Pittsburgh Regional SCIENCE & ENGINEERING Fair
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84th Pittsburgh Regional Science & Engineering Fair

Junior Division

Behavioral and Consumer Sciences (JBC)

Student Project Abstracts

March 28, 2023

Notes to Judges

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- Procedures used
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- Possible research applications
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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)

Behavioral and Consumer Sciences (JBC)

JBC100: Modeling the Detection of Pathogens in Sewage Sheds

COVID-19 has shown us all that new and old pathogens can suddenly appear in the population, and infected people may not show symptoms. Another example of this is polio, which can paralyze some but may not show any symptoms in others. Unintentionally, people may spread it to others leading to an epidemic. Getting tested is also not universally possible because people may not want to get tested, there may not be enough tests available, tests are very expensive, and they may not be accurate. It is vital to detect viruses in communities early to prevent the spread of the disease. The CDC has started to work with some municipalities in many states to sample sewage systems and analyze these samples to determine the prevalence and levels of diseases, providing an early warning system. However, I could not find any good models of where to sample, how often to sample, where to locate sampling points, and the accuracy of identifying viral loads and affected neighborhoods. Therefore, I used some math models to explore this problem. I made several assumptions, but I think that these models provide a good starting point to understand how to build a good nationwide system for early detection of disease. My eventual goal is to use real data and models of sewage flow and sewage sheds to locate sampling points that can precisely identify neighborhoods infected with a disease. I am generating data from my analytical models. If time permits, I will try to use data from the CDC as input to my models. Model analysis and evaluation is continuing. The available results will be presented on Fair Day.

JBC101: Picture Perfect

The reason I am conducting this experiment is to gather more information on how lighting affects a picture and its clarity. I am gathering this information to help others take better photographs and to improve their understanding of photography. I believe this will not only have an impact on the world but on people on social media as well because they take pride in having perfect lighting and making pictures look as nice as possible. There is already a lot known about different photography such as all the different ways shadows affect an object and its appearance on format.com and how lighting makes an object's background and surrounding brighter and darker on photographycourse.net.

JBC102: Derry Delight

Lactose intolerance is a problem in many people's lives. It harms and affects the human body in painful ways. Lactose can do many things such as diarrhea, gas and bloating. Lactose pills and tablets try to stop the pain as much and allow lactose intolerant people consume lactose. In this project lactose pills will be tested for the dissolution rate in different liquids. The liquids that are being tested in this experiment are milk, water, juice, and carbonated soda. This experiment will consist of dropping lactose pills in different liquids.

JBC103: Test

Please visit student's exhibit for abstract

JBC104: Which kind of toy do different cats prefer?

The top three most important facts from my research were that 1. A cat dosnt only rub on things as a sign of affection, but as a sign of territorial instinct. 2. The cats toy/play preferences also highly depend on a cat's personality just like humans, and 3. Cats dont know they are playing until they are 6 moonths old. My hypothesis was that I believed that the cat would go to one of the new toys because of a cat's territorial instinct and that the type of new toy would depend on the cat's personality. To cellect my data I went to a cat cafe, I set down the toys and let the cats choose 3 different times (I had 3 trials for each cat) and as they picked I made sure to record their choice. My data tells me that a cat's choice of play is most definitely dependent on their personality, but they will almost always go to the new toy because the will want to claim it as their own. I tested 4 cats 3 different times, and the favorite toy was picked once which proves my hypothesis correct.

JBC105: Oops I Spilled That! What Dish Soap Works Best on Wildlife?

Occurring oil spills happen all over the world. There are many different soaps to clean it up, but which soap works the best for cleaning up animals after an oil spill? What's the Best Type of Soap to Use on Rescued Animals. If the investigator uses dawn dish soap it is believed it will work the best on rescued animals. The procedure is to pour oil onto the feather and wait three minutes. After three minutes, the investigator will take the measured soap and lather it on. After the soap is lathered on they will put the feather under the faucet for 30 seconds. If some feathers still appeared to be greasy, you would repeat the experiment,but only with the soap and running water. The hypothesis was wrong in the final results of the project, because Dawn and Ajax both took the least amount of soap to extract the oil from the feather.

JBC106: How Music Effects the Tunneling of Ants

The purpose of my project is to find if different types of music will affect the tunneling rate of ants.I believe that classic rock will boost the tunneling rate of the ants. In conclusion the country had the best effect on the ants. The ants that had no music had only 15 cm of tunneling in 5 days .While the ant listen to country music dug 23 cm in 5 days.

JBC107: Ratio of Corn Syrup to Sugar and Marshmallow Height

Three different corn syrup to sugar ratios were tested to determine which ratio provided the greatest height of the finished marshmallows. The ratios included corn syrup greater than sugar, corn syrup equal to sugar and corn syrup less than sugar.

JBC108: Paper Towel Absorption

My research questions are which brand of paper towel absorbs the most water, and is it true that Viva absorbs the most water? When researching, I came across an article that said, Viva absorbs the most water. My hypothesis is that Brawny will absorb the most water because the materials seem very thick. The reasoning behind picking this project was because I want to make sure that when people buy paper towels, they're getting their moneys worth. For example, someone might be buying Bounty for $3.60 when Mardi Gras absorbs more water and is only $1.20 a roll. I did 36 different tests using one, two, and three paper towels, with 6 different towel brands: Bounty, Scott, Brawny, Sparkle, Viva, and Mardi Gras. They were used on water and coke. For water absorbed, the range for one paper towel was 20-30g. For two paper towels, it was 40-60g, and for three it was 35-65g. For coke, it was 20-35g then relatively the same from there. From this, my hypothesis was wrong, and Viva absorbed the most water, so the research question was right.

JBC109: Which Brand of Microwave Popcorn Pops the Most Kernels?

I predicted that the Orville Redenbacher brand of popcorn would pop the most kernels. I did not finish my project yet, but I am confident in my prediction. I will also be taking a survey and finding out what brand of popcorn that people like the most. I will let people try a piece of each brand, and rate them on taste, butteriness, and saltiness.

JBC110: Stain Stain Go Away

Is there a laundry detergent that completely removes my test fabric stains completely? My testing set out to prove my hypothesis that Persil was the best laundry detergent to remove all of my test fabric stains. The procedure that I took for my project was to cut the shirt into 12 squares. Then stain them with the various products and put them in the laundry machine. I first tested Tide, next Gain, then Arm and Hammer and finally Persil laundry detergents. The results of my project were that Tide worked best on the mustard stain as it removed 60% of the stain. Gain worked best on the chocolate syrup stain as it removed 60% of the stain. Persil worked best on the spaghetti sauce stain as it removed 75% of the stain. I concluded through my various tests that no one detergent successfully removed all of the stains despite the claims of the various laundry detergent brands.

JBC111: Grey Tree Squirrels Food Preferences: Natural, Processed, and Ultra-Processed Foods

I tested what squirrels would prefer to eat if I offered them natural, processed, and ultra-processed foods. I tested this in the autumn, and the location was my treehouse in my backyard, which is bordered by a forest where squirrels live. My hypothesis was that squirrels would prefer natural foods because some animals have been shown to typically prefer their natural food. My findings show that squirrels prefer walnuts, a natural food, followed by apples (natural), Cheerios (ultra-processed), Fritos (ultra-processed), cheese, and bread (processed). These findings generally support my hypothesis as they show that squirrels prefer natural foods over processed and ultra-processed foods.

JBC112: Do Images Trigger Information Recall in the Human Brain?

I tested whether images trigger retention of information or not. My hypothesis was that people who saw the image again with their question form would score higher. The results showed that tests with the image received significantly higher results. The average was significantly higher, showing that my hypothesis was correct.

JBC113: Observing Fish and Their Response to Music

The hypothesis was that fish would react differently to music, increasing their activity and following a finger. Throughout the experiment, the fish's behavior was observed to see what their activity level was with certain actions such as moving closer to the observer, hiding behind the scenery, emerging from hiding, moving to the surface of the water, zigzag movements, and last of all tracking a finger across the glass. The hypothesis was incorrect in that the overall activity of the fish did not change, in that there was no increase in activity score in response to music. There were some changes seen in certain activities which suggest that further experiments might be needed to see differences in fish behavior with music.

JBC114: What Melts Faster?

I chose to do this project because I wanted to know if melting rates of chocolate are affected by the ingredients in the chocolate. I chose to use sugar free and regular miniature Hershey Bars. I melted the bars in the microwave on 15 sec, 30 sec, 45 sec, and 60 sec intervals. I used a qualitative rating scale to determine how melted the chocolate was.

JBC115: How Much Iron In Cereal?

My project is about the level of iron in cereal. I chose to use Rice Chex, Froot Loops, Cheerios, Cinnamon Toast Crunch, and Honey Nut Cheerios. The first thing I did was put the cereal in a bag. Then I crushed them into dust and added water. I let them sit over nite. The next day, I placed a magnet into the bag. The magnet was attracted to iron particles. I was then able to determine how much iron would be released from each cereal sample.

JBC116: Does Tin Foil or Plastic Wrap Preserve Food Longer?

My testable question is does tin foil or plastic wrap preserve food longer. The 3 most important facts about my project are mold needs oxygen to grow because it comes from spores in the air . Mold can't grow well in cold temperatures ,it grows better between 60 and 80 degrees fahrenheit and there are many types of mold that grow in different places like outdoor indoor and on different types of food like bread. My hypothesis is that plastic wrap will preserve food longer than tin foil because it is more air tight and mold needs air to grow.In conclusion plastic wrap is the best way to preserve your food because the bread covered in plastic wrap that was in the fridge lasted 13 days and the bread that was uncovered and on the counter lasted 2 day but then got stale.

JBC300: Stress, Tests and Music

Students of all ages have proven to be stressed during tests. To provide more options for test-takers during exams, we are performing an experiment with music. We will record two groups of students' performances on an extremely short assessment. Our hypothesis lies in that students listening to music will perform marginally better than students not. If it proves correct, we hope to expand opportunities for stress-relieving during tests. Specifically, we believe that students should be able to listen to music during all types of examination. Many experiments before ours prove that music does work wonders with stress, and our hypothesis states that stress negatively affects students' scores on tests.

JBC301: Remove It!

The question we answered was, Can you remove nail polish from carpet and hardwood floors using homemade remedies? When using nail polish I got some on my carpet and wanted to know how to fix it without anyone knowing. We tested toothpaste, baking soda and water, and lemon juice to see what remedy cleaned the floor. We believed lemon juice would clean the carpet and the toothpaste would clean the hardwood floor. Lemon juice is a citric acid that we believed could take polish out of carpet. Toothpaste is a cleaning product for teeth and we believed it would clean the hardwood floor. To complete this project we made three nail polish spots on a carpet square and hardwood floor. Then, we let those dry for three days. We washed each spot with one of the homemade remedies, lemon juice, toothpaste, or baking soda and water. Next, we made three nail polish spots on a piece of carpet and on a piece of hardwood floor.Then washed the nail polish spots right away with the homemade remedies lemon juice, toothpaste, or baking soda and water.We found none of the homemade remedies cleaned the nail polish that dried for three days. None of the homemade remedies cleaned the carpet right after the spill. The homemade remedies did work on the hardwood floor right after the spill. The lemon juice and toothpaste only left a thin very light pink color. The baking soda and water cleared all the nail polish off.

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Biological Sciences (JBI)

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Biological Sciences (JBI)

JBI100: How would plant growth be affected by the type of sunlight on Mars?

I am trying to figure out what the type of temperature on Mars will do to a plant's cells, appearance, stem, leaves, and other crucial parts. What I already knew before doing some research was that Mars is a cold and bitter planet. In this paragraph I will be explaining my experiment. I will be planting two plants indoors. Both plants will be placed under a lamp in order to grow. The main reason I have a lamp is because it is cold outside this time of year and I am afraid that I cannot grow plants in this frigid weather. One plant is going to be placed under the lamp for 9 hours with a decent or atrocious amount of light from the lamp. That plant is getting a similar amount of sunlight that Mars gets. That plant is control group 1. Another plant will be placed under a lamp for 15 hours with an acceptable amount of light from the lamp. That plant is getting a similar amount of sunlight that Earth gets in spring or the beginning of summer. That plant is control group 2. Each plant will get the same amount of water and soil. The independent variable is the light the plant receives. The dependent variables are how tall and healthy the plant grew. My hypothesis is that the plant that gets the type of sunlight on Earth will grow better than the plant that gets the type of sunlight. I picked the hypothesis because plants on Earth get a decent amount of sunlight based on their location. Earth has better, superior, and reliable sunlight than Mars. Plants need warm sunlight and temperature to grow. Mars has way less sunlight because of its very long distance from the sun. Mars also has very cold temperatures also because of its distance from the sun. I decided it would be smarter that the plant that is getting the type of sunlight on Earth is going to grow better than a plant that is getting the type of sunlight on Mars. It might be obvious that control group 2 will end up healthier, but the experiment is not only to see what plant will be healthier. I want to see how control group 1 will end up. I want to see how the amount of light affected the plant.

JBI101: How does breathing affect heart rate?

My testable question was how does breathing affect heart rate. My main points of research are that the lungs take oxygen from the air. The heart pumps blood that delivers oxygen to your muscles, this is called the respiratory system. My hypothesis is that if someone breathes faster than they normally do their heart rate will increase because there is more oxygen to pump to the muscles. If they breathe slower it will decrease because there is less oxygen to pump. I collected my data by using an apple watch's heart rate checker. My hypothesis was correct. It has shown that someone's breathing has a very big impact on the heart rate. Also people who are of a elderly age have very little change in heart rate as persons 4 and 5 had the least change in heart rate with a 1 beats per minute difference.

JBI102: Recycle Refresh (Watering Mint with Recycled Water)

The purpose of this project is to determine if recycled water can be used to grow plants instead of new water. My scientific question is Which form of recycled water can grow a plant more efficiently? My hypothesis is that if rainwater, dehumidified water, dishwater, bottled water, and tap water are used, then rainwater will be most effective because it is a natural source of water. My procedure was watering each individual mint plant 3 milliliters every other day, and keeping the light on 9 hours a day. My results were that dishwater is the most effective recycled water to grow mint plants, and tap water was the worst. My conclusion is that dishwater is the most effective water to water mint plants with, and my hypothesis was wrong.

JBI103: The Effects of Magnets on Plant Height

In this project, plant height was measured and compared to the distance a hanging magnet was positioned above the plant. Several different magnet heights were included in this project.

JBI104: Eye Know What will work!

Please visit student's exhibit for abstract

JBI105: Soda You Think Your Teeth are Clean

The purpose of this experiment is to help people understand the effects certain drinks have on their teeth (mostly how the drinks stain them). The scientific question is what drinks stain your teeth the most, and what toothpastes clean your teeth best after drinking them. My hypothesis is Dr. Pepper Will stain your teeth most because of the sugar and carbonation, and Crest Total Toothpaste will clean your teeth the best because of its good ratings. The procedure is to let the eggs sit in the drinks overnight, then look at the results in the morning, after finding which drink stained darkest (by using a color guide). I will use eggs soaked in that drink to test toothpastes. Summarizing the results, Drinks Coke- worst damage/stain level 13, Dr. pepper- 2nd place/stain level 11.5, Iced Tea- 3rd place/stain level 10, Sprite- least damage/ stain level 1 Toothpastes that worked best, Colgate- 1st Place, Crest- 2nd place, Colgate Watermelon- 3rd place, Tom's Strawberry- was in last place. Conclusion, My hypothesis about what drink stains the worst,which I guessed was Dr. Pepper, was incorrect, but my hypothesis that Colgate Total Toothpaste works best was correct.

JBI106: Plants that Grow Together stay Together

Soil erosion can be very bad for our environment. When the soil erodes the pollutants then go into the streams and rivers which will get the wildlife sick. It is also causing the loss of farmland. Can plants prevent soil erosion? If testing the effects on soil erosion, then the soil with more plants will have less erosion because the roots help pull the soil together. In two pans, radish seeds were grown 3 cm apart and 6 cm apart. To simulate rain water erosion water was added to the pans on a tilt like a hillside. The amount of soil drained from each pan was weighed. The results showed that the pan more plants reduced soil erosion the most. In conclusion, soil erosion can be reduced by growing plants.

JBI107: Is My Honey Real or Fake?

Rational: I have read that honey is the third most faked food in the world after milk and olive oil. I have researched that fake honey has been mixed with less expensive sugars, syrups, or water. That led me to wonder if they are selling real or fake honey in stores. I wanted to see if there was a way to test if honey is real or fake. I researched online and found different methods to test at home if honey is real or fake. I could not find information if these methods were accurate. So I plan to do an experiment to see if at home fake honey test methods are accurate and which is the best. Question: What is the best at home test to find whether honey is real or fake? Problem: To determine the best at home test to find whether honey is real or fake. Hypothesis: Because fake honey has more water in it, the test where you drop honey into cold water will be the most accurate. Method: %uF0B7 Identify real honey and fake honey %uF0B7 Identify at home tests to be tested %uF0B7 Test real and fake honey using the different at home tests with multiple repetitions %uF0B7 Record results of each test %uF0B7 Data Analysis: compare test results to determine if at home tests are accurate and my hypothesis is supported Risk Assessment: %uF0B7 Some tests use fire - my parents will supervise any tests using fire %uF0B7 Some tests use a microwave %u2013 my parents will supervise any tests using a microwave %uF0B7 Personal protective gear %u2013 I will wear goggles and gloves for all tests Bibliography: Copeland, Cody, Honey is one of the most faked foods in the world, and the US government isn't doing much to fix it, [Online] https://www.insider.com/fake-honey-problems-how-it- works-2020-9, September 26, 2020 How to Detect Fake Honey,[Online]hhtps;//bee-america.com/blogs/news/how-to-detect-fake-honey#:~:text=The%20Water%20Test&text=Just%20drop%20drop%20a%20teaspoon%20into.in%20water%20without%20even%20mixing.,October 3,2015 Natural Cures. February 8,2017. 3 Tests to Check if Your Honey is Pure or Fake[Video].Youtube.https://www.youtube.com/watch?v=HDmRdiZ1PtO Zizira. August 8, 2018,Honey Purity Test - DIY[Video].youtube. https://www.youtube.com/watch?v=aey2vyV3vWe

JBI109: Grow With The Flow

Knowing that soda contains large amounts of sugar, the purpose of my project was to see the effects it had on a Low Light Houseplant. I tested 4 sodas: Sprite, Sierra Mist, Dr. Pepper, and Orange Fanta. I would pour the same amount of soda in each plant, then monitor their results daily. I did this daily for 6 weeks. Each plant also received equal amounts of sunlight. Sierra Mist produced the best results in plant growth and in leaf changes while Dr. Pepper produced the worst results. In conclusion all produced mold on their leaves, not deeming any of the sodas a true success.

JBI110: Hydroponics

The purpose of my science project is to see if I can grow a healthier lettuce plant by planting in soil or by planting with noil soil at all. The word of the day is Hydroponics. Hydroponics is defined as the process of growing plants in sand, gravel, or liquid, with added nutrients but without soil. My procedure I grew two lettuce plants. One plant grown with sunlight, water and coconut coir only and one plant grown with sunlight, topsoil, water, and fertilizer. I began my project on December 01, 2022. I placed one lettuce seed in an inverted soda bottle using a cotton strand of fabric to transfer the nutrient rich water from the reservoir to the roots of the plant.(See Fig#1) The second seed was placed in a 12 oz pot filled with topsoil. Please note that this item was given 15 ml of tap water every 12 hours. Each plant was placed in a location where they each received equal amounts of sunlight. Growth measurement was assessed every Friday at 4:00 PM for three consecutive weeks. I was not surprised to see that the plant grown in soil grew much stronger and quicker than the one grown using Hydroponics.

JBI111: Can the type of soil affect plant growth?

My testable question was, can the type of soil affect plant growth? The type of soil does indeed affect the growth of plants. The better the soil, the better your plant grows. If you put good things in your soil like compost, or synthetic fertilizer, your plant will grow healthier, stronger, and taller. My hypothesis is that I tested four different types of soil to see which would make wheat grow the tallest. I tested compost, soil from frick park, best rated soil which is miracle grow from the homedepo, worst rated which is organic soil from the homedepo. I thought the compost would grow the tallest because it had organic matter, and organic food scraps. I collected my data by measuring the four types of soil every three days for eighteen days. I measured the plants in centimeters. My data tells me that the soil type does affect the height of your plant. The type of soil needs certain things to grow, the basics, sunlight, soil, water, and other things in the soil like synthetic fertilizer which grows the seeds/plants not the soil and the other thing that you need is a lot of organic matter.

JBI112: Testing the 5 Second Rule

The 5-second rule is something that has been shared in lunchrooms across the world for many years. The 5 seconds rule refers to the amount of time a piece of food can spend on the ground and still be safe to eat. The purpose of this experiment was to test if the 5-second rule could actually work when tested correctly. In this experiment, four types of food with different textures and qualities were used, along 3 different lengths of time and three different flooring surfaces. The hypothesis was, If watermelon is dropped on a wood surface it will collect the most bacteria due to its moistness. Wood also has a lot of bacteria on it that we just can't see from walks on it all day.

JBI113: Does the water temperature affect the growth of a plant?

Please visit student's exhibit for abstract

JBI114: How does the temperature affect the growth of the plant?

Please visit student's exhibit for abstract

JBI300: How does soil type affect plant growth?

The purpose of our project is to study the plant growth of a white stonecrop, also known as sedum album, while they are in different soil types. We hypothesize that the soil mix with rocks in it will thrive while the orchid bark & potting mix will wither and not have enough nutrients to thrive. The procedure we will follow is that we will observe the plants at 2:00 every day. We will water the plants with ¼ a cup of water every 2 weeks. At the end of the experiment we will average the two results together for more precise results. Final results available at fair.

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Chemistry (JCH)

JCH100: Crystal Breakdown

I wanted to know which liquid will break down different crystals. Three crystals (Jade Tumbled, Fluorite, and Citrine) were placed in three different liquids (Acetone, Coke and Ammonia). The crystals were taken out one at a time to measure length/width, depth, and weight for a period of one week . The hypothesis was: If the crystals are soaked in three different liquids, then the density of each mineral will break down and become less solid. The liquid with the greatest effect on the density of the crystals will be Ammonia. I was trying to find out if the same liquid would break down 3 different crystals. The data I collected did not support my original hypothesis. My hypothesis stated a lot of different changes, but in the experiment, there were not a ton of changes. Also, none of them fizzed up in any of the liquids. The independent variable was the same because the types of the 3 crystals stayed the same. A problem that occurred in my experiment was in my first trial no changes happened. An unusual observation I made was that there was only a bit of change out of all the trials. The Width/Length, Height, Depth, and Weight were never different in the first trial, but in Trial 2&3 the Width/Length, Height, Depth, and Weight had some changes. If I did this experiment again, I could have picked different crystals or liquids.

JCH101: Which Cheese is the Strechiest?

The purpose of this experiment was to determine what cheese would be the stretchiest for family pizza nights. Four different Cheeses and 3 trials each. That makes 12 pizzas total. Starting when the pizza got out of the oven and then used the fork to stretch the pizza until it broke. Four cheeses were used in this experiment and each cheese was used 3 times. The hypothesis was: If different kinds of Mozzarella are melted on pizza, then the pre-packaged full fat mozzarella cheese will stretch the most. I wanted to do this project because I enjoy making pizza with my family. The data I collected did not support my hypothesis. The full fat mozzarella had the fattest content. However, the fresh mozzarella ended up stretching the most. Fresh mozzarella is creamer and softer than other cheeses so that is why it stretched the most. Something we noticed is that the Buffalo Mozzarella had a a lot of water in it. Maybe next time I would use different types of cheese.

JCH102: Chewing Gum's effect on saliva acidity

Please visit student's exhibit for abstract

JCH103: Popcorn Storage

Please visit student's exhibit for abstract

JCH104: The Science Behind The Fizz

The purpose of my project is to see which ingredients make homemade Bath Bombs fizz more and which ingredients make them fizz less. Following recipes, included in my report, I created homemade bath bombs. Once the bath bombs were made, one by one placed them in the water seeing which one had the best fizz. Each bath bomb was tested separately My hypothesis was correct in that the bath bomb that contained more dry ingredients was the one in which dissolved longer than the one containing more liquid ingredients.

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Physical Sciences and Engineering (JPE)

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Physical Sciences & Engineering (JPE)

JPE100: Dessie's Discoveries

Candy wrappers use the same material as other items, but what material would really be best? Plastic is the current material of candy wrappers around the world. According to Plastic Soup, a nonprofit organization whose goal is to stop the supply of plastic stated that it can take up to 10-20 to decompose. Other common materials, such as cellophane, only take 4-8.5 weeks to decompose. Another commonly used substance is paper. Paper is the material that takes the shortest amount of time to decompose, only 2-3 weeks. For my research, I have concluded that paper has been the best substance for this experiment. It only takes approximately 2-3 weeks to decompose into the earth. Cellophane is yet another material that would be better than plastic. Cellophane can take about 4-8.5 weeks to decompose. Plastic wrappers take about 10-20 years.

JPE101: The Bob Meow-ley Project

People are starting to do more and more things with their animals. This project is helping people add listening to music to their lists of things to do with their pets. But if you wanted to find out what genres they prefer, or if they prefer one over the other, that is what this experiment is about. So, 5 genres were collected: Reggae, classical, jazz, metal, and rock. Then, the cat was put in a room and played each song three times. Beforehand, there was research about how cats act when they are upset, happy, etc. Then, the 5 different genres of music were tested. Overall, the cat acted best to jazz (Frank Sinatra: Fly Me to the Moon), Metal (Iron Maiden: The Trooper), and Rock %u2018n%u2018 Roll(Billy Joel: Only the Good Die Young).

JPE102: Who Will Win?

What actually happens when you drink a can of Coke? How much Coke can your stomach take? What happens when Coke goes against paper? Which kinds of paper dissolve? There are many different kinds of paper, and some may soak it in, and maybe dissolve afterward. This experiment will test the strength of Coke, and why people might not want to drink it anymore if they already do. It will also test the qualities of different kinds of paper. This experiment involves some small cups, a small amount of Coke, and different types of paper, such as printer paper, tissues, sandpaper, etc. I will wait for 48 hours and see what happens.

JPE103: Bow Knows

This experiment is about how humidity affects the flight of an arrow. The experiment will help the world by changing the way that archery competitions are conducted in terms of weather. It will also affect the conditions that most people go hunting with a bow in.

JPE104: Aw snap! My bricks snapped

Sometimes when I am playing with my reddish-brown LEGOs they seem to chip, snap, and break more often than other colors. For my project I wanted to compare the strength of different colors of LEGO, used LEGOs, new LEGOs, and 3D printed LEGOs. My hypothesis was that the used LUG (LEGO User Group) plates would break more easily than all the new LEGO plates. I also thought that the LUG brown plates would break quicker than the LUG colored plates. I thought that the new colorful LEGO plates would be the strongest. I suspected that the 3D printed plates would break quicker than the LEGO plates and the LUG plates. To figure this out, I clamped each plate to a worktable and then dropped a 3lb. weight on it a maximum of ten times. I then measured the degree of damage. My results showed that the brown plates were much weaker than the colors of plate, and the LUG plates were also significantly weaker than the LEGO plates. I also found that the width mattered because the wider plates were much stronger than the thinner plates. My conclusion was that the brown plates from LUG were the weakest, which supports my hypothesis. My conclusion for my 3D printed plates will be available on the day of the fair.

JPE105: Blast Off!

My interest in space and flying to the moon prompted the research about rocket launches. I wanted to learn more about what causes an object to go higher than another. The purpose of the research is to determine what forces effect the rockets as they are launched into the air, then determine which one will most likely go higher. The hypothesis was: If two different rockets of different masses were launched twice, then the smallest rocket will go the highest because it has the least amount of weight. The larger rocket went higher according to my data. The data I had collected rejected my hypothesis because I thought the smaller rocket would go higher. The larger rocket has a bigger surface area to disperse air which makes it more aerodynamic. The smaller one may have not launched as high because it was lighter with less force.

JPE106: Hydraulic Arm

The purpose of our hydraulic arm was to test if a small push would expand to a large force. Hydraulics are something we can find in daily life so it is important to understand them. We first started by building an assembly with pieces of cardboard, large popsicle sticks, syringes, and rubber bands. Then we tested to see how much weight two syringes of the same size lift, we got to a point where it couldn't lift more than about 150 grams. Then we switched the pushing syringe to a smaller syringe which was able to lift more than the first syringe did, it was much easier to push down too. This concluded our experiment. Our hypothesis was correct. We were able to understand that equal or bigger pushes don't make that strong of an outcome. If we decrease the diameter of the syringe then it will execute more multiplied force. How do we use hydraulics? Some simple examples are when you might get your car fixed. They lift it up on something so the workers can get underneath it. The machine does it relatively easy, how? Hydraulics! There might be a pistone in the lift making it seem so effortless. Other common examples are in building machines, like a crane. How does it so easily lift such heavy objects to higher ground? Hydraulics. Blaise Pascal discovered hydraulics. So, Pascal's principle states pressure equals to force divided by area on which it is acting.

JPE107: Parachute Schute

The purpose of this experiment is to find out what material will make a parachute fall slowest. My scientific question is, Will different materials affect how fast a parachute falls to the ground? The scientist hypothesizes if making parachutes out of different materials and made out of tissue paper, paper, felt, and a plastic bag is tested then the parachute that is made out of tissue paper will fall the slowest. The scientist's procedure was to cut each material into a square, tie a piece of string to each corner of the parachute, tie it to a washer, and drop and time it. The parachute made of a plastic bag fell the slowest and the parachute made out of felt fell the fastest. The scientist's hypothesis was incorrect because the parachute made out of a plastic bag fell the slowest and not the parachute that was made out of tissue paper.

JPE108: Insulation Inspiration

The scientist is performing this experiment to find out which material works the best to insulate a bottle of water. The Scientist's question is which material works the best as an insulator. The scientist hypothesizes that if the water is poured into the cups covered by wool, newspaper, and a space blanket, then the space blanket will keep it the warmest. The scientist covered each cup with its material, and tested for thirty minutes, seeing which material insulated it the best. The space blanket insulated the water the best, and the wool sock insulated it the worst. In conclusion, the space blanket works the best to insulate the water and the wool sock insulates the water the worst. The scientist's hypothesis was supported by the results.

JPE109: Paper Plane Perfection

The scientist explored this experiment because they wanted to know what paper airplane is the best. What paper Airplane with different types of paper and styles goes the farthest and straightest. The scientist hypothesis is that the paper airplane with Cardstock paper and in the original style of paper airplane will go the farthest and straightest. The scientist will Throw each plane design five times, recording how far it goes and how far it goes off the line. A lot of the scientists' results were around 100 to 200 cm but some were in the 400 cm and one plane even went around 1500 cm. Unfortunately the scientists results were incorrect; the farthest and straightest plane was the Bullet plane with Cardstock paper.

JPE110: Do different liquids affect how fast they reach thermal equilibrium?

Do different liquids affect how fast they reach thermal equilibrium? I am interested to see and find out if different liquids take longer to cool down to room temperature than others. I gathered 9 different liquids to test. I did searches on different topics such as, how long does boiling water take to cool?, understanding thermal equilibrium, density of liquids and their boiling point etc. I am experimenting this in our kitchen and testing each liquid one at a time because I don't have enough of the same items (nine thermometers and nine pots). I will record the temperature every minute and see the trend of the dropping temperatures.I am currently working on testing and recording and do not have all the results. I have not reached a conclusion yet.

JPE111: Inexhaustible Illumination

Please visit student's exhibit for abstract

JPE112: Slice the Ice

Please visit student's exhibit for abstract

JPE113: What Type of Plastic Makes the Strongest Brick?

Shredded plastic bottles were used to construct bricks of recycled plastic. The ability of these bricks was evaluated by measuring how much weight could be added to each brick before the brick was damaged or crushed.

JPE114: Corked and Uncorked Bats

In this test I will be seeing if corking a bat helps with hitting distance and exit velocity. I will also be testing the weight for the before and after and the sound. The reason I am testing this is because corking your baseball bat is a known form of cheating and it is banned across the sport. If you are caught with a corked bat you will be suspended for a long time, and I am here to see if it actually helps to cork your bat.

JPE115: how do different liquids effect magnetic force

To find out how different liquids effect magnetic force, I will put one paperclip in three cups each. Then I will be pouring 3 different liquids in the cups. One with corn syrup, one with vegetable oil, and one with water. Then, I will be holding magnets outside of the cups and seeing how fast each paperclip moves, and how it moves.

JPE116: The Physics of Field Goals

The purpose of this project was to create a rubber band catapult to represent a field goal kicker. In addition I studied how the changing distance from goalposts affects how hard it is to accurately kick a field goal. After trial and error I constructed the strongest catapult out of wood and it was a successful build. It was also determined that the size of the rubber bands were the determination of the strength of the kick. The conclusion is that the thicker rubber bands provided the most power. The Field goal was 45 inches away from the Catapult The 2 Thick rubber bands shot at 57 inches avg so it went way over. The one super small thick rubber band shot at 64 inches avg so it went over as well. The 3 Thin big ones shot at 73 inches avg which was the farthest one.

JPE117: To Bank or Not to Bank

The purpose of my project was to determine which angle would generate the most successfully made baskets. In order to test this question, I created a backboard and hoop out of posterboard and regular computer paper. Measurements were taken with a ruler in centimeters for the backboard. Angles were measured using a protractor. I predicted that the most accurate angle would be at 60 degrees. After 10 attempts with each centimeter moving the angle, my hypothesis was proven correct. Going forward, when running this experiment again, I would like to personally test it using an actual basketball court. It would be interesting to see what angle would produce the most accurate shots.

JPE118: Marble Rollercoaster

I conducted an experiment to find out how much height was needed for a marble to travel through a loop. I tested different materials to find different results. I had to change materials from pool noodles to foam insulation pipes because the pool noodles were too thick. I also tested different marble sizes and different heights of the pipe. I have concluded that the smaller marbles worked better than the bigger ones, and had better results due to their small size and lightweight. My results varied on materials and height.

JPE119: What hits a baseball farther a wood or aluminum bat?

My testable question is: What hits a baseball farther, a wood bat or an aluminum bat? There were three things that I thought were key to my research: I had a bag that had all the materials needed for my experiment; I tried to hit the baseball the first time at a baseball field with a hill and every time I would hit the baseballs they would roll down the hill; and finally if I would have done this in warmer weather it would of made the baseballs easier to hit because in the cold the ball is harder to hit due to your hands being so cold that it is hard to swing all the way through. The hypothesis that I had was that if I hit t-balls and baseballs with aluminum bats and wood bats, then the aluminum bat will hit the baseball farther because of the trampoline effect when you hit a baseball with an aluminum bat. So when you hit a baseball the bat dents in so the energy can transfer from the bat to the ball making it go farther. The way I collected my data was I hit 2 sets of 10 t-balls and 10 baseballs with a wood bat and an aluminum bat. I would measure with a measuring tape and spray snow to mark how far everything went. I was wrong about my hypothesis because I didn't realize that the weight of the bats would be so different. The final score was 7 to 3. The 2 went to the aluminum bat but every other one was farther with the wood, except for the last one which got hit further by the metal bat. The first one was not so close but the second one was only two feet off 97 to 99. Then it all went down from there the next 7 where not even close for example #5 was 128 to 105. It was the same weather for both of them so that didn't affect it. They pretty much have the same barrel thickness. Their weight is different so maybe that is why they hit the ball different distances. This shows that a wood bat can hit farther than an aluminum bat, and that also shows that you can think one thing and the opposite could happen.

JPE120: Testing the Failure Weight of Lego Bridges

The purpose of this experiment was to determine the strength of different bridge designs using Lego bricks. The various designs of bridges that were used were rigid frames, girders, arches, and trusses. The method used was to have weight supported on the bridge until it broke. Three different bridges of each design were tested, and then an average failure weight was found. I hypothesized that the truss would be able to hold the most weight, and this was supported by my experiment. This experiment demonstrated that the design of the bridge does affect the amount of weight it can hold before it fails.

JPE121: Hand-Crank Light Generator

The point of my project is to build a hand-crank light generator. The use of a hand-crank generator is to be able to power a light, in this case a LED, using hand power. Throughout this experiment, I learned how to put different parts together to make something that actually works.

JPE122: Can you stop a Tsunami with an opposing wave?

Please visit student's exhibit for abstract

JPE300: Weight about It?

The question we answered was, Does weight placement affect how fast a derby car goes on a derby track? We believe putting a weight on the back top will make it go faster on the derby track. After observing cars it seems the back weight makes a car go faster. But, you cannot always see where everyone's derby car weight is. We believe this project will help future derby car participants. To start this lesson we made a derby car using the Official BSA Pinewood Derby Rules. We made sure for each car race that the car and weight was 5 fluid ounces. Next, we set up our track in the class using a meter stick and level to make sure the track was set up like a real derby car race. We tested our derby car weights in the following order: top back, top middle, top front, bottom back, bottom middle and bottom front. Each weight placement was timed three times. The top middle placement of weights on the derby car made the derby car go faster on average. We were very surprised by this finding and may use this information in our next future derby car race.

JPE301: Ice Cube Meltdown

Ice is something we use almost every day. We especially use ice to cool drinks. We would like to know how the shape of an ice cube contributes to the speed at which it melts. Our experiment will provide us with the most effective ice cube shape to keep drinks cool during the summertime. To find out which cube takes the longest to melt, we will take several ice cube molds and find the volume and surface area of the mold part. Then, we will make the ice cubes and observe them over a period of time as they melted. We will do this to find out if the ones with more volume or more surface area will melt faster. We made a hypothesis that the cubes with the most volume and smallest surface area would take the longest to melt because there is more water the heat has to melt. Final results of the experiment will be available on fair day.

JPE302: Thermosmometer

We are doing a project on thermoses to test insulation and thermal conductivity and transfer. To do this we will put ice in a thermos with water, and we will keep track of it with a thermometer every 20 minutes. Our thermometer is a contactless infrared thermometer. We think that the more insulated and less thermally conductive thermoses will yield better thermal insulation. Results will be available on Fair Day.