81st Pittsburgh Regional Science & Engineering Fair

Junior Division

Student Project Abstracts

March 25, 2020

Notes to Judges

Students prepare Abstracts limited to 100 words that include the following:

- Purpose of the experiment
- Procedures used
- Data
- Conclusions
- Possible research applications
- Minimal reference to previous work
- For continuation projects, the abstract should focus on work done since the last PRSEF
- Should not include: a) acknowledgments, or b) work or procedures done by the mentor

Many students continue their research after the Abstract is submitted, and therefore the Abstract may not fully represent the Project.

Abstracts are available to the Judges prior to the Science Fair as an aid in pre-screening the Projects. Judging is to be based on the actual Project as presented by the student.

Project Numbers are assigned as XYYABC

- X: J-Junior Division (6th grade)
- YY: Category Name
    - BC - Behavioral and Consumer Sciences
    - BI - Biological Sciences
    - CH - Chemistry
    - PE - Physical Sciences & Engineering
- ABC: Project number
    - 1xx or 2xx - Individual student projects
    - 3xx - Team projects (2 or 3 students)

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Behavioral and Consumer Sciences (JBC)

JBC100: Anyone need fresh cilantro?

Keeping produce fresh in the refrigerator is a common problem that we encounter everyday. If we can find a method to keep fruits and veggies longer in the refrigerator while securing the nutrients; this will save a lot of money and time. To this end; I tested different methods to keep produce fresh using cilantro as the source. I created four different environments and studied the time which it takes to rotten the cilantro in each environment. The experiment was conducted for 8 weeks with duplicated test. I placed the first bunch of cilantro in a normal plastic container. The second bunch was placed in a similar container but stems were dipped in water. The third bunch was placed in a container with 100% relative humidity ; but it was not in contact with water. The fourth bunch was placed in a green container (currently the best available containers to keep produce fresh); which was purchased online. After 4 weeks; the cilantro which had no moisture; started changing color to yellow and died. The bunch that was placed in 100% relative humidity survived until 7 weeks fresh. The cilantro bunch that the stems were placed in water survived almost 6 weeks. It can be concluded that if can create a cold high relative humidity environment; produce can last longer saving time and money.

JBC101: The Effect of Natural Vs. Chemical Cleaners on E. coli Inhibition

The purpose of this project was to compare the effectiveness of natural/homemade kitchen cleaners vs. commercial chemical cleaners. It was predicted that there would be no difference in effectiveness of the cleaners. To test this hypothesis; E. coli was cultured in a nutrient broth and incubated for 48 hours at 37 degrees C. The E. coli culture was separated into test tubes and placed under one of the following conditions: nutrient broth only (control); nutrient broth and Lysol cleaner (commercial); nutrient broth and organic cleaner (natural); or nutrient broth and homemade cleaner. The test tubes were incubated for 72 hours and optical density tests were performed using a spec-20 machine to test for the presence of E. coli. Final results will be available at the fair.

JBC102: What Liquids Stain Teeth the Most?

Please visit student's exhibit for abstract

JBC103: What is the Most Durable Alternative for Paper?

Please visit student's exhibit for abstract

JBC104: Salt Race

Salt is used to preserve and flavor food. Different salts are used for different recipes. Salar De Uyuni is the largest salt. The salt that you would normally use is table salt. Flake salt is very thin. Different salts can be used for different recipes depending on the dissolvability.

JBC105: Fabric Dunk Tank

This project should be done to measure fabrics' absorbency; because if this is done; the data could be used to manufacture different types of clothing.

JBC106: Crispy Potatoes

This experiment tests a way of making crispier potatoes. Crispy fries are delicious

JBC107: Are Dimples really Simple?

There are many different ways to create a good golf shot; some good some not so good. But swing is not the only thing that goes into the golf shot; what your hitting (the golf ball) can make a way bigger impact than you think. In my project I will be launching different kinds of golf balls that have different types of dimples; and I will be launching them using a launcher that will act the same every launch. I will record the distance the golf ball goes and see which one can go the farthest. I will also repeat the last part twice more then find the average of the distance of how far the ball goes one last time. Then I will make a graph and figure out which ball/dimples on ball are the best for you. My research told me all about how the balls dimples would affect the balls air flight. They all mainly said that the air that goes under the ball creates drag on the top of the ball to lift it up and create more distance on your golf shot. My hypothesis was that I think the Titleist ball would go the farthest out of them all. I am not done yet with my project results will be seen on Fair Day.

JBC108: Which Toothpaste Is Most Effective at Removing Stains?

Please visit student's exhibit for abstract

JBC109: Which Lead Can Last?

Which can last longer; 0.7 mechanical pencil (23 pieces of lead); or a cedar hb #2 pencil? I am doing this project in hope to find which pencil I should use; mechanical; or wood.The volume of 23 mechanical strips of 0.7mm lead is about 0.83 cubic mm.A wood pencil lead has a volume of about 0.86 cubic mm. For my test; I will use my robot that I created out of a lego robotic set to scribble for however long it takes to use up the entier pencil or 23 strips of lead. So; you would think that clearly; since the wood pencil has more in it; it will last longer; but; the wood pencil has to be sharpened. That gives the lead one a little advantage. But; the lead pencil has to have lead pushed out every once in a while. And; the lead could break. I used about 25% (but really 26.31..%) in 30 minutes and 48 seconds. The length of the piece devided by how much I used is 9.025. So then the time it take to use one piece of lead is 4 hours; 37 minutes; and 58.2 seconds. Now I need to multiply that by 23. That is 106 hours; 33 minutes; and 18.6 seconds.

JBC110: Keeping it Clean

My purpose for this project is to save money. The hypothesis I predicted is that Tide will work the best. I have completed my procedure for this project. The tests came out the way I wanted them to. My hypothesis was correct and Tide worked the best out of the four.

JBC111: Crystal Clean

My purpose of this experiment is to see which window cleaner cleans best out of 3 cleaners. My hypothesis is that the Windex cleaner will clean best. First; I will take two fingers and rub the dirt; milk; and grease one by one onto 9 panes. Then I will wait 24 hours for them to dry. Then I performed my experiment with the cleaners on each soiled pane. In conclusion; my hypothesis was incorrect. The vinegar worked the best on all of the panes and in my opinion; saves money and is better when it is homemade. You are also breathing in less chemicals when using the vinegar/warm water cleaner. This is not only better for the environment; but for your wallet.

JBC112: The Most Effective Way to Remove Bacteria from Produce

People eat a lot of fruits and vegetables. While these foods are healthy for you; fruits and vegetables can have bacteria on them that can make people sick. My goal is to solve this problem by finding the best way to remove this harmful bacteria. Based on my research; I hypothesized that water is the best way to remove bacteria from fruits and vegetables. In order to test my hypothesis; I used four different washes on produce test subjects. I took bacteria samples from the test subjects before and after they were washed. To document the bacteria growth; I took photos. After analyzing the data; I disproved my hypothesis. Water did not reduce or remove the bacteria as I hypothesized.

JBC113: Battery versus Gas Lawn Mower. Which is best?

The purpose of my project is to find out which type of mower is more efficient at mowing; easier to use and cheaper to purchase and operate over a period of time. I think the gas mower will perform better than the battery model because the gas mower should have more power and the batteries will probably not last long enough to do the same job. I will use 2 different mowers to compare. A 21” gas model and a 20" battery powered model. I will cut the same area at least 3 times with each mower and record different data. I will also compare how much it costs to buy each mower and how much it costs for fuel or to charge the batteries for the project. I will record how each mower performs and how hard they are to operate to do the job. I will show my results in tables and graphs.

JBC114: What color paper fades the quickest?

Purpose - To find out what color of paper will fade the most/least. Hypothesis - The yellow one will fade the fastest because it is the brightest. Procedure - I taped sticky notes on to a piece of cardboard. I folded a corner over so I can have a before and after of the color. I have a helping hand magnifier holding the cardboard. The magnifying glass is aimed at the green sticky note to see if it would change the color. Conclusion - The green color will fade the most because of the magnifying glass.

JBC115: Battle of the Highlighters

When school shopping there are a lot of options to choose from. I wanted to do my science project on highlighters so that less time would be spent thinking about which is best. I compared 3 highlighter brands from Wal-Mart and Target. The brands were Pen + Gear Gel Highlighter; Bic Brite Liner; and Sharpie Accent Tank Highlighter. I used each of the three on computer printed paper; a text book; notebook paper with a pen and pencil; and a Bible. I was looking at the highlighters' accuracy; bleed through rating; smearing; and any other notable finding. Here is a brief overview; Bic was the most accurate; Pen + Gear crumbled and ran out quickly; and Sharpie won beat overall.

JBC116: Paper vs. Plastic

The purpose of doing this project is to help shoppers know which bag to use. This will lower the chance of it ripping. The way I conducted my experiment is I put cans in 1 by 1 until the bags broke. I then recorded the weight. The results of my project are the paper bags were stronger. The plastic bags ripped quicker than paper bags. My results mean paper bags are stronger than plastic bags. I can not compare my results to any other experiment. My results do not give me any ideas for future experiments.

JBC117: The impact of stress and thoughts on our performance.

Stress is the condition or feeling experienced when the demands pressing upon an individual exceed the personal coping skills and social resources he or she can mobilize. What I did was I asked the participants to play two different types of games one of speed and one of memory. I let them play a few times until I saw that they had stopped improving (their base level -control). Then I asked them to do a light exercise three times. Then participants took the test while hearing positive thoughts and repeating them. When they finished the game I wrote down the score they got. Later on; participants were asked to take a difficult exercise (which created strong stress) and in addition; they heard negative thoughts that needed to be repeated during the game testing. When they finished playing; I wrote down their score. My hypothesis was that severe stress reduces performance; but minor stress with a positive attitude improves performance. I found that low stress with positive thinking improves performance compared to control and high levels of stress with negative thinking. I realized that controlling stress and positive thinking is important for improving our results. Importantly; there are effective methods for lowering stress and changing patterns of thinking; like practicing positive thinking.

JBC118: How does different types of flour effect the thickness of brownies?

My science fair project is about the effect of different flours on the weight/height of brownies. I used cake flour; bread flour; and all-purpose flour (neutral) and got close or similar results. My bread and cake flour brownies were 3 « cm high but the cake flour brownies weighed 103 grams and the bread flour brownies weighed 81 grams. The all-purpose flour brownies weighed 68 grams but were 4 cm high. In the end; my hypothesis was wrong. The cake flour brownies turned out to weigh the most and the all-purpose flour brownies turned out to have the most height.

JBC119: Apple Preservation

The purpose of this project is to see which juice (lemon; lime; or orange) keeps apples freshest for the longest amount of time. My hypothesis was that the most acidic juice (lemon pH=2) would keep the apples fresh for the longest because the acidity in the juice would protect the fruit from the oxidation process. I placed a tablespoon of each type of juice onto each of three apple slices. I checked each apple two times a day for four days and rated them on a scale of 1-5; with 1 being completely inedible and 5 being completely fresh. The data showed that the lemon and lime juice kept the apples completely fresh (score of 5) for all four days. The orange juice only kept the apples completely fresh for one day and by day four; they were completely inedible (score of 1). In conclusion my hypothesis was supported because the least acidic juice (orange) kept the apples freshest for the shortest amount of time compared to lemon and lime. I believe this is because the acidity level of the lemon and lime juice slowed the chemical reaction of oxidation. Apples contain a large amount of polyphenol oxidase. When they are cut open; the polyphenol oxidase begins a chemical reaction that produces melanins; turning the apple brown.

JBC120: Preservation Methods for Carving Pumpkins

For my science fair project I tested what would help preserve carved pumpkins the best. I used lemon juice; bleach; hairspray; and for my control; I didn't apply anything. In this project; I bought four pumpkins all the same size; carved them with the same design; chose substances to apply to three of the pumpkins; and left one pumpkin without any substance on it. I then labeled each pumpkin with what I applied to it; then observed the pumpkins each day for 15 days. To measure the amount of mold on the pumpkins I used a scale of zero to three; zero being no mold; one being slight mold; two being moderate mold; and three being extreme mold both inside and out. My hypothesis was that bacteria-killing substances would be effective in preventing mold on the pumpkins; and after completing the experiment; I found that I was partially correct. Lemon juice worked the best out of all the substances; and the control surprisingly worked second best; bleach worked third best; and hairspray worked the worst. Overall; the substances were effective; but some worked slightly better than others in preventing mold on carved pumpkins.

JBC121: Science Project

Please visit student's exhibit for abstract

JBC122: What oil will cause petrochemicals to break down the fastest?

Please visit student's exhibit for abstract

JBC123: Which liquid stains teeth the most?

Please visit student's exhibit for abstract

JBC124: Which Toilet Paper Is The Strongest?

Please visit student's exhibit for abstract

JBC125: Temperature

Please visit student's exhibit for abstract

JBC300: Illusion Confusion

Many people wonder if a boy or a girl is smarter. Our experiment provides a way for people to find out. Our research showed that boys were less likely to name the correct shape (compared to girls) when a shape has an incorrect label inside of it. In addition; theories state that people can read words faster than naming shapes. The purpose of this experiment is to see if boys' and girls' brains think differently. To test this; we gathered students between the ages of 11-13 and asked them to name the shape of the object while an incorrect shape label was printed inside. We are not done testing yet; but our current data right now data shows that girls are naming more shapes correctly. Our experimentation is continuing; and results will be available on the day of the fair.

JBC301: Childproof Containers

The purpose of our experiment is to see if childproof containers are really childproof. The procedure of this experiment is that we get a kindergartener or 1st grader and take them to a quiet room. Then; we have a table filled with 5 clean childproof containers. Explain what's happening and give them a minute to open each of the childproof containers. Stop the stopwatch and record if they were able to open the container within a minute. The data we will be collecting is the test subject; their gender; and what container they had. We also put down if they were able to open it after a minute and how they open the container after showing them how to open it. The experimentation is continuing; and results will be available on fair day.

JBC302: Who Has What it Takes

Who has what it takes? For our project we will be testing if there is a difference between generic and name brand food products. We will use chocolate chip cookies to figure this problem out. We will buy numerous different brands of chocolate chips cookies. At least two name brand chocolate chip cookies and at least two generic brand cookies. We will then weigh and measure the different brands of cookies to see if there are any differences in the mass; length or height with the cookies. We will also compare the square unit of the cookies by tracing their outline on a piece of graph paper and counting the boxes that the cookies covered. We will also remove the larger chocolate chips and compare how many chocolate chips each brand of cookie had. We will do this three times for each type of cookie and then take the average of each brand of cookie for all of the data. We think that name brand cookies will measure out better being that they cost more money.

JBC303: Let's get Chippy

We will be testing to see how much grease is in five different types of potato chips. While most of us love the salty snack we wondered how much grease we are eating with our favorite food. So for this we thought to use 5 different types of chips for our experiment. We will place some potato chips on graph paper with wax paper on top of it. We will then take a rolling pin and crush all of the potato chips and let them sit for 1 minute. After they sit will throw everything away except the graph paper; we will then measure all of the grease stain. We will compare all the chips to see which brand produces the most grease.

Biological Sciences (JBI)

JBI100: Soil; Soil; SOIL!
Please visit student's exhibit for abstract

JBI101: How Different Lights Effect Plants
Please visit student's exhibit for abstract

JBI102: Oil spills and wildlife
Please visit student's exhibit for abstract

JBI103: Let is Grow
People need to know what soil to plant seeds in. Some plants need more water than others. Some soils are better at absorbing water; and other soils are better for retaining water. Typically florists use potting soil but different kinds of soil can also be used. Will the potting soil be the best soil to hold the right amount of water to grow sunflower seeds and lima beans?

JBI104: The Effect of Genetically Modified Foods on Slime Mold Growth
The purpose of this experiment was to determine the effect of non-genetically modified food versus genetically modified food on the growth rate of slime mold. It was hypothesized that slime mold will grow more rapidly with exposure to non-genetically modified food than with genetically modified food. To perform this experiment; I obtained my materials including slime mold; agar plates; and genetically modified and non-genetically modified corn flakes. Equal amounts of genetically modified corn flakes were placed at one end of the petri dish. Equal amount of slime mold was placed on the other side of the petri dish. Rate of growth of the slime mold toward the genetically modified corn flakes was observed and recorded. These steps using non-genetically modified corn flakes were repeated. These steps were repeated without corn flakes as my control. The data was analyzed and compared for each group. Final results available at fair.

JBI105: Is the Kastle-Meyer Blood Test Reliable?
Please visit student's exhibit for abstract

JBI106: Which Bait Is Best for a Homemade Fly Trap?
Please visit student's exhibit for abstract

JBI107: Breakfast Compost
Compost is one of the most efficient ways to grow plants. This experiment tested what type of compost was best for growing plants. To figure that out; coffee and eggshells where composted with paper towels and lettuce. Then radishes seeds were planted in each type of compost. Once a week the height of the plants was measured. After one week the coffee compost had the most and largest plants; the data did not support the hypothesis that the eggshell compost would have the most and largest plants.

JBI108: This is your Brain on Exercise
The purpose of this project is to show that mild to moderate exercise improves memory My hypothesis for this study is to further prove that my classmates will better perform on memory testing after the engage in physical activity I divided my classmates into two groups and they performed the activity assigned to them before taking a memory test. Based on the data collected; I have concluded that exercise does enhance brain power and memory.

JBI109: Beyond the Mold
In this experiment I wanted to see which fruit molds the fastest. This can help with saving money and also help food banks know which fruit lasts longer when they collect donations. I conducted this experiment by placing 5 different fruits in separate bags in a moist place. I observed and recorded this for 14 days. The results showed that the strawberry molded the most; and the apple did not mold at all. In conclusion berries and tropical fruit types mold the quickest. This is consistent with two other experiments. For another future experiment I could do organic fruit.

JBI110: The Effect of Temperature on an Athlete's Performance?

Purpose: To help athletes figure out what temperature they do best in. Hypothesis: That my participants will do better in warm weather. Procedure: I timed my participants while doing various athletic challenges and their fastest time told them what temperature they did best in. Conclusion: A majority of my participants did better in cold temperatures so that proves my hypothesis to be incorrect.

JBI111: Enamel vs. Sugary Drinks

Purpose I want to see the effect of drinks on your teeth and how erode. Hypothesis My hypothesis is that Gatorade will erode the fastest because of the chemicals; the grape juice the second fastest; and the Coke will be the least eroded. Procedure I put the eggs into each liquid. I took them out once a day and took pictures for seven days. After the seven days were over I let the eggs dry so I could see how each egg looked after being wet then dry. Conclusion My hypothesis was denied because the grape juice eroded the most and was separating; the Gatorade was just separating and eroding in few places; and the Coke didn't erode or separate.

JBI112: Think Before You Drink

The purpose for my experiment is to find the healthiest water for human and to avoid plastic contamination from excessive use from bottled waters in homes. I hypothesized that filtered water is healthier than tap water and bottled water; but bottled water is healthier than tap water but wastes more plastic than tap water and filtered water. The procedure is make the water filter; pour water into it; put a cup under it; wait for the cup to fill up; test it for the pH of the filtered water; pour the Deer Park water in a cup; test it for the pH; pour the Sam's water into a cup; test it for the pH; then pour each of the waters into the testing tubes and shake it to see how much E. Coil is in the water. The conclusion for my experiment is that filtered water is the healthiest water I tested; then tap water; then Deer Park; Then Sam's Water.

JBI113: Ready; Set; Grow

Purpose: I wanted to determine what soil is best for growing vegetables. Procedure: I planted three types of seeds in sand; soil and clay. I conducted the experiment knowing that I could control; light; moisture and temperature for each soil type used. I measured growth for a six-week period. Conclusion: My results showed that sandy soil was best for growing peas; beans and tomatoes. My next project would be to plant different seeds besides the ones used in my science project to see if they would also grow better in sand giving the light from my LED light; consistent moisture and constant temperature.

JBI114: The Dark Side of Blue Light

I am curious if blue light negatively affects the quality of people's sleep. Today; most people use technology that gives off blue light. They use this technology everyday; for long amounts of time; especially before bed. This technology includes cell phones; tablets; TV's; and computer monitors. My goal is to determine if there is a relationship between the amount of blue light a person is exposed to and their quality of sleep. Based on my research; I hypothesize that the closer to bedtime a person is exposed to blue light; the worse their quality of sleep will be. In order to test my hypothesis; I exposed four test subjects to increasing amounts (0 mins.; 60 mins.; 120 mins.) of blue light over a fifteen day period. Each of the subjects wore sleep tracking devices that measured the length of time they were asleep and the length of time they were awake during the night. I documented the subjects' results each day and then analyzed the data. Proving my hypothesis; I found that as exposure to blue light increased; the subjects' sleep quality decreased.

JBI115: I'm Pumped Up

The purpose of this experiment is to find out if using solar energy is an efficient way to heat water in order to conserve fossil fuels. In my research; I am looked at different solar batch collectors and their heat absorption time and ability to retain heat. I used (4) multi-colored metal buckets and (4) multi-colored plastic bags of the same four-color variations. At the beginning of my research I hypothesized that of the assorted metal buckets and the assorted plastic bags; that the darkest color bucket (blue) will absorb the most heat and result in the warmest temperature faster. However; when left exposed to solar energy that the darkest plastic bag (green) will maintain the temperature the longest. The (8) solar batch collectors were filled with the same amount and same temperature water and then they were placed outside in direct sunlight for 90 minutes. At the end of the 90 minutes; I removed them from direct sunlight and used a thermometer to measure the temperature. This sequence of steps was performed a total of 3 times. After the third time; I let the buckets sit in the shade for 180 minutes to find which solar batch collector held the heat and maintained the highest temperature. I learned that of the metal buckets the dark blue bucket heated up the quickest after the first 90-minute interval. Likewise; of the plastic bags the red bag heated up the quickest in this time frame. However; over the course of the experiment and the three 90-minute intervals spent in direct sunlight; the green bag heated up the highest from the starting temperature of 12 degrees Celsius. Closely following the green bag; were the yellow and blue plastic bags. The results proved that overall the plastic bags were far superior over the metal buckets in heating the water also more efficient than the buckets in retaining heat.

JBI116: Let It Grow

My purpose is to help farmers to use the correct fertilizer that makes plants grow the fastest. My hypothesis is that chemical fertilizer will grow the most. My research backs up my hypothesis. My procedure is to attempt to water my plants every week. I have not gotten to my conclusion at this time.

JBI117: The Mold & the Beautiful

I questioned why some foods mold faster than others. The purpose of this experiment was to determine whether natural or processed foods can resist mold longer. My initial hypothesis was that natural foods would mold faster than processed foods. I conducted my experiment by setting foods in Ziplock bags on a tray for 14 days. I took note of changes that occurred over the course of my project. After conducting my experiment; I determined that natural foods mold faster than processed foods. My results indicate that some factor; likely preservatives; make processed foods mold-resistant.

JBI118: Does bleach added to antibacterial soap kill more bacteria?

My hypothesis was that bleach added to antibacterial soap would kill more bacteria on kitchen surfaces. I assessed bacterial growth on surfaces contaminated with raw chicken. My results showed that antibacterial soap prevented bacterial growth. When bleach was added to the antibacterial soap; it showed the same results. Thus; the results did not support my hypothesis that bleach would provide additional benefit in preventing bacterial growth.

JBI119: Yogurt Fermentation

Effect of temperature and sugar addition on yogurt fermentation: Yogurt is bacterial fermentation product made from cow milk. It can be made at home. With the right temperature and energy sources bacteria can grow. I studied the effects of different temperatures and how much sugar was added. The best bacterial growth observed was the 5 percent sugar placed in 37 C. The data revealed both temperature and sugar addition help bacteria growth in milk. Temperature has an even more important role in yogurt fermentation. Yogurt can be home made with 12 hours with milk by adding 5 percent sugar and growing in 37 C.

JBI120: The Effects of Caffeine on Our Bodies

Please visit student's exhibit for abstract

JBI121: Flocculation

I will be conducting the effects of flocculation (Super Floc) in river water. Flocculation acts like a magnet on the dirt; clumps it together; and allows it to sink to the bottom. My hypothesis was that a ratio of 3:32 would create clearer water (measured by turbidity). After comparing a 3 different ratio; I learned...

JBI122: Does Watering a Cactus with Different Liquid Change Its Form?

Please visit student's exhibit for abstract

JBI123: The effect extracted bismuth has on plant growth

I tested how bismuth affects plants. I predicted if I add bismuth to a plant; it would help the plant. I am testing this because there won't be a shortage of bismuth for a long time; but the quantity of fertilizers may be reduced in the future. To collect bismuth; I ground the Pepto Bismol tablets and mixed it into a HCl containing solution. After filtration and a period of drying; a bismuth powder remained. The bismuth plants initially grew more. But after a week; 1 of the bismuth's plant died. My hypothesis was incorrect because bismuth doesn't help plants.

JBI124: The Effect of Technology Use on the Vision of Children

This experiment is about how technology can affect kids in many different ways. For example; it can affect how they think; their relationships; their attention; and their vision. The eyes are what was tested in this experiment. Each group was given a doctor-approved eye test after spending a certain amount of time on a device. One group had A.D.D and two did not. It was important to tests subjects with A.D.D to know if it would have a different effect on the experiment. Their eyesight was measured and their vision was recorded.

JBI125: How Green Is Your Ink?

The purpose of my project is to see if ink has negative impacts on our environment. This is a useful topic because it helps people understand which kind if ink to use to help our environment through the soil and healthiness of plants. My hypothesis is that if algae-based printer ink is added to the soil of the plant; it will grow better than the plants with vegetable/soy-based or water-based ink. The project involved growing twelve plants; four plants impacted with water-based printed card stock pieces; four with soy/vegetable based ink; four with algae-based; and four plants impacted by no changes in the soil. I planted these plants and watered them every day with the same amount of water; not differing from plant to plant. Each month; I recorded the plants growth and averaged them based on ink impacting the soil. I recorded this information in a chart. The result of my experiment showed that ink does have a negative effect on our environment; not just one ink type; but all. The water-based in affected plant had the best growth rate compared to the soy/vegetable-based ink; and the algae based ink. The soy/vegetable-based ink show a very minor difference to the algae-based ink; with the projected third month growth of only a difference of less than one-hundredth of an inch.

JBI126: Energy From Garbage: How To Produce Biogas

The purpose of my experiment is to verify if food scraps produce biogas; which food scraps produce the most; and if time affects the process. I prepared six bottles and six balloons as well as onions; blueberries; lettuce; and apples. As a second step I made the same quantity of purees of each of the selected fruit/vegetables and poured them inside each bottle. In one of the remaining two bottles I put a portion of pureed onion with half teaspoon of bleach and I left the last bottle empty. Then I put a balloon on every bottle and sealed them with duct tape. I took pictures of all the bottles at the beginning of the experiment; after three days; after seven days; after ten days; and after fourteen days from the beginning of the experiment. On the third day; the only one that inflated was the blueberry one (35mm). After seven days two balloons were inflated: pureed onions inflated 35 mm and pureed blueberry inflated 70 mm. On day 10; 3 balloons inflated: pureed onions (45.7 mm); pureed apples (35 mm); and pureed blueberries (82.7mm). After day ten the balloons started to deflate. The balloons on the empty bottle and on the bottle with bleach and pureed onions never inflated throughout the experiment. I think the experiment was successful and proved my hypothesis: the food scraps produce biogas; the one with more sugar produces the most; and that disinfectants like Clorox disables the production of biogas.

JBI127: How Does Caffeine affect Plant Growth

Please visit student's exhibit for abstract

JBI300: Which category of compostable substance will break down the fastest- fruits; vegetables; or "other" biodegradable items?

Composting is a way to help the environment; but have you ever actually wondered what decomposes fastest? In our experiment we tested three different categories of natural items. A tea bag (biodegradable item); banana peel (fruit); and a slice of pepper (vegetable). Using these three basic components; we were able to see which one decomposed first. The way we tested this was by composting the three items in separate bins and weighing each one every week. Our hypothesis was that the tea bag will decompose the fastest do to the small size and lightweight. Our project showed we were correct and the tea bag decomposed the fastest in three weeks. Hopefully while we did this project we also helped the environment.

JBI301: Spread the Soap; Not the Germs

The purpose of our project is to make sure when you wash your hands you was them correctly; and don't spread germs. It is very important to wash your hands and have proper hygiene so we can decrease the risk of getting people sick and starting diseases. Our very first step is getting our volunteers. Second you get your Glow Germ Gel squeeze a nickel-sized amount of the gel into my volunteers hand. Then; ask your volunteer to rub the gel in like it was lotion. Next; ask your volunteers to wash their hands like they usually would. Last; go into a dark room; and shine the UltraViolet pen light and shine on the volunteer hands analyze were the most common places you can find germs at . This will probably help our volunteers be more aware about their hygiene circumstances; and be more cautious about washing their hands. Like keeping sanitary items with you. I will be developing more ways to keep the germs away ; and keeping our environment safe . I will observe where the germs are most likely to appear faster. Where they appear; I will be more cautious.

JBI302: Inherited Fingerprints

Our purpose of this experiment is to figure out how fingerprints are inherited. The first step of our experiment is gathering all of our materials. Our materials are a paper towel; moist towelettes for cleaning hands; white printer paper; tracing paper; parchment paper; a pencil; clear tape; scissors; white paper; sibling pairs(at least 15 pairs);unrelated pairs of people; magnifying glass(optional); and a lab notebook. So first we have to make an ink pad variation; then you would rub a pencil on a piece of printer paper until an area about 3 by 3cm is completely gray.

Then you would use a moist towelette so you can clean off the person's right index card. After you're done doing that; thoroughly dry off that same finger with a paper towel. Then you would press and slide both sides of the right index fingertip once over the pad. After that you would take that same fingertip and roll it onto the sticky side of a clear piece of tape. Next you would use another towelette to clean that person's gray finger. Then you cut off that piece of tape with the gray fingerprint on it; then stick it to a white piece of paper. Last when your fingerprints start to fade; rub a pencil just a couple times over the pad and then and try again. We’re gonna be recording data to see if our siblings' fingerprints are inherited. As we said before we're seeing if there inherited.

Chemistry (JCH)

JCH100: Transforming yogurt into "raviolli""
Please visit student's exhibit for abstract

JCH101: Rethink your drink
Please visit student's exhibit for abstract

JCH102: What stains teeth?
Please visit student's exhibit for abstract

JCH103: Crystal Creativity
Please visit student's exhibit for abstract

JCH104: How to turn milk into plastic
Please visit student's exhibit for abstract

JCH105: Dissolved; Just Like That!
Please visit student's exhibit for abstract

JCH106: Lighting the Way
Many light bulbs use the filament tungsten. However; tungsten is a very expensive filament. I'm trying to find a cheaper filament that also last as long and is as bright as tungsten. To find a better filament I will test three different wires (copper; iron; and graphite) and see if any are long lasting enough to be a possible alternative to tungsten. In the end; my hypothesis was proven incorrect because copper had the longest burning average instead of my hypothesis of iron.

JCH107: Melting Chocolate
This project explores the ingredients in chocolate and the rate at which different chocolate candies melt. A double boiler setup was used to find the melting point and time it took to melt for 16 grams of M&M's; Ghirardelli; Cadbury; Hershey; and Twix to melt. The experiment was replicated twice; average melting point and time was recorded for each type of chocolate. The slowest melting chocolate is tied between Twix and M&M's. This could be because of the shell in M&M's and the caramel cookie in the Twix. These results can be used to help people choose which type of chocolate they should use. It can also help people who want to do another variation of the experiment. For example; which who is fastest melting; the best type of chocolate for summer.

JCH108: The Purest of Them All!
This experiment was to determine whether school tap water; water fountain water; home tap water; rainwater; well water; and creek water are pure. The results concluded that well water was the purest with 0.00 ppm chlorine; a 7.5 pH; trace nitrogen and phosphorous; and a turbidity of less than 50 FNU. The unhealthiest water source was tap water with a result of 1.05 ppm of chlorine; pH of 7; traces of nitrogen and phosphorous; and a turbidity that was less than 50 FNU. The experiment concluded that well water was the purest.

JCH109: Elephant Toothpaste
Please visit student's exhibit for abstract

JCH110: Dropping into the Oblivion
The purpose of my project was to see what acidity affects limestone the most. Knowing the acidity of groundwater under limestone would help to predict potential sinkholes. I put limestone rocks into water with different amounts of vinegar; which is very acidic. I weighed the rocks before putting them into the water and vinegar; and I weighed them every day for three days. My hypothesis was confirmed when I learned that limestone erodes very quickly in higher levels of acidity; but it still erodes in lower levels; just more slowly; depending on the pH of the liquid.

JCH111: The Melting Ice

Ice is melting! The polar ice caps are melting and the oceans are rising. I read about the work of Ice911; working to protect the ice by reflecting solar radiation from its surface using silicate glass. I want to duplicate some of the research being done by Dr. Field of Ice911 and see if whether glass silica and sand best reflect the sun's energy and prevent ice from melting. My experiment froze three sheets of ice; covering one with silicate glass; one with sand; and one with nothing. I measured the time it took each to melt; repeating the experiment 5 times. My conclusion was that the work of Ice911 is a valuable way to help protect our polar ice caps.

JCH112: The effect of food processes on the amount of vitamin C in yellow peppers

The purpose of my experiment is to find if food processes take out or neutralize the amount of vitamin C; because people might not be getting enough of vitamin C because they must get processed foods because they can't afford fresh foods; or they just don't have access to them. My testable question was" Does cooking; freezing; or canning affect the amount of vitamin C in yellow peppers?"; if this was true it probably is with other fruits and vegetables. My hypothesis for my experiment is "If processing fruits and vegetables affects the amount of vitamin C; then the canned peppers will have the least amount of vitamin C and fresh peppers will have the most amount of vitamin C because canning requires the most processing of the food processes and fresh peppers require none at all." My experiment was to puree and drain a yellow pepper and then test it by slowly dropping the juice into a DCIP indicator solution. When the DCIP reaches an amber color you know it's been fully titrated. My data shows that fresh yellow peppers have the most Vitamin C; taking 35.67 drops to titrate on average; freezing has less Vitamin C; taking 81.33 drops to titrate. Keep in mind that the more drops it takes to titrate; which is when the indicator fully changes to the ending color; the less Vitamin C there is in the substance. Cooked takes 95.33 drops on average to titrate; and the canned took 166.67 drops; which is significantly less than fresh. This proves my hypothesis correct and shows that Food processes do affect the amount of vitamin C. I realize now that the vitamin C could have "returned" after letting it thaw for freezing; but my data shows that that was not the case. I also could have done it all at once; because the DCIP solution only lasted for 1 week refrigerated and this could have effected on my results because I didn't Conduct all my trials on the same day.

JCH113: Cookie Mutants

A small change in baking ingredients 'mutates' a regular chocolate chip cookie into delicious; or crispy; or chewy cookies. The purpose of the experiments was to find my own personal favorite recipe and investigate the chemical interactions of the ingredients. I made 3 different recipes changing which changed the amount flour; type of flour; and amount of shortening. I found the traditional recipe to be the best.

JCH114: Onion Tears

I am attempting to find a way to cut an onion without crying. I hypothesized that freezing an onion before cutting would prevent tears; but not as well as cutting the onion underwater. My procedures included gathering supplies; freezing the onions and cutting the onions and measuring my if my eyes stung; if they teared up; or if I cried. I learned freezing an onion is not as effective as cutting it underwater.

JCH115: The Effect of Acidic And Basic Liquids On Lead

In my experiment; I wanted to test liquids that have diverse pH levels in order to see the effect of lead on each of them. The liquids I tested are isopropyl alcohol; ammonia; water; and vinegar. Before testing; I thought that the vinegar would have the largest effect on the lead by making it dissolve because Vinegar is highly acidic. Lead was added to containers with each solution. After 4 hours; 24 hours; 48 hours; and 16 days observations were recorded. At the 16 day mark; ammonia dissolved the most lead. In the end; my hypothesis was partially wrong. Vinegar did make lead dissolve just not as much as Ammonia did.

JCH116: Testing Which Beverage Melts Ice Fastest

In this experiment; we tested the effectiveness of different beverages to melt ice. We wanted to see which melted the fastest. We tested the water (control); cranberry juice; lemonade; lemon juice; coke; club soda; diet coke; and orange juice. Maya's hypothesis is that club soda would melt ice the fastest because it has sodium in it and sodium is used to melt ice. My hypothesis is that water would melt ice the fastest because it is more natural; without any added chemicals. We tested with 125 mL of each solution and one ice cube. We timed and video recorded each solution as it melted. We ranked the solutions in order based on when they completely melted. We reviewed our results by watching the video we recorded to ensure our ranking of the solutions was accurate. Our results showed that the control (water) melted ice the fastest at 22:40 (minutes: seconds) and cranberry juice at 1:05.33 (hours: minutes: seconds).

JCH117: How Can Acid Rain Water Make Rocks Disappear?

Please visit student's exhibit for abstract

JCH118: The X-plosion

Please visit student's exhibit for abstract

JCH119: Is black ink really black?

Please visit student's exhibit for abstract

JCH120: What happens if you mix different types of sodas with Pepsi and put a Mento into it?

Please visit student's exhibit for abstract

JCH121: How Clean is Your Water?

Please visit student's exhibit for abstract

JCH300: Solids flow like Liquids

The purpose of this experiment is to see how the candy changes its characteristics from how it started. The steps are one make a bottle into a funnel; the second step start with the smaller opening and then enlarge it if it is jammed; the third step is to cut a hole and make sure it is wide enough for the funnel can fit through without tipping over. After you are done with the funnel you have to cut windows on each side of the cardboard box. The data for this experiment is that me and my partners will check every 5 minutes to see how the different objects changed. Also to determine how the size of different granular materials affects their mass flow rate through a funnel. The experimentation is continuing; and results will be available on fair day.

JCH301: Slime Chemistry

My science project is about how to make slime. My lab partner and I are going to be testing different ways to make slime and why glue forms into goop with borax; contact solution and much more. If you have ever played with slime you know that it can be fun with all of its bouncy; ickiness. There are so many different variations of slime and how to make it. I personally love making slime. It's fun and very soothing in my opinion. I just don't like messes; especially when slime gets stuck to the carpet. Slime is a fun goopy thing to play with and make. The slime you make or buy is not usually edible; but you can make edible slime. Have you wondered why slime behaves the way it does? I did.

Now I want to share with you. My partner and I will show you that cemetery is the study of matter which is what everything around you is made of. What is slime actually made of? If you have made slime before; you probably followed a recipe and put different ingredients together; similar to baking a cake. The ingredients for making slime vary but always include elmer's glue and borax. Elmers glue is made up of a polymer. Slime can also be harmful to skin and others. Be careful not to get it in your eyes ;especially when you use borax it is a harmful mineral. What was the purpose of slime?

JCH303: Bass Eruption

Project will consist of a bridge that will have a rolling ball that will fall into a volcano making it erupt and overflow underneath the bridge potentially causing it to collapse.

Physical Sciences & Engineering (JPE)

JPE100: Does Temperature Impact Battery Voltage Output?
Please visit student's exhibit for abstract

JPE101: How Far Will it Go?
Please visit student's exhibit for abstract

JPE102: The car
Please visit student's exhibit for abstract

JPE103: A Battery That Makes Cents
Please visit student's exhibit for abstract

JPE104: A Pendulm of A Softball
Please visit student's exhibit for abstract

JPE105: Amazing Airplanes
Please visit student's exhibit for abstract

JPE106: What materials can catch a bubble?
Please visit student's exhibit for abstract

JPE107: How much baking soda
Please visit student's exhibit for abstract

JPE108: Turftastic
Baseballs might bounce higher on different soils under the turf. If all of the MLB baseball stadiums used these mixtures it might make the game more exciting. Using different artificial or natural mixtures might lead to less injuries in the game of baseball. The different soils might not dent the baseballs as easily as the normal soils would.

JPE109: How Far Can Sports Balls Travel?
Please visit student's exhibit for abstract

JPE110: Kelvin's Thunderstorm
Please visit student's exhibit for abstract

JPE111: What Propeller Shape is Most Efficient for Boat Travel?
Please visit student's exhibit for abstract

JPE112: Don't Break Your Pencils
Don't break your pencils! Pencil strength: When a pencil breaks; you get pretty mad. It's a big problem because if a pencil breaks; you will need to buy more. This study showed which pencil is the strongest and which one has a darker marking. I first found the width of the pencils and the materials that make the pencil. I then tested 9 different types of pencils from jumbo pencils to #2 pencils to bendy pencils to find the solution. To make sure that my answer was fair; I made a wooden model which holds the pencil in place without moving. To find out how much weight each could hold; I put weights in my backpack and hung the handle on the pencil.

JPE113: The Science of Tie-Dye

Tie-dye is a fun family project; my project is trying to prove that it might be much more involved in science. My project has the purpose of finding out which fabric fiber could result in the brightest tie-dye. In order to find out which fabric results in the brightest tie-dye; I used the fibers; cotton; hemp; rayon; nylon; and linen. I took these fabrics and dyed them each red; and then I washed them. After a day of drying the shirts of different fibers; I tested each of the shirt fabrics; that were now colored red; I put them against a color brightness table. The brightest shirt fiber was cotton; my prediction was correct.

JPE114: Heavy Hitters

The data did not support the hypothesis; if 12U softball players hit a ball off a tee using bats of various weights; the ball will travel the furthest using the heaviest bat; because each softball player hit best with a different bat. This is understandable because each player has a different size; weight; height; strength and experience. Another component of momentum which is velocity wasn't measured in this experiment. Each softball bat was only 28.35g difference in weight and this may have affected the results. If the bats had a greater mass difference the results could be more conclusive.

JPE115: Humpty Dumpty

My project name is "Which Egg Will Drop Faster? Raw or Hard Boiled"? my purpose for this project is because I am interested as to which egg will drop faster. I hypothesized that the hard boiled egg would drop faster. The procedure was first; I set a tarp on the floor so no egg would get onto the ground; then I stood on a chair and dropped the eggs. My conclusion is the hard boiled egg dropped slightly quicker.

JPE116: How Efficient is Solar Energy in Heating Water?

The purpose of this experiment is to find out if using solar energy is an efficient way to heat water in order to conserve fossil fuels. In my research; I am looked at different solar batch collectors and their heat absorption time and ability to retain heat. I used (4) multi-colored metal buckets and (4) multi-colored plastic bags of the same four-color variations. At the beginning of my research I hypothesized that of the assorted metal buckets and the assorted plastic bags; that the darkest color bucket (blue) will absorb the most heat and result in the warmest temperature faster. However; when left exposed to solar energy that the darkest plastic bag (green) will maintain the temperature the longest. The (8) solar batch collectors were filled with the same amount and same temperature water and then they were placed outside in direct sunlight for 90 minutes. At the end of the 90 minutes; I removed them from direct sunlight and used a thermometer to measure the temperature. This sequence of steps was performed a total of 3 times. After the third time; I let the buckets sit in the shade for 180 minutes to find which solar batch collector held the heat and maintained the highest temperature. I learned that of the metal buckets the dark blue bucket heated up the quickest after the first 90-minute interval. Likewise; of the plastic bags the red bag heated up the quickest in this time frame. However; over the course of the experiment and the three 90-minute intervals spent in direct sunlight; the green bag heated up the highest from the starting temperature of 12 degrees Celsius. Closely following the green bag; were the yellow and blue plastic bags. The results proved that overall the plastic bags were far superior over the metal buckets in heating the water also more efficient than the buckets in retaining heat.

JPE117: Break that Bridge

Please visit student's exhibit for abstract

JPE118: Batteries Zap Back

My project is will other batteries help a battery last longer? My hypothesis is Duracell will last long overnight. We glue 2 flashlights to a piece of wood and let them go on at around 8:00 AM and wait until the next morning.

JPE119: Interactive Rover

Project Title: Interactive Rover In many cases; humans are unable to access confined places or areas with harmful gases. Also; in many natural disasters such as earthquakes; many lives are lost because they are not spotted in the rubble and debris. The interactive rover is a robot capable of taking pictures of areas and sending them to the user. It is additionally able to detect obstacles in its path and avoid them in addition to taking a picture. My goal is to research its capabilities by recording certain aspects when testing the rover The research is not yet completed and results will be presented at the fair.

JPE120: How Much Electricity does different vegetables; fruits; and plants give off?

Project Title: What Plant Sends out the Most Electricity. Most of the earth's energy comes from nonrenewable power such as coal and gasoline. My experiment will present a new form of renewable energy. I think that plant may be a reliable source of electricity. This new "plant" energy is electricity produced from fruits and vegetables. I will test oranges; apples; and potatoes for this experiment. I will connect each one to a multimeter and test its stored electricity. Then I will see if it can light up one; two or three lightbulbs. Results will be recorded and a conclusion will be drawn. I have not finished testing the experiment. The results will be shown on the day of the science fair.

JPE121: Can vegetables charge a phone?

If the power goes out and you need your phone. I think potatoes will work better than lemons. The procedure I used was the following: Gather needed materials Insert nail in the middle of the lemon or potato Insert coin 2.5 centimeters away from the nail Connect one end of the wire to the potato or lemon and the other to the voltmeter Connect the second wire to the nail and the other to the voltmeter Check reading Check if the clock is working Give them the same time to charge (1 hour) Start from the same spot Start with 2 completely dead phones Wait one hour Check the charge on the phone Run the test again but switch phones Record both results My conclusion is that I didn't have enough power to charge a phone.

JPE122: Reducing the carbon footprint of a household through refuse intervention

Humans have a huge carbon footprint; and people just put it aside but this issue can not be postponed any longer. My experiment tests how much a family can improve upon their waste output. My father and I collected two weeks' worth of trash and took measurements such as the weight of non-recyclable; recyclable; and compost and whether or not it was in the garbage or recyclable. After this; I did research on the carbon footprint of the weight of the trash and I prepared an educational module to educate my family on how to improve upon their wasteful habits. Now I will present it to them and give them a week to prepare. Then; I will measure two weeks and hope they have improved. Not all data collected but will be displayed on the day of the fair.

JPE123: RoboSmart Feeder

According to the American Pet Products Association (APPA); 67% of Americans own pets. Every year; many people go on vacation; and more importantly; every day; a pet's owner needs to feed their pet. They may forget to feed them; or they may even overfeed them. My project's goal is to feed the pet the right amount of food on schedule. This is an engineering project involving robotics. I will be using a Raspberry Pi and coding in Python to control the components. After doing research on servo motors; DC motors; and stepper motors; I have decided to use the stepper motor; because it is able to do complete rotations with precision. To physically dispense the food; I will use a manual cereal dispenser and attach the motor to it. When the scheduled time comes; the motor will turn; and the program will dispense the right amount of food into the pet's bowl.

JPE124: 3D Printing Brushless Hub Motor Parts for Electric Vehicles

Hub motors are a type of electric motor that is built into the vehicle's wheel. In this experiment; we will investigate optimal designs of hub motors based on 3D printed parts. A brushless hub motor will be used for the experiment and we will focus on 3D printing the stator. The hub motor will be connected to a commercial brushless motor controller. We will measure current; voltage; and rotations per minute (rpm). The current and voltage will be measured using an ohmmeter and the rpm will be measured using a tachometer. Our goal is to improve the manufacturability and cost of a hub motor. Our conclusions will be presented at the Pittsburgh Regional Science and Engineering Fair.

JPE125: Impact Craters

My project is about how dropping a ball from various heights effect impact. What I did was drop a ping-pong ball and metal ball; then dropped them from 1.524 meter and 3.048 meter. One example my project can help everyday life is when a car crash occurs; or for when a meteorite hits the moon and makes a crater. Another way that I could of made this project different would of been to test one more height maybe like a height of 0.914 4 meter.

JPE126: Trash Bot

Solid waste management has been a major challenge around us for a long time. In big cities and densely populated areas; the dumpsters get filled up quickly and trash overflows around it. To address this; an approach to monitor and alert the public works department is needed; so they can empty the bins before they overflow. The goal of this project was to develop a prototype for an efficient and cost effective device called TrashBot to monitor the trash level and send alerts about the fill-level to a smart device. The Trashbot will also detect if the waste is dry or wet to help with waste segregation; which is important for effective waste management. . The TrashBot will use an Arduino UNO R3 microcontroller; an ultrasonic sensor and a moisture sensor. The sensors use a C++ based Arduino program called Sketch to determine the garbage level and moisture level. A HM10 Bluetooth Low Energy (BLE) module will send the alerts from the Arduino microcontroller to the smart device. The TrashBot will be tested by varying the level of trash and the type of trash (wet and dry) and by observing the notifications sent to the smart device. This solution would enable waste management companies to optimize their collection routes to eliminate trash overflow; reduce CO2 emissions and maintain cleaner public spaces. The scope of the project can be expanded in the future to incorporate automatic waste segregation.

JPE127: Mousetrap Car Design

What factor influences the speed and distance of a mousetrap car the most? This study aims to discover what factors influence the most the speed of a mousetrap car. Three mousetrap cars were built. Two of the cars were made using aluminum rods; one car was 2ft long and the other was 1.5ft. One of the cars was made out of carbon fiber and was 2ft long. The 2ft vehicle made of aluminum made it only 7 meters at most; while the carbon fiber vehicle had a maximum distance of 15 meters. Even the 1.5ft vehicle made it to 9 meters; but the 2 ft car only made it to 7 meters because the added weight of solid aluminum made one car about 100g heavier than the other. This shows that weight plays a bigger part in how far a mousetrap car goes.

JPE128: Using computation to defeat a common household problem: Matching socks with Python3

Computational algorithms are everywhere; from buying airplane tickets to looking things up on Google. The purpose of my project is to find a computational approach to matching socks. I am testing two sorting algorithms to do this important household chore. Random sort continually picks two random socks and sees if they are matches. Bubble sort continuously checks if neighboring socks are in order from light to dark. If they are not then the two socks will switch. I created the algorithms in Python. I kept track of how many computations it took for the socks to be matched. My hypothesis is that bubble sort will match all the socks in fewer computations than random sort. I simulated 10;000 piles of socks each with 6 pairs of socks; and tried each algorithm on every pile. For each pile; I subtracted the two numbers of computations and then averaged across all 10;000 piles. I will analyze the differences in the number of computations between the two algorithms.

JPE129: The Impact of Greenhouse gases on the Efficiency of a Solar Thermal Water Heater

According to the US government 18% of the energy used by US households is put toward heating water. A solar thermal water heater is a device that uses the sun's energy to heat water to temperatures approaching 65oC. In this project I am trying to discover if greenhouse gases placed inside the water heater will impact its productivity and efficiency. Gases being explored are CO2 and N20; both well known greenhouse gases.

JPE130: How does the elasticity of rubber change with temperature?

What happens when you heat or cool a rubber band? For my project I put rubber bands in heated water and measured the length of the rubber band and took the temperature of the water every 3 minutes. When the water got to room temperature I took out 100mL of water and added 100mL of ice. My hypothesis was that when you cool a rubber band it becomes less elastic. While I ran my experiment I had trouble getting the temperature of the water down to room temperature. My project met most of the objectives and can help make better and stronger rubber bands

JPE131: A Homemade Air Conditioner

My project is a Homemade Air Conditioner. It is important because people without money need to cool their homes in the summer. First I cut holes in the lid of an ice cooler. Then I cut a hole for the fan at the center of the lid. Then I took water bottles that were frozen in the freezer and put them in the cooler. I aimed the fan to blow inside and release the cooled air to the room. I measured the temperature in the room at the beginning of the experiment and one hour after on a day where the temperature outside was rising. I conducted the experiment 3 times and found that the temperature of the room dropped by 12 degrees when the cooler was filled with ice.

JPE132: Why Does The Moon Affect The Tides?

Please visit student's exhibit for abstract

JPE133: The Effect of Temperature on the Elasticity of Rubber Bands

Please visit student's exhibit for abstract

JPE134: Testing bicycle braking methods to minimize brake overheating

For my experiment; I tested different bicycle braking methods to see which method would minimize heat buildup. When your brakes overheat it can cause serious damage and injury. I wanted to test which technique of braking would work best and minimize the heat. The three methods I tested were constant braking (which was my control); pulse braking for one second on and off; and pulse braking for 4 seconds on and off. My hypothesis was that pulse braking for 4 seconds on and off would create the least heat because the breaks would have time to cool off in the four seconds that I wasn't braking. I also predicted that constant braking would create the most heat because I learned from my good research that the pressure in the brakes is what causes the heat; and constant braking would create a lot of pressure. To do the experiment; I took the temperature; with a non-contact thermometer; of the bike's brakes before and after riding down a hill. I applied these different braking techniques as I descended. According to my results; my hypothesis was proven correct. The average amount of increased heat when pulse braking four seconds on and off was 43.9F; 70.7F pulse braking one second on and off; and 90.1F for constant braking down the hill. In conclusion; the bicycle breaking method that minimizes the most heat is pulse breaking for 4 seconds on and off.

JPE135: Affecting Domino Effect

For my experiment; I decided to determine if the distance between dominoes affects the time it takes for them to fall. To do this; I used one hundred double-six dominoes. Each domino is 5.1 cm x 2.5 cm x 0.8 cm. I used a straight line made of masking tape on the floor to make sure that I set the dominoes up in a straight line each time. I used the stopwatch app on an iPhone to time the experiments. I ran the experiment 5 times for each of the distances. I used the distances; measuring from front of one domino to the front of the next; of 1.5 centimeter; 2 centimeters; and 2.5 centimeters. I measured the spaces before hand using a ruler and marking them on the masking tape. Each time; I used my finger to start the fall. I recorded the times in a table. Then; I used the table to create a graph. The graph shows the times of the falling dominoes.

JPE136: Earthquakes and Foundation Materials

The purpose of this experiment was to find out how different foundation materials were impacted by a simulated earthquake. The data collected did support the original hypothesis that a tower constructed on a foam foundation took longer to fall than a tower constructed on a foundation of wood or brick. The Lego tower on a foam foundation lasted the longest before collapsing with an average of 43.7 seconds before collapsing. The Lego tower on a wood foundation lasted the second longest before collapsing with an average of 19.3 seconds before collapsing. The Lego tower on a brick foundation lasted the shortest amount of time with an average of just 4 seconds. The independent variable made a difference with respect to how long before a tower would collapse; but didn't make a difference for how much damage the building suffered. A problem with the experiment was that the Lego tower kept collapsing at the same weak spot in the tower. There were no unusual observations in this experiment. The experiment could have been changed by using an electric shake table so that the shaking was more precise because it was difficult to shake a manual shake table at the same speed each trial.

JPE137: The Effect Of Price Point on the Longevity of Batteries

Batteries tend to die out sooner than expected and are expensive to replace. The purpose of this experiment was to determine which brand of battery lasts the longest; and whether price point has any relationship to battery life. In addition; I attempted to create a homemade battery to compare against store-bought batteries. I then tested four brands of batteries by monitoring and recording the length of time the batteries lasted in identical desk lamps. Data collected for this experiment consisted of measurements of milliamp output from the batteries using a multimeter. Each lamp took three batteries; and there were four lamps. Therefore; every measurement procured twelve data points. The results of the measurements were compared to the price points. In conclusion; my hypothesis that Duracell Optimum batteries would last the longest because they are the most expensive brand of batteries was disproved. The regular Duracell and Energizer batteries; both of which were less expensive than the Duracell Optimum; performed better. Interestingly; the least expensive battery (HDX) ran out first; which indicates that price may affect battery longevity. Overall though; the experiment was a success as it proved that higher prices may not necessarily indicate longer battery-life. For future projects; testing more brands of batteries in various devices or environments would provide more conclusive data. In order to further this experiment; I would suggest determining a method to successfully create a homemade battery. This could indicate that a homemade battery may be a cost effective alternative.

JPE138: Can Growing Plants Slow Soil Erosion

Please visit student's exhibit for abstract

JPE139: How Agitation Affects Composting

I looked at how agitation affects composting. I started with four compost bins on my back patio. I never agitated the first bin (the control). I agitated the second bin every day. I agitated the third bin every three days. And I agitated the last bin every Saturday. I have collected data by testing the odor (smell); the texture (how much food waste has decomposed); and the pH level. I started with soil and leaves then added leftover peels and ends of fruits and vegetables. I took recordings every three days and would pour a half a cup of water in each bin every Saturday. So far the food in bin: 1 is growing tons of mold. The other bins are decomposing faster than I expected. The lack of bad odor; good pH level; and consistent texture lead me to believe that bin: 4 has the best quality compost so far. I continue to agitate the bins and collect data.

JPE140: Particle Accelerator

Please visit student's exhibit for abstract

JPE141: How does the air pressure of a soccer ball affect the distance it travels when kicked?

Please visit student's exhibit for abstract

JPE142: Which paper airplane design flies the farthest?

Please visit student's exhibit for abstract

JPE143: 7 Liquid Stack
Please visit student's exhibit for abstract

JPE144: Which object will be magnetized the most?
Please visit student's exhibit for abstract

JPE145: How do you make a magnet?
Please visit student's exhibit for abstract

JPE146: Will a Ping Pong Ball Bounce Higher or Lower with a Hole In It?
Please visit student's exhibit for abstract

JPE300: Strong Rocks: Comparing Commercial and Natural Rock Sealants
This experiment was designed to test the effectiveness of different sealants (commercial and natural) on marble and limestone rock. It was predicted that commercial sealants would be more effective than natural sealants. To test this hypothesis; sealants were applied to samples of marble and limestone and mass was measured. The commercial sealant was compared to the natural sealants of beeswax; linseed oil; and jojoba oil. Each sealed rock was then placed in an acid rain mock solution made of vinegar and water. After soaking; the change in mass was calculated. Final results available at the fair.

JPE301: Sunsational Solar Engineers
The purpose of our experiment is to show others that going solar is a powerful opportunity. It is better then using other non renewable resources; and slowing down the effects of global warming. We will test how strong the power of the sun is. We will do this by using solar panels on a train. First; we will attach solar panels on the toy train; and then measure how fast it goes over a length of 10 feet. We will vary the number of solar panels on the toy train; and hopefully the more surface area will outweigh the weight of the extra solar panels. We think that the more solar panels that are added on the train; the faster the train will go. We have not finished the experimentation yet; but the results will be ready and listed on fair day.

JPE302: Balloon Car
Power a car with just air

JPE303: Scratch Video
Create video and programming through Scratch.

JPE304: WiFi Thieves
WiFi Theives For our project we will be testing to see if WiFi strength is affected by different materials. We want to know if we can use different materials to make our own faraday cage. We will try to use aluminum foil and copper fabric to complete this task. We think if we use aluminum foil to block out the WiFi signal then it will block it out because the aluminum foil will act like a little Faraday cage. We will do this by keeping the same WiFi signal and phone and placing them the same distance apart during the whole experiment. The one thing we will change is what we add to the phone each time; like aluminum foil and copper cloth.

JPE305: Corn or Rice
Corn or Rice? For our project we will be testing to see if we corn or rice stays warm longer in a cloth bag. We decided to complete this project to see if a bag could be made to put on horses when they come in from the cold. We are going to heat two fabric pouches; 1 with corn in it and the other with rice in it. Then we will place temperature stickers on the fabric bags and place the fabric bags on a horse figurine. We will continue to check the temperature sticker throughout the next 3 minutes to see how quickly heat is lost from each bag. We think that the corn bag will retain its heat more than the rice bag.