



Pittsburgh Regional
**SCIENCE &
ENGINEERING** Fair
powered by **CARNEGIE SCIENCE CENTER**

**79th Pittsburgh Regional
Science & Engineering Fair
Junior Division
Student Project Abstracts
March 23, 2018**

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: Burning Candles

I choose this project because I wanted to learn which candle would burn the fastest. My question was will a colored candle burn faster than a white candle. My hypothesis was that the white candle would burn the fastest because the color of the candle would affect it more. I did my project by getting three candles, colored red, white, and yellow. Then waited five minutes to see which candle would burn the fastest. The result of which burned fastest was white candles. My hypothesis was correct. The white candle will burn the fastest. I will enjoy doing this project again.

JBC101: How Long is the Life of a Battery?

My family uses lots of batteries. So, I wanted to know what batteries would last the longest. I hypothesize that Duracell batteries would have the longest life and be the most cost effective. I bought new batteries and tested the batteries with a universal battery meter. I played an Xbox game with each type of battery for 30 minutes. Recorded the data, retested and repeated. After three trials, Duracell proved to be the longest last in battery, but may not be the most cost effective because Rayovac came a close second with 0.5 volts lower.

JBC102: Online Testing - Time & Performance

I researched whether middle schoolers perform better when taking a test on a paper or on a computer. My hypothesis was that computer-tested participants would perform worse than paper-tested participants because students are easily distracted by computers. The test included math questions and CRT (Cognitive Reflection Test) questions, where the CRT questions assessed the concentration of the students. The purpose of the experiment was to help schools understand what homework or test format is better for their students. My initial results show that the majority of computer-tested students are faster and score higher on both math and CRT questions.

JBC103: Anole Feast

My project is feeding a lizard canned crickets dipped in this baby food. I am doing this project because I like lizards.

JBC104: Want to Read a Good Book?

Reading is a thing people use all day every day. There is reading on the computer and reading on paper. When timed, the subjects read one the typed copy for one minute, then on the computer for one minute. When doing this investigation, you have a quiet room, same computer, font size and a length of time. The subjects had to read 229 words in one-minute and then on paper. When it turned out I expected the subjects to read less on the computer than paper. After a few subjects I noticed my prediction was true.

JBC105: Does Practice Make Perfect?

This investigation was performed to see if the players shot percentage would be greater after practicing. This investigation showed if you practice, the number of free throws made will increase. During the experiment, half the subjects practiced for two weeks. The group that practiced made more shots at the end of the experiment. Subject 4 showed the greatest increase improving from 7 to 11. The subjects that didn't practice did not improve as much as the practice group. The subjects built muscle memory.

JBC106: Do Fidget Spinners Really Make Attention Spans Bigger?

The purpose of my experiment is to determine whether or not fidget spinners actually improve academic performance in the classroom, as companies claimed to sell more fidget spinners. I am testing this idea by conducting this experiment, which is structured as follows: Human participants will be pulled from normal classes twice to partake in the experiment. Both times, they will complete a ten-question quiz. The first time, students will be permitted to play with a fidget spinner during the quiz. The second time, they will not be permitted to use a fidget spinner. Using this method, I will calculate the average scores of both the fidget spinner and non-fidget spinner groups to determine which time the students did better as a whole. I will also look at individual scores to see which students did better than others. With this data, I can finally determine whether the claim that fidget spinners are an attention booster is actually true.

JBC107: How long fire retardants last in clothes?

How washing clothes (in washing machines) would affect fire retardant effect of sleepwear.

JBC108: Selective Attention: What You're Missing

Purpose: To learn and to see if selective attention is real. My research can prove or disprove the existence of selective attention. Procedure: 1. Give out parent signature papers to two boys and two girls in grades 1-8. 2. Get the forms back after they are signed. 3. Show each participant a short, child appropriate video. 4. Tell the participant to focus on how many times people pass the basketball. 5. Survey questions will be asked. 6. Answers will be recorded. 7. Repeat steps 1-6 for all participants. 8. Analyze data. 9. Graph the results. 10. Draw Conclusion.

JBC109: Best Burn For Your Buck

Have you ever wondered how long it takes for a candle to burn? In my experiment, I burned three different brands of candles to see which one would burn the longest. Out of all the three brands, Yankee candle, Target candle, and Walmart candle, I predicted that the Yankee candle will burn the longest and I proved it. The candles each burned two to three days. The Yankee candle burned the longest for 29.79 hours. However, the Walmart candle which burned the fastest proved to be the most cost effective.

JBC110: Birdy Buffet

The purpose of this experiment is to solve if birds prefer homemade feeders vs store bought. I hypothesize that birds will prefer the store bought feeder. I put 2 feeders the same distance from the house and ground and put 1 cup of seed into each feeder. The feeders were weighed and the process was repeated. From my results, more seed was eaten from the homemade feeder. My hypothesis was not supported.

JBC111: Light It Up!

For my project I decided to burn scented and unscented candles and see which will burn faster. The result was surprising and not many people would think "Does one burn faster? Have I been buying the right one?" If you think about this, most people would think that unscented candles would burn faster. After doing my three trials, I found that they all do burn at the same rate. So next time you buy a candle you can buy anyone you want and you won't be given a bad price.

JBC112: Can Kids Crack the Case?

Many children mistake medicine for candy and to stop them from being harmed childproofing has been created, but it doesn't always work. My experiment is proving if childproof caps are effective to stop children from opening harmful containers. To perform my experiment I'll give 17- 6 year olds a childproof container to open in 1 minute. They will have 5 attempts. After their first attempts the subject will be shown how to open each and step 1 will be repeated 5 more times. I haven't performed the experiment yet but I believe the oldest girls will succeed.

JBC113: Finger Families

Fingerprints are used to identify a person. I am interested in finding out if fingerprints are similar in families and if they may be inherited. I am fingerprint people who are related to each other and compare their fingerprints to see how many similar characteristics they may have. I think I will find similarities between family members.

JBC114: I Heart Video Games

The purpose of this experiment was to determine if playing video games increased or decreased heart rate. Each subject played a video game for ten minutes while their heart rate was monitored. Most showed a decrease in systolic blood pressure and pulse rate. Seven of the subjects' systolic pressure increased while twenty-four decreased. For the diastolic pressure, twenty-one subjects increased and nine subjects decreased. One subject had no change in diastolic pressure. The pulse rate of ten subjects increased while twenty-one decreased. This is because different activities effect your heart.

JBC115: Stain Repellent?

This experiment tests the effectiveness of stain repellent products. The first is a shirt advertised as being stain repellent. The second is a spray that, after spraying on an article of clothing, will make that article of clothing repel stains. The student hypothesized that the stain-repellent shirt would be the most effective at repelling stains because of the hydrophobic nanotechnology utilized.

JBC116: What's Poppin'

The question was which microwave popcorn will pop with the least amount of unpopped popcorn kernels? I decided to take the three most popular in store microwave popcorn brands, (Orville Redenbacher's, Pop Secret, and Act II) and do three trials to see which brand popped with the least number of unpopped kernels. I hypothesized that Orville Redenbacher's will pop with the least because I've eaten these three brands before and I didn't think there were a lot of unpopped kernels with Orville Redenbacher's. To do the experiment I placed each bag of popcorn in the microwave separately, and set the time for 2 minutes and 10 seconds. After the time was up I dumped the popcorn into a bowl, and in a separate bowl I placed the popped kernels until I got down to the unpopped kernels. Then I counted just the unpopped kernels, and recorded all the data on a chart. Then I repeated it for two more trials. Based on the data I collected I was wrong! It turned out that Act II had the least unpopped kernels.

JBC117: Which Brand of Nail Polish Stays on the Longest?

In this experiment, four different brands of nail polish were tested to see which one stayed on the longest. False nails were painted with two coats of each brand (OPI, Essie, Sally Hansen, and Wet N' Wild). Each nail was brushed with strokes from a nail file. Three trials were done. The average number of strokes needed to scrape off the nail polish was calculated. According to the data, it was found that the brand of nail polish that stayed on the longest was OPI.

JBC118: It's All In The Brain!

The goal of this experiment was to learn who remembers more objects, boys or girls. The hypothesis states that females are going to remember more objects than the males because of the way girl's brains are wired compared to boys. Objects were laid on a table and the subjects were supposed to recall the most objects and write it down on loose-leaf. The results ended up proving that the male participants recalled more than the females. In conclusion, 52 percent of the objects was memorized by the boys and 48 percent was memorized by the girls.

JBC119: What Antacid is the Most Efficient?

Purpose: I tested different antacids to see which is the most effective and efficient, liquids or tablets. Procedure: I poured three antacid dosages into 20 ml of vinegar and tested the pH level with a probe and meter. Then I wrote down my results onto my chart. The test time was 2 minutes and then for my other set it was 10 minutes. Data: For my analysis of two minute testing Tums Ultra strength chewable tablets are the most efficient and for my ten minute testing so far Rolaids Ultra strength is the most efficient. Conclusions: My hypothesis is being proven right now because the liquid antacids are doing much worse than the tablet antacids so I think even after more testing my hypothesis will still be correct.

JBC120: Save Money Drink Better

Have you ever wanted to keep your drink cold by using an insulated cup but thought that they are too expensive for you to buy? Well, what if I told you that you could get a better insulated cup for half the price of a popular name brand. I put three cups to the test and found out that you can get an inexpensive insulated cup that outperforms other popular name brands. So next time you go to buy an expensive insulated cup remember, that there is a better inexpensive way to go. What will you pick next time?

JBC300: Which Mint Dissolves the Fastest?

There is a special acid in vinegar that takes longer for sugar to dissolve. Icebreakers have the lowest amount of sugar out of the 4 mints. The other 3 mints have 5 or less grams of sugar in them. Density matters because it can relate to how fast or slow the mints dissolve. Altoids have the highest density and Icebreakers have the lowest density. The Altoids averaged time to dissolve was about an hour. The Icebreakers average time was 35 minutes. After testing our fastest dissolved mint was the Icebreakers.

JBC301: The Effect of Education on Cafeteria Waste

Landfills are polluting our environment, taking up useful space, and hurting the ecosystem because of all the trash that we throw away. The purpose of our experiment is to see whether the cafeteria waste will reduce if the students understand the effect landfills have on the environment. First, we plan to weigh the waste in the cafeteria for three consecutive days and find the average of the weights. Next, we are going to conduct a small lesson to all of the 6th grade classes about the impact that landfills have on our environment. Finally, we are going to measure the trash again for three days and calculate the average of the weights. We are still in the process of continuing the experimentation.

JBC302: American vs European Detergents

We decided to do the science fair because we wanted to work as a team to discover which detergents from Europe or United States would work the best. The four detergents we tested were Tide and All from America and Persil and Ariel from Europe. Our hypothesis was that the Ariel would work the best. We stained four shirts and tested in a washing machine to see which cleaned the best. We found that Persil go most stain out, Ariel second, Tide third, and All fourth. In conclusion, European detergents removed more stains than American detergents.

Biological Sciences (JBI)

JBI100: Effect of Home Remedies on E. coli

Escherichia coli are bacteria that affect over 3 million people a year and cause illnesses like pneumonia. Honey and vinegar, two solutions, are usually used to treat certain internal issues. This experiment tests the effectiveness of those solutions eliminating E. coli. To test this, E. coli and solutions of different concentrations were prepared, and after incubation were tested to see which solution produced the largest zone of inhibition. At the end, 75% vinegar created the largest zone of inhibition compared to the honey, but not to the control. Therefore, 75% vinegar would be best for a low severity of infection.

JBI101: Effect of Preservatives on the Growth of Bacteria

The purpose of this project was to determine the effect of natural preservatives on the growth of E. coli bacteria. It was predicted that as the concentration of each natural preservative increases, the ability for the bacteria to proliferate will decrease. Petri dishes were inoculated with E. coli bacteria and inhibition disks soaked in either lemon juice, vinegar, or pink salt solution will be placed in quadrants. After 48 hours of incubation, colonies will be counted. Results available at fair.

JBI102: Which Kills Bacteria Better?

I am trying to figure out which kills bacteria better: hand soap or hand sanitizer. My hypothesis is that the hand sanitizer will kill more bacteria than hand soap. I cultured bacteria from the school environment to identify a suitable source. I collect new samples and expose the bacteria to different soaps and hand sanitizer and measure the zone of inhibition. The best soap or sanitizer will cause the highest zone of inhibition. The experiment is still in progress.

JBI103: Glucose Level Variation According to Time of Day

My project involved measuring glucose levels in subjects at certain time intervals throughout the day. This topic interests me because I have a strong family history of diabetes. For the experiment, a diabetic and a non-diabetic subject's glucose level were tested upon waking and at 1pm.

JBI104: The Dirt On Detergent

Our cleaning chemicals are being drained into the environment, and are killing plants. In this experiment cleaning supplies' effect on plants is tested against natural cleaning supplies' effects on plants. Plants were watered with cleaning solutions. I measured plant height and the surface area of each plant's largest leaf was measured. The natural plants grew more, which supported my hypothesis. This proves that the natural cleaners are much better for our environment and we are effecting the environment when we clean.

JBI105: That's Stinky

In this experiment, I will isolate DNA strands. I have been fascinated by DNA and how I am made up of billions and billions of DNA strands. I feel like the red onion, you would see DNA more clearly. I am currently still testing my hypothesis. I also feel the white onion, you would see almost nothing at all. I will probably need a lot of onions!

JBI106: Colors and Canines

Have you ever wondered if dogs have favorite colors? I noticed that my dog would prefer one color toy to another and that inspired me to develop my experiment. I wanted to determine which color dogs prefer. I set out colored bowls and I let the dogs choose from each bowl. I learned that the majority of dogs would prefer red to the other three colors that I tested. Now I know which color my dog prefers when I purchase bowls, collars, or toys and other items for my dog.

JBI107: Which Acne Product is Most Cost Effective in Inhibiting S. epidermitis?

My experiment is to determine which price range of acne treatment best inhibits S. epidermitis, which is a bacteria that lives on your face and causes pimples. I think that the more expensive the product, the better it will work. I am going to figure this out by testing five different types of acne treatments; two are inexpensive, two are mid-range, and one is expensive. They will be applied to petri dishes inoculated with S. epidermitis using paper disks soaked in the treatments. Zones of inhibition will be measured to determine effectiveness. Results available at fair.

JBI108: Measuring the Chance of Developing Celiac Disease

I will look at people who have Celiac Disease and what they have in common. Based on the information that I gather I will try to determine who will and who will not develop Celiac disease.

JBI109: Which Solution Makes Pea Plants Grow the Best?

For my science experiment, I wanted to see if pea plants could grow if watered with liquids besides water. I thought that the pea plants would grow when watered with all the solutions, not just the water. They did grow but died quickly. The plants watered with just water grew the best. I learned that liquids such as orange juice and soda are very high in sugar and sugar causes the roots of plants to not absorb the nutrients they need. Plants still grow best the old-fashioned way: water, light, and dirt.

JBI110: Do Fingerprints Follow the Incomplete Dominance Pattern of Inheritance?

The purpose of this project was to try to determine if fingerprint pattern is inherited in the "incomplete dominance" form of inheritance. It was predicted that each finger would follow this pattern. Fingerprint samples were collected from parents and offspring and their print types were identified. Then, the print type was analyzed using the incomplete dominance ratio to determine if the pattern was shown. Results available at fair.

JBI111: Liar, Liar, Pants Are On Fire

Have you ever wondered when speaking to someone if they were telling the truth? In this study, I set out to discover different methods of lie detection. I surveyed male and females between the ages of 7 and 60. They were asked 3 questions, then I asked them to repeat their answers in no particular order while extending their arms. I applied pressure to their arms which allowed me to gauge tension levels. I felt I could tell the ones being more honest felt less tension.

JBI112: The Effect of Caffeine on Plant Growth

My project is measuring how caffeine affects plant growth. I used wheatgrass and caffeine tablets. Different amounts of caffeine (tablets) were used, dissolved in water and placed on the plants. Each caffeine tablet was 200 mg. I had four test groups. A control group with water only, a group treated with one caffeine tablet(200 mg), a group with two caffeine tablets(400 mg), and the fourth group received three tablets(600 mg). I hypothesized that caffeine will increase wheatgrass growth because it is a stimulant to humans. I predict that the 200 mg group will record the most growth.

JBI113: Do Video Games Affect Blood Pressure?

In my experiment, I wanted to see if video games can affect your blood pressure. I studied myself, age 12, beginning by taking a standard blood pressure. Then I played NHL 17 for 3 10 minute periods, taking my blood pressure once every period. Then I played RIGS MCL for 3 5 minute matches, taking my blood pressure once every match. Lastly, I played Tom Clancy's Rainbow Six Siege for three matches, taking my blood pressure once every match. All three of the video games caused my blood pressure to rise.

JBI114: Eyes Are Watching You!

Many people read in the dark which dilates their pupils. I wanted to find out what was the best for people's eyes when reading in the dark: no light, a flashlight, or an iPad. To get my results, people sat in a room and read once with no light, once with a flashlight, and once on an iPad. Participants' pupil sizes were compared. While reading on an iPad participants average pupil size was the smallest. Proving my hypothesis correct that it would be best for your eyes reading on an iPad.

JBI115: Agriculture vs. Aquaponics

Scientists are looking for ways to grow foods that do not require soil and chemicals. Aquaponics is a process of growing crops using fish and their waste as natural nutrients to grow plants. This process doesn't use fertilizers that are bad for the environment and our health. My project was testing whether lettuce would grow faster and taller using agriculture or aquaponics. I grew lettuce in two tubes, one with soil and the other with water and fish. I measured plant growth for 21 days. The soil seeds grew faster, but the aquaponic seeds grew taller.

JBI116: Plant Growth

Do you want your plants to grow faster? Well, in my project I grow plants in different mediums. (soil, water, & crystal soil) You'll learn what medium grows plants the fastest. The plants in the water grew best. Using soil didn't work whatsoever. Earlier, I hypothesized water works the best. If attempting this project, you supervise the plants. You grow plants in 3 mediums for a week, measure the height, take notes and make a chart. The results matched my hypothesis. The water worked the best. If I did this project again, I'd grow the plants longer for better results.

JBI117: Mealworm Growth

Insect eating animals or "insectivores" are increasingly becoming popular pets. Many geckos, frogs, and tarantulas all need live insects to thrive in captivity. My experiment is to see what brand of insect "food" is the best. I start by getting four groups of mealworms in separate containers. One group will eat fresh vegetables, one will eat a store bought diet, one group will be eating a specially made website bought diet, and the last group will be eating a bran bedding. Experimentation is still continuing so I have not come to any conclusions.

JBI118: Effect of pH on Bean Plant Growth

For my project, I am going to study how pH levels affect bean growth. I am going to put beans in containers with liquids that have different pH levels. I am going to measure how long it takes for seeds to germinate and how much they grow. My hypothesis is that beans in neutral water will germinate the fastest and grow the most since its pH level is neutral. I am interested in this because I would like to know how pH levels affect the environment. The experiment is still in progress.

JBI119: Trash To Gas

The purpose of this project is to see how much methane can be produced with cow manure. The material I will be using are cow manure, 2 liter bottles, tape, fruit peels and balloons. The cow manure will be mixed with the fruit peels and placed in the bottles equally. Once it is put in the bottle, I will measure how big the balloons get. Results from the experiment will be available at the fair.

JBI120: Concentration Inquisition

Sometimes people have a hard time concentrating, and I wanted to help with that. I wanted to find out people concentrate more when they chew gum while taking a mini quiz. To get my results, different participants were timed chewing and not chewing gum while taking a mini quiz. The end results were compared, showing that chewing gum does help people concentrate better when taking a mini quiz. Overall, people's test results when chewing gum were under 45 seconds, whereas not chewing gum, test results were over 45 seconds. Therefore, my experiment proves that chewing gum helps people concentrate more.

JBI121: Complex Social Behavior in Madagascar Hissing Cockroaches

Complex social behavior is usually attributed to higher level creatures, but lower level creatures like cockroaches can exhibit these types of behaviors too. This experiment aims to understand if cockroaches can be trained to cooperate and thrive under adverse conditions and help untrained cockroaches to do the same. I hypothesize untrained cockroaches will take less time to feed in the light with trained cockroaches than on their own. Therefore when cockroaches live in colonies, the cockroaches are more likely to survive compared to when they live in solitude.

JBI122: Potting Soil vs. Planting Soil

Purpose: To find out which soil is the best for sunflower growth. Procedure: 1. Order seeds and obtain six pots (three for potting soil and three for planting soil). 2. Plant sunflower seeds under a growth light. 3. Water all seeds on the same schedule. 4. Record the height and number of leaves. 5. Take pictures at least twice a week. 6. Record data and draw conclusion.

JBI123: Can Classical Music Calm Caged Dogs

My project involves putting dogs in a cage and playing classical. I Put the dogs into a cage and i played classical music while they were in the cage. I would have them in the cage for 5 minutes and write down what happen. Also i would take pictures even if they were just sitting there.

JBI124: The Wonders of Composting

The purpose of my experiment is to try different ratios of carbon (dried leaves and shredded newspaper) and nitrogen (shredded lettuce) to determine which mixture decomposes faster. I plan to measure the temperature of each mixture to monitor the decomposition. I am storing the mixtures in gallon sized ziploc bags and recording the temperature of each mixture every week. The project is still in progress and my hypothesis is that the mixture with equal parts of carbon and nitrogen will decompose the most and yield the most compost

JBI125: Can You Handle the Heat

In this experiment, I test out the greenhouse effect, I've been fascinated by changes in temperature. This project I will be focusing on temperature change and humidity change. From inside and outside of the closed off glass box. I think that it is warmer in the isolated box than outside of the glass box. I am currently still testing my hypothesis. I have been checking the temperature and humidity daily to see the change in weather

JBI126: Growing with Light

In this experiment, the student tested the growth of plants under different colors of light. It was hypothesized that the same type of plant will react differently to different colors of light.

JBI127: Got Lactose

When you go to your favorite ice cream parlor to gobble down savory goodness do you ever wonder what it really is and how it affects the people standing next to you? This delicious delight is lactose a sugar molecule found in milk and it is not as it seems. Most people have a hard time digesting lactose at the age of two but it gets more serious than that. It can cause bloating, gas, even stomach issues. In this experiment we will investigate the activity of lactose and the enzyme responsible for the ability to digest it.

JBI128: Ready Set Grow

Have you ever grown plants in your house? If so you probably have used lights to grow them. The purpose of my experiment was to show which light would grow microgreen radishes the best. My hypothesis was that the colored LED light would grow the best. I did not prove my hypothesis. The LED light grew the plants the heaviest. The average weight for the LED light was 49 grams, the colored LEDs average was 21.6 grams and the halogens average was 8.6 grams.

JBI129: The Effect of concussions on reaction time

I tested to determine if concussions that are fully recovered from affect reaction time. To do this I had 10 people who have had concussions in the past and 10 people who have never had concussions, and had them take the same reaction test this helped me see if you would be more affected if you had had a concussion than if you hadn't. My results show that people who have suffered one or more concussions suffer from worse reaction time. I think these might have occurred because the concussion might have affected that part of the brain.

JBI300: Cat sense of smell and preferences

We are researching cats' sense of smell. We set out two options of food at the end of a T-shaped maze. We thought the cats would be more attracted to the meat option and most of the time we were correct, but about half of the time the cats would pick the non-meat option. Also when we set out the food in front of the cats, sometimes they would go to the opposite food when going through the maze. Now, we think the one they picked might have been because of the stronger smell or they wanted to get out.

JBI301: Your Immune System's Memory

How does your immune system use its memory? Our project's purpose was to use magnetic tape, iron filings, and salt to make a model of the immune system. We found out that when you get sick, your body's immune system fights off this sickness. Your body has B and T cells in the immune system. B and T cells create memory cells. These memory cells remember what sicknesses your body has been through. Since it has seen this sickness before, it knows exactly how to fight it off again. This is how your immune system uses its memory.

JBI302: Organic vs. Non-organic fruit

We researched what supported more bacterial growth— organic or non-organic fruit. Our hypothesis is that organic fruit will grow more because it has fewer added chemicals. We cultured bacteria from four different types of fruits (apples, bananas, pears, and oranges) and compared them after a few days in the incubator. Our data analysis is currently in progress. We are analyzing photos of our bacteria on different days and tracking the number of colonies and their sizes. So far we have noticed that organic fruit is growing more bacterial colonies than the non-organic fruit.

JBI303: Ready, Set, Grow

There are so many soils nowadays, and you really want to pick the best one for your garden or plants. Our experiment tested the most reliable soil. We wanted to find out which soil could produce the most rapid growth of basil seedlings. The soils were Miracle Grow Potting Mix (MGPM), Natural and Organic Potting Mix (NOPM), Sphagnum Peat Moss (SPM), and Seed Starting Potting Mix (SSPM.) We put each type of soil in for pots each and put four basil seeds in each pot. We measured the length of the seeds for 14 days and found the best soil.

Chemistry (JCH)

JCH100: Food Grade Chemical Spherification

My goal was to learn about spherification. My hypothesis is that spherification works best when pH is near 7. I tested Coca-cola, tomato juice, and grape juice. First I made a Calcium Chloride solution using water and Calcium Chloride. Next I made a Sodium Alginate solution out of Sodium Alginate and one of the three test liquids I mentioned before. Then, I measured the pH of the Sodium Alginate solution. I squeezed the Sodium Alginate solution into the Calcium Chloride solution. Occasionally juice balls formed. I disproved my hypothesis because spherification works best when pH is more acidic.

JCH101: Efficacy of Various Solutions in Cleaning Pennies

The reason I did this project is to see the cheapest way to clean pennies. The first step I did was put three pennies in jars with a certain solution; next I let them soak and scrubbed them with a toothbrush. Then, I waited a day and then scrubbed them again. The important facts I learned from this experiment is that you should not clean with hot sauce, ketchup, and bleach due to them staining the pennies. Windex and Root Beer best due to them cleaning the pennies the best.

JCH102: Here Today, Gone Tomorrow

The question asked was "Do all liquids evaporate at the same rate?" I thought the rubbing alcohol would evaporate the fastest because the molecules in it are not as strong as those found in other liquids. After placing five measuring cups on the counter, I measured 500mL of water, salt water, vinegar, pepsi, and rubbing alcohol into them. Every other day, I measured and recorded the amount that was in them for a week. I repeated this two more times. The rubbing alcohol evaporates the fastest and vinegar the slowest. Changing the temperature in the house could change the results.

JCH103: Sour Apples

Oxidation of apples causes the apple to become brown, mushy, and undesirable. The obvious solution is to put lemon juice on it but does that really work? My prediction was that the lemon juice would greatly affect the apple's oxidation. Two bunches of apples are cut and one bunch has lemon juice while the other has water. The color of the browning is recorded over time. The average color of browning for the apples with water is 1.5 and the average browning for the apples with lemon juice was 1.4. In the end there was not a very large difference.

JCH104: Which Lip Balm Recipe Has the Best Overall Performance

It's wintertime! Do you know which lip balm recipe holds up best? This experiment tests heat, stickiness, and water durability using different combinations of beeswax, almond oil, and shea butter. If five varying recipes are tested, then the recipe using eight grams of beeswax, four grams of almond oil and eight grams of shea butter (recipe J) will test best. After careful experimentation and analysis, the conclusion is that the hypothesis was supported: recipe J had the best overall mathematical results. Knowing what recipe was most successful has enabled me to use a healthy product to keep my lips hydrated.

JCH105: Teeth Staining Project

The purpose of my project is to show how different beverages can stain your teeth. I hard boiled five eggs and let them soak in five different beverages for a period of time. I removed the eggs from the beverages to see how they would be stained. Many different beverages stain your teeth but in my experiment Orange Crush stained the most. My results meant and showed me that although many drinks of different colors stain your teeth, ones with bolder colors stain the most. For a future experiment I would use all bold colored drinks.

JCH106: Ooey Gooey Syrup

Have you wondered how temperatures affect maple syrup? I was thinking that the highest temperature would affect it the most. My hypothesis was right! It did affect it the most! Maple syrup is made from xylem sap. Maple syrup used to be made in the USA. Canada is now making 80% of Americas maple syrup. I was doing some research and I found out that maple syrup contains 24 different antioxidants. The reason I chose this project was because it sounded interesting to find out that maple syrup can move faster at a higher temperature. In completion of the highest temperature took the shortest time to pour. If I was to do this again I would change the maple syrup to honey.

JCH107: Color Changing Flames

The purpose of my experiment is to help junior fireman learn about the fires they will be putting out one day. When you become a junior fireman there are many classes you need to take and pass, called essentials, before you can go on. One of the first training classes goes over fire extinguishers. How they work, why they work and what materials they work on. I chose the color changing flame project to learn more about how the material or chemical burns, what the temperature of the colored flames are and what fire extinguisher would be used. I believe this project will help all junior fireman when they are beginning their classes.

JCH108: Desiccants Mummifying Hot Dogs

For my science fair experiment, I mummified hot dogs. I chose this topic because I learned about embalming and mummification in school. For my experiment, I covered hot dogs with different desiccants in bags to see which one would drain the hot dogs' fluid. I hypothesized that covering hot dogs separately with baking soda, salt, and cinnamon would drain its fluid. Baking soda worked best. Surprisingly, cinnamon caused the hot dog to shrink too. Salt caused little change. The hot dog without desiccants grew mold and smelled. I learned baking soda was the most effective at draining the fluid.

JCH109: It Will Glow Your Mind

In my experiment, I wanted to find out what makes certain rocks glow. I set rocks (fluorescent and non-fluorescent) on a table and shined a UV (ultraviolet) light on them. I also researched ultraviolet light and the affect it has on florescent minerals. UV light has short wavelengths, Infrared light (IR) has long wavelengths. UV light is invisible. I learned when UV lights are exposed to certain minerals, the atoms in the minerals get "excited" and, therefore, glow under the light. Not all rocks possess the minerals to be florescent.

JCH110: Dirt on Dirt: Looking for Lead

In this experiment, the student tested soil samples from around the city of Pittsburgh for lead content. The student hypothesized that lead samples closer to where steel mills and plants used to be would have higher contents of lead.

JCH111: Stretch It

Have you ever wondered how to make putty to play with? In this experiment, my main goal is to learn how to make putty. Here are some facts from my research. I learned when more glue is added, the putty gets more thicker than when you add more borax. Therefore, the evidence I found is you would not want to add too much borax, if you want to play with it because it is not as densely hard and the putty increases in liquidity.

JCH112: Which Stains Your Teeth More; Tea or Coffee

Many people drink coffee or tea in the morning, but did you know that those liquids can stain your teeth? In my experiment i used chalk in tea and coffee to see which would stain more. I let them soak in for about 7-28 hours for each trail. After the time was up I used a centimeter gird and measured the darker stained areas to calculate. I found out that tea stains your teeth more and had a larger surface area.

JCH113: Shiny Pennies

I did this project because it excites me on a molecular level. I wanted to know which liquids cleaned pennies the best and why. It is explored how elements copper and oxygen bond together and how they are separated. Through experimentation I found that the acidic liquids cleaned oxidation the best. 25 tarnished pennies were soaked in different liquids to see which one would clean the beat. The results showed tat lemon juice cleaned better than orange juice, cola, and dish liquid.

JCH114: Which Fabric Makes the Brightest, Boldest Tie- Dye?

Have you ever wondered which fabric is the best for tie-dyeing? That is what I tested in my experiment. My topic was fabric and tie-dyeing. I chose it because this summer, I tried tie-dyeing. The fabric I used was cotton, and I wondered why many people use cotton for dyeing. After research, my hypothesis was that cotton will dye the best. For my experiment, I dyed five different fabrics consistently. I was surprised by my results. Nylon was the boldest, and polyester was barely even changed. I learned that all fabrics accept dye differently.

JCH115: Changing Gummy Bears

My project is changing gummy bears. In my project I used different liquids to observe the absorption rate of each liquid into a gummy bear. Each gummy bear soaked in the liquid for 24 hours. I then took them out and measured each one. Then I could compare that mass to the beginning mass. The higher the viscosity of the liquid, the less the gummy bear grew.

JCH116: Taste the Density

Many bakers want to be the best, but how do they make the best cupcake? With the perfect recipe! My project proved that taking away flour from the control recipe would make a very dense cupcake, which is not originally what I thought. I predicted that adding more flour would make the cupcake denser, but that was wrong. The cupcake with more flour had a density of 0.597 cubic grams per centimeter while the cupcake with less flour had a density of 0.77 grams per cubic centimeter. This project helps people everywhere because it can help them make better cupcakes.

JCH117: The Fun of Bubbles at Home

This investigation was conducted because if you use just generic soap like Soft Soap is used to make bubbles it won't produce the biggest bubble. When Dawn and Palmolive are used they will produce very large bubbles. The first step was to make the solution, then prepare the surface, use the straw to blow to blow the bubble, after the bubbles are popped measure the radius of the bubble and then record the measurement. In conclusion the Dawn did produce the largest bubble, Soft Soap produce the second largest bubble, and Palmolive produced the smallest bubble.

JCH118: Fun with Slime

The purpose of my project is to determine how using different bases affects the elasticity of slime. I tested a recipe of slime and changed the base used each time. I then tested how far the slime would stretch. My hypothesis was if I change the base used to create slime, then the slime created will have different amounts of elasticity. I think that the slime with baking soda will have more elasticity because baking soda makes it more elastic. No it was not because the slime did not form at all. I learned that neither bases made it more elastic with contact solution. When I was making the slime the baking soda just would not form but the salt stretched average of 5 cent., the toothpaste stretched 7.6 cent. I thought the baking soda slime would stretch farther. When I was making the slime the baking soda just would not form but the salt stretched average of 5 cent., the toothpaste stretched 7.6 cent. Toothpaste 7.6 cent. Baking soda 0 cent. salt 5 cent.

JCH119: The Effect of Baking Powder

In The Effect of Baking Powder three cakes were baked with different amounts of baking powder. The cake with the least amount of baking powder was the tallest at 7.37cm, the cake with the most baking powder was 6.37cm, and the original recipe was 4.7cm tall. The cake with the least amount of baking powder weighed 2,604g, the cake with the most amount of baking powder weighed 2,632g, and the original recipe weighed 3080g.

JCH120: Acid Balloons

The purpose of my project is to see if the balloon will pop or not while using different acids mixed with baking soda. I added baking soda to a balloon and added the acid to a bottle. I then put the balloon on top of the bottle and measured the circumference of the balloon after it blew up. My hypothesis was that the balloon was going to pop but it didn't. The lemon juice started to fizz and it inflated the balloon. I also thought that if I used different acids added to baking soda it will create a reaction and the balloon will blow up at a different amount. I think that the balloon will expand larger when vinegar is added. My hypothesis was not supported because I thought that the balloon was going to pop by using using coca cola but it didn't. It was not supported because coca cola was actually the weakest acid and blew the balloon up the least. The vinegar balloon did not create bubbles or have any sound. It expanded slowly to 18 ½ inches in circumference. The Coca Cola balloon had no sound and expanded slowly to 7 inches. The lemon juice balloon pushed loud fizzy bubbles up for almost 10 second and it expanded to 22 inches.

JCH121: Lecturing Litter

People litter so much every day not having a clue about what they are doing to the earth. I wanted to find out what area is "cleaner": urban, suburban, or rural. To get my results, litter was collected from 3 areas, and tested with a Taylor brand drop test for sodium chloride. Results were compared, proving my hypothesis incorrect that the urban area water would have the most sodium chloride. My results showed that the suburban area water had the most sodium chloride. My experiment demonstrates that suburban areas are more polluted than urban and rural areas.

JCH122: The pHacts of Liquids: Temperature's Effect on pH values

In this project, I will be experimenting whether temperature will have any impact on the potential hydrogen levels of liquids. I will be using a pH sensor I constructed in order to get accurate readings of the pH values. PROBLEM STATEMENT: Does the temperature of a liquid change it's pH value. HYPOTHESIS: I believe the the ph value of a liquid will change based on the temperature of the liquid. PROCEDURES: 1.) I will construct my own pH sensor. 2.) First I will fill 3 glasses of liquids. 3.) I will place 3 in the freezer, leave 3 out to room temperature and leave 3 out in the sun. 4.) I will then use my pH sensor to identify the pH values of the liquids 5.) Finally, I shall record the values in a table I will create.

JCH123: Would you "dye" for that?

Hair dyes seem to make your hair very weak and frail. In my experiment I will test to see which type of hair dye is the best for your hair. I am interested in finding out how varieties of hair dye effect your hair and how much it breaks down the cells inside. I will study the results under a microscope to identify how the dye effected the hair.

JCH124: Bouncy Ball Height

Does the temperature of the ball effect it's bounce? My hypothesis is the frozen ball will bounce the lowest and the boiled ball will bounce the highest. I chose this project to see the effects of the temperature on rubber balls. For my project, I took 3 balls. Boiled one for 2 minutes, froze one for 1 hour, and one was room temperature. At 160 cm I dropped them, recording how high they bounced. This was repeated 3 times for each ball. My project proved my hypothesis correct. To make my project better, I would see if different surfaces effected the results.

JCH125: Which Drink Stains Teeth the Most?

I wanted to find out how to modify structure to withstand seismic waves. The procedure for this model was to gather materials, build a rectangular prism and bolt a meat carver into it. At home I built this model and tested it, and made sure everything worked. My hypothesis was that without support beams the building would collapse. When I performed the experiment my hypothesis was proven correct. I decided that every building code should have the rule that you should always have triangular support beams in your buildings.

JCH126: Which Antacid Works Best?

My experiment was conducted to help consumers buy the leading antacid. Heartburn is a common problem, so this could help anyone who frequently gets heartburn buy the best antacid. I did this by putting 1 mL of antacid into the same amount of lemon juice in test tubes and putting test strips into them. Doing this, I learned that Mylanta had the highest pH level. Baking soda, the cheapest, was second. This means Mylanta is most effective, but baking soda is the better option. For future experimentation, I could test generics against brand-name antacids, or to other generics.

JCH127: How Permanent is Permant

Have you ever wondered how permanent your markers are? They are a typical use of many people. I hypothesized that the Staedlter brand would last because it had a thick point. I marked five cloth squares with five markers and tested them by washing them. My results showed that the Staedlter brand only faded one cm in the test and lasted longer than the other brands. The Staedlter brand stayed permanent and lasted the longest. Now you know which marker to trust.

JCH300: Pop Pop Fizz Fizz Quiz

When you have a cold or are sick, you might take Alka-Seltzer tablets. Our project is about which water temperature Alka-Seltzer dissolves in faster. We put the tablets in the different temperatures of water and as soon as we dropped the tablets in, we started the timer. When the product stopped fizzing we stopped the timer and recorded the time. The cold water times were: 153, 89, and 94 seconds. In room temperature, the times were 44.9, 48.5, and 54.4 seconds. In hot water, the times were 27.5, 25.8, and 28.5 seconds. In conclusion, the fastest dissolving time (25.8 seconds) was in hot water.

Physical Sciences & Engineering (JPE)

JPE100: Mentos in Soda

My purpose is to help people signal a start of an important event, to celebrate a party, or just as a kids activity. My question was what kind of soda has the highest explosion? I would get 5 mentos and put it in the sodas. I learned that diet soda can go higher than regular soda. My results mean that diet soda goes higher than regular soda. No, I can't compare mine with others. No, it doesn't give any ideas for future experiments.

JPE101: Auto Fuel From Household Goods

Which liquid works best when combined with baking soda to power a homemade plastic automobile the farthest? I think the liquid that will work best is vinegar when combined with baking soda to power a plastic automobile. Three trials for each liquid powering a plastic automobile mixed with 1 tb of baking soda. Including: Coca-Cola, Low Sodium Club Soda, Water, Apple Cider Vinegar, Hawaiian Punch, 2% Milk, Ginger Ale

JPE102: Generating Electricity Through Waves

Introduction-Renewal energy can be used to produce light, heat, or for the movement of any objects. In this experiment, I will explore how to get energy from water waves and this will be renewal energy. Problem Statement- Does the amplitude of the waves is directly proportional to the electricity? Procedure- The amplitude of waves will generate the electricity which I will be monitoring with multi-meter. Result- The mechanical energy generated from the motion of the water is converted into electricity.

JPE103: What Blocks Wi-Fi Signal?

The main objective of this project was to find which material that I tested would block the most Wi-Fi. I found this by getting a box and wrapping it in aluminum foil to make it block all the Wi-Fi signal. Then I measured the dBm of the signal after using one of the materials as a lid from 4 feet away with a computer program. To make sure that this was accurate data, I took a control in-between each material to make sure that the base signal was about the same. Some materials blocked little or no signal: wallboard, bread, pine wood, and plastic. Other materials blocked some signal but were not as good as metal: concrete, compressed wood, and Wi-Fi-blocking fabric. Water and metal were the best blockers.

JPE104: Stretch It!

In this experiment I answered the question of why temperatures effects rubber bands. Rubber bands were soaked in hot, cold, and room temperature water. The rubber band was held up to a meter stick with a weight hanging on it, to observe the amount of stretch. The average length in room temperature water was 20.1 cm. The average length in the cold water was 23.7 cm. The average length in hot water was 18 cm. I investigated this experiment because I am very interested in physics and I was curious about the outcome.

JPE105: Determining the Most Effective Adhesives on Plastic and Wood

For my project, I tested epoxy, wood glue, super glue, and Gorilla glue on wood and plastic. I wanted to find what glue was the strongest on plastic and wood. I created a winch and pulley system along with a digital scale to find the shearing force required to separate glued materials. I hypothesized that the super glue would hold the best for the plastic and Elmer's wood glue would hold the best for the wood.

JPE106: Three Person Chess Board

Can I make a different three person chess board? The board that I plan to make has to have some sort of wall between each team's rooks, so each team does not immediately lose their rooks. New rules will be necessary so that the pieces don't move recklessly, and have a way to move simpler.

JPE107: What Wood You Use?

In this investigation, different types of wood were tested to see which is best suited for construction. If the same amount of force is applied to a nail inserted into Pine, Maple, Oak, and Poplar, the nail will penetrate Oak the least, and Pine the most. My procedure for this project was, I assembled a hammer to a hinge, that was attached to a 2x4. The hammer was raised to 90 degrees and then released to impact the nail consistently. All woods were tested. Pine was the softest and Oak was the hardest, most dense wood. Which wood you choose.

JPE108: Iron For Breakfast?

Iron deficiency can cause many health problems. Breakfast cereals are considered to be an excellent way to get your daily iron. This study evaluated three breakfast cereals with various iron contents. This study was conducted because it is important for consumers to know and trust the labels of the foods they eat. The iron content for each cereal was extracted by blending the cereal into powder form, adding water, and using a high-power magnet. The cereal with the highest daily percentage was Total Wheat. It also extracted the most iron on the magnet.

JPE109: Create Structures to Withstand Seismic Waves

I wanted to find out how to modify structure to withstand seismic waves. The procedure for this model was to gather materials, build a rectangular prism and bolt a meat carver into it. At home I built this model and tested it, and made sure everything worked. My hypothesis was that without support beams the building would collapse. When I performed the experiment my hypothesis was proven correct. I decided that every building code should have the rule that you should always have triangular support beams in your buildings.

JPE110: Water and Ice Erode Rock

The purpose of this project was to investigate what happens when rocks experience rain and freezing, and to find out which rock would be affected the most. Limestone, sandstone, and shale rocks were chosen for the experiment. The rocks were placed under dripping water, then frozen and thawed, and placed under dripping water again. From this experiment I learned that all of the rocks eroded. The weight of the shale rock and the appearance of it changed the most of the three rocks. These results mean that weathering affects all rocks, even when recreated in your home.

JPE111: Affect of Wax on Mountain Skiing

The purpose of this project was to determine if more expensive ski wax allowed for greater ski velocity. It was predicted that the more expensive the wax, the faster the velocity of the ski would be. To test this, skis were stripped and wax was applied. A boot was attached to the ski and a weight was placed in the boot. The ski was released to travel downhill toward a target and speed was recorded. Results available at fair.

JPE112: Veggie Power

The purpose of my project is to determine if the type of vegetable affects the amount of electricity created. For my project, I connected wires to different vegetables and then tested to see if they would turn an LED on. For the first trial which was the potato it didn't work because we used a regular light bulb instead of a led light. The second trial which was the cucumber didn't work because I used the wrong wire when I should have used copper wire. In the third which was a lemon the light lit up because the clips were the right place. My hypothesis was if I change the type of vegetable used to create electricity then the amount of electricity created will differ. The lemon will give of the most energy because I thought that a lemon with lots of juice will attract more energy. My hypothesis was supported because everything that I thought could happen, happened. When I stuck the the nail's into the lemon nothing happened until I attached the alligator clips to the nails and the Led light, light up.

JPE113: Ice...How Curious Are You?

Ice cubes are used to keep stuff cold or if you got hurt. What do you use, you use ice. But what we are doing here is what makes an ice cube melt the fastest. What I am doing is getting water, Gatorade, pop, and apple juice, and all you do is get your stop watch, paper, and a pencil and calculate your data on witch ice cube melts the fastest.

JPE114: How Much Electrical Energy Can the Motor Produce?

Electricity is such an important part of our daily lives. I thought it would be interesting to create a simple motor and observe the small changes I made. In experimenting, I changed the thickness of the wire and alternated the magnets to see if it would still spin. The battery used initially was a "D" size, but then changed to a "C". The wire did not spin with fewer magnets but "D" battery was hot to touch. Changing to "C" battery displayed better results. Experimented with fewer magnets and observed the rotation of the coil.

JPE115: Best Insulator for Balls at Different Temp.

AbstractReferees and soccer players struggle with soccer balls maintaining their bounciness throughout the whole game as temperatures change. This experiment investigates which insulators reduce bounce changes due to temperature fluctuations. Three insulators were used: aluminum foil, bubble wrap, and polyester batting. These insulators were wrapped around size 1 soccer balls. All the soccer balls were either put in a freezer or in an oven to create controlled temperature changes. The balls were then dropped from a ladder to measure bounce height. The results revealed aluminum foil was best for hot weather, and bubble wrap was best for cold weather.

JPE116: Volcanic Panic

The purpose of my project is to determine how the shape of a volcano's vent affects the height of the eruption. I tested this by creating volcanoes with different sizes of vents and then adding the same amount of baking soda and vinegar to each one. I then measured how big the eruption was. The cinder cone eruption was 7 inches, the shield eruption was 3 inches and the composite was around 6 inches. If I change the shape and size of my volcano's main vent then there will be a different sizes of eruptions. I think that the smaller vent will have the biggest eruption because the smaller water bottle does not need a lot of energy to push the vinegar out of the volcano. My project was supported because the volcano with the smaller vent had the highest record.

JPE117: The Simplest Electric Train

This experiment tests the steepest hill that the world's simplest electric train can climb. The train was constructed using a coil of copper wire attached to a board, and the train consists of a battery with a magnet attached to each end. The student hypothesized that the steeper the hill, the more energy the "train" or battery will use.

JPE118: Just Head It?

My project, Just Head It, determines the impact of a soccer ball on the head both before and after using a protective headband. Using an accelerometer attached to a headband, which is strapped on to a helmet, I tested the impact of a soccer ball. I hope that the information gained from this project will help others make a more informed decision about heading a soccer ball.

JPE119: Can Fruits Or Vegetables Supply Power To An LED?

Finding a different way to supply energy can inspire you to use an alternative energy source there are multiple ways to do this; such as, friction, but what if we could supply energy with something we use in our everyday lives? We could use fruits and vegetables! It's easy to do this all you need is a zinc coated nail, a copper coil and a fruit or vegetable. Insert the two items apart from each other and use connectors to supply power to whatever your powering.

JPE120: Take Flight

I am going to test how the shape of a paper airplane affects the length of the flight. I think that the shape will affect how far an airplane will fly.

JPE121: The Effect of Friction on Speed

If a wheelchair will move faster on a fine surface than it will move on a coarse surface. The engineering goal is to determine the most efficient and safest type of wheelchair ramp. Test a model rolling down a ramp measuring 4 ft in length with different surface conditions. The control variables will be the elevation of the ramp, the length of the ramp, the weight of the ramp, and the wheel model. The dependent variable will be the time it takes the model to travel down the ramp. The independent variable will be different surface conditions of the ramp.

JPE122: Strength of Magnets

My experiment is about measuring the pull distance of different magnets. These magnets have different shapes and sizes. Pull paperclip using smallest magnet to the biggest magnet based on their volume and shape. Initial results for block magnet were as expected and showed smallest magnet is weakest and biggest was strongest. This trend was not true for disc magnets and results were different. I observed largest or biggest surface area of the magnet played a key role in bringing the paperclip closer to the magnet at a farthest distance when pulled either from North or South Pole of the magnet.

JPE123: What Material catches the most Humidity?

The purpose of this experiment is to find out what material collects the most humidity. It could be used in real life because the best material could collect fog for drinking water. I looked at how plates of different materials collect humidity and turn it into drinking water. I exposed plates of different materials to see how much humidity they would catch. In my experiment, sand paper caught the most moisture, and the metal plate was second best.

JPE124: Let Your Light Shine

Have you ever wondered if one brand of battery is better than another? In my experiment, I tested to see which battery would last the longest in a flashlight. I hypothesized that Rayovac batteries would last the longest because it has a higher voltage than Energizer or Duracell batteries. Using a video camera, I measured the time the flashlight stayed on. My data revealed that Rayovac batteries have an average of 2,606 minutes, Energizer batteries had an average 2,558 minutes, and Duracell batteries had an average of 1,060 minutes. With this data, I now know to buy Rayovac batteries.

JPE125: Explorations of Benfords' Law

Benford's Law is an observation about the leading digits of the numbers found in real-world data sets. One might expect that the leading digits of these numbers would be uniformly distributed, so that each of the digits from 1 to 9 are equally likely to appear. In fact, it is often the case that 1 occurs more frequently than 2, 2 more frequently than 3, and so on. This observation is a simplified version of Benford's law. The law is applied in analyzing the validity of statistics and financial records. Western Pennsylvania Regional Data Center and (US) data.gov has published many data sets. I took some of the data sets and used tools like Tableau and Excel to test the law. From the project I learned that data and math are very helpful in solving real world problems.

JPE126: How to Build a Better Battery

Does increasing the number of coins used in a homemade battery increase the amount of electricity generated by the battery? My hypothesis is that as I increase the number of coins used in each battery, the amount of electricity will be generated. I also believe that as I increase the number of paper towel squares used, this will also increase the amount of energy being generated. During the experiment the number of coins and paper towel squares used will be increased every trial. The size of the paper towel squares (1in.x 1 in.) and the liquid conductor (lemon juice) will remain the same in each of the two trials.

JPE127: Jumping Sparks

This experiment was done to find the furthest distance a spark could jump. The hypothesis predicted that the spark could travel 7cm, and create 210kV/cm. For the procedure, two metallic spheres were put a set distance apart; then, if no sparks were created over three tests, the spheres would be moved closer, and if sparks were consistently created, the spheres would be moved further apart until the furthest distance was reached that sparks were consistently created. The hypothesis was incorrect, as the furthest distance sparks were consistently created was at 1.5cm., which means only 45kV/cm were created

JPE128: Do-It-Yourself Raspberry Pi Motion Camera

Security cameras are expensive when additional features of secure-access, night vision, and motion detection are included. My experiment provides an affordable camera, email integration and a password protected live feed. I used a Raspberry Pi Single-Board-Computer and a Pi-Camera to create my camera and its features. Authoring motion-detection and integrated email with python, I achieved the capabilities of expensive security cameras. I tested the camera by accessing the live feed at night. When it detected motion it would send a 10-second-video-clip to my email. My data supported my hypothesis to create an email-integrated night vision camera.

JPE129: Tricky Faces

This experiment tests the effects of disguises on facial recognition software. For the experiment, the student placed different forms of disguises on a mannequin head to see if the facial recognition software would recognize the face. The student hypothesized that the number of disguises would directly correlate with the ability of the software to recognize the face.

JPE130: Battery vs. Temperature

My project is to see if the temperature of a battery matters. My hypothesis is that when the battery is cold it will output a higher voltage. The hypothesis was inconclusive as while it appeared to output higher voltages at lower temperatures, the results only differed by 0.10 volts. The experiment was performed with two batteries at each of the freezing, ambient, and high temperatures. Three trials of each were performed. It was a fun experiment to do anyway even though the results are not clear. I think the science fair is a fun thing to do.

JPE131: Aluminum Air Battery

Batteries are a common item that we use every day, but contain chemicals that are harmful to the environment. My hypothesis was that I could create a battery using household items without harmful chemicals. I tested my hypothesis by using aluminum foil, paper towel, saltwater, and activated carbon. Using these materials in the right combination produced electricity that lit up a light bulb. My experiments showed me the higher the salt concentration, the brighter the light. This supported my hypothesis. However, the electricity was low and more experiments need to be done to see if more electricity can be produced.

JPE300: Hydro Power

This experiment proves that water could generate power.

JPE301: Aerodynamics of a ping-pong ball

We researched aerodynamics of ping-pong balls. We dimpled ping-pong balls and measured how far they would go in a wind tunnel, how long it takes them to fall from a bridge and how high they go when put in a hair dryer air jet. We hypothesized that dimpling a ping-pong ball would make it more aerodynamic because it makes golf balls more aerodynamic. But we found that was not the case. In all our experiments the original ping-pong ball proved more aerodynamic. We think this is because the dimples don't work at low velocities or they only work when spinning.

JPE302: Maglev Train

Our purpose is to see "What will be the effect when more than 1 stack of magnets is placed on the train?" We chose this because we wanted to see what will happen when more magnets are put on the train. Hypothesis: "We think that the train would levitate even higher than it is right now." We thought it would levitate higher because we thought that when you add more magnets on it, the more repulsion it has. Description: I made a track and a train out of legos and I used magnets to levitate the train from the track. There is two lines of magnets on the train. It has 7 magnets on each side. The track also has two lanes of magnets It has 19 magnets on each side. In total, the magnets on the train is 14 on one layer of magnets and 38 magnets on the track. Final results will be shown at the competition!

JPE303: Candy Flow

Our question was what is mass flow rate? We hypothesized that Skittles and Runtts will flow better than the Candy Corn, Jolly Ranchers, Gummy Worms, and Air Heads because the Skittles and Runtts are smaller than the Candy Corn and other candies. In our project we put candy in a funnel. And timed it while the candy fell through. At the end of our project the Runtts flowed the fastest. Our project was very fun. Even if it did take a while. It was very confusing at first but we worked it out at the end.