine how various temperatures affect different mixtures of concrete before they cure; and after they are cured how easy do they crumble when hit with a hammer. Eight mixtures of concrete were made of which two contained added sand, paint, rebar, and peanuts. It was found that the mixture containing paint was the strongest when frozen and the mix with rebar was the strongest when heated. Research states that rebar is recommended at both temperatures. Future work on this project will include a slump test.

Project Number: MER017

Grade: 8

Title: Moon Lander

Abstract: The reason I chose to do a moon rover project is because I am very interested in robotics. I am making a moon rover out of Legos and I am trying to see if I can make a decent rover running on solar and electrical power. I will then compare my rover to NASA's moon rover and see how mine compares. This is my first time working with solar power and I want to see how it works.

Project Number: MER018

Grade: 8

Title: Magnetic Machine

Abstract:

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Project Number: MES001

Grade: 7

Title: Meteor Music

Abstract: Under ideal conditions meteors can be easily observed with the naked eye. Unfortunately ideal conditions are uncommon. It is frequently cloudy and light pollution makes it virtually impossible to observe all but the brightest meteors. Taking advantage of two facts it is possible to observe meteors 24 hours a day. If an FM antenna is connected to an FM radio receiver that is tuned to a distant transmission it is possible to receive the signals that have been bounced off of the meteor's ionization trail. These signals are collected by attaching an FM receiver to an A/D circuit. The digital signal can be fed to the com port on a PC and analyzed using appropriate software that will discriminate between background noise and FM signals.

Project Number: MES002

Grade: 8

Title: Magnetic Field and Plant Growth

Abstract:

Project Number: MES003

Grade: 8

Title: Factors Affecting Soil Erosion

Abstract: The purpose of this study was to determine the effectiveness of ground cover at preventing erosion. Grass, gravel,shredded newspaper and screening were applied individually to the top of soil samples. The earth plots were elevated on an inclined plane to simulate a natural slope. Water was applied to the soil to simulate rain. The amount of run-off was collected, dried and measured. The data was analyzed to determine the most effective material to use as a ground cover.

Project Number: MES004

Grade: 8

Title: Planet X Is Earth in Jeopardy?

Abstract:

Project Number: MES005

Grade: 7

Title: Phosphates vs Algae Biomass

Abstract:

Project Number: MES006

Grade: 8

Title: Materials Effective in the Absorption of Oil Spills

Abstract: This experiment was conducted to determine which kind of sorbents-organic or synthetic- would be most effective in absorbing oil. An aquarium was filled with salt water and a bubble stone created waves. A controlled amount of oil was spilled into the water. The amount of oil absorbed by the test agent was recorded. The materials were tested in the whole state as well as shredded.The sorbents tested included raffia, mood moss, straw, oak leaves, cotton, rayon, paper towel, cardboard, wool, polyester, nylon and acetate. The two most effective sorbents were paper towel and mood moss. This experiment exhibits the potential for using natural substances on oil spills at sea.

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Project Number: MES007 Grade: 8

Title: Oil and Seawater

Abstract:

Project Number: MES008 Grade: 8

Title: Effect of Blade Angle on Windmills

Abstract:

Project Number: MES009 Grade: 8

Title: Acid Rain and Evaporation

Abstract: Determine if acidity of water affects evaporation rate. I became interested in this project because acid rain affects lakes and rivers and I wanted to see if it would interfere with natural water cycle. I prepared acid rain by mixing nitric, hydrochloric and sulphuric acid with distilled water until pH reached 4.3. I added 15 mL of "acid rain" to 4 petri dishes, 15 mL of water to 4 petri dishes, and measured evaporation rate over 18 hour period. Acid rain evaporated in 18 hours compared to 17 hours for distilled water. Acid in rain water may cause it to evaporate more slowly.

Project Number: MES010 Grade: 8

Title: The Effect of Overpopulation of Mung Bean

Abstract:

Project Number: MES011 Grade: 7

Title: Effects of Acid Rain

Abstract:

Project Number: MES012 Grade: 7

Title: Roots - Gravity or Not?

Abstract:

Project Number: MES013 Grade: 8

Title: Animals & Oil Spills/ Not a Good Combo

Abstract: Oil spills are very harmful to the animals that come in contact with them. This experiment intended to find out which animal would be most affected by an oil spill. Three samples were soaked in oil and cleaned in different detergents. The results state that an animal like a whale can be cleaned the most efficiently, followed by birds, and then furry animals. However, references state that animals fluff their fur, which may keep the oil on the top layer instead of soaking down through. Further work is needed to determine if this might increase their chance of survival.

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Project Number: MES014 Grade: 7

Title: Combustion in Confined Spaces

Abstract:

Project Number: MES015 Grade: 8

Title: The Effect of Herbicides on Yeast

Abstract: People are not completely sure of the effect of herbicides on soil and the ecosystem at large. The soil ecosystem had numerous microbes that often play key roles in many biogeochemical processes. Are herbicides harmful to the essential living components of the soil? The purpose of this study is to assess the effects of various concentrations of two herbicides, Miracle Gro and Round Up, on yeast survivorship. I made different dilutions of the Miracle Gro and Round Up herbicides and tested on yeast survivorship.

Project Number: MES016 Grade: 8

Title: Mosquitos

Abstract:

Project Number: MES017 Grade: 7

Title: How Safe is Our Water?

Abstract: Water is a major resource used every day, but how safe is it. This project studied how safe drinking water is and if water purified at home is safe to drink. Taking samples of tap, river, bottled, and home-purified water, the experimenter tested for Bacteria, Chlorine, pH, and hardness. Tap water was the cleanest followed by bottled water, purified water, and river water in that order. Thus, water consumed every day is clean. The home-purified water was suitable to drink, but more tests are needed to find definite results. In the future more tests might be performed at shorter intervals.

Project Number: MES018 Grade: 8

Title: Bioremediation of Oil in Soil

Abstract: I did this experiment because my dad introduced me to the idea of bioremediation of oil. Soil contains bacteria and other micro-organisms that can get energy from hydrocarbon compounds like fuel and oil. Bioremediation is using nutrients like fertilizers to stimulate the micro-organisms to digest the oil or fuel faster than they do naturally. I liked the idea of making something do what it's not naturally supposed to do.

Project Number: MES019 Grade: 8

Title: Oil Spills & Bird Survival

Abstract: Oil spills occur every year and are devastating to wildlife and the environment. The purpose of this experiment was to determine which household cleaning product would remove oil most effectively from bird feathers. The feathers were coated with 1.5 grams of oil and then cleaned uniformly with a product containing surfactants and a paintbrush. This process was repeated with 5%, 10% and 15% solution of each product. The mass of the feathers was measured after the oil coating and again after the cleaning and drying and recorded. I observed that Dawn Dish detergent performed the best, probably because it contains an oil-dissolving

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surfactant known as Sodium Lauryl Sulfate. I plan to continue this project by testing various cleaners and different feathers.

Project Number: MES020                                  Grade: 8

Title: Dirty Currency?

Abstract: Acid rain is a common threat to our society today. This experiment was intended to observe the effects of acid rain on a common everyday coinage metal, the penny. Eight different pennies were used and placed into jars with different pH levels ranging from 2 to 8 to see what pH level had the greatest effect on the pennies. After experimentation, it was found that the pH level of 5 had the greatest effect on the penny which included a loss of luster and wearing away of the details. Future research is planned to repeat the experimentation a number of times to ensure accuracy of the results.

Project Number: MES021                                  Grade: 8

Title: Freezing Seeds

Abstract:

Project Number: MES022                                  Grade: 8

Title: Which Water's the Worst?

Abstract: Which has the worst properties, rainwater, School Water, or Tap Water?

Project Number: MES023                                  Grade: 8

Title: The Effect of Water, Temperature, and Heat on Plants

Abstract:

Project Number: MES024                                  Grade: 7

Title: Barometer

Abstract:

Project Number: MES025                                  Grade: 8

Title: Water What???

Abstract:

Project Number: MES026                                  Grade: 8

Title: The Effect of Different Coverings on a Sun Oven

Abstract: While searching the internet, I learned that sun ovens are being used in Africa to cook food. By doing this experiment, I hoped to discover a way to cook food in a sun oven faster & more effective. I built four ovens with different coverings I tested glass, plexi glass, plastic wrap failed to cook. The cooking time of an egg was tested in each oven five times with a stopwatch. At least once the glass and the plexi glass failed to cook. The other two ovens had varying times. These results caused the experiment to be inconclusive.

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Project Number: MES027 Grade: 8

Title: How Strong Is Hard Water?

Abstract: To determine if amount of salt in water affects surface tension. Softeners use lots of excess salt during brining. Normally this excess salt goes into sanitary sewer system, then to a stream or river. Salt concentrations in streams can grow to harmful levels. Wildlife and ecosystems are endangered. I constructed balance beam to determine force required to lift plastic lid from water surface, to which varying amounts of salt was added. High salt water required 300 drops to lift lid; low salt water required 362 drops and no salt required 520 drops. Salt in the water reduces surface tension.

Project Number: MES028 Grade: 7

Title: Air Pressure and Our Weather

Abstract: Could I predict what the weather would be using a homemade barometer?

Project Number: MES029 Grade: 7

Title: Colored Lights On Plants

Abstract:

Project Number: MES030 Grade: 8

Title: Peat Moss vs. Regular Soil

Abstract: Peat moss, formed from organic materials, is said to retain more water than regular soil. Would using peat moss in planting conserve water in times of drought? Different peat moss/soil mixtures were combined. Water was poured through each, and the amount of retained water was measured. The 50% peat moss/50% soil mixture retained the most water. Although 100% peat moss contained the most organic materials, it permitted the water to "run through" rather than being retained in the soil. A mixture of peat moss and soil is most effective for retaining water and thus should be used in times of drought.

Project Number: MES031 Grade: 8

Title: Chemicals on Heart Rate of Daphnia

Abstract: The experimenter thinks the chemicals will affect the heart rate of the daphnia because they are so strong. Six different chemicals were used, two different herbicides, two different pesticides, and two different fertilizers. The experimenter took the average heart rate of the daphnia in the control then diluted the different chemicals and put three daphnia in each of the thirty dilutions. The five different chemicals were 10%, 1%, .1%, .01%, and .001%. The experimenter took the average heart rate of the daphnia after being placed in the dilutions and compared the two rates.

Project Number: MES032 Grade: 8

Title: Do You Know How Much Acid You Drink Each Day?

Abstract: High levels of pH in water can be harmful to humans. The purpose of this experiment was to explore the different levels of pH drunk each day. Four different types of water was tested with a pH meter. Twenty more samples of each type of water was ran through different amounts of charcoal filter. It was determined that the charcoal filter did bring most of the waters except for



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Project Number: MES038 Grade: 8

Title: Duckweed vs Eutrophication

Abstract:

Project Number: MES039 Grade: 8

Title: Earthquake

Abstract:

Project Number: MES040 Grade: 8

Title: Patton's Water Dirty or Clean?

Abstract: My purpose for conducting this project stemmed from my interest in fishing for trout in my local stream. I wanted to locate areas of the stream that may have more fish. To do this I gathered thirty sterilized plastic bottles and collected water and soil samples from three different locations in the stream. The samples were tested for the presence of bacteria and other particles. From my data I concluded that Test Area A, the cleanest part of the stream, had the most bacteria colonies. I believe this amount of bacteria may affect the presence of fish in a stream.

Project Number: MES041 Grade: 8

Title: Differential Solar Rotation

Abstract: The project I chose is entitled "Differential Solar Rotation". In this experiment I compared the rotation of the sun to the rotation of the solid sphere. This was done using image processing software and data obtained from the NASA/ESA SOHO satellite. I used these images to follow sunspots across the solar disk from limb to limb at different latitudes. Numeric data of linear velocity was obtained by superimposing the pictures onto a coordinate grid representing equal areas of the spherical surface. Comparing the speed of the empirical rotation to the theoretical speed of a solid sphere, I hypothesized that sunspots located at differing latitudes would rotate more slowly than they would if the Sun were a solid body. My data bore this out. I did this experiment because of the increasing interest in the sun, the solar system and all of outer space.

Project Number: MES042 Grade: 8

Title: New Orleans Drainage

Abstract:

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Project Number: MMH001

Grade: 7

Title: Inhibiting Oral Bacteria Growth

Abstract: There are many brands of mouthwash on the market today. My investigation was to determine what mouthwash inhibits the growth of oral bacteria most effectively. I cultured two oral bacteria, *S. mutans* and *Lactobacilli*, on agar plates. I tested fifteen different mouthwashes with six different active ingredients to see which one inhibits bacterial growth the best. It was determined that Advance Breath Care, containing cetylpyridinium chloride, inhibited growth the best. My follow-up study would be to test different mouthwashes, all with the active ingredient cetylpyridinium chloride, to determine why one works better than the others.

Project Number: MMH002

Grade: 8

Title: Bacteria on Currency?

Abstract: Currency is passed from person to person. Could bacteria that can cause diseases also be transferred? Paper money and metal coins were swabbed onto agar plates. The plates were incubated and observed for bacterial growth. Although bacteria were observed on all currency, more bacteria were present on the paper money due to its fibrous composition. Bacteria can be transferred when currency is passed from person to person. People should wash their hands after handling currency.

Project Number: MMH003

Grade: 7

Title: The Effect of Acid on the Inhibition Rate of Bacterial Growth

Abstract:

Project Number: MMH004

Grade: 7

Title: Burnin' Bellies

Abstract:

Project Number: MMH005

Grade: 7

Title: What Bacteria Can Penicillin Kill?

Abstract: This experiment is to determine what type of bacteria penicillin kills. Bacteria used were collected from the atmosphere, isolated and distinguished as Gram-positive and Gram-negative strain by Gram staining. Penicillin sensitivity test showed that eleven out twelve Gram-positive and two out of three Gram-negative strains were penicillin sensitive; and the average diameters of inhibition circle around the filter paper which was saturated with 140000 unit/mL penicillin, were 2.25 cm for Gram positive and only 0.75 cm for Gram-negative strains. The result suggested that Gram-positive bacteria are more sensitive to penicillin than Gram-negative bacteria and some bacteria strains have resistance against penicillin.

Project Number: MMH006

Grade: 7

Title: The Microbiology of Sauerkraut

Abstract:

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Project Number: MMH007 Grade: 8

Title: Eww...Koodies

Abstract: The purpose of my experiment is to take five males and five females and swab both their hands and their mouth and test to see who has more bacteria.

Project Number: MMH008 Grade: 8

Title: Does Stress Affect Blood Pressure?

Abstract:

Project Number: MMH009 Grade: 8

Title: How Clean Is Your Lunch Box?

Abstract:

Project Number: MMH010 Grade: 8

Title: Radiation as a Food Preservative

Abstract:

Project Number: MMH011 Grade: 8

Title: Happy Horses Drink Healthy Water

Abstract: In my project I compared the location of a horse's water bucket to the amount of bacteria present in the bucket. I found this experiment significant because water is a crucial element to a horse's nutrition and development. If the water supply is contaminated it can lead to illness or even death. I gather samples of the water and I swabbed each bucket. I inoculated agar plates with the samples and incubated them for 3 days. After my testing, I found more bacteria in the indoor water source, but more mold in the outdoor water source.

Project Number: MMH012 Grade: 8

Title: The Staining Effect of Beverages on Teeth

Abstract:

Project Number: MMH013 Grade: 8

Title: Effects of Artificial Sweeteners

Abstract:

Project Number: MMH015 Grade: 8

Title: Bacteria on Library Books?

Abstract: Library books in our school library often look dirty. Are they just dirty, or are bacteria present on their covers? Primary, intermediate, and new library books were streaked and cultured for bacteria. Bacteria were present on all the books, even the new ones. More bacteria, however, were present on the intermediate books. Primary students have scheduled "bathroom

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breaks" when they wash their hands. Intermediate students do not wash their hands as often as the younger students. All students should wash their hands before and after handling library books.

Project Number: MMH017    Grade: 7

Title: Natural Products versus Antibiotic Treatment on Common Bacteria

Abstract: The purpose of this study was to determine the relative effectiveness of natural products and prescription antibiotics at controlling bacterial growth. *B. cereus* and *E. coli* were used as test cultures. A wide spectrum of prescription antibiotics and natural products such as alcohol and colloidal silver were applied to growing bacterial cultures. The zone of inhibition was carefully measured and recorded. The data was analyzed to determine which agent was most effective in controlling bacterial growth.

Project Number: MMH018    Grade: 7

Title: Which Antis. Inhibits Bacteria Best?

Abstract: If cuts, scrapes and burns are not treated promptly, bacteria can lead to infection. This project was conducted to determine which over the counter antiseptic would inhibit bacteria best. Neosporin, Bactine, Hydrogen Peroxide, Povidone Iodine and Rubbing Alcohol were used. They were placed onto agar plates on which lines were drawn to split the plates into 4 sections. The antiseptics were placed on individual sterile disks and then placed on to the plates which were rubbed with non-pathogenic *e-coli* bacteria. After 24 hours the zones of inhibition were measured for each section. Bactine inhibited the most bacterial growth.

Project Number: MMH019    Grade: 8

Title: Synergy, Antibiotics & Medicinal Plants

Abstract: Medicinal plants have been used for years to treat infections. The plants have been replaced with antibiotics, but antibiotics have shown bacterial resistance. This research is to determine if these plants could be formulated together and antibiotics could be formulated with plants to create a synergistic effect. That is, the effect of the combined antibiotic and plants will be greater than the sum of the two added together. These combinations were tested against two bacteria. The zones of inhibition were graphed. Several combinations showed synergy, but some showed antagonism. Further research could provide different plants formulated and different bacteria tested.

Project Number: MMH020    Grade: 7

Title: Stinky Feet

Abstract: Materials used in shoe manufacturing are of utmost importance. The purpose of my project was to determine which shoe material would produce the least amount of foot bacteria, which causes foot odor. The experimental trials included testing leather, synthetic, and canvas shoes. I grew baseline bacterial colonies, and then "dirty foot" colonies using sterile technique. I determined that my control, the sock only, made the least amount of foot bacteria. When comparing shoes, the synthetic produced the least amount of bacteria. Interesting follow up experiments could involve studying what product, or antibiotic would best inhibit bacterial growth on feet.

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Project Number: MMH021 Grade: 8

Title: Soft Drinks and Their Effect on Blood Pressure

Abstract: This project tested whether ten different soft drinks affected a person's blood pressure. Blood pressure was taken 10, 20, and 30 minutes after drinking several different soft drinks. Some with caffeine, some without caffeine. The experiment was repeated 2 hours later. Each of the subjects had different results.

Project Number: MMH022 Grade: 7

Title: Which House Cleaner is Most Effective on Bacteria?

Abstract: Everyone wonders which housecleaner works the best, and I found out. I used e-coli as the bacteria and tested how well it did on each housecleaner. Using petri dishes, sterile swabs, sterile discs, and an incubator, I found out which works the best. I dipped two sterile discs into each housecleaner, and then placed them in the bacteria. The housecleaners were Clorox, Spin n' Span, Scrubbing Bubbles, 409, Fantastik, Lysol, and in one dish there was no housecleaner. The dish with no housecleaner was my control. I found out that Clorox works the best in killing bacteria.

Project Number: MMH023 Grade: 8

Title: Does the Dew Do it?

Abstract:

Project Number: MMH024 Grade: 8

Title: Dirty Little Secrets About Your Pet

Abstract:

Project Number: MMH025 Grade: 8

Title: Porcelaine Paradise

Abstract: To find out which type of port-a-potty is the safest for health benefit

Project Number: MMH026 Grade: 8

Title: Which Pill Really Dissolves Fastest?

Abstract: The goal of this project was to determine which of the pain killing pills dissolved the fastest? Advil, Motrin, Aleve and Tylenol were added to a solution of hydrochloric acid with rennet tablets. Timing was observed to see which one dissolved the fastest.

Project Number: MMH027 Grade: 7

Title: Which Beverage Stains Teeth the Most?

Abstract: The project I did was Which Beverage Stains Teeth the Most. I thought that coffee would stain teeth the most. I poured 240mL of beverage into glasses, dropped an eggshell into each glass and let sit for 24 hours. I removed and rinsed the eggshells. I took pictures of all the eggshells. For calculating results I used the luminance scale in Microsoft Paint. I found that

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cranberry Juice cocktail stained the eggshells the most, grape juice second most, Diet Coke the third most, apple juice the fourth most, tea the second least and coffee the least.

Project Number: MMH028 Grade: 7

Title: The Effect of Electromagnetic Waves on Cellular Respiration

Abstract: The purpose of this study is to determine the effect of electromagnetic waves on cellular respiration. Cultures of yeast were exposed to two different strengths of electromagnets. The amount of carbon dioxide produced from cellular respiration was measured by displacement of water. The amount of carbon dioxide produced by the cultures exposed to the electromagnets were compared to control cultures. The results of this experiment show that exposure to electromagnetic waves does increase the rate of cellular respiration. This information would be valuable to consumers who expose themselves daily to sources of electromagnetic radiation.

Project Number: MMH029 Grade: 8

Title: How Sterile are Band-Aids?

Abstract: The purpose is to see how sterile band-aids are because you are putting them on open wounds. I will buy different band-aids and use hospital gauze. I will put gloves and goggles on myself. I will swab the gauze with a sterile swab, moistened with distilled water. I will swab an agar plate with the swab that was rubbed on the gauze. The agar plate will be placed into an incubator for 48 hours. I will examine the dish and count the number of bacteria grown. The conclusion is that the CVS Generic Brand was the best band-aid tested.

Project Number: MMH031 Grade: 8

Title: Dirty Money

Abstract:

Project Number: MMH032 Grade: 8

Title: Is Antacid pH Phased by its State?

Abstract:

Project Number: MMH033 Grade: 8

Title: Effectiveness of Wound Cleaners

Abstract: This work was intended to determine which wound cleaner is the most effective at killing staphylococcus epidermis bacteria. Sterile discs covered in wound cleaner were placed in bacteria swabbed agar plates. The zone of inhibition was measured around the discs. The control was a sterile disc on an agar plate. Hydrogen Peroxide inhibited the most bacteria growth. Dial was the second most effective and Alcohol and Betadine were equally effective, although they were not very effective. The experimenter might use different wound cleaners next time.

Project Number: MMH034 Grade: 8

Title: Presence of Amoeba on Total Dissolved Solids

Abstract:

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Project Number: MMH035

Grade: 7

Title: Coping with Smoking

Abstract: Is smoking really terrible for someone's health? This project intended to look into that question and find the answer. Five nonsmoking subjects and five smoking subjects tried to blow out a candle from as far away as they possibly could in half-foot margins. It was determined that the nonsmokers blew out the candle from farther away than the smokers. Many sources show that smoking is bad for someone's health. Hopefully, in the future no one will smoke.

Project Number: MMH036

Grade: 8

Title: The Effect of pH on E.coli

Abstract: Esherichia. coli is the most common pathogen in mammals. This experiment is designed to test how acid and bases affect the growth of E.coli bacteria. In the experiment E.coli bacteria is grown at four different pH values(1.5, 7.0, 9.2, and 12.6)in the cultrue dishes in a controled laboratory bacteria cultrue room. This experiment proved that a strong acid can effectively eliminate bacterial growth and that bacteria grew more abundently in a slightly basic enviroment. This experiment demonstrates the efficiency of the human stomach and the importance to maintain a healthy diet to protct this vital organ.

## INTERMEDIATE DIVISION – PHYSICS

Project Number: MPH001                      Grade: 7

Title: Follow the Rainbow

Abstract:

Project Number: MPH002                      Grade: 8

Title: Volts, Watts, and Intensity

Abstract: To Determine if voltage or wattage affect the intensity of light I measured light intensity of 10 standard 120-volt bulbs, 10 energy saving bulbs, 10 standard 130-volt bulbs, 10 long-life bulbs. 120-volt bulbs produce almost .1 foot-candles per watt; 130-volt bulbs produce almost .075 foot-candles per watt; long-life bulbs produce almost .055 foot-candles per watt; energy-saving bulbs produce almost .09 foot-candles per watt. As wattage increases, the intensity of the light increases. Lower voltage bulbs had greater light intensities.

Project Number: MPH003                      Grade: 7

Title: Paper Towel Test

Abstract: The goal of this project was to find out which brand of paper towels has the most absorbency and which has the most durability. Water was placed on the paper towel and the circumference was measured. Weights were placed on each one until it ripped. Water was poured on each to see which one could hold the most before leaking through. All measurements were recorded.

Project Number: MPH004                      Grade: 8

Title: Is Bigger Actually Better?

Abstract:

Project Number: MPH005                      Grade: 8

Title: The Effect of Gear Ratio on Touque

Abstract:

Project Number: MPH006                      Grade: 8

Title: Heat Insulation in Fabrics

Abstract: Warm clothing is very important for many people in modern society. This project was conducted to test which fabrics out of silk, wool, polypropylene, fleece and cotton work the best to insulate heat. Thermometers were wrapped with the tested materials until they snugly fit into a test tube. The test tubes were heated in boiling water then the time it took for the thermometers to cool was recorded. It was discovered that silk was the best insulator. The least effective insulators were cotton and fleece (their results were very close). In the future, more materials might be tested.

## INTERMEDIATE DIVISION – PHYSICS

Project Number: MPH007 Grade: 8

Title: Acceleration of Gravity

Abstract: The scientific question that I'm researching is "does the weight of an object affect the acceleration due to gravity?"

Project Number: MPH008 Grade: 8

Title: The Perplexing Pendulum

Abstract: Pendulums have several uses in mechanical devices, such as clocks. This experiment was designed to determine if the period of motion of a pendulum is affected by weight, length, or amplitude. Each variable was tested in a series of timed trials to determine which had the most impact on the pendulum. Results have shown that the period of motion was most significantly affected by the increase or decrease of length. Sources suggest that geographic location also affects the period of motion. I plan to test this theory in the future by performing the experiment at different altitudes.

Project Number: MPH009 Grade: 7

Title: Balloon Physics

Abstract: A test method was developed for measuring the amount of pressure inside balloons during inflation. This test method was used to measure the maximum inflation pressure of three different sizes of round balloons, determine which balloon size is hardest to inflate, and compare three different stretching methods for reducing the maximum inflation pressure. Four lengthwise or widthwise stretches proved to be equally efficient for reducing balloon inflation pressure by 1 kiloPascal. The maximum pressure generated by people of different ages was measured to show that a 1 kiloPascal reduction in inflation pressure is significant for enabling people to inflate balloons.

Project Number: MPH010 Grade: 8

Title: Mighty Mini-Bridges

Abstract: To determine if arch bridge or beam bridge would support more weight. Build three bridges of each design using wooden rods and glue. The same amount of construction material was used in each bridge. All bridges were 30 cm long, and 6 cm high. Add weight to each bridge by suspending weights from center of bridge until it collapses. Beam bridges collapsed on average under 20.4 kg of added weight. Arch bridges collapsed on average under 19.9 kg of added weight. The beam bridge in this experiment supported more weight than the arch design.

Project Number: MPH011 Grade: 8

Title: Heat Absorption and Color

Abstract: The purpose of my experiment is to find out which colors absorb the sun's heat the most. My materials included five pieces of colored construction paper in the colors of white, black, blue, yellow, and green, five-Celsius thermometers, and a sunny windowsill. On the sunny windowsill I placed a thermometer under each piece of paper. After an hour of exposure I recorded the results. In all three trials the black paper absorbed the most heat and the white paper the least. I concluded that darker colors absorb more of the sun's heat than do lighter colors.

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Project Number: MPH012 Grade: 8

Title: Testing Lubricants on Small Bearings

Abstract: The purpose for doing this experiment was to find which lubricant allows small bearings to continue moving the longest with the least friction. My hypothesis was that a successful test could be designed to determine which lubricant best decreases the friction in the bearings. Starting with clean bearings each time, I applied a lubricant to the bearing and accelerated spindle in the electric drill against the wheel so the speed would be the same for each trial. My hypothesis was supported. The test allowed a fair comparison of the lubricants on three different size bearings.

Project Number: MPH013 Grade: 8

Title: The Science of Voltage

Abstract:

Project Number: MPH014 Grade: 8

Title: Melting Cubes

Abstract: My project was set up to find out if ice cubes melt quicker in Coke or Sprite under a 40 watt light bulb. Four same sized clear colored drinking glasses were set up, two of which were under a lamp with a 40 watt light bulb in it, and the other two were away from the lamp. A stopwatch started right when the ice cubes were put into the soda. It stopped when they were completely melted. It was recorded how long it took the ice cubes to melt in each soda under light and no light. It was determined that ice cubes melt quicker in Coke than Sprite, under light. Therefore next time you are in the sun, and you order a soda, and want to get the maximum usage out of the ice cubes, you should order a Sprite.

Project Number: MPH015 Grade: 8

Title: The Effect of String Tension on

Abstract: String tension is an important part of stringing a tennis racquet. This project intended to learn which string tension was best for ball accuracy and velocity. It was hypothesized that 63 pounds would be preferred, since it is the average tension used. Three different racquets were strung to 60, 63, and 66 pounds. The accuracy and velocity of tennis balls hit by each racquet was measured. It was determined that 63 pounds was the best string tension. Future work is planned to experiment with varied string tensions and ball brands.

Project Number: MPH016 Grade: 8

Title: Does Temperature Affect Pressure?

Abstract: The purpose of my experiment was to determine if temperature affects pressure. I did my preparations by taping a thermocouple onto a stick. I drilled holes into a stopper, for a tube and the thermocouple. I placed the stopper into an airtight cylinder. I constructed a manometer. I marked the manometer, and filled it with water. I secured the manometer over the tube. I placed the cylinder on a hot plate. I recorded the temperature when the water rose. I let the cylinder cool. My data was consistent throughout the trials. In conclusion, temperature affects pressure.

## INTERMEDIATE DIVISION – PHYSICS

Project Number: MPH017

Grade: 8

Title: Hot Rod, Cold Rod

Abstract: My question was: Will a Hot Wheels car go faster on a cold track, a normal track, or a hot track. I did this experiment to find out if a car would go faster on a cold or hot road. In my hypotheses I stated that I thought a Hot Wheels car would go faster on a cold track because the particles are closer together than on a hot track. In my experiment I used three Hot Wheels cars, each of the same make, and an eighty-two centimeter section of track. First, I cooled the track and timed each car as it went down the track. I timed the cars when the track was at room temperature next. After that I heated the track and then timed the cars as they came down the track. My hypothesis was denied. In my hypothesis I said the Hot Wheels cars would go faster on a cold track. After I tested the cars, I found that the cars went faster on the hot track. I think this is because there was more traction on the warm track. I could have made my experiment better by using different cars or by using different lengths of track. My experiment was fun, challenging and I learned from it.

Project Number: MPH018

Grade: 8

Title: Cold vs. Hot Guess What?

Abstract: The purpose of this experiment is to determine if the temperature of a golf ball affects the distance traveled when hit with the same force. A mechanism to hit the balls with the same force was designed. Golf balls were heated and frozen. The mechanism was used to hit the golf balls and the distance traveled was recorded. It was determined that the frozen golf balls traveled the farthest. I believe the weather temperature was a variable in this experiment that affected the results. In the future, I would repeat this experiment when the temperature was milder.

Project Number: MPH019

Grade: 7

Title: Spinning Into Energy

Abstract: Different wind blade designs produce varying amounts of energy. Six different windmill blades were tested using a voltmeter and a hair dryer. The voltage was measured and recorded with each blade type. The results show each blade type. The results show that a blade that is longer and has a larger pitch produces the most energy.

Project Number: MPH020

Grade: 7

Title: Insulator Performance

Abstract:

Project Number: MPH021

Grade: 8

Title: The Force of Karate

Abstract: My experiment determines which karate moves exert the most pressure on the human body. My procedure involved me standing in clay while completing a karate move into more clay and measure the depth of the imprint left in the clay. I tested karate kicks, punches, and stances. I determined that the jump front snap kick, the middle punch in a horse stance, and a back stance produced the most force for each of the karate kicks, punches, and stances respectively.

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Project Number: MPH022                                  Grade: 7

Title: Which Golf Ball Will Go Furthest?

Abstract: Advertisements about golf balls made me wonder if they were true, that their golf ball would go further than other balls. So taking 5 golf balls that weere constructed differently, I bounced each from the second floor balcony in my house on to a granite block that I placed on the floor below. Using a measurement chart that I had placed against the wall, I recorded how far each ball bounced. I tested each ball 10 times. The golf ball that did the best was the newer Titeist NXT.

Project Number: MPH023                                  Grade: 7

Title: Whish Detergent is most Flammable

Abstract: I tested to see which laundry detergent is most flammable. I did this because I wanted to see which product would be the safest for a home.

Project Number: MPH024                                  Grade: 8

Title: Throwing Footballs

Abstract: The purpose of this experiment was to see if the amount of air in a football affected the distance thrown. In my procedure I took all the air out of an official size football. I pumped eight full pumps and threw and measured it. Next I pumped eight more times and I threw it. Last I pumped eight more times and threw it. I repeated this process four more times. With more pumps the football went further when thrown. In conclusion I found that the amount of air in a football affects the distance thrown.

Project Number: MPH025                                  Grade: 7

Title: Propulsion

Abstract:

Project Number: MPH026                                  Grade: 8

Title: Surf's Up!

Abstract:

Project Number: MPH027                                  Grade: 8

Title: Building a Better Bridge

Abstract: To determine what type of triangle (right, isosceles, or equilateral) would result in the strongest bridge. I became interested in this because I live in an area surrounded by bridges and I noticed that most of them are composed of triangles. I designed three bridges ; built five of each design from toothpicks and modeling clay. Mass of constructio materials remained constant. The right triangle bridges held 1.7 kg before collapsing; the equilateral triangle bridges held 1.8 kg; and the isosceles triangle bridges held 3.2 kg before collapsing. In this experiment, the isosceles triangle bridge supported the most weight.

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Project Number: MPH028    Grade: 7

Title: Laundry Aids Change Flammability?

Abstract: Every day millions of people use fabric softener and/or dryer sheets when doing their laundry. This project is to see if fabric softener or dryer sheets make clothing more flammable. I chose five different fabrics and two different fabric softeners and dryer sheets. After laundering as directed, I timed how long each material took to ignite. My results showed flannel to be the slowest material to ignite. Downey Fabric Softener and Snuggle Dryer Sheets had the over-all slower ignition times of all the laundry aids tested.

Project Number: MPH029    Grade: 8

Title: Oil Viscosity

Abstract:

Project Number: MPH030    Grade: 8

Title: Seeing in Ground with Electricity

Abstract:

Project Number: MPH031    Grade: 8

Title: Electrical Charges

Abstract:

Project Number: MPH032    Grade: 8

Title: The Effect of Modern and Antiquated Insulation on Heat Retention

Abstract:

Project Number: MPH033    Grade: 8

Title: The Alaris and the Ikelos

Abstract: Purpose: Determine which of two newly designed future gliders, as featured in Popular Science, would travel farther. I built models of two gliders – the Alaris and the Ikelos – and a glider launcher. The mass of both gliders was held constant. I launched each plane 15 times and measured the distance traveled. The Alaris averaged 3.3 meters per flight and the Ikelos averaged 2.6 meters per flight. The Alaris, with a swept back wing design, glided the farthest.

Project Number: MPH034    Grade: 7

Title: Concrete Reinforcement

Abstract: The problem of this research is to determine which reinforcement rod withstands the most weight. The experiment consists of placing rods of steel, copper, and plastic into slabs of cement and testing to see which can withstand the greatest weight. The slab which can withstand the greatest weight being dropped has the strongest reinforcement.



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freezing and room temperature were clearest, though more trials may declare a more proficient method. Possible plans to further my knowledge would include re-testing in a more controlled environment and increasing the number of trials to gain more accurate results.

Project Number: MPH042                      Grade: 7

Title: Energy Needed to Break Boards

Abstract: Energy needed to break boards. Each board is two centimeters wide and nine centimeters long. The first set is of three boards five centimeters high. The second set is seven point five centimeter boards. The last set is ten-centimeter high boards. In total I have nine trials. For each trial I am using a 1.1-kilogram weight on a pole. I will measure the height of the weight and use a formula to calculate the energy. It took most energy to break the seven point five centimeter board.

Project Number: MPH043                      Grade: 8

Title: Bowling Balls and Hooking Ability

Abstract: This project, "The Effect of Oil on a Bowling Ball's Hooking Ability", is testing the hooking ability of a bowling ball. Oil is on bowling lanes to reduce friction. If there is more oil there is less friction, and if there is less oil there is more friction. This project is designed to find out if a bowling ball that was designed to hook in medium oil, hooks better if heavier oil or lightly oiled conditions. The hypothesis to this experiment is that the ball will hook most on the light oil, medium on the medium (control) oil, and least on the heavy oil.

Project Number: MPH044                      Grade: 8

Title: Effects of Temp. on Solar Cells

Abstract: My project was to see how the power output of the solar cell changed as the Temperature changed. Through out my days of testing the three trials of heat and cold, I found out that whenever the temperature got higher, the power began to slow down. Whenever the temperature got colder, the power went up slowly. Therefore, in order to get a higher power output, it would be best to keep the solar cell in a cold area of where it can receive sunlight.

Project Number: MPH045                      Grade: 7

Title: Heat Generation of Colored Candles

Abstract:

Project Number: MPH046                      Grade: 8

Title: Magnets in Motion

Abstract:

Project Number: MPH047                      Grade: 8

Title: Thermal Or Not!

Abstract: Thermal conductivity can be explained or shown in many ways. The purpose of this experiment was to determine the heat conductivity of foam, plastic, glass, and tin. Four different liquids were placed into each container and the temperature changes were recorded over a ten minutes period. It was determined that the liquid in the foam container lost the least amount of

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heat energy. Future work is planned to determine if other materials, other than those tested, will conduct heat more effectively.

Project Number: MPH048

Grade: 8

Title: Solar Water Heater

Abstract: This experiment was conducted to determine whether black or white materials affect the efficiency of a solar panel. In this experiment, two solar panels were constructed, one white, and one black. Black tubing was coiled in the black panel, and clear tubing in the white panel. One quart of water at forty-seven degrees Fahrenheit was measured into a container, and set on a table. A small pump was then placed into the container, which circulated the water through the panels. Two floodlights were set about eight inches away from the panel to heat the water, which was circulated through the panel for one hour and thirty minutes. The final temperature of the water in the black panel reached one hundred and seven degrees Fahrenheit and ninety-seven degrees Fahrenheit in the white panel. Thus, the black panel heated water more efficiently than did the white panel.

Project Number: MPH049

Grade: 7

Title: Photo Quality: Digital Vs 35 MM

Abstract: This work examined the comparative quality of a digital versus 35 mm photo. Five different objects were selected and photos were taken and developed under the same conditions by both a 5 megapixel digital camera and a 35 mm camera. The megapixels (picture elements/dots) were counted within a 1x1 centimeter area of each photo. The results were compared and, with all conditions being equal, the quality of a 35 mm camera's picture is very similar to the photo taken by a 5-megapixel digital camera. Future work will determine if the same results would occur under various lighting and distances.

Project Number: MPH050

Grade: 8

Title: Air - Insulator or Not?

Abstract:

Project Number: MPH051

Grade: 8

Title: The Effect of Sling Length on a Trebuchet's Launching Distance

Abstract: The trebuchet is amazingly accurate. It could throw a heavy boulder hundreds of meters and hit a target. By doing this project, I hope to find out how the sling length affects the distance a projectile it thrown. My theory was that the longer the sling length, the farther the projectile will go.

Project Number: MPH052

Grade: 7

Title: Does Temperature Affect the Viscosity of Oil?

Abstract:





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suggests that varying types of gases and the amount of etching on the inside of each bulb may cause these variations.

Project Number: MPH062

Grade: 7

Title: Blow Wind Blow

Abstract: Blow Wind Blow is a project that attempts to find the relationship between the shape of a building and its resistance in movement when high winds blow against it. The question that was asked in this experiment was which shape of building moves the least amount when hit with high winds? The hypothesis that was formed after researching different shapes of buildings and their relationship to wind was that the triangle shaped building will move the least when hit with high winds. In order to test this hypothesis the following procedure was created. Find the speed of the wind generated by the fan with an anemeter. Then a styrofoam base was created to hold the buildings. The buildings were created in different shapes required by the experiment with newspaper and pipe cleaners. They were placed in the base and the fan was turned on. The movement was recorded. After concluding the procedure for this experiment, the following results were gathered. Triangle top (1.6 cm), triangle middle (0.91 cm), triangle bottom (0.0cm), circle top (2.4 cm), circle middle (1.2cm), circle bottom (0.0cm), rectangle top (2.6 cm), rectangle middle (1.5cm), rectangle bottom (0.083 cm), square top (2.9cm), square middle (1.6 cm), square bottom (0.22cm). After analyzing the results, the following conclusions were made: The triangular shaped building performed best with the least amount of movement, the circular building performed second best, the rectangular building performed the second worst, and the square building performed worst with the most movement. My hypothesis was supported because it stated that the triangular building performed better than the other three building shapes. If I were to do this project again, I would use different materials to create the building structures and create a core to the buildings to give added support to produce more accurate results as compared to the real world.

Project Number: MPH063

Grade: 8

Title: The Power of Pulleys

Abstract: The purpose of my experiment was to determine a way to organize pulleys to provide the greatest mechanical advantage. The purpose of my experiment was to explain the best combination of pulleys to do work. To complete my experiment I constructed a device to test the pulleys. I tested various amounts of large and small pulleys in the device. I discovered that using six large pulleys had the greatest mechanical advantage and one large pulley had the worst mechanical advantage.

Project Number: MPH064

Grade: 8

Title: Batter Up!

Abstract:

## SENIOR DIVISION – BIOLOGY

Project Number: SBI001

Grade: 11

Title: Genetic Susceptibility to Prostate Cancer

Abstract: The male Afro-Caribbean population on the island of Tobago possesses an abnormally high rate for prostate cancer. Preliminary prostate cancer screening has shown high serum prostate-specific antigen (PSA) levels. An examination of polymorphisms in the PSA gene using polymerase chain reaction (PCR), restriction digest, and gel electrophoresis revealed that a substitution (of the A nucleotide) mutation (G/A or A/A) is prevalent in the population and can be a factor contributing to an elevated risk for prostate cancer. Further study done on PSA regulatory genes will clarify the specific cellular significance of mutations in the PSA gene and its role in regulating signal transduction! pathways.

Project Number: SBI002

Grade: 9

Title: Effect of Caffeine on Mustard Plants

Abstract: To study effect of Caffeine on Mustard plants. Newly germinated mustard plants were divided into groups of three each. Each group of plants each was watered daily with 50ml of freshly prepared 2%, 1% , 0.5%, 0.4%,0.2% or 0.1% caffeine solution or tap water. Appearance and height of plants was recorded daily for 10 days. 0.5%, 1%, and 2% Caffeine solutions caused plant death while 0.1% and 0.2% caffeine solutions stimulated growth of mustard plants. Caffeine has dual effect on mustard plants, causing plant death at high concentration and stimulating growth at lower concentrations.

Project Number: SBI003

Grade: 12

Title: Effect of Manure on Soil

Abstract: Cow manure is used for fertilizer on many farms. The state of the cow, whether pregnant, nursing, or not nursing, may determine the nutrients in the manure, and thus its usefulness as a plant fertilizer. This project determines effect of various cow manures on some key soil nutrients.

Project Number: SBI004

Grade: 12

Title: Carbon Dioxide and Mosquitoes?

Abstract: To determine if insect repellents effectively mask CO<sub>2</sub> since mosquitoes and other insects are attracted to CO<sub>2</sub> released from the human body.

Project Number: SBI005

Grade: 11

Title: Fried Rice

Abstract:

Project Number: SBI006

Grade: 11

Title: Thinking Under Pressure

Abstract: Gases tested under water include neon, helium and argon. A subject breathed these gases, and completed several tasks to test narcosis and mental ability. Times were recorded to determine the least narcotic gas, and also the most narcotic gas.

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Project Number: SBI007

Grade: 12

Title: The Effect of H<sub>2</sub>SO<sub>4</sub> and HNO<sub>3</sub> on radishes

Abstract: The purpose of this experiment was to see the effect of H<sub>2</sub>SO<sub>4</sub> and HNO<sub>3</sub> on the growth of radish seeds. Measurements will include the height of the plant and the length of the root. It was hypothesized that the solutions will make the seeds grow faster. The independent variable is the solutions and the dependent variable is the radish seeds. Materials are the radish seeds, test tubes, and the solutions.

Project Number: SBI008

Grade: 9

Title: Effects of Caffeine on Triops

Abstract: Caffeine may have adverse consequences on growth. The purpose of the experiment is to discover the effect of caffeine on growth and life-span of Triops. Five Triops kits were set up following the provided instructions, except 200mg, 100mg, or 0mg of caffeine were added by an assistant to blind the experimenter. Daily checks for germination, viability and activity of each Triops were performed. Hatchlings were weighed weekly using an electric metric scale. Data analysis was performed using T-test and Anova. The results concluded that caffeine was inversely correlated to the girth and life-span of the Triops.

Project Number: SBI009

Grade: 9

Title: Lights Up Bacteria!

Abstract:

Project Number: SBI010

Grade: 9

Title: Protein Absorption

Abstract:

Project Number: SBI011

Grade: 11

Title: Could You Survive the Titanic?

Abstract:

Project Number: SBI012

Grade: 10

Title: The Effect of Acid Rain on Tadpoles

Abstract: Because of the recent drop in frog population, I decided to research if acid rain had a harmful effect on the growth of tadpoles, possibly causing mutation or death. I daily added 6 ml. of acid rain with varying pHs to three different experimental tanks. Because of the high numbers of mutations found in the lower pHs, I have concluded that the lower the pH of an acid rain fall is, the worse effect it will have on the tadpoles.

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Project Number: SBI013 Grade: 11

Title: Caffeine on Population of Daphnia

Abstract: Daphnia were exposed to several concentrations of caffeine and their heart rate was measured. There was a significant change in heart rate as well as tolerance and withdrawal but there was no significant difference in the natural changes in population.

Project Number: SBI014 Grade: 9

Title: Potatoes: Good, Better, Best

Abstract: Do you like your potato chips light or dark? Did you know that temperature affects the chip color? I tested the sugar levels of four different varieties of potatoes that were stored in different temperature conditions. Samples from each variety were properly prepared and then tested with an AGTRON machine to test chip color and a sucrose machine to test the level of sugar. The Pike variety produced the darkest chip and the Reba variety contained the most sugar. In comparison of conditions, colder temperatures produce potatoes with more sugar and a darker color.

Project Number: SBI015 Grade: 10

Title: Smoker's Olfactory Function

Abstract: The purpose of this experiment was to investigate the effects of smoking on human olfactory function, and to further investigate if these effects vary among ages and between sexes. Human olfactory function, or olfaction, was tested through the Alcohol Sniff Test, and the Q-Sit Smell Identification Test. These are both highly accurate, validated means for measuring olfaction. The tests were administered and the results were analyzed using two statistical analyses, the t-test and the likelihood ratio test. Both data sets were found statistically significant, and from this we can deduce that smoking does have adverse effect on human olfaction.

Project Number: SBI016 Grade: 12

Title: Does Sunblock have an Effect on the Growth of Radish Plants?

Abstract: The independent variable is the sun block used. The dependent variable is the growth of the radish plants. The control was the group of plants that were grown without the sun block solution. This project was conducted based on the interest of the prevention of UV rays. I tested the sun block on radish plants in twelve different mini flower pots. It was hypothesized that the sun block will effect the growth of the radish plants.

Project Number: SBI017 Grade: 9

Title: The Effect of Rhizobium melliloti on the Growth of Medicago sativa

Abstract: My project is based on the symbiosis of Rhizobium bacteria and Alfalfa plants. The bacteria supply nitrogen to the alfalfa and in return are protected from oxygen by the alfalfa's roots. I had three different experimental groups using different methods of inoculation to see which method was the most effective for producing the longest stems and roots on the alfalfa plants. I also had a control group of unsterilized plants to compare my results to.

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Project Number: SBI018

Grade: 11

Title: The Effects of Heat on the Behavior of Wolf Spiders

Abstract: The purpose of this research was to study the effect of heat on the behavior of wolf spiders.

Project Number: SBI019

Grade: 9

Title: The Effect of Transforming Growth Factor on Fibroblast Cell Growth and Morphology

Abstract: The object of this project was to see if a certain kind of growth factor would affect the cell shape and number of cells present. Different amounts of growth factor were added to two corresponding 6-well plates for examination. After examination, the growth factor did end up affecting the cell shape and number.

Project Number: SBI020

Grade: 9

Title: Tadpole's Growth

Abstract: I wanted to test the tadpole growth in different water temperatures. I put two tadpoles in each tank with warm, room, and cold temperatures. I record the growth and temperature each week. I record if they had legs, arms, a tail and gills. I had to food them everyday. That is how I tested the growth of tadpoles.

Project Number: SBI021

Grade: 0

Title: The Effects of Digestive Enhancing Products in Rumen

Abstract: In today's milk market, efficiency matters. Cows need to be in peak condition. In order for a cow to feel healthy, the cow's digestive tract must function well. This experiment was designed to test efficiency of digestion enhancing products in relation to economics. Cow rumen was combined with the products: a yeast culture and microbe culture, then compared against the control. Analysis of the results, done with a t-test, showed that neither product was statistically significant: for the yeast culture ( $p= 0.4799$ ) and for the microbe culture ( $p=.884$ ). Because neither were significant, the price of these products outweighs the benefits.

Project Number: SBI022

Grade: 12

Title: Surgeon General's Warning

Abstract: The purpose of this experiment is to determine the effect of nicotine on the heart rate of *Daphnia magna*. The researcher hypothesized that nicotine will make the heart rate of *Daphnia magna* increase as the concentrations of nicotine are increased. The researcher first measured the normal heart rate of *Daphnia magna* over 10 trials. Next add one drop of 0.0001% concentration of nicotine to the depression slide with one daphnia, and count the heart rate. The average is calculated over 10 trials. Heart rates were counted for increasing concentrations of nicotine and results compared.

Project Number: SBI023

Grade: 12

Title: Plant Growth in Nutrient Rich Environments

Abstract: This experiment tests the effects different types of nutrients on growth of a plant cutting. The nutrients were Nitrogen, Potassium, Phosphorus, Sulfur, Calcium, and Magnesium.

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It was Hypothesized that the plants that were grown in a complete nutrient solution will have a better chance to leaves and roots. The Independent Variable: types and amounts of nutrients used. A complete nutrient solution was compared with a No Phosphate solution and a No Nitrate solution. The Dependent Variable is the amount of root growth, coloring, height, and the number of leaves on each cutting.

Project Number: SBI024 Grade: 11

Title: DNA Extraction

Abstract:

Project Number: SBI025 Grade: 12

Title: Does your fish have ich

Abstract: To get Ich to grow and study how it effects fish. What causes ich and when is it the best time to treat it.

Project Number: SBI026 Grade: 11

Title: From the Heart

Abstract:

Project Number: SBI027 Grade: 11

Title: Excess Salinity on Plants

Abstract: In this experiment, I will be conducting research to see the effects of excess salinity on Elodea plants. It will help to determine if a higher concentration of salt in a lake or river will affect the plant growth there. An Elodea plant was obtained, leaves were taken off and put under a microscope, and a couple drops of salt water (with different concentrations) were added to each different leaf. The reactions were observed to see what changes occur in the leaves due to the higher concentration of salt in the water. This experiment showed dehydration due to excess salinity.

Project Number: SBI028 Grade: 10

Title: Got Milk: Effects of Pasturization

Abstract: Milk and other dairy products area a necessary addition to a balanced diet. This testing was intended to determine which type of milk, fresh or pasteurized, offers the most nutritional advantages. Both fresh and pasteurized milk were analyzed for calcium content, phosphorus level, pH, vitamin content, and the percent milk fat present. It was determined that fresh milk used within 72 hours of extration from the cow and stored at 63 F offered the best nutritional value. Future testing is planned to determine why pasteurization affects the milk.

Project Number: SBI029 Grade: 10

Title: Silicon & Stem Stiffness

Abstract: This project was conducted to investiagte the effects of silicon on the elasticity of plant tissue. Forty snow peas were grown hydroponically for 36 days. Segments of the stems were evaluated for deflection using masses of less than two grams. The data showed that pea plants provided with silicon at 100 ppm had an elastic modulus 15.8 times that of the control.

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Project Number: SBI030 Grade: 9

Title: Preserving a Flower's Bloom

Abstract: There are many proposed home solutions to preserve the bloom in cut flowers. Some of the most common are aspirin or vinegar solutions. This project tested these solutions against plain water to determine if they really had any effect. The test results show that simple water is superior.

Project Number: SBI031 Grade: 11

Title: The Effects of Caffeine On Mealworms

Abstract:

Project Number: SBI032 Grade: 11

Title: Are Wolf Spiders able to determine the Difference between night and day?

Abstract: The purpose of this experiment was to find out if Wolf Spiders were as nocturnal as experts say they are. The researcher varied the amount of light on the spiders every couple of hours and kept the spiders under close observation at all times. At first the spiders did not come out in the light, but when the light was constant they adapted to the light and came out during the day. Wolf Spiders are nocturnal but if you keep them under constant light they adapt to the light conditions.

Project Number: SBI033 Grade: 9

Title: Additives and Plant Growth

Abstract: This project was done to determine if ordinary food additives used to flavor food in the kitchen would have any effect greater than ordinary tap water on the growth of plants. The experiment showed that most additives hindered or had no effect on plant growth when compared to ordinary water.

Project Number: SBI034 Grade: 11

Title: The Effects of Microorganisms On The Growth Of Legumes

Abstract:

Project Number: SBI035 Grade: 10

Title: Can Chemicals Cause DNA mutations?

Abstract:

Project Number: SBI036 Grade: 9

Title: The Effects of Brackish Water and Salt Water on Brassica rapa

Abstract: The purpose of this experiment was to test whether Brassica rapa would grow if you watered it with salt water or brackish water. The Brassica rapa was planted in 45 styrofoam cups and watered with fresh water until they sprouted. Then, they were split into 15 groups, and watered with salt water, brackish water, and fresh water. They were monitored everyday, watered when needed, and measured every other day once they had shown adequate growth. The









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shells, peanut shells, and coffee grounds in recycled plastic bottles. An iron solution of 8 ppm was poured through the filter systems repeatedly and the iron concentration was measured with a visible light spectrophotometer. I hypothesized that shrimp and crab shells would remove iron the best, but my hypothesis was neither refuted nor supported because of variable results. Further experimentation would include use of another method to determine iron concentration.

Project Number: SCH009

Grade: 11

Title: How much P is in your cola?

Abstract: The purpose of this project was to determine the amount of phosphorus in several different cola drinks: Coke, Pepsi, and Dr. Pepper. Because the coloring of most sodas would interfere with the spectrophotometric method, I have combined two different lab techniques. I decided to use a chromatographic technique to rid the cola of dyes. Using a column made from an anionic exchange resin and a syringe, as well as HCl to help the phosphate ions form phosphoric acid, I used 8 M HCl to elute dyes from the phosphoric acid solution. Then, I treated the phosphoric acid extracted in the first procedure with  $\text{KH}_2\text{PO}_4$  in order to give it a blue color that can be measured by a spectrophotometer. I used a 4 ppm  $\text{P}_2\text{O}_5$  solution made from  $\text{KH}_2\text{PO}_4$ , a solution made from ammonium molybdate, ascorbic acid, sulfuric acid, and deionized water as standards and prepared a calibration curve. The absorbance of each solution was measured using a Spec 20 at 830 nm. I performed three trials for each sample.

Project Number: SCH010

Grade: 11

Title: How Low Can You Glow?

Abstract: The purpose of this project is to determine if length of glow and intensity of glow of the chemical Luminol is affected by the amount of Luminol present in a reaction. This is done by preparing a solution containing different amounts of Luminol - three with 0.2 grams, three with 0.4 grams, then 0.6, 0.8, and finally 1.0 grams respectively; three trials were conducted with each quantity of Luminol. Length of reaction was timed with stopwatch and intensity was measured by placing pieces of unmarked white printing paper over bowl in which the reaction took place. Results were recorded.

Project Number: SCH011

Grade: 10

Title: Effects of pH on Fe Chelators

Abstract: Iron is an essential component in many human physiologic processes. Unfortunately, excess iron can lead to diseases associated with Hemochromatosis and Thalasesemia. Oral iron chelators could counteract similar iron overload. This experiment compared two different chelators, Ferritin and EDTA, under low pH to mimic gastric acidity, as would be experienced if taken orally. Results indicated that Ferritin worked best, but both chelators retained marginal amounts of iron binding in acidic conditions. Future studies in different pH environments or with human subjects could expand the biologic parameters of the project.

Project Number: SCH012

Grade: 11

Title: Who ya' gonna call: Scum-busters!

Abstract: It is first important to understand concepts related to the use of chelating agents along with structure and reactions. It is then when one can understand the chemistry behind consumer goods. In order to determine the EDTA content in Tilex cleaners, a titration must be conducted. Start by preparing the standard calcium solution and titration apparatus. No additional laboratory equipment is required beyond the standard titration glassware. The indicator and buffer solutions need to be prepared before titration. Because the wine-red to pale blue endpoint is challenging to



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Project Number: SCH018

Grade: 12

Title: A Qualitative Analysis of Drinking Water

Abstract: Five water samples were obtained from local drinking water sources. Each sample was tested for the presence of each of the following: ammonia, nitrates, phosphates, pH, sulfides, silica, iron, copper, chromium, and cyanide. A specific reagent was used for each test. The results were collated and graphed. A comparative analysis of the data was performed.

Project Number: SCH019

Grade: 9

Title: Juice It Up

Abstract: Citrus cleaners are claimed by some to be effective in removing stains from clothes. This project examines the effectiveness of several citrus juices on the removal of grape juice stains on different kinds of cloth. The tests determined that the juice of an orange was the most effective in stain removal with cotton fabrics, but comparatively ineffective on polyesters. No citrus juices

Project Number: SCH020

Grade: 9

Title: Single Displacement React. of Cupric Sulfate Aq. Solution w/ Fe Powder

Abstract: To find the most effective way to prepare copper from iron powder in various  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  solutions, approximately 0.02 moles of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  crystals were added to each solution: distilled, tap, HCl,  $\text{NH}_4\text{OH}$ , and NaCl waters. Approximately 0.02 moles of iron powder were added into each solution to carry out single displacement reaction for two minutes. Some copper solids were precipitated in some solutions. Results show that the reaction was complete in the HCl solution (most effective way), but did not occur in the  $\text{NH}_4\text{OH}$  solution. The reaction time was too short for the other three solutions. The poster shows the details.

Project Number: SCH021

Grade: 11

Title: Heavy Metal Calcium Supplements

Abstract: a composite analysis of lead in OTC calcium supplements

Project Number: SCH022

Grade: 11

Title: An Athlete's Supply

Abstract: Complex carbohydrates are one of the best sources of energy for athletes. Dietary starch and stored glycogen are examples of complex carbohydrates. The purpose of this experiment was to test for carbohydrates in a regular muffin and a reduced fat muffin. Different methods were used for testing the carbohydrate content. First, a refractometer was used to test sugar content. Benedict's Test was used to test for reducing sugars. A titration was used to test for dietary starch. Finally, both muffins were digested and retested for sugars.

Project Number: SCH023

Grade: 12

Title: Does It Matter?

Abstract:



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the bloodstream and would not work as rapidly. The fastest dissolving tablet, of the three, was the Advil.

Project Number: SCH030 Grade: 12

Title: Material Science: Adhesive Testing

Abstract: Glues are one of the most commonly used household items. Each glue may be used in a variety of ways. This project was an attempt to determine which glue formed the strongest bond and how that particular glue's strength was influenced by the nature of its chemical properties. Three types of glues were used: Elmer's, Trifix, and Contact Cement. It was determined that there is a significant difference ( $p < 0.0001$ ) between the strengths of these glues. Future work would test optimal curing time for these glues as well as to test other types of glues.

Project Number: SCH031 Grade: 12

Title: Tissue's Reaction to pH Changes

Abstract: Living tissues try to maintain a neutral 7.0 pH to maintain their health. This project investigates the response of potato and liver homogenates to exposure to acidic and basic solutions. The test results show that, although their pH was affected, the tissues' active enzymes worked to try to reestablish the tissues original pH level.

Project Number: SCH032 Grade: 12

Title: Crystals in the Abstract

Abstract:

Project Number: SCH033 Grade: 12

Title: Non-linear Effects on Crystal's Coef. of Thermal Expansion

Abstract: The purpose of this research is to explore the cause of non-linearity between the coefficient of thermal expansion,  $\alpha$ , and temperature. The potential energy function  $U(r_0+d)$  is expanded to include non-linear terms in its Taylor Series expansion. Using statistical mechanics, an atom's average displacement from its equilibrium position (denoted by  $d$ ) within the crystal's lattice could be calculated, from which the temperature-dependence of the coefficient of thermal expansion can be derived. The calculated results have shown that the particles' vibrations are indeed the cause for the non-linearity between  $\alpha$  and temperature, since the expressions for  $\alpha$  include temperature,  $T$ , as the variable. Moreover, as the Taylor Series expand to include more terms, the approximated function for the coefficient of thermal expansion also increases in accuracy. Given specific parameters, the functions can be graphed to model empirical data.

Project Number: SCH034 Grade: 11

Title: What effects do various chemicals/solutions have on metals?

Abstract: The purpose of this research is to measure the effects of chemicals on metals.

Project Number: SCH035 Grade: 10

Title: "Finding the Physical Properties of Butter, Margarine, and Oil Using DSC"

Abstract: Using a MicroCal MC-2 Differential Scanning Calorimeter, seven materials (5 margarines, canola oil, and butter) were scanned from 0 deg C to 100 deg C to find the

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enthalpies of phase transitions/melting points of each material. The results were then compared, and correlations were observed between melting behavior and ingredients/Nutrition Facts of each material. Graphs were created to represent the data.

Project Number: SCH036

Grade: 12

Title: Oligodynamic Action

Abstract: I tested the effect of heavy metal chlorides on the growth of *Micrococcus luteus*. I prepared concentrations of 1%, 2.5%, 5%, and 7% and applied them to sterile disks inoculated with the bacterium incubated at 37 degrees celcius and observed the zones of inhibition.



## SENIOR DIVISION – COMPUTER SCIENCE/MATH

Project Number: SCM006

Grade: 10

Title: Programming Trigonometric Functions

Abstract: With current calculators and C++, inverse functions produce one answer that often does not include the answer the student is looking for. In addition, the functions are often limited to sine, cosine, tangent, and their inverses. To eliminate this problem I decided to create an all-purpose trigonometric program to be added into other programs. I did this with C++ using just Taylor series and the inverse tangent function after mathematically deriving solutions. This proved successful. To better test this I created client software that demonstrates the program's use. Extensions include more client programs and the same programming on handheld calculators.

Project Number: SCM007

Grade: 11

Title: Maze Madness

Abstract: The purpose of this experiment is to better understand the concept of math in mazes. The work I performed will help me better understand the concept of mazes and the mathematics involved in mazes. I will also learn how to use algorithms for solving mazes. To complete this project I researched information about the history of mazes, types of mazes, and algorithms for mazes. I created five mazes and tested four algorithms. I found an algorithm for getting out of 2-dimensional maze.

Project Number: SCM008

Grade: 11

Title: Game of Fire

Abstract: This project consists of developing a computer program that charts the movement of a forest fire. The program uses a set of rules to determine where a fire spreads using an entered forest and wind velocity. It was discovered that when wind speeds are high the fire spreads only in the direction of the wind. When wind speeds are lower, the fire spreads in all directions. This program could be used in predicting where to send firefighters in case of a forest fire and in planning a sequence of trees that has the least probability of being destroyed by fire.

Project Number: SCM009

Grade: 12

Title: Development of Computer Algorithms for Simple Games

Abstract: The purpose of this project was to create self-improving algorithms capable of playing several simple games. Each time it played, the algorithm would use the results of previous games to determine the best move. The self-improving algorithm proved to be better than a constant algorithm in both games tested. The success of the algorithm is to be tested in the future on more complicated games.

Project Number: SCM010

Grade: 12

Title: Is What's Left Right?

Abstract: Most accepted tests for randomness involve collecting data about a random number generator (RNG) and performing a chi-square test, which is unnecessary. A true RNG with N distinct, discrete, and equally likely outcomes should generate many outcomes in few trials, with the last few requiring many trials. From this, the random distribution test is developed, where the number of outcomes and the number of trials needed for each to occur at least once produces the random distribution coefficient, which describes the RNG. This experiment develops the RDT and analyzes it as a test for randomness.

## SENIOR DIVISION – COMPUTER SCIENCE/MATH

Project Number: SCM011

Grade: 12

Title: (Cellular Automata) ^ 3

Abstract: A cellular automaton is a cell whose state depends on its neighbors. This work extends the common study of two-dimensional cellular automata into the third dimension. A program is designed that will create a three dimensional environment. The user inputs a pattern and according to the rules of the game of Life, changes are made. Eventually the program reaches stasis. The results show that some two-dimensional patterns remain, while new patterns also emerge in the third dimension. Future work includes increasing the size of the environment.

Project Number: SCM013

Grade: 10

Title: Orbital Simulation

Abstract:

Project Number: SCM014

Grade: 10

Title: Simulating Solar Systems

Abstract: The objective of the project was to design and write a program to simulate solar systems in three dimensions and draw them on the screen. The program should be able to use dynamically-allocated memory and be object-oriented.

Project Number: SCM015

Grade: 12

Title: Physical System Visualization

Abstract: This program uses Visual Basic 6 and the Wild Tangent Active-X component to model a variety of physical systems. In the program, the user selects particles of various charge, mass, restitution, etc. to interact within a confined space. The motion of the particles is realized through continuous position calculation based on principle concepts of physics, such as kinetics and electromagnetism, which converge into complex interactions. This program's purpose is to give the user an empirical understanding of these physical behaviors.

Project Number: SCM016

Grade: 9

Title: Exploration of Factorization

Abstract: Explore and summarize methods of factorization through experiences and observation. There will be corresponding shortcut methods for particular polynomials and certain good optional methods for generalized polynomials.

Project Number: SCM017

Grade: 10

Title: On Partitions of Test Cover Problems

Abstract:

## SENIOR DIVISION – ENGINEERING/ROBOTICS

Project Number: SER001 Grade: 11

Title: A Novel Source of Energy: Wind-Induced Vibrations

Abstract: This project investigated the feasibility of the novel idea of harvesting wind energy from mechanical vibrations, and compared the expected efficiency of such power generators with modern wind turbines. Experiments with rubber bands and piezoelectric material showed that mechanical vibrations nearing resonance have the potential to harvest an amount of energy that exceeds the theoretical efficiency (2/3) of the ideal wind turbine, as proposed by Betz' Law. The potential power was linearly proportional to wind speed, and the only limiting factors were the capacity of the piezoelectric material and the relative size of the vibrating filament.

Project Number: SER002 Grade: 11

Title: Thermal Contact Resistance

Abstract: The purpose was to determine if thermal contact resistance between two metal blocks depends on the blocks' material properties, pressure between them or both. Pairs of different metal blocks held under pressure were kept on a hot plate equipped with temperature control. Contact resistance between each pair of blocks was calculated at different temperatures and contact pressure. Results show that: the contact resistance depends on the material properties, contact pressure, and temperature; and pressure is more effective than the material properties. Future work with other materials, at different pressures and temperature is recommended.

Project Number: SER003 Grade: 11

Title: Now Isn't That Refreshing

Abstract:

Project Number: SER004 Grade: 9

Title: A Shocking Breeze

Abstract:

Project Number: SER005 Grade: 9

Title: BRASS Phase II: Basic Robotic Air-Ship System and Communications

Abstract: My project's goal is to build an aerial robot that uses a compass and ranging sensors to fly an effective and precise search pattern to locate a certain object. The aerial robot would, upon finding the object, relay the location to a land based robot which will identify the shortest route to the object and then go to the object. The robots will be a helium filled Mylar blimp with an aluminum frame and a three wheeled "car". Both of these will be controlled by Basic Stamp 2sx microcontrollers programmed in the PBasic programming language on Next Step boards.

Project Number: SER006 Grade: 12

Title: Electrostatic Acceleration

Abstract: Ion propulsion is one possible method of providing motive power for future long-term space missions. This project examines the effects of a series of variables on the effectiveness of such a means of propulsion from a theoretical standpoint. The study examines how current density, beam power usage, thrust, and propellant flow rate affect its operation.

## SENIOR DIVISION – ENGINEERING/ROBOTICS

Project Number: SER007 Grade: 12

Title: Solar Powered Arial Photography

Abstract: solar, Wireless, less power usage, electric airplane

Project Number: SER008 Grade: 12

Title: What? You Built a Jet Engine?

Abstract:

Project Number: SER009 Grade: 11

Title: Airplanes!

Abstract:

Project Number: SER010 Grade: 12

Title: How Safe are our Buildings?

Abstract: The purpose of my experiment was to determine which type of beam, steel reinforced concrete beam or FRP reinforced concrete beam, is stronger. I tested the beams using a loading frame. I recorded the force on the beam and the deflection of the beam. Also, I heated three beams of each to 50 degrees and 95 degrees and tested those. In all of the trials, the FRP reinforced beams held more force than the steel reinforced beams.

Project Number: SER011 Grade: 10

Title: Rating Bridges

Abstract: Bridges are inspected every two years to determine structural deterioration. A formula called the rating factor is used to calculate a bridges new weight capacity with these deficiencies. When not current with strict government standards, it is necessary a sign be posted informing motorists of the new weight capacity. This projects objective is to examine the maximum deterioration loss a member on a bridge can handle before it need to be posted.

Project Number: SER012 Grade: 11

Title: Chip Off the Old Block

Abstract: A computer processor water-cooling system was developed using many recycled parts. Research was via articles and textbooks. "Junkyards" were searched for materials; companies donated equipment. Water-cooling devices built were dehumidifier radiator, MGB heatercore, PVC evaporator, refrigerated radiator, and refrigerated heatercore. The control device was a fan/heatsink combination. Processor temperatures were monitored under "idle" and "full load" conditions. Results were compared using a coefficient formula for simplification. The "idle" coefficients were: refrigerated radiator, 10.6; refrigerated heatercore, 10.8; radiator, 11.4; heatercore, 11.6; evaporator, 11.6; and control, 12.7. The most effective device was the refrigerated radiator, followed by the refrigerated heatercore, the non-refrigerated radiator, the evaporator, the non-refrigerated heatercore, and the fan/heatsink device.

## SENIOR DIVISION – ENGINEERING/ROBOTICS

Project Number: SER013

Grade: 10

Title: Dam Terrorism

Abstract:

Project Number: SER014

Grade: 9

Title: Creating an Artificial Robotic Ant

Abstract: The overall purpose of my project was to design and test a robotic "ant" that can mimic an activity that a real ant would participate in. The movement that I decided to attempt to recreate was the lifting motion. As you may know the ant has developed a reputation for being able to lift many times it's own weight. My testing will prove whether it is possible for me to construct a robot that can carry out this task.

Project Number: SER015

Grade: 11

Title: Robotics

Abstract:



## SENIOR DIVISION – EARTH/SPACE/ENVIRONMENT

Project Number: SES006 Grade: 9

Title: Effects of Aeration on Pondwater

Abstract: This project tests the hypothesis that the quality of pond water will improve with aeration. An experiment was set up to determine the quantitative effects of aeration on dissolved oxygen, nitrite, and ammonia contents, along with visibility. The test results compare the aerated water to a control of non-aerated pondwater.

Project Number: SES007 Grade: 12

Title: It's A Sticky Situation

Abstract:

Project Number: SES008 Grade: 11

Title: Decomposition of Azo Dyes With TAML Activated Peroxide

Abstract: The purpose of this experiment is to investigate the effectiveness of TAML® activated peroxide in the degradation of the azo dyes Acid Red 1 and Acid Yellow 23. To complete this experiment one must first create two solutions to test: One containing Acid Red 1, and the other containing Acid Yellow 23. Then, using a fixed amount of hydrogen peroxide, vary the amount of TAML® activator added to each solution. Run a control using no TAML®. Measure the change in color of the solution.

Project Number: SES009 Grade: 11

Title: Synergistic Effect of Pollutants

Abstract:

Project Number: SES010 Grade: 11

Title: Where have all the herps gone?

Abstract: My project is on how reptile populations in Pa are decreasing through the years. I am seeing how this is affected by the growth of the human population in Pennsylvania. Then I will draw a conclusion on if the herp population is decreasing because of human population is increasing.

Project Number: SES011 Grade: 12

Title: Exploring the Fuel Cell

Abstract: This study is to determine which electrolyte solution is most suitable for maintaining the longest fuel cell run-time. Thoroughly understanding this technology may enable man to find alternative methods of storing energy. Briefly, 1 molar solutions of the various salts were diluted with 90ml distilled H<sub>2</sub>O and poured into a beaker. Allowed solutions to sit. Place power cables on the generator and at end of the graphite rods. Turn the power generator on, run and observe for 5 minutes. Attach cables to motorized fan and record the run time. Longer run times suggest an efficient storage mechanism. The mixture of electrolytes was more effective than salt solutions, individually, but the zinc was overwhelmingly more effective than them all.

## SENIOR DIVISION – EARTH/SPACE/ENVIRONMENT

Project Number: SES012

Grade: 10

Title: Which type of turbine is the most efficient when producing electricity?

Abstract: The problem that is addressed is whether an efficient wind turbine can be produced by increasing blade pitch and increasing hub precone diameter. Windmills are vital to our environment when considering the excess usage of our natural resources. Finding an efficient wind turbine as an alternative power source will help serve this immense predicament that the world is in today.

Project Number: SES013

Grade: 11

Title: Mr. Sandman

Abstract:

Project Number: SES014

Grade: 9

Title: Fertilizer Runoff vs N2 Cycle

Abstract:

Project Number: SES015

Grade: 11

Title: Playground Pollutants

Abstract: The air we breathe should be safe and healthy. Research suggests toxic air pollutants are a health threat in urban areas, and children, the elderly, and people with respiratory ailments are at risk. My work was to determine if air pollutants are present at local playgrounds and if the amount exceeded EPA limits. Using a portable air monitor, air samples were taken from local playgrounds located near and away traffic areas. Pollutants were found in all playgrounds tested and NO<sub>2</sub> and SO<sub>2</sub> exceeded EPA limits. Repeating research in other seasons is planned for future evaluations.

Project Number: SES016

Grade: 9

Title: Effect of Allelo-Chemicals on Seeds

Abstract: The purpose of this project was to find out which part of the hemlock tree held the greatest amount of allelopathic effect on the germination of rye grass seeds and the radicle growth of radish seeds. I made extracts from four parts of the tree, (green needles, brown needles, pine cones, and bark), then watered my seeds with them. I hypothesized that the green needle extract would have the greatest effect, and this was supported by my data. To further this experiment, I would test different parts of the tree (root and core sample), then compare this to my results.

Project Number: SES017

Grade: 12

Title: L.U.S.T.S.

Abstract:

## SENIOR DIVISION – EARTH/SPACE/ENVIRONMENT

Project Number: SES018

Grade: 12

Title: Amateur Radio Astronomy

Abstract: The purpose of this project is to further knowledge of radio astronomy. The project was completed by downloading data packets from the EPN pulsar database. Then the data was normalized and input into MATLAB mathematical analysis software. The results were analyzed on graphs and conclusions were formed.

Project Number: SES019

Grade: 9

Title: Pesticides and Soil Bacteria

Abstract: I investigated the effect of varying concentrations of the following pesticides on the growth and development of the soil bacterium *Rhizobium leguminosarum*: Diazinon, Thuricide, Methoxychlor, and Rotenone. I prepared concentrations of .1, .25, .5, 1.0, and 5.0% and exposed the bacterium to these concentrations.

Project Number: SES020

Grade: 11

Title: Does the effect of acid rain on crops depend on soil factors?

Abstract: The purpose of the project is to look at how soil factors affect plants grown in "acid rain". Hypothesis: acid rain slows down the growing process. Independent variables: amount of acid rain and soil factors. Dependent variables: height of plants, number of leaves per plant, color and general appearance. Constants: are the amount of time under light, amount of misting, and watering plants. Procedure: plant radishes, separate them into four groups: half misted with water, half with acid rain; half with fertilizer and half without fertilizer. Records and measurements: watering, misting, heights of plants, number of leaves per plant.

Project Number: SES021

Grade: 11

Title: Don't drink the water!

Abstract: I tested a polluted stream for acid mine drainage pollution then designed a passive water treatment system to treat it.

Project Number: SES022

Grade: 10

Title: A Grave Mistake

Abstract:

Project Number: SES023

Grade: 10

Title: pH and Biodegradation

Abstract: I grew a culture of a *Penicillium* species and made test oil spill setups with crude oil; I inoculated the spills and altered their pHs with buffers from 4 to 10. After a two week period, I extracted and purified the oil samples and after dissolving them in petroleum ether tested each sample's percent transmittance with a spectrophotometer unit for a wavelength range of 340nm to 800nm.

## SENIOR DIVISION – MEDICINE/HEALTH/MICROBIOLOGY

Project Number: SMH001

Grade: 10

Title: Natural Cancer Suppressors

Abstract: Resveratrol and Lutein are antioxidants thought to play a major role in both cancer prevention and therapy. Resveratrol is thought to have a link to the French Paradox. Lutein is thought to help maintain the health of the eyes, heart, and the breast and cervix in women. To see if Resveratrol and Lutein have an effect on adenocarcinoma cells, 6 well cell culture plates were seeded at  $5 \times 10^4$  cells per well. Then, the cells were treated with Resveratrol and Lutein (100mM dose). All cells treated with Resveratrol and Lutein demonstrated a decrease in cell proliferation. Lutein appears to have a greater effect on the growth rate of the cells, but Resveratrol seems to have a great one. Overall, the results supported the fact that Resveratrol and Lutein do have an effect on adenocarcinoma cells. Future work will include, Resveratrol and Lutein's effects on other types of normal and cancerous breast cells.

Project Number: SMH002

Grade: 9

Title: From Fat to Bone

Abstract: To explore a new source of stem cells for autologous bone tissue engineering, rabbit fat tissues were used to isolate stem cells. The isolated cells were then cultured with an osteogenic media and the bone inducing growth factor, BMP2, and tested for bone formation. The results showed that the isolated stem cells had osteogenic capacity through increased alkaline phosphatase activity and mineralized extracellular matrix production. This experiment indicates that the stem cells from fat tissue could be a new cell resource for bone tissue engineering. Future work will be focused on the stem cell purification by using the cell-cloning method.

Project Number: SMH003

Grade: 9

Title: Hawthorn Berries and Heart Rate

Abstract: The Hawthorn bush is an indigenous plant with berry blooms that are composed of the bioflavonoid, Vitamin P (rutin trihydrate). There is little research on the effect of Vitamin P on the heart, hence this research. This investigation, "The Effects of Hawthorn Berries (Vitamin P) on the Heart Rate of Daphnia", concluded that Vitamin P lowers the daphnia's heart rate.

Project Number: SMH004

Grade: 9

Title: Antioxidants and Cancer Growth

Abstract: Resveratrol an antioxidant produced in the skin of grapes has positive cancer effects in inhibiting cell growth and impede lung cancer promotion. Sulforaphane was identified in broccoli sprouts by scientists at Johns Hopkins. Sulforaphane also has positive cancer effects in inhibiting lung cancer growth by triggering cancer fighting enzymes. Seeded cells were placed into 6-well plate dishes and grown in incubation. Then treated with sulforaphane, resveratrol and given the food supplement, C-DMEM. Based on data it was concluded that the growth rate of A-549 cells exposed to sulforaphane was lower than those A-549 exposed resveratrol.

Project Number: SMH005

Grade: 9

Title: Caffeine Versus Cancer Cells

Abstract: The purpose of this investigation was to compare effects of caffeine on growth of normal cells (IEC cells) with cancer-like cells (IEC-TAG14 cells). I hypothesized that caffeine would preferentially kill cancer cells, since caffeine is known to inhibit DNA repair. I grew each



## SENIOR DIVISION – MEDICINE/HEALTH/MICROBIOLOGY

normal level of sixty to one twenty ml/dl, however, male patients had more stable and predictable blood glucose levels.

Project Number: SMH011 Grade: 9

Title: Fight the Common Cold with Zinc

Abstract: Zinc throat lozenges are used by many people to treat the symptoms of the common cold. This project tries to determine if various doses of zinc can actually inhibit a lamda virus infection of E.coli cells. Results of the testing indicate that E.coli cells incubated with 15g/ml of zinc had a 55% reduction in lamda virus infection.

Project Number: SMH012 Grade: 11

Title: Effects Of A Black Light On Bacteria

Abstract:

Project Number: SMH013 Grade: 11

Title: Colloidal Silver - Antibacterial Agent?

Abstract:

Project Number: SMH014 Grade: 12

Title: Can Herbs Prevent E. coli UTI's?

Abstract: The purpose of this experiment was to determine if herbal supplements such as Cranberry, Echinacea, and Goldenseal eliminate the growth of E. coli, the most common bacteria causing Urinary Tract Infections. The results of this project stated that none of the herbal supplements worked and the control grew less colonies than the test materials. Future research involves using actual urine samples instead of sterile water.

Project Number: SMH015 Grade: 9

Title: Medications In The G.I. Lab

Abstract: The purpose of this experiment was to see if there is any relationship between the medications that are prescribed for diagnoses found during gastroscopys and colonoscopys and the medications performance. For example, if medication A was the most prescribed medication to treat hemorrhoids, then does that mean that medication A allows the least amount of reoccurring symptoms compared to the other medications that treat hemorrhoids. To carry out this experiment I collected data from a G.I. lab. I found out how often each medication was prescribed for each diagnosis. I also found the percent that the medication allowed reoccurring symptoms. In the end, most of the time the most prescribed medications allowed the least amount of reoccurring symptoms.

Project Number: SMH016 Grade: 12

Title: Dirty Money

Abstract: I cultured the hands of people after they touched a dollar bill on nutrient agar plates. I had growth of fungi, gram positive and gram negative bacteria on many of the plates.

## SENIOR DIVISION – MEDICINE/HEALTH/MICROBIOLOGY

Project Number: SMH017 Grade: 11

Title: The Efficacy of Natures Biotics Pills

Abstract:

Project Number: SMH018 Grade: 12

Title: Can Herbs and Spices Hinder Growth of E. Coli?

Abstract: The purpose of this experiment is to determine whether herbs/spices inhibit bacterial growth. It was hypothesized that herbs/spices will hinder growth of bacteria. The Independent Variable is the herb/spice. The Dependent Variable is the growth of the bacteria. The procedure: Dilute one teaspoon of each herb/spice into distilled water. Streak on agar. Add two drops of E.coli and incubate overnight. Record any changes in the growth of the bacteria. It was found that some herbs/spices reduce the amount of growth of bacterium. For instance sage inhibited bacteria growth but nutmeg did not.

Project Number: SMH019 Grade: 12

Title: Breaking Bone in the Name of Science

Abstract: To determine the best bone substitute and see if by adding PMMA or PCL to yeast cells if they would proliferate, die, or grow. Add yeast to PMMA and PCL bone scaffolds indirectly and directly, and to PMMA and PCL. It was determined that both chemicals produced relatively the same data and one was not a significantly better chemical to use.

Project Number: SMH020 Grade: 9

Title: Peptide LSA-5 vs Penicillin

Abstract: The engineered antimicrobial peptide LSA-5 is more potent than Penicillin against the growth of Staphylococcus aureus.

Project Number: SMH021 Grade: 11

Title: The Effectiveness of Hip Anthroplasty

Abstract: Hip implants are getting more common. This project examines hospital medical records of testing on two different types of implants to determine which type implant resulted in less pain, more rapid recovery, a better gait, and an overall higher Harris Hip Score. The forms before and after surgery were examined to obtain the data.

Project Number: SMH022 Grade: 11

Title: RNA Interference with Gene Expression

Abstract: The purpose of completing this experiment was to interfere with hnRNP F gene expression via siRNA (small interfering RNA) technology. By supressing the expression of the hnRNP F gene, a weak, proximal polyA site is chosen, producing Immunoglobulin secretion, as opposed to the distal polyA site, which produces membrane-bound Immunoglobulin.



## SENIOR DIVISION – MEDICINE/HEALTH/MICROBIOLOGY

Project Number: SMH028

Grade: 12

Title: Inactivation of E.Coli by Pulsed Light

Abstract: The purpose of this experiment was to test the effect of Pulsed UV-Light on pasteurized apple cider contaminated with E. coli O157:H7. The hypothesis is that the longer the apple cider was treated by pulsed UV light, the lower would be the count of colonies.

Independent variable was the amount of exposure to UV-light. Dependent variable was the number of colonies. Procedure: place the contaminated apple cider into the Pulsed UV System for treatment at the varying times. The diluted samples were incubated for 24-48 hours. After incubation, colonies were counted. The results of this experiment supported the hypothesis.

Project Number: SMH029

Grade: 9

Title: The Effect of Temperature on the Transformation of E. coli

Abstract:

Project Number: SMH030

Grade: 7

Title: Which Headache Medication Dissolves the Quickest?

Abstract: The goal of this project was to determine which medications dissolve the quickest, therefore entering the bloodstream and relieving a common headache. 100 mL of hydrochloric acid was used with a pH of 2 and placed in 12 beakers. Temperature was kept between 36-38 degrees C. A magnetic spinner was used and timing was recorded with each medication.

Project Number: SMH031

Grade: 10

Title: Inhibition of Phage Infectivity

Abstract: The focus of this study was to assess the ability of phages to retain their structural and functional integrity (their infectivity) in various environments for two periods of exposure. A T2 phage model was employed to represent the viral realm. Treated phages were mixed with host cells (E. coli) and top agar. This mixture was plated and the resulting plaques were counted. Sunlight treatments were similar to control. Pine Quat treatments produced more plaques than control and Clorox less. The chemical agents and the passage of time significantly altered phage infectivity; sunlight did not.

Project Number: SMH032

Grade: 12

Title:

Abstract: In doing this experiment, I hope to determine which of two methods of bypass surgery (on pump vs. off pump) is more conducive to patients based upon their risk factors. In order to make this determination, I observed two hundred patients undergoing bypass surgery using both methods and compiled data on their co-morbidities as well as their post-operative success and recovery. I was able to find correlations that suggest very straightforward results. My conclusions are reflective of my initial hypothesis that indicates for the clear majority of patients, off pump bypass surgery is clearly beneficial.

## SENIOR DIVISION – MEDICINE/HEALTH/MICROBIOLOGY

Project Number: SMH033 Grade: 9

Title: Sunscreens - Does SPF Matter?

Abstract: My project included an investigation of the effectiveness of sunscreens in preventing UV light from penetrating cells. I used sunscreens with spf's of 4, 15, 30, and 45 to determine whether an increase in the spf value beyond 15 was a significant factor in preventing UV light from affecting a strain of yeast that is particularly sensitive to UV radiation.

Project Number: SMH034 Grade: 9

Title: Bacteria Growth on a Water Fountain

Abstract:

Project Number: SMH035 Grade: 9

Title: Effect of Ca<sup>2+</sup> on Phage Infectivity

Abstract: Bacteriophages (phages) are viruses that infect bacteria. Standard protocols for phage infection specify addition of Ca<sup>2+</sup> ions when phages are introduced. To investigate the effects of the Ca<sup>2+</sup>, two phages were isolated from the environment, purified, and grown in quantity, using standard protocols. Plates of *Mycobacterium smegmatis* (smeg) were prepared and phages were suspended in buffer. Ca<sup>2+</sup> concentrations varied across different plates and suspensions, phage concentrations in each buffer were also varied. The plates were then spotted and checked for plaques. One phage was found to be more infectious with increasing Ca<sup>2+</sup>; the other was not sensitive to this variable.

Project Number: SMH036 Grade: 11

Title: Rave Rats

Abstract: Methylenedioxymethamphetamine (MDMA) is a popular rave drug throughout the world. MDMA exerts long-term neurotoxic effects of 5-HT (serotonin) neurons. Heavy MDMA users exhibit mood disorders such as depression. With the large number of individuals taking MDMA, one would think that there would be a widespread epidemic of depression, but there isn't. Therefore there must be another factor linking MDMA to depression. 24 rats were used in my research. I investigated the relationship, if any, between MDMA and c-fos expression. I determined that MDMA produced a dose-dependent effect on c-fos expression.

Project Number: SMH037 Grade: 9

Title: Bacteriophage Host Specificity

Abstract:

Project Number: SMH038 Grade: 9

Title: Effect of Antibacterial Soap on E Coli Bacteria

Abstract: *Escherichia coli*, or E. coli bacteria is one of millions of strains of bacteria that can be easily spread and cause illness. There are more than 500 different types of E. coli, some of which cause sickness and others that are harmless and can live in the human body. I tested the effect of antibacterial soap, regular soap, and no soap on the growth of E. coli bacteria. Through this experiment, I learned the bacteria grown with antibacterial soap produced fewer colonies than those of the other two groups. The bacteria grown with no soap added to their environment



## SENIOR DIVISION – MEDICINE/HEALTH/MICROBIOLOGY

Project Number: SMH045

Grade: 9

Title: Dental Safe Sugar substitutes

Abstract: The experiment I am conducting is the ability of Oral Streptococci bacteria to utilize artificial sweeteners. What I am trying to figure out is if certain artificial sweeteners cause the bacteria to produce Lactic Acid. If my experiment proves that they do produce Lactic Acid, then the assumption that the artificial sweeteners do not contribute to the formation of caries is a false statement.

Project Number: SMH046

Grade: 12

Title: A Brighter Smile

Abstract: Various products are available for home use in attempting to whiten teeth. This project compared the relative effectiveness of four such products to ordinary brushing on teeth extracted by a dentist. The teeth were compared to a standard whitening guide after 7 and 10 days of treatment. The results varied from one shade of difference to a seven shade difference.

Project Number: SMH047

Grade: 10

Title: Examination of Indian Homeopathic Remedies

Abstract: The antibacterial effects of turmeric, red chili powder, cinnamon, and honey, as described in the Hindu religious texts, were tested over time using *E. coli* and *B. cereus*. It was hypothesized that capsaicin-rich red chili powder would have antibacterial properties. Well in nutrient agar plates were filled with solutions of the four foods, and then inoculated with the bacteria. The radii of the inhibition zones were measured every twelve hours for forty-eight hours. data was subjected to chi-square analysis, showing that turmeric had a significant antibacterial effect, followed by chili powder. Cinnamon had no effect, while honey aided growth of bacteria.

Project Number: SMH048

Grade: 11

Title: Antioxidants in Different Teas

Abstract: Tea has been hailed for hundreds of years as an excellent source of antioxidants. This experiment was conducted to determine which of three different types of tea contains the highest amount of antioxidants by testing the polyphenolic content of the teas using the Folin-Ciocalteu Reaction and comparing results to a Gallic acid standard curve. It was found that imported green tea had the highest polyphenolic content. It was concluded that unfermented teas like green teas contain more phenols than fermented ones, such as black teas. Future work may include different methods of phenolic extraction from the tea.

Project Number: SMH049

Grade: 11

Title: Herbal soaps and the growth of *E. coli*

Abstract: The purpose of this experiment was to determine if herbs reduce the growth of *E. coli* better in the natural state, or when they are added to soaps. Independent variable was the herbs: prune and cinnamon. Dependent variable was the zone of inhibition. Procedure: Make 5 different agar plates, two for the natural herbs, two for the herbal soaps, and one for the control, which was distilled water. Spread the bacteria onto each labeled plate, incubate the plates for two trials and record the zone of inhibition. Results: natural herbs inhibited the bacteria growth better than the herbal soaps.





## SENIOR DIVISION – PHYSICS

Adding salt to the water lowered the resistance and increased the flow of electricity, however, there was a point where continuing to add salt did not cause the resistance to fall. I now better understand why I have to get out of the swimming pool when lighting is visible.

Project Number: SPH006

Grade: 12

Title: Do Added Products in Concrete Beams Affect Their Customary Support and Deflection?

Abstract: This experiment was used to determine whether adding Styrofoam, straw, or an aircraft cable to a concrete mix would affect a beam's performance in strength and deflection. Admixtures were placed in a concrete mix and tested for strength and deflection. When compared against the control, it was determined that the aircraft cable beams could support the most weight, and all three altered beams had more deflection. It can be concluded that only certain substances added to a concrete mix give more strength to a beam, and deflection is greater when admixtures are present. To further the project, different beam shapes could be tested with different admixtures.

Project Number: SPH007

Grade: 11

Title: The Frugal Fuel Cell

Abstract: I constructed a hydrogen fuel out of cheaper materials. I tested the fuel cell and found that it could produce more voltage due to hydrogen.

Project Number: SPH008

Grade: 11

Title: No More Tears from Tears

Abstract: This experiment was conducted to determine which factors affected the tear strength of large plastic bags commonly used in the kitchen. Did cost, brand name, or simple thickness govern the overall strength of the bags? The results showed that brand name was not the major factor; thickness was.

Project Number: SPH009

Grade: 9

Title: Forever Moving

Abstract: My project defies almost every law and theory of physics. In my science fair project I will attempt to create a perpetual moving machine. I know this sounds impossible but I have a few ideas on how to build a "perpetual-motion machine of the second kind". At the very least I wish to come up with a theory that will argue against the first law of thermodynamics. My project will combine classic physics with quantum physics.

Project Number: SPH010

Grade: 12

Title: A Sticky Disc. - Thermal Convection

Abstract: It is hard to imagine that the Earth's plates move. I chose to test the extent of how thermal energy, which creates motion in a fluid, and the viscosity of a fluid, relate to the convection that is inferred for the Earth's mantle and the plate tectonic movements. An apparatus representing the molten lava that the plates rest on was constructed. The high viscosity of the vegetable oil produced the greatest movement of the balsa wood. However, the wood did not move without heat. The heat of a fluid has the greatest impact on the movement of an object.





