79th Pittsburgh Regional Science & Engineering Fair

Intermediate 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: M – Intermediate Division (7th and 8th grade)
- YY: Category Name
  - BS – Behavioral and Social Science
  - BI – Biology
  - CH – Chemistry
  - CM – Computer Science and Math
  - CS – Consumer Science
  - ES – Earth/Space/Environment
  - ER – Engineering/Robotics
  - MH – Medicine/Health/Microbiology
  - PH – Physics
- ABC: Project number
  - 1xx or 2xx – Individual student projects
  - 3xx – Team projects (2 or 3 students)

Table of Contents

Behavioral and Social Science (MBS) 1
Biology (MBI) 9
Chemistry (MCH) 17
Computer Science / Math (MCM) 30
Consumer Science (MCS) 32
Engineering / Robotics (MER) 38
Earth / Space / Environment (MES) 45
Medicine / Health / Microbiology (MMH) 51
Physics (MPH) 56

Behavioral and Social Science (MBS)

MBS100: Got My Message?

You know the music you don't pay any attention too that plays in grocery stores? Actually, you might be paying attention to it. Stores and advertisements litter their commercials with supraliminal messages to get you to buy their products. Your conscious and subconscious are working against you at these moments by intercepting these messages and influencing your decisions. My experiment was to determine if subliminal or supraliminal messages are more effective. My data showed that supraliminal messages are affecting people more. So the next time you find yourself buying a burger, remember, it may not have been your choice.

MBS101: Effect of Music on Plant Growth

This project was done to display the data of how different types of music stimulate the germination of seeds and the growth of plants. The overall plan was to put 3 seeds and 3 plants all in different areas with sunshine and water. 1 plant and 1 seed were exposed to rock music while the other 1 plant and 1 seed were exposed to classical music. The other seed and plant were not exposed to any music. The observation of how music does or not does help plants was calculated. Final results will be available on the science fair day.

MBS102: Will Racing Against Someone Improve Running Ability?

This experiment tests whether running solo or with competition will produce a better running time.This will allow for runners and other athletes to know what the best workout plan is or the way to gather the most accurate timed results. The researcher plans on having six students run a mile by themselves, with a partner, and as a group while being timed. Then the researcher will compare the times of each student's three groups to see where their best time lies and analyze the results. Results will be available on fair day.

MBS103: Does Listening to Music While Studying Help you Memorize your Work?

This project is a project designed to help students want to study more. In this experiment the researcher will have participants listen to music while viewing a series of 15 pictures. After the test the researcher will have students recall what they remember from the PowerPoint. Once this is over the researcher will have students watch another PowerPoint of different pictures in silence and then recall what they remember. Pop music is predicted to have the best results because it has the highest beats per minute. Results will be available on fair day.

MBS104: The Dollars and Cents of Perception

Visual perception affects people’s choices -- people will grab and choose before they think and calculate. My study hypothesized that rationale thought and logic are influenced by visual perception. Two jars of the same size and shape and clear in color were used for the study: one jar (Jar A) was filled completely with nickels, the other jar (Jar B) was half-filled with dimes. At least one participant in each age group chose the jar with the nickels, the less valuable choice, thus proving my hypothesis: visual perception interferes with thought and logic.

MBS105: Beauty in the Eye of the Beholder or Beheld?

The purpose of my experiment is to see how your perception of beauty changes with age and gender. I will test 6 total in each age group category with 3 female and 3 male test takers.. 6 th graders, 8 th graders, 18 to 25 year olds, 35 to 45 year olds. I assigned each member a letter for identification purposes and then gave them my test which includes 10 questions about features. After they were taken I put them into graphs. At the moment my project is in process so I have no current conclusion or data.

MBS106: The Brains Behind Where's Waldo

Why do you notice a certain person in a crowd? Why do somethings stand out more than others? In this experiment I will testing how objects are noticed in a crowd, depending on if it is a large or small crowd. I will be experimenting on 20 people to see how long it will take them to find the object in a larger or smaller crowd faster. I am still testing my experiment, but I think it will take them longer to find the object in a larger crowd, because it has more people in the background

MBS107: Kids vs. Adults: Who's More wired

Purpose: To predict and discover the usage and access of technology between kids (K-8) and Adults. Procedure: 1. Predict and estimate (Hypothesize). 2. Select human subjects. 3. Get permission. 4. Interview human subjects. 5. Compile and interpret Data. 6. Chart data.

MBS108: Are Composite or Natural Faces More Appealing to the Human Eye?

This project will test whether composite or natural faces are more appealing to human eyes. This study is predicted to show that natural faces will be more attractive than composite faces. The researcher will use a PowerPoint presentation of human pictures to make them both natural and composite. The participants will include students from grades sixth, seventh, and eighth, along with staff members. Participants will choose which face is most attractive and data will be collected based on number of times each type of face was chosen. Results will be available on fair day.

MBS109: Gaming Stereotypes

This project is analyzing people's views of gamers. A Google Form will be sent to a group of eighth grade students and they will respond with their answers of what they believe a true gamer is. The purpose of this project is to collect people's views of gamers and compare them with actual statistics. After data is collected and compared to real statistics, hopefully people will realize that just because people like to play games, that they shouldn't be thought lesser of any other person.

MBS110: Everyone Needs A Story

Narrative stories are very important. They help inspire and motivate the mind. They fuel our passion and keep our culture flourishing. Using 22 participants, half of the participants were given a narrative about childhood cancer and the other half a list of facts about childhood cancer. I measured the results by using an empathy quiz and a scale to determine monetary donation. My prediction was that the participants with narratives would give the most money and have a higher score on the empathy quiz. My data proved half of my hypothesis.

MBS111: The Effect of Gender on Visual Selective Attention

This investigation was intended to see if gender has an effect on Visual Selective Attention. Visual Selective Attention occurs when two or more messages are presented at the same time, and people must focus attention on one message and ignore everything else. My hypothesis stated that gender wouldn't have an effect on Visual Selective Attention. Each of the 54 subjects (27 boys and 27 girls) was shown a paper with different color words and different color text. They were told to read the color of the text not the actual word. It was concluded that females were faster than males, so my hypothesis was not supported by this investigation. Further research showed that the males took longer because they show more cognitive interference than do the females.

MBS112: How Males and Females React Differently to Stress

I believe that genders do react differently to stress and stressful situations. I think that men tend to, by nature, react in a more violent way than women.

MBS113: Attention to Detail

Have you ever listened to a speaker and found yourself doodling on a piece of paper? Do you think it helped your attention span? The purpose of my experiment was to see if doodling does change your attention span. My results revealed that it doesn't increase your attention span. When you are listening to the teacher without doodling, you will most likely get the best score on the test. On average the doodlers scored 82.42% on their test and the listeners scored 88.57%. So next time you are doodling, ask yourself, "Am I focused?"

MBS114: Are Video Games Good For Your Reflexes?

Playing Video games sometimes take fast movements and quick thinking. In my project I tested if video games would improve your reflexes. I chose this topic because I believe video games could help people with diseases that weaken your reflexes. The Way I will experiment my topic is by making the subjects play 20-30 minutes of video games then will throw things in their direction and see if they can catch it or I will drop objects and see if they catch it. I am still in the process of testing so I do not have all of my data.

MBS115: Phantom Limb Syndrome

This experiment will determine whether a body is able to feel brief sensations that occur in patients with phantom limb syndrome. Subjects will sit at a table while wearing a front-facing robe, only their left arm in the sleeve. A plastic hand is placed inside the right sleeve; the participant places their right hand on the other side of a divider out of their sight. The researcher will brush the hidden hand and the fake simultaneously. Later, an assistant unexpectedly hits the fake hand with a hammer. Reactions are recorded. Research results will be available fair date.

MBS116: Do fidget spinner actually help you focus?

The purpose of this project was to investigate the common opinion that fidget spinners play a role in increasing focus. A memory-response test was given to participants with and without the use of a fidget spinner to determine if it affected the number of words remembered by participants. I tested participants of all ages with a slideshow of words and test I created. More people scored higher without a fidget spinner, but the results were very close and I still believe a fidget spinner have neither a positive or negative affect on focus.

MBS117: Child Dexterity and Child Resistant Containers

The ability of small children to open child-resistant containers was evaluated both before and after watching an instructional video demonstrating how to open such containers.

MBS118: Perception of Criminal Characteristics Across Diverse Nationalities

The purpose for my experiment was to see if nationalities or ethnicities had biases against one another. This experiment will hopefully show people another side to their bias opinions. I first created a questionnaire to survey students in my grade. I distributed Human Form 4 permission forms to 230 students in my school. I then showed the participants a variety of pictures of criminal and noncriminal people and recorded their responses. I then finally analyzed their responses and overall data. After analyzing the data, I found that biases may have been present in Hispanic backgrounds. Facial expressions effect results.

MBS119: Do You Hear What I Hear?

The purpose of my experiment was to see which sound environment allowed students to concentrate better. Subjects took a general knowledge quiz in silence or with music or loud noises playing. Results of this experiment showed that students who took the test in silence scored the highest on the quiz with an average of 64%.Those who were tested in a noisy environment scored the worst. In conclusion our environment can affect our performance, especially on mental tasks. Future experiments might be to verify these results as well as explore gender and age differences.

MBS120: How Does Color Affect Memory Performance in 6th, 7th and 8th Grade Students?

The experiment's purpose is to investigate how color affects memory performance in middle school students. Before the initial experiment, information gathered concluded red to be the most probable color associated with memory because the eye comprehends longer wavelengths of visible light. Red is one of the longest wavelengths. To discover an answer, the researcher will run three trials using human participants. Participants will be asked to recall a variety of media relating to color, such as colored flashcards, words, and an image. Their results will be recorded and analyzed by the researcher. Results will be available on fair day.

MBS121: In a Blink of an Eye

The purpose of my experiment was too determine if emotions affect blinking. I believe emotions do affect blinking. Procedure: 1.Start by seating the first person. Turn on blank scene. Record blinking for 2 minutes. This is my baseline. 2.Next run and record 2 minute clips from the funny, scary, sad, and romantic movies. 3.Repeat steps 1 and 2 for the remaining volunteers. 4.Once all volunteers watched the clips go through the videos and count the blinks. 5.Next graph and compare the results from each recording. 6.Average them together to see if emotions affects how much a person blinks

MBS122: Calling All Horses: Foals' Aural Recognition of Father's Vocalization

Horses have a complex system of communication. Domestic horses can distinguish between their handlers' faces and voices, and those of unfamiliar people; however, it has not been determined if they can distinguish between their family's vocalizations and other pasture mates. This investigation was a voice recognition test of horse foals to determine their ability to identify their father's vocalization from other aural stimuli. It also examined their behavorial responses and response speed. Results indicated that foals respond more quickly to their father than to another pasture mate and emit a vocalization., rather than ear-perking.

MBS123: Is It Really Your Choice?

The choices that we make affect every little outcome in our lives. Even the seemingly small ones greatly influence our future. But what if I told you, not all of these decisions are your own. Marketers target your brain with thousands of supraliminal messages. These messages affect every decision you make. My results showed that eight out of ten adults are affected by this method of influence. Even the most well minded and versed in this area can and will be affected. So next time you go to the grocery store, ask yourself, is this really your decision?

MBS124: Do People Respond Differently Based on Clothes?

My science fair project was how do people respond differently to the same question asked by people wearing different types of clothing. I thought people would respond more favorably towards me in the formal outfit. I needed a formal and informal outfit to conduct this experiment. I wore a dress for the formal outfit and sweatpants and a sweatshirt for the informal outfit. I went to Target in the evening and asked people what the time was. I asked people of different ages and genders. I asked them and then recorded their response. My hypothesis was correct and supported.

MBS125: Fear of Distress

The purpose of this experiment is to discover which distress call which distress call increases the heart rate of middle schoolers the most. Each participant had their resting heart rate measured, then had their heart rate measured while listening to four different distress calls: woman, man, cat, and dog. Heart rates were measured in BPM. The participants' heart rates increased most when listening to the man's distress call. The man's distress call was rough, and had more pitches reaching 3,000 hertz, which could have made the participants' heart rates increase. The data didn't support the hypothesis, for quite an interesting reason.

MBS126: Is False Memory False?

The purpose of this project is to see if people actually have collective false memory based on the Mandela Effect. I conducted my research by using students from 6th and 7th grade. I showed them a series of pictures and listed two famous movie lines. I learned students do not have collective false memory. I feel individuals misinterpret things a result of something being said too quickly or an image flashed too quickly in front of them. I learned it is best to see still images or see things on paper to get accurate information.

MBS127: Blue vs Multicolor

I wanted to answer the question does blue pen really help people remember better? I conducted my experiment by first passing out permission slips to students, they were given word lists to study and after a few minutes they were asked to write down as many words as they remembered. I learned that blue pen is the easiest to remember compared to other colors of pen. A future experiment I would try, would be to compare blue pen and black pen and see which would be easier to remember.

MBS128: Can you detect lies without a machine?

Can a test be done to detect lies without using a lie-detector machine? This project will use various questions and arm movement to see if there is correlations between arm movement and lying.

MBS129: Colorful Personality

This project is researching what eye colors are related to which personality traits. This project will survey middle school students on a google form and then graph the results. The form will include which eye color (blue, green, brown, and black/very dark brown eyes) is related to intelligence, kindness, attractiveness, devious, creative, trustworthy, and secretive and mysterious. Trends are expected to be seen because brain and eye development happen closely together in utero and are linked with genes that create abnormalities in the brain. Results will be available on fair day.

MBS130: What colored paper impacts your reading?

The purpose of this project was to see if colored paper would impact reading. People should care because it could help with test scores and grades. My hypothesis was that pastel colored paper would be the best and neon paper would provide the worst results. I tested participants ages 11-13 with stories on white, pastel pink, and neon pink paper. After conducting my tests, it was concluded that my hypothesis was supported.

MBS131: The Human Lie Detector

In most cultures, lying is forbidden because it doesn't uphold the trait of honesty. However, according to the Theory of Mind, lying is stated as a fundamental part of human nature. The Theory of Mind also states that lying is closely related to empathy, or the ability to 'walk in another other's shoes'. To detect lies, official personnel use an fMRI scanner, which shows that seven parts of the brain are in use when telling a lie. To test if lies can be detected without machinery is the point of this experiment.

MBS132: What Do You Recall?

Please visit student's exhibit for abstract.

MBS133: The Impact of Intervention on Dreams and Different Stages of Sleep

Do different stages of sleep change what type of dream you're having when you're given the same sensory experience?

MBS134: Smile or Smirk

In my project I will test how a human eye sees facial expressions. I am doing this by testing 10-15 people on how well they can recognize various facial expressions. My experimentation is continuing so I do not know the results at this time but I think my participants will be able to recognize simple widely known expressions such as happy and sad but less widely known expressions such as disgust they will not be able to recognize as easy.

MBS135: Can You Read This?

I tested if you can comprehend sentences if letters aren't placed correctly or contain numbers because if there's a typo I was wondering if it's possible to read it. I tested my participants by taking them alone into a room and having them read the sentence aloud with a maximum time of 30 seconds. I discovered it's possible to read when letters or numbers are mixed. It takes longer for some sentences because of the higher difficulty level. Reading jumbled letters in words is possible, but is difficult. In the future, I can rearrange the words instead of the letters.

MBS136: Are Sibling Stereotypes True?

1)Gather families of different sizes, 5 families of 5, 5 families of 4, 5 families of 3. 2) Ask the children of the family specific questions or give them written questions relating to the order of birth. (ex: Eldest children are asked about their ambitions due to the common stereotype that oldest children are the most driven.). 3)Ask the other members of the family the same question relating to the child, abd whether or not the child answered truthfully. 4) Gather Data. 5) Continue to repeat the process till all children are questioned. 6) Analyze data. 7) Draw conclusions.

MBS137: Memory Mnemonics

Purpose: To see if student participants cam memorize a list of words more accurately using a mnemonic device or just looking at the list.

MBS138: The Effect or Color Printing on Proofreading

Color in advertising is used to increase the impact of an ad. However, poor contrast reduces readability, and decreases the effectiveness of the ad. This experiment was intended to find out if different colors of print would have an effect on students' proofreading skills. It was my hypothesis that the black ink would yield the best results while the red would yield the worst results. Each of the 48 subjects read four different one-page passages in each of the four different colors tested: red, blue, black, and green. The subjects were told to circle the errors they found - there were 24 errors in each passage. The errors were previously placed in each passage according to letter envelope features (Healy, et al. Journal of Memory and Cognition, 1993): b for d, o for p, etc. and also added and deleted letters. The results showed the hypothesis to be partially correct: More subjects were able to detect the errors in black print. However, the red print was not in last place. The green print produced the fewest errors detected. This may have been because the black print provided the best contrast to be recognized more quickly in the visual process by the magnocellular pathway in the LGN of the thalamus in the human brain. Also, the students possibly were more accustomed to the black text. The results from this investigation will benefit anyone working in design for marketing and advertising.

MBS139: Inspiration and Art Appreciation

This experiment tested the effects of inspiration on art appreciation. The participants in the control group were given the images of three paintings with basic information about the work of art. The experimental group was give more in-depth information about the background of the artist and image. Both groups answered questions based on the information they received and their perception of the art. The student hypothesized that the experimental group would better appreciate the art because of their understanding of the painting.

MBS140: How Does Music Affect the Time Taken to Solve a Rubik's Cube?

Rubik's cubes are one of the most popular toys to this day giving everyone a challenge to solve. Once one can solve this brain teaser, the goal is to solve it faster than an average person can. That is exactly what I tested for. I wanted to see how music affects the time taken to solve a Rubik's cube. I timed myself solving the cube while listening to music different genres of music. I found that music does decrease the average time taken to solve the cube. In conclusion, now I know the fastest way to solve the Rubik's cube is by listening to music.

MBS141: Is Multitasking Worth It?

My project is "Can Students Multitask?" This project will help teachers understand how difficult it is for students to multitask. First, I timed the participant as they typed a paragraph, while answering trivia questions. I timed them as they answered different questions. Next, I tracked their time while they typed a different paragraph, with a similar length. When multitasking, the participant took a longer time, and made more errors when typing and answering trivia. Robert Rodgers, did a project like mine, and received the same results. A future experiment I would conduct is "Multitasking, Boys vs. Girls."

MBS142: Do you see what eye see?

The purpose of this project was to determine if the color of an individual's iris affects their ability to distinguish between pigments. It was predicted that people with blue or green eyes will have more difficulty distinguishing between similar hues. 100 12-13 year old participants were given 3 color determination tests and their scores were recorded and analyzed by reported eye color. Results available at fair.

MBS143: Someone's On Pointe!

My experiment "Someone's On Pointe!" researched the structure and strength of a dancer's ankle with and without the use of a pointe shoe. This experiment took dancers and tested them based upon their ability with and without a pointe shoe. The subjects completed certain tasks given to them, such as, turns and holds on releve. After gathering all information from the subjects, the graphs have shown that the more experienced dancer showed increased strength than those just beginning with pointe. In conclusion, results showed ankle strengths increases over time training both with or without pointe shoes.

MBS144: Cell Use on Pittsburgh Roadways

Use of cell phone while driving is a common habit. There is a lot of data showing that people get into accidents more often due to this behavior. Our hypothesis is that Pittsburghers will have a lower rate of cell phone use while driving than the national average.

MBS145: Eye See it Differently

My project, “Eye See It Differently,”explores how colorblind people see colors in the world. I tested six colorblind subjects on their ability to detect various numbers on Ishihara color plates. Each plate had a number and a background of different color dots, and the subject would have to identify a number in each plate first without any assistance, and then while wearing Enchroma colorblind glasses and finally with the use of the Colorblind Pal App. I wanted to see what tool, if any, helped colorblind people see colors more accurately. The app was found to be the most effective.

MBS146: Crossword puzzles vs Catchy Songs

The purpose was to find the solution to the catchy song stuck in people’s head. The problem I tried to solve was how to get the song out of your head. My procedure was to play the song three times. I would give them the crossword puzzles to everyone and I would ask them what they remembered through the days. The important facts I learned from this experiment was that no one forgot the song, everyone varied in different parts of the song. My results mean that my method didn't work and to choose a different one for the future.

MBS147: Color Perception

The purpose of my project was to see if warmer colors would be recognized more than cooler colors. I predicted that yellow would be recognized the most. My data did not prove my hypothesis because red showed up the most. Yellow was fourth best at 14.5%. Red was the most with 25.0%. Next time you want to be noticed, wear red!

MBS148: Subliminal Messages

My project was testing how subliminal messages stick in your mind. The purpose was to see how vulnerable your brain really is. I made a video with a message of a color hidden in it, and then asked the participants which color appealed to them. I also performed a control trial to compare. The results showed that the messages did not clearly stick in the subjects’ minds. These results differ from other tests that I’ve seen, so an idea for the future could be using audio instead of visual. I could also try repeating the messages more often.

MBS149: Deal 'em Up

The purpose of this experiment was to determine how many times you to shuffle a brand new deck of cards to make the cards sufficiently shuffled to deal. I took a brand new deck of cards and hypothesized that if I shuffled it 7 times, it would be sufficiently shuffled. I defined sufficiently shuffled as no player receiving two cards of the same suit in consecutive order. I dealt each hand to four players. I checked each hand dealt to see if it hand two cards of the same suit in consecutive order. I dealt 30 hands. Each time, I put the cards back in the same order I received the new deck in. I documented my findings from each hand dealt and found that overall, 7 times is not sufficient to shuffle a brand new deck of cards to make it “sufficiently shuffled” as I defined that term

MBS300: Left or Right?

We researched if gender, age, hand dominance, or eye dominance affects the instinctive direction one turns in order to get to a location equally as easily accessible by turning left or right. We hypothesized that the way people would turn would be the opposite of their eye dominance while the direction that they would turn would be the same as their hand dominance. With our findings, we noticed that there was no trend in age, gender, or eye dominance while we also noticed that right-handed people tend to go right more and left-handed people to go left.

MBS301: Time Perception

We tested different age groups to see if time perception changes as you get older. In our research we learned that kids use their emotional side of thinking, and adults use their technical side of thinking. We hypothesized that kids will perceive time to be longer than it actually is because they are bored.

MBS302: Color Memorization

The purpose of my experiment is to find out if color assists in retention. Our results well help students know what color they should write their study guide. For this experiment we will be writing facts and concepts with color markers and showing it to people and recording the retention rate for each color.

MBS303: Education: Digital or Paper

The purpose of our experiment is to determine whether or not electronic devices are beneficial to a student's study habits. We will have three groups, within each group a select number of students will study for a small quiz made by us. One of the groups we have studied with flashcards on paper and the other group will have studied on an electronic device. Then we will check the quizzes and determine whether electronic devices or paper is a better study material.

MBS304: The Truth Behind Lie Dectectors

Our science fair project is “The Truth behind Lie Detectors”. The purpose of the project is to determine which lie detector, a real one or an app. We hypothesized that the real lie detector would perform better than the app because it costs more money, had better ratings, and the app was more meant for entertainment purposes. We performed 16 tests and recorded whether the app or real lie detector got the question correct or incorrect. In conclusion, our hypothesis was right and the real polygraph test got more questions right.

MBS305: Does dogs' breed affect their memory

the purpose of this experiment is to have a better under standing of the dogs memorie. How we will do the experiment is we will have three bowls then we will spray perfume on the outside of the bowl, so they can sniff out the toy. Then we will show the dog the toy put it under the bowl swap them around and see if the dog can figure out which bowl the toy is under.

MBS306: Meditation and tests

Our experiment is going to see if meditating has any effect on a test score. We will have people take two tests- one without meditation and one with meditation. We will then compare the results.

MBS307: Do Video Video Games Affect Sleeping and Learning?

We will determine if playing video games affect your nightly sleep and learning during school hours. We will look at what types of video games are being played by students and compare the results.

MBS308: Ambiguous Illusions

Does gender affect the way we view ambiguous optical illusions? If so, why does it affect how we see them? If we show ambiguous illusions to both genders, then the gender will affect the way they see it. Find optical illusions and print them out. Study the optical illusion. Find people of both genders and use them to test the optical illusion to see if gender has any effect on the brain and how we see the optical illusion. Observe subjects' behaviors, actions, and habits. Study responses and understand what they were seeing and why. Study the opposing genders and see if they have any different responses or see anything differently. Write a conclusion on how to how not gender affects the way we see illusions.

Biology (MBI)

MBI100: Planaria Regeneration

The purpose of this experiment was to determine if different pH levels would affect the regeneration of planaria. Planaria are flatworms that if cut in half both parts of the planarian body would regenerate. It has hypothesized that a lower pH level would provide a better living environment for the planaria to regenerate. The planaria were transferred into environments with .5% vinegar, .3% vinegar, and .2% vinegar. They stayed in the water for three day before they were cut in half horizontally. The amount of time it took for them to regenerate was then recorded and put into a data chart and graphs. The results of the experiment where that the planaria in the .2% vinegar regenerated fully in the least amount of time.

MBI101: Artificial Light Helping Plants Grow

This experiment tests the effects of different types of artificial light on the growth and development of basil plants. The student hypothesized that light bulbs with a full spectrum range would make the plant grow the tallest because of the presence of multiple different colors of light.

MBI102: Game of Salads: An Interstellar Song of Lettuce and Radishes

Commercially available simulated "Martian Soil" was used to grow radishes and lettuce plants. Plant growth in simulated Mars soil was compared to growth in potting soil and sand.

MBI103: How Do personal genome variations affect drug metabolism?

The purpose of my project is to analyze how the differences in genomic sequence cause people to react differently to prescription drugs. I have chosen to analyze the effect of Atorvastatin. I am using PharmGKB to gather information about Atorvastatin, the pathways it takes in the human body, and the proteins it interacts with. I will find information about the different alleles that are associated with Atorvastatin. By analyzing these alleles' information using the SNP database, I want to see how a simple mutation in the DNA that encodes for the protein may cause a different reaction to Atorvastatin.

MBI104: Bad Bettas

This experiment will be researching if different fish foods affect betta fish aggression. Four groups of bettas will be fed different diets: bloodworms, flakes, and pellets. Bloodworms are predicted to have the most effect due to their high nutrition. Throughout the period of 300 seconds, the researcher will time and video aggressive behaviors by recording the time in seconds the fish have flared fins. The research will be conducted for three weeks everyday. Results will be available on fair day.

MBI105: What snack would my Caique prefer?

The purpose of this project was to determine what snack food my pet Caique would prefer, if given several options. A Caique is a species of mini-parrot characterized by it's small stature and playful personality and its ability to bond with it's owner. The study involved offering the bird, peanut butter, peanuts, marshmallow cream, cranberries, and pretzels while observing his behavior and reaction to each snack. This was done in his home environment where he is comfortable and not stressed. The major observation was that the Caique's reaction had more to do with texture rather than flavor.

MBI106: Susceptible Soils

Which type of soil is most susceptible to erosion? I hypothesize that potting soil is most susceptible. I did this project because I am interested in gardening, and I was curious about soil erosion, and if I could help. For each trial, I took three loaf pans , and filled them with soil. I watered them for three days. Then, I took the loaf pans and propped them up into a cake pan. I poured water over the soil, so that the soil could "erode". I weighed the cake pan and compared my results. The soil that "eroded" the most was potting soil. My hypothesis was correct.

MBI107: Grow Your Garden Without Dirt

I did this project to see if i could grow an herb garden for my Gram without any dirt. I hypothesis that the type of water would matter, pond water will show the best growth. To complete this project, I had to learn about hydroponics. Hydroponics is the method of growing plants without soil. I chose the wicking method. The wick touching both the growth medium and the other end of the roots. I recorded the height and growth of each plant,each day. After three trials, I found the pond water did produce the best results.

MBI108: The Gas Fruits Pass

1.Buy apples or pears, bananas, potassium iodide, and 8 plastic bags. 2.Label 4 bags "control" bags and 4 bags "test" bags. 3.Place an unripe pear or apple in each control bag. 4.Place one ripe banana in each or the test bags along with an apple or pear. 5.Observe changes daily. 6.2-3 days later, create a potassium iodide and water solution in a 1 liter bottle with 450mL of potassium iodide and 425mL of water. 7.Pour the solution into a tray about 0.5 cm deep. 8.Cut the fruits in half, and place face down in the solution. 9.Use the ripeness chart for recording results.

MBI109: Affect of Temp. on Swim Speed

The purpose of this experiment was to see if fish swam faster in cold, warm, or hot water. It was predicted that they would swim fastest in hot water. To do this experiment, 9 guppies (Poecilia reticulata) were purchased and kept in a tank at a temperature of 23.3ºC. This temperature acted as the “warm” temperature. A “cold” temperature of 25.6ºC and a “hot” temperature of 28ºC were also used. Fish were isolated and their horizontal swim motion was monitored over a time period of 1 minute. Speeds were calculated using s=d/t. Results available at fair.

MBI110: How Does Color Contrast Affect Visual Acuity?

How will the contrast or similarities of a target and its background affect acuity? It was hypothesized that greater visual acuity will occur when subjects view targets and backgrounds of contrast. Test subjects for 20/20 vision and color vision using a Snellen chart and Pseudo-isochromatic Plates obtained from an optometrist. Next, the 30 subjects were tested using 56 slides on an iPad, each constructed with two lines, 1.6 mm apart. The distance at which each subject could correctly define two lines and the color of the lines on each of the 56 slides, was recorded. This research could be useful in the construction of flyers, electronic billboards, and signs of all types, including advertisements and Department of Transportation signs for motor vehicles.

MBI111: Easy and Inexpensive Way to Make Water Potable

My last year’s project indicated that boiling water was a very effective method to kill bacteria from river water. Brita filter, however, was ineffective .In this year’s project, I will explore other techniques to make the water potable. The river water will be taken. One of the methods I propose to use is to expose the water to UV light for a specific time. Copper and silver are considered to have antimicrobial properties. Therefore, I will test the effectiveness of these metals to kill the bacteria. I will also try additional traditional techniques like treating the water with safe chemicals.

MBI112: Which is smarter: mixed breed dogs or pure breed?

In this experiment I will test my four pet dogs, two which are pure breeds and two which are mixed breeds. I will teach them tricks and decide based off of my observations which one is smarter!

MBI113: Green, Green Grass of Home

The purpose of my experiment is to see which soil additive, hydrated pulverized lime, pelletized dolomite lime, or wood ashes, will adjust the soil ph and result in the best grass growth. The hydrated lime was clearly additive. However, wood ashes are a simple alternative to costly store bought additives.

MBI114: The 'V': An Integral Part of a Goose's Life

Purpose: To find out why geese fly in a 'V' and to see if this information helps other geese fly. I believe that the formation will affect the drag experienced by the geese that are following the leader at the head of the 'V'. I think that these geese will experience less drag. Procedure: I will build a wind tunnel and place model geese in the wind tunnel. One goose will be movable and will act as the lead goose. The trailing goose will be fixed in place but attached to a lever that will push on an electronic scale to measure the drag that is experienced by the goose. 1. Place the trailing goose model in the wind tunnel and attach to the electronic scale. 2. Zero the scale. 3. Record the reading on the scale with the wind tunnel off. This will be the control reading. 4. Start recording the scale readings. A. Record the reading every 10 seconds for 1 minute. B. The value on the scale should be zero. If not, re-zero the scale. 5. Turn the wind tunnel fan on. 6. Record the readings from the amount of drag being applied to the fixed bird that is shown on the electronic scale every 10 s for 60s. 7. Turn the wind tunnel fan off. 8. Place the lead bird in position #1. 9. Repeat steps 5-7 for all different positions of the lead bird. 10. For each position of the lead bird, calculate the average drag from the 6 different readings over the one minute test period. 11. Make data tables based on data given in the experiment. 12. determine if the position of the lead bird affects the drag experienced by the trailing bird.

MBI115: How Does Fracking Affect Plant Growth?

When given the correct environment, a plant will flourish, and it will supply living things with the oxygen, as well as food for many a creature. Although, some plants are not given the correct environment. This experiment was conducted to find out how a plant grows when not given the best environment and how it can't function like it should. I believed that a plant that experienced oil leakage from fracking would not grow as well as a plant growing in a healthy environment. The 20 plants that I used were separated into two groups, one group that would be treated with oil, and one that would be treated without oil. My plants were kept under the same Sun-Simulant growing lamp, and were each watered with two milliliters of water until day 14, when plants were watered with 3 mls due to their size, and finally with 10 mls, and group one also was treated with 1ml of 5w-30 motor oil, to represent the oil from fracking. At the end of the three weeks, the plants in Group 1, or the group with oil, were an average of 10.2 cms in height, and group 2 was an average of 12.8 cms in height. My hypothesis was correct in the case of this experiment. The oil that was soaked up by these plants did stunt the plants' growth rate.

MBI116: What is the Effect of Acute Lead Poisoning on the Immune System?

In 2015, the residents in Flint, Michigan had high concentrations of lead in their water. It was known that this contamination significantly affected their neural function, but how did it affect their immune system? My project studies the immunotoxicology of concentrations of lead, matching the lead level in the Flint residents' blood, on lymphocyte proliferation.

MBI117: Does Aspirin Help Plants Grow?

From all the preparation and experiments, my project has finally come to a conclusion. I started out with planting Christmas Flowers bulbs and feeding one with water with dissolved aspirin and the other with just regular water. From the result of my project, the regular plant extremely outgrew the other. It took a course of five weeks for each plant to get their results. In my words, I would prefer regular water over any other substance to treat a plant to be stronger and healthier.

MBI118: Plant growth

I decided to use a bean plant and the following liquids: water, coke, coffee, beer, and orange juice to check out plant growth. After planting, each were watered with water until they sprouted. The plants were watered weekly with the beverage that it was randomly assigned. Every week before I watered the plants I measured them to see how much they had grown from the previous week. I measured all three of the plants in each clay pot and recorded my findings.

MBI119: Testing Different Liquids for Flower Lifespan

I tested different liquids to see how long cut flowers would last. I observed them every day until the flowers died. The project took longer than I thought it would take. I was not very surprised with the results. The first flower died in four days. The one that lasted the longest was ten days. The flowers with bleach died first. The ones with just water died next. Then the flowers with sugar and water died last. Overall my project took a while, but it went very well.

MBI120: How Does Caffeine Affect Plant Growth?

This project will test the effects of caffeine on green bean plants. One group of plants will be given water, one group caffeinated green tea, and one group caffeinated black coffee for 30 days. The plants will be measured in centimeters from when they are first visible from the soil to the end of the 30 day period. Notes will be taken throughout this period. The hypothesis is that green tea will result in the best growth because the chemicals in caffeine can help plants grow, but too much can dehydrate the plants. Results will be available on fair day.

MBI121: Let It Grow

Even though we know lots about plants there is still much more that we have yet to discover. I chose this project because I wanted to know more about how the minerals and chemicals a plant receives would affect the growth of a plant. Upon going into this experiment I assumed that Calcium would help the best because it is crucial to plant growth and development. The purpose of this experiment is to find out what chemical in tap water (Calcium, Magnesium, or Sodium) impacts the growth of a pea plant the most. The hypothesis for this experiment is that the pea plants getting the distilled water with Calcium Carbonate will grow faster because the process in which Calcium Carbonate participates is large and growing and involves nearly all aspects of plant development. For my procedure: Fill four jars per chemical with three cups of distilled water mixed with one chemical. In twelve Mason jars place foam disks with two seeds each into one jar. Repeat. Do this three times, for three trials. Each trial lasts about 14 days. There are no known risks. An adult with access to these chemicals and a lab safely premade these chemicals. The data collected will consist of 42 days (total with three trials). Each day a measurement is taken to determine which chemical has a higher average growth over a period of 14 days. The final results will be available at the student's exhibit on Fair Day.

MBI122: The Effect of Poisons on Hydra

For my experiment, I examined hydra in non-biological poisons. I analyzed the hydra and saw if the regeneration properties of hydra continued to work in these polluted solutions. In my experiment I used tide, salt and plumber cleaner as pollutants to mix with the existing water. My results concluded that hydra are ultra sensitive to environmental poisons. They were not able to survive in the polluted solutions.

MBI123: How Different Fertilizers Affect Plants with and without Sunlight

My experiment is to test which of three fertilizers work most efficiently. UI will have four plants total. One of the plants will be the control while the other three will be fertilized. I will be testing in two locations. I will test in the sun and in the shade. All plants will receive the same amount of water, same amount of fertilizer, and same size pot. My hypothesis is fertilizer A will grow the best in the sun, but have little effect in the shade. In the future, I plan to use this data on further research to find which plants best react to fertilizer.

MBI124: How Different Genres of Music Affect the Growth of Pothos

I want to see if different genres of music will make the plant grow faster or slower than normal.For my project I will have eighteen pothos plants in the same room, but far enough apart that they will not be affected by the other genres of music. I will play each genre for ten minutes. I will also have a control plant that does not listen to music. I will do cuttings of each of the plants. I will measure them every day. The genres of music are classical, jazz, country, rock, disco. My purpose for doing this is to help botanists and nursery workers to make their plants grow faster. My hypothesis is that the pothos will grow faster with classical and jazz and grow slower with rock, disco, and country.

MBI125: How Different Pollutants Affect Marine Life

The topic of my science fair experiment is how pollutants affect marine life differently in fresh or salt water. I am using shells instead of marine life. I experimented on how the seashells absorbed pollutants differently. The pollutants I used were vinegar-acid, oil, and liquid furniture polish-chemical. This topic is important to me, because I visited the ocean and am interested in it. I think it is important to protect our environment. To complete my experiment I used, 6 seashells, 6 plastic cups, water, sea-salt, vinegar, furniture polish and cooking oil. I hope this will teach others about the environment.

MBI126: Pumpkin Eating Contest

Have you ever had pests eat your garden and wonder how you can get rid of them without harming your plants? My project is the perfect solution. I sprayed pumpkin plants with different homemade sprays to see which one would repel bugs and to most effectively keep the plants healthy. I had three sprays and a control; rhubarb, soap, and tobacco. I predicted that the rhubarb spray would do the best, but the tobacco spray repelled the insects the most. The tobacco spray is easy to make yourself, and creates an effective repellent that keeps the plants healthy.

MBI127: GMO:Better Than Your Average Seed?

Purpose: To see whether genetically modified plants (soybean) are superior to unmodified soybean plants when competing with weeds for nutrients such as food and light both before and after herbicide is applied. Procedure: 1)Order five genetically modified and 15 unmodified seeds. 2)Place potting soil into each of the five pots, and put a genetically modified seed in the center of each of the five pots. Place three unmodified seeds surrounding the genetically modified seeds. 3)Add three radish seeds and three basil seeds to each pot to serve as weeds. 4)water each pot equally over the life of the experiment. 5)Record the growth of the genetically modified and unmodified seeds. 6)Add Roundup to each of the five pots. 7)Record the growth of the genetically modified and unmodified seeds. 8)Analyze data and draw conclusions.

MBI128: "Pea" J.A.S.

Please visit student's exhibit for abstract.

MBI129: Is Preen Really that Green? Part Two: The Effects of Pre-Emergent Herbicides on Seed Quality

In a prior study, seedlings exposed to Preen grew at a slower rate, weighed less, produced fewer blooms and had a less developed root structure. In this study, Marigold seeds from a parent plant exposed to Preen were compared to a control group. The seeds from the Preen parent had a lower germination capacity and a slower germination rate. Furthermore, the seeds from the Preen parent grew slower, produced fewer blooms and weighed less when compared to the control group. Based on this study, exposure to Preen appears to have a negative impact on a plant's ability to reproduce.

MBI130: Do Plants Like Coffee Too?

Based on an understanding that coffee has negative effects on young people, I undertook this experiment testing the effects of coffee on plants. To do this, I used five lima bean plants, each receiving coffee instead of water (except for the control) beginning at different points in their life cycle. After thirty days, I determined that coffee has a negative effect on plants. The plant that only received coffee never fully germinated ,and coffee slowed the growth rate of other receiving plants. In conclusion, if you want your plants to stay healthy, you should not give them coffee.

MBI131: How does pH affect the growth of wheat grass

The purpose of the experiment is to see if the levels of the ph can affect the growth of wheat grass. Rain water in the USA is increasing in ph which could be affecting the growth of plants, including grass. The following steps will be taken: First I will take containers of water and adjust the ph varying levels and measure the temperature. next I will plant the wheatgrass seeds in the dirt of five different containers. Every day I will water the plant with the ph water and each week I will record the growth and measure the length of each plant. I will analyze the results.

MBI132: Western Harvester Ants

Which habitat is best for tunneling, sand or gel? My hypothesis is that the ants in the sand habitat will create more tunnels than those in the gel habitat. I also predicted the tunnels would be longer in the sand than in the gel. First, I placed 25 ants into each habitat. Next, I measured the tunnels daily for 30 days. Then, I recorded my measurements in a log. In conclusion, my data proved that the western harvester ants in the sand habitat created more tunnels, which were longer and more intricate, than those in the gel habitat.

MBI133: What is your dog's Favorite Color?

The question I asked was what color are dogs most attracted to? My purpose was to teach people more about the eyesight of dogs and how they see things. I set up the bowls in the order orange, yellow, green, red, blue. I took the dog out of the room and placed a treat in each bowl. I tested 5 dogs 10 times each. My results were that blue was the favored color. Through research I found that dogs are mostly attracted to blue and yellow so my results would make sense. In future experimentation I could test cats.

MBI134: The Dream Garden

The Dream Garden is the best Garden of Lima beans you can have. I will get there by experimenting with the environment of the seed. I will see what seeds are growing the best in certain environments. Project question: How does the environment affect plant height, color, and health?

MBI135: Thirsty Plants

Problem Statement Does the amount of soil moisture directly correspond with the growth of a plant? Procedures: I will acquire the necessary materials to construct a Hygrometer. Then, construct and test the sensor in a pot of dry soil and a pot of wet soil Next, I will grow a plant in wet soil, a plant in dry soil, and a plant in normal soil and record the height of the plant throughout the process

MBI136: Thirsty Plants

My experiment was to get five fittonias and water each with a beverage to see how it affects plant growth. Water was the base. I used carbonated water because it adds carbon dioxide, orange juice on another for the Vitamin D, apple juice, and Coca-Cola for the sugar content. I used a solution of thirty milliliters of water and thirty milliliters of the beverage for each specific plant each day. Experimentation showed orange juice and apple juice decreased the plant’s size and the other beverages showed an increase in size. My conclusion is acidic juices harm plant growth and carbonation helps growth.

MBI137: Inorganic vs Organic Fertilizer

The experiment I did was between organic and inorganic fertilizer. I wanted to tell which one would be better for my garden. My hypothesis was inorganic fertilizer would be better. Through experimenting I had proven that inorganic fertilizer is better. I also had fun with the responsibility of monitoring and taking care of the plants. I had 50 cilantro plants total, and there are 25 plants with organic soil and 25 watered with an inorganic water mix. The project was successful and proved my hypothesis correct.

MBI138: Liquids vs. Plant Growth

Robert Hooke discovered plant cells(1665) Question: Observing effects of plant growth with multiple liquids? The observation of plant cells, are going to be altered with many possible liquids such as tea, milk. Plant cells will nurture or die if each liquid has certain characteristics like water or not.

MBI139: Water Contamination Leading to Water Scarcity

My project is to make water that is acidic by pollution, better with a filtration of charcoal and sand. What I will do is have a control being a normal bottle of water and another bottle of water with lemonade and water. Both will be pH tested and then the impurity bottle will be filtered through a filter with activated charcoal and sand, as activated charcoal filters are used in fish tanks to regulate the pH level, and will be pH tested again the results would be documented as a table of before and after. This will be able to help more people in third-world places to drink water safely like all of us do. I am mid-way through the experiment while I have the lemonade and creating the charcoal filter.

MBI141: How Carbon Dioxide and Food Affects Water

My experiment was about how carbon dioxide affects water with or without food: plant food, sugar, and Brewer’s yeast. My experiment also proved that growth occurs without food, but with water. I chose this because I have a pool and I want to see how to control algae growth.

MBI142: Acidic or Not

Water sources have become more acidic over the past years due to contamination and other variables. My experiment provides us with the most acidic water source, testing five water samples. To do that, I put one pH test strip in each of five water solutions, measuring the acidity level. Then, after five minutes, I recorded the acidity level and color of each pH test strip placed in the water trials. The results showed lake and well water produced an acidic pH level, rejecting my hypothesis which was that river water would produce an acidic pH level.

MBI143: How Safe Are Our Local Waters on Golf Courses?

Problem: How Safe Are Our Local Waters on Golf Courses? Hypothesis: It is hypothesized that moving water on golf courses will be safer than standing water on golf course. Safer water sources contain fewer pesticides, less lead, less bacteria, less nitrites/nitrates, and less chlorine than sources that are less safe. A safe water supply also has a pH between 6.5 and 8.5. Safety is determined by the EPA guidelines. Materials: Glass jars with lids; Water samples from golf courses and moving waterways; WaterSafe Test Kit which tests samples of water for lead, bacteria, pesticides, nitrates/nitrites, chlorine, hardness, and pH; Permanent Marker, Notebook to record results and observations, Pen and Pencil, and Masking Tape. Procedure: 1. Clean glass jars and lids with soapy water, rinse with water; 2. Label the glass jars with masking tape, noting the exact location and type of the water source; 3. Collect water samples; 4. Test each water sample for each of the following: lead, pesticides, nitrates/nitrites, nitrites only, pH, hardness, chlorine, and bacteria; 5. Record the data, and 6. Draw conclusions.

MBI144: How Different Sound Frequencies Affect Plants

The purpose of this experiment is to see how different frequencies of sound affect different plants. Firsts I will by different types of plants. Then I will expose each type of plant to each type of frequency. I will record the responses of the plant on a google doc.

MBI145: Effects of Various Light Sources on Plant Growth

Please visit student's exhibit for abstract.

MBI146: Can Smartphones Change Temp. of CSF?

This experiment tests the ability of a cell phone to change the temperature of cerebralspinal fluid surrounding the brain. For testing, the student placed a working smartphone with 4 running apps.on top of a plastic bag of water, measuring the starting and ending temperatures after twenty minutes. The student hypothesized that the phone would increase the temperature by 1.8 degrees Celsius after twenty minutes of use.

MBI147: Stars Growing Green

Life on planets other than earth is a large topic of interest. In this experiment, it will be found if algae can grow using a different light source than the sun. In reference to the real-world, the purpose of this experiment is to find if algae can grow on another planet based on the color of light of the star the planet orbits. The hypothesis is that the growth of algae will vary with the color of light. There are two species of algae used in this experiment. In the first set of trials, Spirulina will be used. In the second set of trials, Porphyridium cruentum will be used. There are three trials per set. The first steps of the procedure include mixing sodium nitrate, sodium phosphate, and sodium chloride with water to prepare the algae. Then the algae are placed in a box with a light hung fifteen centimeters above the algae. The color of lights includes red, blue, white and yellow. There are no risks in this experiment. After ten days, the algae will be measured in grams using a balance. Then the average of the trials will be calculated. If there is a significant difference in growth, then the growth of the algae did vary with the color of light. After this is determined, the two species of algae's growth will be compared. Then it will be determined which algae could grow on another planet based on the star it orbits by determining which algae grew more during the experiment. The final results will be available on Fair Day at the exhibit.

MBI148: How carbon affects grass

The more CO2 in the air, the more rapidly and abundantly plants grow. My experiment is going to discover whether or not carbon in the soil has the same affect on plants. If it does, carbon will provide an alternative for synthetic fertilizers. What I will do is fill 4 containers up with dirt and 0%, 1%, 5%, and 10% carbon. The carbon will be provided by activated charcoal. I will look for any change or color of the plant. The results will be available at the science fair.

MBI300: Are Fingerprints Inherited

Our project is to find out if fingerprints patterns have an inherited quality to them. We will do this by taking 15 pairs of related fingerprints and 15 pairs of unrelated fingerprints. Then we will compare them and find the percent that have the same pattern.

MBI301: Does Watching Different Genres of Movies Affect Blood Pressure?

The purpose of executing this experiment is to determine how blood pressure is affected by pleasurable or bored feelings. We will determine this by having the subject watch a movie, either comedy or a movie that we think will be found boring. We will then test their blood pressure and look for change between the two movies.

MBI302: Ultraviolet Radiation's Effect on Yeast

We are experimenting how UV Radiation effects the colony growth of Yeast. We will use smear plates in order to allow the yeast to develop and test how the colony grows with the use of UV Light. This will allow for us to understand how UV Light Radiation effects the DNA of the yeast and can affect the DNA of other species and plants.

MBI303: Does Wi-fi Radiation Affect Plant Growth?

Does a wireless router cause plants to grow differently? Our project tested Marigold growth both near the wireless router and as far away from the router as possible in the confines of a house. The Wi-Fi-router affected the Marigolds because not as many sprouted. The growth of the ones that did end up sprouting ended up not growing as much. The marigolds farther from the Wi-Fi-router sprouted more plants and those flowers grew more. Our project relates to everyday life because it shows gardeners that planting Marigolds away from the Wi-Fi-router will thrive more.

MBI304: Could the Theory in "The Age of Adaline" ever be Possible?

The purpose of this project was to determine if the theory in "The Age of Adaline," that states that shock can have an effect on the process of aging, could ever be possible. It was predicted that the theory would not be possible and that it would result in the death of zebrafish embryos. To test this theory, zebrafish embryos were submerged in metallic containers. The water was cooled to a near freezing temperature, then shocked. Zebrafish were studied for 5 days to determine if growth was visible. Results available at fair.

MBI305: Chemicals on Daphnia Heart Rate

Daphnia are semi transparent ocean crustaceans with long antennae and prominent eyes. These crustaceans are known to sanitize water in ponds, lakes, and streams, and they are a primary indicator of environmental health. In our experiment, we submerged one Daphnia into one of six chemical solutions: acetylcholine, epinephrine, caffeine, nicotine, potassium chloride, or calcium chloride. In each solution, the heart rate differed. In caffeine, acetylcholine, and epinephrine, the Daphnia's heart rates drastically increased from the crustaceans' average heart rate of 220 BPM. But for, nicotine, potassium chloride, and calcium chloride, the Daphnia's heart rates stooped way below the average.

Chemistry (MCH)

MCH100: Blue Dyes in Gatorade

The purpose of this project is to find out what Gatorade has the most blue dye. To do this you need a spectrophotometer, twenty cuvettes, Grape Gatorade, Arctic Blitz, and Blue Cherry gatorade. To figure out which had the most dye, you need to put the different gatorades in the cuvettes ,and put them in the spectrophotometer. Then you collect the absorption and transmission for five trials. The hypothesis is that the Grape Gatorade will have the most blue dye because it has a high concentration of ingredients, it absorbs light, and barely reflects light. However, the blue cherry ended up having the most blue dye having an average of .203 while the grape had .2286, and the Arctic Blitz had an average .7452.

MCH101: Rethink Your Drink

In this experiment, eggshells were placed in three different solutions: tea, coffee, and cola. This experiment was conducted to determine if the different acidities of the drinks stained the eggshells differently. the eggshells were placed in the solutions for 15 days and the discoloration of the eggshells were observed daily. The tea solution had the greatest acidity and stained the greatest surface area on the eggshell. Coffee showed the least discoloration. the hypothesis was supported by the data, showing tea would stain the greatest area on the eggshell. What are you drinking today?

MCH102: Indium Extraction from iPhones

This experiment tests the ability of sulfuric acid to extract indium from used smartphone screens. The student added varying concentrations of sulfuric acid to ground smartphone screens to attempt to extract indium. The solutions were mixed and centrifuged, and the remaining pellet was put through the flame test. The hypothesis of this experiment stated that the highest concentration of sulfuric acid would extract the most indium.

MCH103: Does Kool-Aid Affect How Ice Melts?

This experiment tested the flavor of Kool-Aid that melts ice the fastest. The different flavors of Kool-Aid tested were Lemonade, Grape, Cherry, and Orange. The Lemonade was predicted to melt the ice the quickest because the Lemonade Kool-Aid has the lowest pH or in other words, it has the most acidity which causes ice to melt. The independent variable is the flavor of Kool-Aid and the dependent variable is the time it took for the ice to melt. The Lemonade Kool-Aid did melt ice the quickest at an average of 17 minutes and 28 seconds. The Orange Kool-Aid was the second quickest flavor to melt ice at an average speed of 20 minutes and 36 seconds. Cherry Kool-Aid came in as the third quickest average at 32 minutes and 34 seconds. The slowest melting time was Grape Kool-Aid measuring in at a very slow rate of 41 minutes and 26 seconds at an average. In conclusion, the hypothesis was supported and the Lemonade Kool-Aid melted ice the quickest.

MCH104: Does Particle Size Affect Reaction Time?

This experiment was to determine if particle size affects reaction time and the amount of CO2 given off. Anti-acid tablets were used whole, in half, in quarters, and crushed. According to literature, the greater the surface area, the faster the reaction will occur. I tested each size of tablet three times each. I controlled the temperature of the water used in the reaction. The average CO2 given off and reaction times were similar among the whole, half and quartered tablets. The crushed tablets gave off the least about of CO2 and the reaction was faster.

MCH105: To Freeze or Not to Freeze?

At the beach, I looked at the ocean and wondered does it freeze as fast as other types of water. In my project I tested ocean water, pond water, and tap water to see which would freeze first. I hypothesized the ocean water would freeze slower that the others. First I placed each of the types of water in plastic containers. I checked every 10 minutes to see if there was any freezing occurring. I recorded what I seen each time. In conclusion my hypothesis was correct because the ocean water took longer to have any kind of freezing happen.

MCH106: What solution makes gummy bears expand?

Have you ever eaten gummy bears? I love gummy bears! I am curious how big I can make them expand. I will use salt, baking soda, and vinegar separately and wait five hours. I will then observe the gummy bears.

MCH107: What makes Pennies Corrode?

I decided to test different substances on pennies since I noticed pennies vary in color and discoloration. I used different liquids: Coke, Sprite, Olive Oil, Water, Dr. Pepper, and Mountain Dew, and I waited. I documented results daily

MCH108: Making a Chemical Reaction

For my science fair project I combined two ingredients to make a reaction happen. I combined vinegar and baking soda to make a film

MCH109: Which Sunglass Lenses Provide the Best Protection from UV Rays?

Please visit student's exhibit for abstract.

MCH110: The Effect of Antacids on the Neutalization of HCl

Please visit student's exhibit for abstract.

MCH111: Sugar Cube Experiment

This experiment is researching what liquid will dissolve sugar the fastest. The liquids I will be using are diet soda, regular soda, room-temperature water, hot water, and vinegar. My hypothesis is that the soda will dissolve in the fastest time because it has more chemicals than any other drink. To determine what drink is the most effective, a sugar cube will be placed into each liquid and timed to see how long it takes for the cube to lose its shape. Results will be available on fair day.

MCH112: Hot or Not

Are your hands freezing cold, and you can't go to the store to buy a hand warmer? I proved in my project how to make a homemade hand warmer the best way. I tested which material (iron, sand, and salt) makes a hand warmer hotter and allows heat to last longer. I proved that iron is more helpful in making the warmer hotter and that adding more salt will produce heat for the longest amount of time, which is not what I predicted. So next time your hands are freezing, you'll know how to make an easy helpful hand warmer.

MCH113: How Much Fat In Your Chips!

The purpose of the project was to see how much fat was in potato chips, and to see if there is a difference between low-fat and regular chips. To find this out, I put five grams of crushed chips into mason jar and then put 10 grams of acetone into the jar. After letting the acetone evaporate, the remaining fat was left. Originally, I thought there would be a huge difference between the low-fat and the regular, but I found out that there was not really a difference at all.

MCH114: Enzymes... Should They Stay or Should They Go?

90 samples for each of the following fabrics (linen, cotton, and polyester) were cut into 10.5 cm squares. A 5 cm square was drawn onto each of the individual fabric squares. 8g of wheatgrass was mixed with 200mL of tap water using a magnetic stirrer for 2 minutes. 20 drops of the wheatgrass mixture was dropped into the center of the fabric square and allowed to rest for 5 minutes before being brushed out using 20 even strokes. 30 samples of each fabric were then washed in a bio detergent, a non-bio detergent, as well as without any detergent. This would serve as the control. The fabric swatches were then allowed to air dry. The remaining stain was then assigned a numeric value based upon a digitally created stain scale. Results were averaged, graphed and analyzed. The bio detergent removed the wheatgrass stain better than the non-bio detergent and the control.

MCH115: Sip All Day, Get Decay!

Cavities and tooth problems are now more common than ever. Sodas are anything but but healthy, especially on your teeth. I wanted to find out what makes soda unhealthy, and why. After experimenting, the sugar from the sodas are the main cause of tooth erosion. Bacteria feeds on the sugars, creating acids, causing tooth decay. I tested Coca Cola, 7 UP, and Root Beer by putting a sample of calcium carbonate in a container of each of the sodas. The results supported the hypothesis. Coca Cola had the highest sugar content, and eroded the calcium carbonate the most.

MCH116: Salt and Water and Rust Oh My!

The purpose of this project was to find out if salt will affect the amount of rust produced from a nail. My hypothesis was that the nail in the 1.5g of salt mixture will rust the most since it has the most salt. To test this, I measured the change in mass of each nail in different mixtures weekly. When the project was finished, it turned out that the nail in the 1.0g solution of salt and water rusted the most, witch does not support my hypothesis.

MCH117: Which Beverage Has the Most Electrolytes?

Project : Which Beverage Has the Most Electrolytes? An electrolyte is an ion that is electrically charged. The human body needs electrolytes because they carry electrical impulses and are needed for muscle contractions. When you exercise, you lose electrolytes, and to prevent from getting dehydrated you need to replenish those electrolytes. The more electrolytes a drink contains, the more beneficial it is in replacing ions. This experiment was conducted to discover which beverage contains the most electrolytes by measuring how well an electric current passed through the 8 drinks tested. Electricity was measured in amperes (amps) in this experiment. To measure electrolyte concentration, an open circuit was made with: copper wire, a nine volt battery, a non-conductive spacer, and a digital multimeter device. Cords linked to the multimeter were placed in each beverage and the ampere reading was recorded in 3 separate trials for each beverage and water, which was the control. I hypothesized that chocolate milk would contain the most electrolytes because it has calcium, which is one of the most common electrolytes. In conclusion, my results showed that chocolate milk had the most electrolytes with scoring an average of 40.2 amps, and coming in close behind chocolate milk was 2% Milk with scoring an average of 37.5 amps. These results provide valuable information to athletes seeking peak performance and overall good health while training and competing.

MCH118: Contact Solution vs. Slime

The purpose was to determine how contact solution affects the density of slime. If there are three slimes with different amounts of contact solution, the slime with the least contact solution will stretch farthest and fall fastest, because the density is less and the slime will be able to move and stretch easier. In this project 3 slimes were made with different amounts of contact solution. Then measured was the stretch of each the two ways. In conclusion, the slime with the least contact solution was least dense and the slime with the most contact solution was most dense.

MCH119: The Effect of Eggs on a Brownie's Height

The number of eggs included in a recipe for brownies was evaluated by measuring brownie height.

MCH120: Oh, Where Did it Go?

Common sense is smaller objects dissolve faster than a larger object because of size. To test this, an Alka-Seltzer tablet was dropped into 155mL of water and was timed on how long it took to dissolve, this answers the main question, does changing particle size have a measurable effect on chemical reaction rate? The results show that powdered tablets have the shortest chemical reaction rate, due to having increased surface area. Thus, meaning that particle size does have an effect on chemical reaction rate.

MCH121: Snap! Crackle! Pop!

The purpose of this experiment is to see if temperature affects chemical reaction time. This will be tested by dropping an Alka-Seltzer tablet in three different water temperatures and recording the total time of the chemical reaction in seconds. The results showed that the Alka-Seltzer tablets in the hot tap water had the shortest chemical reaction time of 26.3 seconds. The longest chemical reaction time was observed in the ice water with an average reaction time of 127.41 seconds. That means that the hypothesis was supported by the data, because heat is kinetic energy and energy speeds up chemical reactions.

MCH122: What are the Effects of Ozone on Rotting Fruits?

This science fair project will describe the effects of ozone on the amount of time fruits take to rot. The researcher will build an ozone generator using three plastic bins, two fans and an ultraviolet light bulb. Two pieces of various fruits (oranges, strawberries, bananas, and apples) will then be placed in two different bins, one piece receiving a constant flow of ozone and one piece receiving constant flow of regular air. Photographs and notes will be taken everyday to determine which set of fruits begin to rot faster. Results will be available on fair day.

MCH123: What is the best drinking water?

In my experiment I tested a bunch of different waters, to find out what their Ph level is. The waters that I tested were Dasani, Aquafina, SmartWater, tap water, filtered tap water, Evian, FIJI, Alkaline 88 Water, and Essentia. Dasani had a pH level of 4. Aquafina and Dasani had a pH level of about 5. Tap water and filtered tap water had a pH level of about 8. Evian and FIJI also had a pH level between 8 and 8.5. Alkaline 88 water had a pH level of 8.5. Essentia had the highest pH level of 9.5.

MCH124: Dissolving Ice with Salt

During a blizzard salt trucks need to get on the road so people can get where they need to go. What if they could use a better type of salt to melt the ice faster? Dissolving Ice with Salt tests a different type of salt to melt ice faster. To do this three 27 mL ice cubes were placed in a bowl and 36 grams of salt was added to the three ice cubes. Red Hawaiian Salt, Sea Salt, and Pink Himalayan were tested. Red Hawaiian Salt had the fastest average melt time of 52 minutes.

MCH125: Are You Drinking Acid?

The purpose of this experiment was to see if bottled water is more alkaline than tap water. Alkalinity claims many health benefits. I wanted to prove that buying bottled water over using tap water is beneficial. I was wrong! After completing three trials of ten different water bottles, the results were basically the same. A few water bottles were in the alkaline range while the tap water was always in the alkaline range. As shown in the data tables, some water brands were very acidic. The choice is clear; choose tap water. It’s cheaper, better for the environment, and healthier.

MCH126: What is the Best Skin Moisturizer?

My project was to find the best skin moisturizer. The end result was that the Eucerin worked the best. I sampled five lotions on Jell-O. I sampled Jergens, Aveeno, Vaseline, Eucerin, and Nivea. The Aveeno worked the least because it did not soak into the Jell-O. All the lotions turned pink from absorbing into the Jell-O except for the Aveeno. The Aveeno was still white. My project took two weeks to find the end result. The Jell-O was set in petri dishes. The Jell-O never completely set because it was only refrigerated for a few hours.

MCH127: Vitamin C Mystery

The purpose of the experiment is to test the juices from organic and inorganic foods to see how much ascorbic acid they contain. If I titrate different amounts of iodine in various types of food juices mixed with starch solution, the iodine reacts with all the ascorbic acid first, resulting in a color change. Vitamin C is calculated using the amount of iodine when compared to the control, which is a vitamin C tablet. The graphs show orange juice to have the highest vitamin C content, while tomato juice has the lowest. The hypothesis was supported by the data.

MCH128: How Does River Health Vary in the Allegheny River?

A variety of water quality parameters were measured in Allegheny River water samples collected from 8 different locations; Locations ranged from the headwaters to the point where the Allegheny meets the Monongohela River.

MCH129: Change of Melting Point in Wax

This experiment's purpose is to find out if different types of salt affect the melting point of wax. The hypothesis is, adding salt to wax will make the melting point of the wax decrease, but the Epsom salt, table salt, and sea salt will all affect the melting point in the same way. The regular wax had the highest melting point. The other salts, table salt, sea salt, and epsom salt, all decreased the melting point the same way. The candle with no salt (the control) had an average melting point of 139.8 degrees celsius . The candle with 1 g of table salt had an average melting point of 135 degrees celsius. The candle with 1 g of Sea had an average melting point of 134.6 degrees celsius. The candle with 1 g of epsom had an average melting point of 134.8 degrees celsius. The hypothesis was supported because the wax with no salt, melted at a higher temperature than the wax with table, epsom, and sea salt. The table, epsom, and sea salt all affected the temperature at which the wax melted in about the same way.

MCH130: Candy Chromatography

The purpose of this project is to see which dyes are sued in the coatings of certain colored candies by using paper chromatography. I think that each colored candy will have more than one dye used. Three different colored candies will be selected to be tested. The chromatography paper and the type of salt solution that each candy coating will be tested in will be constant. There were distinct differences between the candy dye and the food color dye when tested, but in some ways they were similar as well. To figure out how many dyes were in each candy color and in food color, paper chromatography was used. The dye in the candy was less soluble than the dye in the food coloring. The dye in the food coloring almost always traveled the length of the solvent, but not the dye in the candy. According to the results, two dyes were used in red and green candy as well as the food colorings, however the blue candy only showed one color.

MCH131: What Color Candle Burns the Fastest?

The purpose of my project was to see the amount of dye in a candle affected its burn time. My prediction was that the candles with less or lighter dyes would burn faster than the candles with heavy or dark dyes in them. I feel my hypothesis is most likely correct because it always seems light colored candles burn much quicker than dark ones in my personal experience. I will use this procedure: · Light each candle. · Let them burn to the halfway point. · Record data in charts.

MCH132: Ionic vs. Covalent Bonding

Please visit student's exhibit for abstract.

MCH133: Which Sunscreen Works the Best?

For my project my question was "Which Sunscreen Works the Best" because in the summer a lot of the time I see people get sunburn. I predicted that SPF 30 would work the best. What I did in my project was that I got the SunWise Frisbee that changes color in the sun and I put each sunscreen on it for five, ten, and fifteen minutes. Then I would remove the sunscreen and see how much it protected where the sunscreen was to where it wasn't. I rated it on a scale one being the best and five being the worst. I found that SPF 30 protected the most each time. So my hypothesis was correct.

MCH134: Immiscible?

In my project, I am trying to find out if I would be able to make oil miscible with water. I predicted that I would be able to mix water and oil. To test my theory, I mixed table salt with vegetable oil in a bowl for two minutes. I poured the mixture into a graduated cylinder containing water. I observed to see if the two liquids had mixed or if they were separate. After that, I recorded the volume of mixed liquid. In conclusion, all three trials proved that oil can mix with water. My hypothesis was correct.

MCH135: Electrocution as a Medium

Does the roughness of a surface affect crystals and how they form on it? The growth pattern of the crystal layer did not follow my hypothesis. Most of the sandpapers grew their crystal layer at about the same rate, with the finer grits actually lagging behind a bit at the start (the opposite of my hypothesis). By the end of my measurements the middle grits had developed the thickest crystal coating. My experiment proved my hypothesis was incorrect. The smoothest sandpaper did not grow crystals the fastest, but neither did the coarsest. Instead the middle grits grew the crystals best, which suggests that the roughness of the surface may not matter for how well crystals grow on it. The crystals grow due to oversaturation of the solution, so any surface may work as a starting point. There may be a difference due to surface roughness that was not shown in this experiment. With slower growing crystals, I might have been able to see some distinction between the growth on different surfaces. With this experiment and these materials, however, I was not.

MCH136: Poop to Power

My hypothesis was that cow manure kept in a warm environment would produce the most methane gas. I started to wonder why cow manure worked the best. I found out that it was the cow manure had more ammonia than other livestock manures. I was not sure that my hypothesis was right because you also need bacteria to get methane and bacteria grows in warm climates the most so that was my expected outcomes.

MCH137: Testing the pH of Bar Soaps

The purpose of this project was to see which bar soap is safest and healthiest to use on the skin. The soaps were Dove, Irish Spring, Caress, Dial, and Ivory. The hypothesis is that dove soap will be the most acidic and healthiest because it has no scents or dyes which could irritate the skin. Put the litmus paper on the wet bar soap and wait until it changes color, then match it to the pH scale to see the pH. Dove was the healthiest with a pH of 6, and Ivory was the worst with a pH of 9.

MCH138: Which Sunscreen Is Best at Blocking UV Rays?

Sunscreen is a cream or lotion rubbed onto the skin to protect it from the sun. Recent statistics show that the rate of melanoma diagnosis is increasing. Melanoma is one of the most dangerous forms of skin cancer and sunburn, which is a major factor to causing melanoma, can be prevented. I hypothesized that Coppertone Sport would be the most effective sunscreen because it has more active ingredients than the other sunscreens, in particular homosalate. Homosalate protects people from the sun by filtering out the harmful UV rays. I tested 4 different brands of sunscreen in SPFs 30 and 50, 3 times for a total of 24 trials. A UV light was used to mimic the sun and a UV detector that connected to a smartphone to find the UV intensity. I took a control reading by placing the UV detector inside of a resealable plastic bag, turned on the light, and read the intensity reading shown on the scale on the smartphone. The control reading was 3.9. To test the different sunscreens, I used a resealable plastic bag and drew a 4cm x 4cm square on the bag. I put the detector inside the bag with the sensor centered in the square. I then put 0.62 mL of the first sunscreen on the bag inside the square. The UV light was held 3 cm above the detector and was turned on. I recorded the reading shown on the meter and calculated the intensity reduction by subtracting the reading from the control. I did this for every sunscreen three times for a total of three trials per sunscreen; then found the average. My results showed that Coppertone Sport was the best brand to protect from UV rays. After analyzing the results, I concluded that Coppertone Sport performed the best because it had more active ingredients, specifically homosalate.

MCH139: Electrolyte Concentration in Sports Drinks

The purpose of this experiment was to find out if Gatorade has more electrolytes than other drinks and is therefore better to drink during and after exercise. Gatorade, Vitamin Water, and Body Armor are tested for electrolytes, I hypothesize that Gatorade will have the most electrolytes because it is advertised as such.

MCH140: Dissolving Candy...What Will Happen?

What effect does different liquids have on the dissolution rate of candy? I am going to be using different candy in my experiment such as Sweet Tarts, Skittles, and M&Ms. I am also going to be using different liquids to put the candies into. I am going to be using Sprite, cold water, warm water, and lemon juice. I set a max of 20 minutes to have the candy dissolve. If the candy did not dissolve, I would take it out after 20 minutes and measure it in size. Many of the candies did not end up melting. On the chart, the bars representing 1200 seconds was 20 minutes. The results were inconclusive, so I put down the max amount it could be. For the candy that did end up dissolving there really was no constant trend. The closest trials were on the Sprite. From what I have observed in this experiment, I have come to the conclusion that the cooler the liquid, the less likely the substance is to melt. For example, if you put ice in a freezer it will most likely stay the same temperature and form.

MCH141: Water Boiling with Salt

The purpose of this experiment is to find out which type of salt boils water the fastest. It is hypothesized that the table salt will boil the water the fastest. The different types of salt being used are table, sea, and epsom salt. First, measure out 25 grams of salt. Then, put the salt on the boiling water and and start the stopwatch. Wait until the water comes to the boiling point and record how long it took for the water to come to the boiling point. In conclusion the epsom salt worked the best.

MCH142: What Glue is the Strongest Adhesive?

Hypothesis- It is hypothesized that the Gorilla Glue will work will work the best at keeping the wood together against weight as opposed to Elmer's Carpenter Glue, Liquid Nails, Titebond Ultimate Wood Glue, and Titebond Original Wood Glue. Once you have finished your testing see which glue held the most weight. The glue that held the most weight is your strongest glue.

MCH143: Chill Out!

To determine if the amount of ammonium chloride affects the temperature of an endothermic reaction 10 grams of ammonium chloride were added to a beaker containing 250 mL of distilled water and stirred on a magnetic stirrer set at 800rpms for three minutes. This was repeated twenty-nine more times for 30 samples. The entire process was repeated for 20, 30, 40, and 50 grams of ammonium chloride as well as for the control; distilled water with no ammonium chloride. The results supported my hypothesis; which was that as the amount of ammonium chloride increases the temperature decreases.

MCH144: Battery Survival

Batteries are used in all our electronics today, but what happens when they are subjected to extreme temperatures? The hypothesis was that the temperatures would negatively affected the battery's life. To test this, three flashlights, containing identical batteries, were placed in three different environments: a refrigerator 3°C, freezer -15°C, and under a heater 37°C. Each environment was tested three times. The graphs showed that a decrease in temperature resulted in a lower battery life. When the temperature increased the batteries life also did. The data supported that colder temperatures decreased battery life, however the heat increased battery life.

MCH145: Filtering Water with Carbon

In this experiment, colored water was combined with three different carbon filtration materials: carbon, wood, and coconut. Each tested sample was combined with the carbon based filtration materials for one, three, and five minutes. After the time limit was reached the samples were filtered through a series of four coffee filters. Each sample was photographed. Affinity Designer, a digital design program was used to determine the color value changes between the control sample and the filtered samples.

MCH146: Cloudy With A Chance Of Acid

Weak acids in rain, which come from identified pollutants that dissolve in rain, have the ability to dissolve limestone. This can become problematic over time when the acidic water wears away at outdoor statues, monuments, and buildings that are composed of limestone. This experiment compared sealed limestone rocks and exposed limestone rocks. The limestone rocks were placed in different values of pH, ranging from 1-4 and the control was pH7. The results proved that the sealer protected the rocks from the solutions, saving them from degradation. Sealer should be used to preserve national statues, monuments and buildings.

MCH147: What's the best stain remover?

What's the best stain remover? Well I'm going to find out. I'm going to be taking a plain white t-shirt and making a few stains in the shirt and using different disinfectants on each stain. My hypothesis is that out of all the disinfectants I'll use the Clorox will work the best because I've heard great reviews.

MCH148: The Mold Experience

What food molds the fastest? What causes food to mold? What prevents mold? If I put out bread, cheese, and fruit to mold, then the bread will mold first, the cheese second, and the fruit last. Put foods on display and watch for mold to begin. I will dispose of the food as soon as mold is observed.

MCH149: Stretchy Slime Time!

The purpose of this experiment was to find out which slime mixture: flubber, butter,or clear was most flexible. The hypothesis states that Slime A (flubber) would stretch the furthest, the data did not support this hypothesis. My younger sister inspired the idea of stretching slime to see which mixture would stretch further. During this experiment, six trials of slime were kneaded for two minutes, then stretched across the floor and measured with three measuring tapes and a yard stick.In conclusion, the graphs show that Slime B (butter) stretched further because of its molecular makeup.

MCH150: Does Mint Actually Cool Things Down?

Purpose:Mint is a flowering herb, and here are many different kinds of mint. It grows in cool and moist areas where there is shade. Many people enjoy the light, fresh taste of mint. Mint-flavored gum, breath fresheners, and hard candies often advertise that mint has a cooling effect, and use images of frost and ice to demonstrate the sensation. But is this sensation really a result of mint actually lowering temperatures? Does mint, known for its cooling effect, really lower temperatures, or is it just a sensation? Materials:Pack of regular mints(Altoids, Tic-Tac, Mentos, etc...). 2 glasses of hot water. Thermometer. Pen and paper for notes. Procedures: 1.Get a glass of hot water, take the temperature. Record this. 2.Place 5 mints of hot water and take the temperature again. Was there a change? 3.Place more mints in 5 at a time and record whether there was a change at all. You should monitor it for 30 minutes. 4. The other glass of hot water is to be used as a reference. This is because we know water cools over time and we want to make sure that if there is any change in temperature, it is not independent of time, but of the mints speeding up the cooling process. 5. record your results. Any changes?

MCH151: Electrolyte Challenge

The purpose of the experiment is to decide whether, out of the the four liquids: Orange juice, Distilled water, tap water, and Gatorade, which one replenishes the most electrolytes. I gathered the materials instructed,see list in(procedure). I tested each liquid 3 times then found out the average. I used a multimeter to measure the microamps and milliamps and then converted the average measurements into amps. After I converted the measurements I used the equation: Conductance(siemens)= Current(amps)/ Voltage(Volts)= G=I/ V to measure which liquid produces the most electrolytes. The liquid that replenished the most electrolytes, can you guess……...ORANGE JUICE!

MCH152: The Importance of Ingredients in Cupcakes

Have you ever wondered what would happen if you used baking soda instead of baking powder in a recipe? Forgetting an ingredient in a recipe can be easily done, and can also easily mess up your recipe. My theory was that if I change some of the ingredients in the cupcakes, they will turn out differently. I tested this by using 4 different batches of cupcakes; one regular batch, one with baking soda instead of baking powder, one with almond milk instead of regular cow milk, and one with gluten-free flour instead of all-purpose flour. I baked all of the batches of cupcakes and compared the results. The regular batch was a light, golden brown color and was flat on top with only a slight dome shape. The ones with baking soda were a much darker brown, almost mocha-like color, and had the same dome shape. The almond milk cupcakes had a very similar color to the regular ones, but were very puffy and were not as flat as the first two. The last batch, the one with gluten free flour, had a very dome-like shape and was harder to the touch. In conclusion, my experiment shows that if you must change an ingredient in a cupcake or happen to accidentally put in baking soda instead of baking powder, it can change the outcome of the cupcake. This experiment is helpful to the community because it shows that although altering an ingredient in a batch of cupcakes could have terrible outcomes, it could also result in something that may look or taste better, or may also be helpful if you have specific dietary concerns.

MCH153: Permeation Denied!

The purpose of my experiment was to find out which brand of platic preserves food most effectively. The plastics tested were Glad Ware plastic wrap, Saran plastic wrap, Ziploc Sandwich Bags, and Press'n Seal. Each plastic wrap was used to cover an apple slice of the same size. The apples were scanned initially and after five days. A visual scale was used to rate the appearance of the apple slices. My data showed that Saran, Glad Ware, and Ziploc bags preserved foods essentially the same. Press'n Seal preserved foods the worst. When the thickness of the plastics were taken into account, Ziploc's rating dropped to last place.

MCH154: pH Effects on Copper Corrosion

This project studies how pH impacts the corrosion of copper. My hypothesis is that acids will make copper corrode the most. I prepared copper coupons by cutting copper sheets into 20mm^2 squares. Five different levels of pH were studied (pH = 3, 5, 7, 9, 11). Acidic and basic solutions were prepared. The coupon corrosion was rated on a visual scale of 1-10 and by measuring coupon thickness before and after the test. Results showed that the coupons in pH 3 solution corroded the most, followed by those in pH 5, pH 7, 9, and 11 solutions caused a similiar amount of corrosion (very little). My hypothesis was supported by the experiment.

MCH155: Which over the counter antacids neutralize the most?

Many people suffer from heartburn, indigestion, and Gastroesophageal Reflux Disease and these people count on over-the-counter antacids for quick and easy relief. These customers do not know what product is the best to buy. So TUMS, Gaviscon, and Alka-Seltzer were tested to see which one is stronger. The hypothesis was that TUMS would be the most effective when neutralizing stomach acid because it has the highest pH, the highest ANC, and the most effective dissolving rate. The experiment consisted of the tablets being cut to be the same weight then being dropped in white vinegar for three trials. The tablets would each have their own bowls to dissolve in and after they are fully dissolved the pH would be measured and written down in the chart. At the end of the experiment TUMS tested at a pH of five for every trial, but Gaviscon and Alka-Seltzer tested four for each trial. In conclusion, the hypothesis was supported by the results because TUMS neutralized the vinegar the most.

MCH156: Fuel From Sun & H20 - Mimicking Nature

Hydrogen is an energy carrier that can be used in fuel cells to produce clean energy. In nature, plants use just Solar Energy, Water and Enzymes (Catalysts) to produce energy. Mimicking plants, my experiment splits water to Hydrogen and oxygen more efficiently using photo-voltaic cells, as a source of electricity, and by using Cobalt Salt Catalyst coating on one of the electrodes in an electrochemical cell . In presence of catalyst the efficiency of water splitting increases.

MCH157: Flower Power

My question was: Which of the three substances(plant food, sugar, or aspirin) will keep the roses alive the longest? I hypothesize that aspirin in the water will keep the roses alive the longest because aspirin is known to help you heal. This is why I think that the water with the aspirin in it will preserve the roses better. To do the experiment I took three roses of equal size, 2.54 centimeters, each in a vase filled with 120ml of tap water. Then I put 5 milligrams of the plant food that came with the roses in one vase, and that same amount of sugar in another. The aspirin was an 81 milligram tablet that I put in another vase. I also kept them at 62 degrees Fahrenheit for five days. I did my experiment three times, and I was wrong to my surprise the roses that were in the plant food did the best!

MCH158: How does Kool-aid powder effect the boiling and freezing point of water?

How does Kool-aid powder affect the boiling and freezing point of water? This was my project this year. It was hypothesized that all of the flavors of Kool-aid will decrease freezing point and increase boiling point of water, but grape Kool-aid powder will increase the boiling point and decrease the freezing point of water more than orange, cherry and Blue Raspberry Kool-aid because it has the most sodium, acids, and solutes. This was done by setting up two apparatuses to conduct the experiment. In conclusion, the hypothesis was supported. All flavors of Kool-aid powder decreased freezing point and increased boiling point. The flavor that was most effective in doing this was Grape. This was because grape Kool-aid powder had the most sodium and the most acids.

MCH159: How Much Fat Is In Your Food?

Acetone was used to extract fat from three different foods; percentage fat results were compared to the corresponding food label.

MCH160: Color Absorbing Heat from Sunlight

This experiment investigates the role of color in absorbing heat from sunlight. The student spray-painted wooden boards different colors, and measured their temperature change in the sunlight. It was hypothesized that the darker colors will have a more drastic temperature change because of their ability to absorb heat from light.

MCH161: Affect of Cornstarch on Bath Bomb Fizz Rate

The purpose of this experiment is to see if cornstarch affects the fizzing rate of a bath bomb. My hypothesis was that if i increased the amount of cornstarch in the original bath bomb recipe, the fizzing rate (how fast it fizzes) would increase also. I increased the amount of cornstarch by 35 g in each bath bomb until the amount hit 140 g. I had 4 trials of 5 different bath bombs. I timed the fizzing rate in seconds, when the bath bomb dropped into the tub of lukewarm water. I stopped my timer when it was completely dissolved, and concluded that my hypothesis was correct. The bath bomb with the most cornstarch (140 g) had the fastest fizzing rate.

MCH162: Effect of pH on Lactase

This project tests the effect of pH on the efficiency of the enzyme lactase. In the experiment, the student tested the production of glucose in environments of varying acidities. The purpose of this experiment is to see which type of lactase supplement is most effective for people with lactose intolerances. The student hypothesized that the enzyme would be most productive in a pH of 2.

MCH163: The Great Germ War

My project is on the materials in cleaning solutions on how to make it stronger and faster on killing bacteria. I want to see what I can do to strengthen the cleaning effectiveness a cleaning solution to see if it kills the germs faster, how many germs it kills, and how much of one mineral in the cleaning solution does it take to make something clean. I would like to make a solution as strong as it possible can or make it better to kill harder germs and kill them fast. My plan is to conjure bacteria and use my substance on it (using different strengths of chemical) and see how it reacts. After I use my chemical I will seal it and then study how it reacts and how long it takes to kill all of the bacteria. I will be using a Petri dish and Nutrient Agar to test the chemicals. Depending on the solution I will have to bass what mineral I will be testing and using. I know that there are a lot of cleaning solutions in the world so I will have to use my own creation to test this so I won't copy anybody's work. I will be using three solutions: Vinegar, Lemon Juice, and peroxide. To test these I will use a dirty surface (a key bored) and every time use these I will clean the surface with gauze so I won't mess up my data. I will be using this three times over and seeing who has the better cleaning material in it to see how much bacteria it kills compared to the nutrient agar.

MCH164: The Effect of pH on Chicken Liver Enzymes

In this experiment I tested the effect of pH in different liquids on the enzyme in chicken liver. The enzyme is called Catalase. It reacts to hydrogen Peroxide by producing bubbles depending on how much of it there is. To test my results I measured the amount of bubbles to determine how "Alive" the chicken liver was. I was able to tell the bleach degrades fastest followed by Sprite following in a close second.

MCH165: Identifying DNA

Can an eighth grader build a tool for identifying DNA to help with Forensic Science? This project will help me develop an understanding of the steps used to match evidence from a crime scene to a suspect through building a Gel Electrophoresis Chamber.

MCH166: Homemade Lava Lamp

The purpose of my project is to see what will happen when I make my lava lamp and change the amount of Alka-Seltzer tablets added into the soda bottle. I created a homemade lava lamp and added different amounts of Alka-Seltzer to it. I then counted how many bubbles were created. My hypothesis was, if I change the amount of alka-seltzers added into the soda bottle, then will it affect the number of bubbles that the lava lamp makes. My hypothesis was supported. The homemade lava lamp with one Alka-Seltzer tablet had an average of 13 bubbles.The homemade lava lamp with two Alka-Seltzer tablets had an average of 17 bubbles.The homemade lava lamp with three Alka-Seltzer had an average of 22 bubbles.

MCH167: What is Best to Drink While Playing Sports?

This project is researching if sports drinks, water, or orange juice is best to drink while playing sports. In the project, the amount of electrolytes in each drink will be measured using a conductance system made up of a digital multimeter, 9v battery, wires with alligator clip leads, a bowl, a piece of a plastic straw, and a type of drink. It is predicted that the orange juice will have the most electrolytes. Results will be available on fair day.

MCH168: Producing Biofuel from Prickly Pear Cacti

If cacti, specifically prickly pears(Opuntia ficus-indica), could be turned into a biofuel it could help utilize semi arid land. Using deserts to create fuel could mean more arable land could be used to grow food for a growing population. Prickly pears could also be a form of renewable energy which could help reduce the amount of fossil fuels that are used and burned. The first step in creating a biofuel is to hydrolyze the cactus . The hydrolyzed cactus needs to be broken down by cellulase which is then added. After this sits for 24 hours, the glucose levels are measured and yeast is added to ferment. Then once the cactus ferments for another 24 hours, the ethanol content can be measured.The present glucose is what can be turned into ethanol. The ethanol that is formed is what can be used as biofuel. My hypothesis is that if the fruit, skin, and pad of a prickly pear are turned into an bio-ethanol, then the fruit will make the most ethanol since it has an initially high glucose content. This means that the fruit of the cactus would produce the most biofuel compared to the skin and pad of the cactus.

MCH169: How Does Fabric Softner Affect the Flammability of Different Fabrics

This experiment was to determine if fabric softener makes materials more flammable when subjected to a flame for an allotted amount of time. I did this because if you were in a house fire and are wearing clothes washed with fabric softener, you may be at a higher risk. In my experiment I compared how materials burned with and without fabric softener. I held my fabrics from a ring stand and let them burn for the allotted time, then I dropped them into water. In conclusion, I found that, on average, the fabric softener increases that amount of material burnt.

MCH170: Stretch It

My question was does temperature affects the elasticity of a rubber band? My hypothesis was that cold water would affect the rubber band the rubber band the most causing it to stretch the farthest. I think this because the hotter to the molecules get the more they vibrate making the rubber band harder to stretch. In my project I put the rubber band into a beaker and filled it with the temperature of water that I was using, I let it sit there for 20 min. After the time was up I measured the rubber band.

MCH171: Melting Rate of Ice Cream

The purpose of this experiment was made to figure out how different types of ice cream affect the melting rate of ice cream. It is predicted that skim milk will melt the fastest because it has the less fat content out of the 3. There were 4 types of ice cream made with 4 different types of milk in them. The 4 types were Skim, 1%, 2%, and Whole milk. They were then melted to see which type melted the fastest and which melts the slowest. Research concluded that whole milk will melt the slowest because of its fat content. The evidence did not match my prediction. The times were scattered and 2% milk was the slowest to melt. The average melting rate for 2% was 120 minutes. This means that 2% melted the fastest.

MCH172: How does table salt affect the freezing point of water?

This project will determine how salt affects the freezing point of water. Reason for this project is because it is an interesting project. There were five different amounts, and five trials each. When the salt is added, it will be stirred for one minute, and then poured into five different beakers. The beakers will be placed in an ice bath for ten minutes. Then repeat those steps five times and add ten more grams of salt each time. The results show that the salt did not have an effect on the temperature. The data had a negative effect on the hypothesis.

MCH173: Do Synthetic Preservative Make a Difference

Although the health effects of synthetic food preservatives are currently debated, they are still commonly used. Opponents to their use argue that synthetics like BHA and BHT are known carcinogens. Proponents suggest that food quality is much improved due to their use. This experiment explored how different types of preservatives used in baked goods influence their safety and quality. Baked goods were prepared with no preservatives, with natural preservatives only, and with natural and synthetic preservatives. The baked goods were evaluated at five different time points over a 2 week period to determine their quality, freshness, and safeness for consumption.

MCH174: Storage Wars: How Does Storage Temperature Affect Ph?

The purpose of this experiment was to determine how storage temperature affected pH. This experiment was conducted at home using a pH meter and a thermometer. Orange and lemon juice was also used and stored in different temperatures. The hypothesis that was formulated supported the data. The pH changed about .4-2.0 each time the temperature was changed. The graphs turned out to be very surprising and the pH change was surprising, too.

MCH175: Nitrate and Nitrates in Bacon

Nitrates and nitrites are found in many foods.They occur naturally in foods like vegetables, but are also added as preservatives to many processed foods, such as bacon. Some studies show these compounds can cause cancer while other studies show that these compounds contribute to heart health. Many foods are advertised as “no nitrates or nitrites added” because of the concerns about these compounds causing disease. Many uncured foods have nitrates and nitrites added using vegetable sources. The purpose of these experiments is to test the hypothesis that uncured and cured bacon will have similar levels of nitrates and nitrites.

MCH300: Gas vs. Liquid

We tested dry ice versus multiple liquids. We decided to test the reaction between two completely different chemicals because we wanted to observe how the dry ice would react to everyday liquids. These everyday liquids included hair detangler, oil, nail polish remover, soapy water, and cranberry juice. Since our school is not allowing us to use dry ice in the classroom, we had many questions that could not be answered in a school environment, which led us to doing this experiment. We concluded after this experiment that dry ice reacts better to substances or liquids that have low density properties.

MCH301: Will Different Ratios affect outcome of bath bombs

When creating something homemade, have you ever wondered if changing the amount of ingredients will affect something? We added varying amounts of cornstarch to a bath bomb mixture to see if it influenced the outcome.

MCH302: Salinity and Sound

The purpose of our experiment is to discover if sound transmitted underwater is affected by the salinity of the water. Based on our research, if the salinity of the water increases, then the amplitude of the sound will decrease. We intend to test this by placing a hydrophone and an underwater speaker into a tub of water at different salinities and emitting and measuring a mid-level frequency of sound.

MCH303: Testing Flammability

Flammability is an object’s ability to burn or ignite. Objects that have high levels of flammability are known as fuels. Fuels are one of three things required to make a fire. An ideal fuel has many access points for oxygen to enter. In this experiment, everyday household items were tested to see which ones are most flammable, in other words, which one burns the hottest or paper, brightest which was newspaper, and longest which was tape. The information may help make a decision when it comes to fire safety and can also help you make a fire quick and effectively.

MCH304: What Factors Affect Hydrogen Production From Salt Water Hydrolysis

Hydrogen can be produced by the process of electrolysis of water and can be used as an alternative, clean fuel source. Since sea water is plentiful, our project aims to study how electrolysis of saltwater solutions (sodium chloride) may be used to produce hydrogen gas through a renewable source. This experiment includes the breaking down of water into hydrogen and oxygen. We will measure the hydrogen produced in solution such as water and sodium hydroxide solutions. Also, we will also be testing which amount of voltage will be producing the highest amount of hydrogen.

MCH305: Effects of Elements on Crystal Properties

The purpose of our experiment is to learn the different properties that different types of crystals produce. We want to look at how the chemical make up of the crystals affects their properties. We will grow crystals using salt, charcoal, sugar, and borax, and we will test them for mass, weight, a strike test, and the length from the diagonals.

MCH306: Does Tea/Coffee/Pop Stain your Teeth?

Build up of food and liquid items could not only cause bad breath, but also caused stained teeth. This project will test different drinks on egg shells, which have a similar chemical make up to human teeth.

MCH307: Filtering Lead-Creating Safe Water

The purpose of our experiment is to create safe drinking water for people by finding the best filter to remove lead from tap water. We will be taking water with a constant amount of lead and filtering it through 3 different filters to see which best removes the lead.

MCH308: Piezo Cake

The purpose of our experiment is to find the most efficient energy conversion between mechanical energy and electrical energy using a batch of homemade piezoelectric crystals known as rochelle salt.

MCH309: Which soda stains teeth the most?

1) The purpose of our experiment is to see which soda stains teeth the most. 2) The procedure we will use is setting egg shells in the 6 different types of soda for 4 days and see which one leaves the egg shell with the most color.

MCH310: What burns fire the best?

There are many ways to start a fire: sticks, lighter fluid, and many more. One way is the diamond brand "Strike a Fire" starter. This project will investigate four different ways to start a fire: fire chalk, fire liquid, dryer lint and sticks. The time that the firs burns and the size of the fire will be measured when these types of fire starting materials are added to the flame.

Computer Science / Math (MCM)

MCM100: Capitalization Corrector

Consistent and correct capitalization in writing is important. I gathered a corpus from text files of books. I used the corpus to make a dictionary of words with each location within the sentence, the capitalization, and the number of times that capitalization in that place showed up. To apply my dictionary to text I put the files I wanted to correct into a directory. The model would read the file and search for each word in the dictionary, and choose the most popular capitalization at that certain location. The model is good at correcting basic english, common names, and well known places. Adversely, the corpus is out of date, so improvements need to be made in order to modernize and expand it.

MCM101: Which Method for Solving a Rubik's Cube is Fastest?

Two different methods for solving a Rubik's Cube were evaluated for speed and efficiency by giving detailed instructions to test subjects.

MCM102: Hacking Away

Have you ever wondered how secure your password is. Well that's what I am testing. Using a computer language called Python to make a password guesser. Hacking is a federal offense so I will be doing it safely and only in the context of the science fair. I will use different password with varying levels of difficulty. The computer will try to guess the password and I will count how many times the computer gets the password correctly and incorrectly Afterwords I will find the average of how many times the computer gets the password correct.

MCM103: Block the Route

My question is what material affects internet speed the most? I hypothesize that wood will have the greatest effect. When I did my project, I installed Dr. WiFi on my IPhone. Second, I cut materials 35.6 x 36.8cm. Third, the router and the IPhone were placed on an even level 3 meters apart. Fourth, I tested the router with nothing blocking it. Fifth, each material was placed in front of the router, and results were recorded. Last, I repeated steps 4 and 5 for 2 more trials. In my project, the wood had the greatest effect, my hypothesis was correct.

MCM104: Global Poverty: Causes or Consequences?

One-fifth of the world’s population lives in poverty, and half of those in extreme poverty. I hypothesized that an important cause of poverty is high birth rate. I collected data on 103 middle and poor income countries and employed simple and multiple linear regressions to analyze correlation between poverty (outcome variable) and demographic, health, and educational predictor variables. I found that the strongest predictors of poverty were birth rate and literacy rate. Analyzing the changes in these variables in China over time suggested a causal relationship. Therefore, lowering birth rates and increasing literacy rates could help reduce world poverty.

MCM105: The Future of the Economy

Bitcoin is gaining popularity incredibly fast. Seven years ago, cryptocurrency in general was an idea mostly just thought of in theory. Now, millions of user have invested real money into this currency, putting their full trust in it as well. As the bitcoin world grows, the question of the stability of the network gets raised. Also, is cryptocurrency even better than the system we already have in the first place? If a program that simulates the future of cryptocurrency is run, then cryptocurrency will prove to be a superior method of economics, because it goes along with the high tech world we live in today.

MCM106: Making Geometric Patterns With a Rubik's Cube

Objective: The focus of my project is to interpret how to create patterns with a Rubik's Cube. Procedure: 1)Study the different geometric Rubik's Cube patterns.Remember that each pattern uses the solved cube as the beginning point. 2)Asking yourself these questions may help you as you try to create the patterns. -Which pieces have relocated from the original starting point? -Which pieces have remained the same? -For the pieces that have exchanged places,did they move from an antithetical side or an adjacent side. 3)How many moves does it take to generate each pattern?

MCM107: Gender Distribution Paradox

Math is a vast topic which strengthens logic and reasoning. I stumbled upon a counterintuitive probability problem which asked out of four children, which gender distribution has the greatest probability. First, I theoretically derived the answer. I am currently surveying people and seeing if they know of anybody who has four children and their genders. My last step will be using computer programming to simulate the results and comparing it with the other two results as well.

MCM108: Aiding Search and Rescue after Natural Disasters

This study focuses on the challenge of delivering help to trapped victims who are difficult to locate. Search and rescue (SAR) tasks are further complicated by the fact that key communication and other infrastructure are often inoperable after a disaster. The study offers a novel approach to assist SAR.

MCM109: Bike Sharing in Pittsburgh and Beyond

In general, Bike-sharing helps to address urban challenges by reducing traffic congestion and carbon emissions, improving air quality, reducing vehicular collisions, improving public health and fitness, and reducing the overall cost of street maintenance. The mission of Pittsburgh Bike Share is to expand access to public transit through easy-to-use, affordable active transportation opportunities. Pittsburgh City with other partners implemented the bike share – healthy ride - program in 2015. In my project, I have taken the data about all healthy ride trips that is available from 2015. I have analyzed the data using a tool called Tableau to observe the frequency of the trips and the routes and study the pattern. I have compared the data of 2015, 2016 and 2017 and drawn conclusions about bike share and its effectiveness in easing the public transit in Pittsburgh. Some of the lessons that I learnt from doing this project are that (1) Collecting data and analyzing it will help in solving real world problems. (2) Data is powerful and it can help people improve their quality of life, save money, advance technology, cure diseases and make a difference in communities. (3) Data driven decisions are not biased and helps solve problems more successfully.

MCM110: Designing a Test of Random Process Estimation

Designing a Test of Random Process Estimation is about figuring out how humans analyze pseudo-random input. This is important-these inputs occur through a variety of things in nature, and if humans can't analyze these processes effectively, then we may have to re-evaluate our decisions regarding these processes. The Poisson distribution and a student-created HTML program are used in the project

Consumer Science (MCS)

MCS100: Lights On!

I will identify which batteries are the best from among different types of batteries such as carbon zinc, alkaline, and rechargeable batteries. The batteries will be tested in flashlights to determine how long the flashlight stays on and how strong the beam of light is. I will compare the cost of those batteries. I chose the experiment because my family and I enjoy night hikes, but when we reach for a flashlight it does not work. This is because the batteries have leaked since the flashlights were not used regularly. The results of my experiment will be available on competition day.

MCS101: Hook 'em Up

Have you ever wondered how important fishing is? In my project, I used three different types of Powerbait with the same scent, but different colors; green, orange, and purple. I fished for and hour everyday for a weekend, at the same temperature, humidity and water temperature. Green had the most bites with a total of 13, orange was second with 11, and purple was last with 8. When I was using the green or orange Powerbait, the bites were so strong the fish just hooked them selves but when i was using the purple Powerbait, I had to put in a bit of work to hook them on.

MCS102: Best Material for Winter Gloves?

This project tests the best material for winter gloves. In the experiment, the student wore each type of glove while holding a bag of ice and water. The beginning and ending temperatures were recorded for the results. The student hypothesized that the leather gloves would show the smallest amount of temperature change.

MCS103: Preservatives - Good or Bad

I want to know what substance (vinegar, lime juice, lemon juice, peroxide, regular water, and salt water) takes off the most nitrites on food. My purpose for this project is that I can't eat the store-bought fruits, so I want to know which substance I should use to make it better for me. I am going to test apples with each of these products and water to see the amount of nitrites that came off the fruit.

MCS104: Which lotion potion prevents the most water motion?

The purpose of this experiment was to determine if a moisturizing cream will prevent water evaporation more effectively than a moisturizing lotion. It is predicted that a lotion of a certain brand will permit greater water evaporation than a cream of the same brand. To perform this experiment, 30 gelatin molds were made as a control and for testing each product. Equal amounts of either cream or lotion product were spread onto the gelatin molds. Height and weight of the gelatin molds with the product and the control molds (without product) were made at regular intervals of time. The results will be discussed at the fair.

MCS105: Moisturizer: All Natural Homemade vs. Store-Bought

Do you have dry skin? Many people around the world have dry skin and look to lotions to solve their problem, but sometimes commercially advertised lotions have dangerous chemicals. I designed this project to see if a homemade lotion could be safer for your skin and moisturize better than the advertised lotions. By testing lotions such as Olay, Suave, Equate, Vaseline, Aveeno, NIVEA, and my homemade lotion, I was able to see if a homemade lotion worked better than the store-bought lotions. Results will be displayed on fair day.

MCS106: Whitening Toothpaste

The purpose of the experiment was to determine which whitening toothpaste would whiten the most using a color code. If Crest 3D White Luxe Glamorous White Toothpaste, Crest 3D White Whitening Toothpaste, and Tom’s of Maine Simply White Natural Fluoride Toothpaste are used to whiten a stained egg, then Crest 3D White Luxe Glamorous Whitening Toothpaste will have the most whitening effect because it contains trisodium phosphate, which is an industrial strength stain remover. 18 eggs were stained with pepsi then whitening with 3 different types of whitening toothpastes. The results showed that Crest 3D White Whitening Toothpaste whitened the most.

MCS107: The Battle of the Tumblers

The purpose of the project was to find out which tumbler cup would keep water the coldest for a set amount of time. If the most expensive brand yeti tumbler is compared to the Rtic and Ozark Trails then the Ozark Trails would perform the best because the research states that it is more efficient. To do this project get 3 tumblers and get ice and room temperature water and put into the each cup and wait every hour for 4 hours to check the temperature. The hypothesis and research was correct the Ozark trails came in first place.

MCS108: Perception of Sugar

This project is going to test how accurate participants' perception of sugar is in various foods. The researcher will be testing 24 students in 6th 7th and 8th grade and 14 faculty members to see if they are aware of the amounts of sugar in foods. Participants will take a quiz where they are asked to decide which food has more sugar between two choices. Each pairing will have one seemingly healthy food and one seemingly unhealthy food. The participants will then view the answers on a slideshow. Results will be available on fair day.

MCS109: Pumpin' Iron

The purpose of this project is to determine if cereals fortified with iron have as much iron as stated compared to cereals not fortified with iron. If iron is extracted from cereals that are fortified and not fortified with iron, then Multi Grain Cheerios will have the most iron because Multi Grain Cheerios have more whole grains and all whole grains have iron. Iron was extracted from a cereal and water blend with neodymium magnets. The results were that the claims made by the cereal brands were accurate when saying iron fortified cereals had more iron than non fortified.

MCS110: Lather Up

Hair is one of the many physical features that draws attention from others. For most individuals, it is important their hair looks the best it can. The project looks at how synthetic shampoos compare to more natural shampoos. This will be tested through a series of tests that are based on what shampoos claim they can do. My hypothesis is the homemade shampoos will work better than synthetic. Results will be available on the day of the Science Fair.

MCS111: What toothpaste brand will whiten teeth the fastest?

The purpose of this experiment is to find out the best toothpaste to buy based on its whiteness effect on teeth. The brands were Tom's of Maine, Colgate, Crest, and Arm & Hammer. The independent variable is the toothpaste brand and the dependant is the amount of whiteness. The hypothesis is that Crest toothpaste will whiten teeth the best because of the amount of ingredients. In conclusion, Tom's of Maine that actually whitens teeth the fastest. The hypothesis wasn't supported because it said Crest.

MCS112: Choice of Color

How do color choices impact decision making? Selection decisions can be highly influenced by color choices. Our selection of clothes, consumer electronics and major purchases such as automobile can be highly influenced by the color offering. This project will seek to study the perception of color choices and its influence on the selection process.

MCS113: What Is the Best Method Residents Can Use to Purify Water After a Natural Disaster?

Please visit student's exhibit for abstract.

MCS114: Are Childproof Containers Really Childproof?

The purpose of my experiment is to test the safety of childproof containers. I will time children ages 4-12 as they attempt to open childproof containers. Each child will attempt to open 3 childproof containers and one container that is not childproof. I hypothesize that most children over 8 years old will be able to open each container in under 1 minute. I plan on sending my findings to companies that produce medicine so they can improve their designs to make them safer for children.

MCS115: Which Common Drink Stains Teeth the Fastest?

Teeth are naturally white or off-white in color, but build-up from foods and drinks such as coffee and tea over time can stain the white color and turn teeth yellow and discolored. In this experiment, I used egg shells which are very suitable to test acid erosion because they will show similar stains to teeth. Both teeth and eggshells are made of stone-like minerals containing mostly calcium. Bird eggshells are made of calcium carbonate, while dental enamel is formed from calcium phosphate. The drinks used were Powerade, Gatorade, black tea, green tea, and coffee. Each egg shell was soaked in each drink for 10 days. My hypothesis was that the black tea would stain the most coffee would be second but still be very stained. At day 3, the coffee had stained the shell the most. After 10 days the shells were taken out and dried for 3 days. When the egg shells were dried the results were analyzed and recorded. The studies showed that the black tea stained the "teeth" the most. If you drink this tea over a long period of time, your teeth will begin to show sign of stain.

MCS116: How Much Iron is in Cereal

What cereal of my three test cereals will contain the most iron? I Think That the cereal with the most iron will contain the most iron. My trials have proven that my hypothesis is correct,and so was my question.I used three variables in my project with three trials of each. I have concluded that my hypothesis,judging by the data which i collected is true, and my question was also answered. The rice crispies surprised me the most, because it had more iron than it stated to have.

MCS117: The Best Bang For Your Battery!

In my experiment, I decided to measure the overall battery life of AA alkaline batteries of multiple brands. The brands I tested were Rayovac, Duracell, and Energizer. I placed each battery in a small flashlight, and timed its endurance with a stopwatch. In total, I tested 75 batteries, 25 of each brand. Unfortunately, I found no definitive results that put one battery above another.

MCS118: Which White Is Right?

For my project, I wanted to see which Crest toothpaste whitens the best. I took five different stain agents and soaked 30 unglazed tiles overnight. Then, I brushed the tiles with five different toothpastes, Crest Cavity Protection, Crest 3D White, Crest ProHealth, Crest Baking Soda and Peroxide, and Crest Kid's, once a day for 25 days. My prediction was that the Baking Soda and Peroxide was going to whiten the best. After 25 days, Crest 3D White whitened the best and proved my prediction wrong.

MCS119: What is the Most Neutral Water?

Have you ever wondered how acidic different types of water are? During this experiment, I acquired four different types of water and tested them via pH strips. I hypothesized that Fiji would be closest to seven, the expected pH of water. Check out my results at Science Fair!

MCS120: Sugar in Soda

This project measured the amount of sugar in soda. This was done by measuring the specific gravity of the solution which is a comparison between the density of soda and water. The density (mass/volume) of soda is greater because of the mass of the sugar. The social impacts in this experiments include people on diets need to be careful about what they drink so they might want to choose a soda with a lesser amount of sugar. Also parents often say "Don't drink too much soda because it has lots of sugar in it." This study shows that some soda flavors have a lesser amount of sugar which makes them a better choice.

MCS121: Mom's Hair Scare

Professionally dyed hair extensions were washed with a variety of shampoos to determine if "color last" shampoo can prevent fading of the dye.

MCS122: Sour Power

In this project I am making batteries out of fruit. I want to know how much fruit it will take to get enough power to charge an IPhone 7. I will test different fruits to see how much power they make and if the acid levels change how much power the fruit makes. I chose this topic because I want to know if I can charge my phone with fruit.

MCS123: Is Sugar-free Really Sugar-free?

Three bottles of French Vanilla, Italian Sweet Cream, Pumpkin Spice, and Hazelnut coffee creamers were purchased. 5mL of French vanilla coffee creamer and 5mL of distilled water were added to a test tube, capped and inverted 5 times. 2mL of the mixed solution was transferred into another test tube. 10 drops of Benedict's solution were added. The test tube was suspended in a hot water bath at 45°C for 5 minutes. A color scale was used to add numeric values. The procedure was repeated 10 times for each of the three bottles of French Vanilla coffee creamer. The entire procedure was repeated for Italian Sweet Cream, Pumpkin Spice, and Hazelnut. While sugar-free creamers are not sugar-free, Hazelnut sugar-free actually has a greater presence of sugar as compared to French Vanilla regular coffee creamer.

MCS124: Testing Lactose

I will be testing lactose in different kinds of milk to see which ones actually are the best for people with lactose intolerance. I'm curious to find out which milk will be the best one because it could help tons of people with lactose intolerance. Questions I'm asking are what milk will be the best and how to persuade people to get these milks and how there better for them. I'm doing this project because no one else has done it yet, and I thought it would be interesting.

MCS125: Protecting Your Smile

Having a white, beautiful smile is important to people. There are many "teeth whitening" products on the market; people may not need to purchase products if they realize the harmful staining effects of certain beverages. This experiment has proven that drinking cola in moderation will help to lessen staining and discoloration of your teeth. A white smile adds to self-confidence. This experiment creates awareness so people may have a better understanding of the negative effects of cola on their teeth. Maintaining healthy teeth at a young age will have lasting effects throughout a person's life. Your smile is worth protecting!

MCS126: Bright Smiles

Does whitening toothpaste even work? Based on my research I predict whitening toothpaste will work. I predict that advanced white toothpaste would be the best to use. In this project I used three types of toothpaste: crest, colgate, and advanced white. I used three different drinks to stain boiled eggs: coffee, kool-aid, and cranberry juice. The boiled eggs were used as teeth. After staining the eggs, they were brushed until white to measure the time taken. The result from my project is the colgate toothpaste was the best toothpaste to use because it whitened faster than crest and advanced white.

MCS127: How do different saturated fats affect the body?

This experiment was conducted to test different saturated fat levels in different cooking oils. The test was done using peanut, canola, corn, soya bean, and olive oils, along with iodine. I found out the oil with the least amount of saturated fats was canola oil. It is important to know what oil to use for your health, and saturated fats are not healthy.

MCS128: What Color T-shirt is Best to Wear in Sunlight?

Forty-nine individual fabric squares measuring 4 X 4 cm were cut for red, yellow, blue, white, and black country classic 100% cotton fabric and labeled for identification. Each sample was tested with a Vernier UVA sensor to measure how much UVA light penetrated the fabric as the sample was held up to a Punson UV light. A LabQuest 2 interface was used for the data collection. To determine the ability of the various fabrics to convert infrared light into heat energy, the fabric was placed in a dark room beneath the UV light for 60 minutes. The fabric samples were removed and the temperature of each sample was recorded using a Vernier Go Temp sensor. This was repeated for all color samples. Results were averaged, graphed and analyzed. Black cotton fabric is the best to wear to protect your skin from the sun's harmful UV rays while white is the best to wear if you want to be cooler outside.

MCS129: How much bacteria is in your makeup?

I will be testing different makeup foundations for bacteria. I will use a new foundation, a tube foundation, and an old foundation (has not been used for five months). I will mix nutrient agar in petri dishes to measure.

MCS130: Swish, Swish, Rinse! Eggcelent Mouthwashes?

120 large eggs were hardboiled and placed in 120 mL of coffee. Both the hardboiled eggs and coffee were cooled to 20º C. To determine the amount of coloring present on the individual egg a color scale was created to determine the intensity of the coffee stain on the hardboiled egg. To create the scale one hardboiled egg was placed in 120 mL of coffee for 10, 30, 50, 70, and 90 minutes. The 120 eggs were allowed to rest in 120mL of coffee for 90 minutes before being removed and allowed to air dry. The intensity of the stain was assigned a numeric value based upon the color scale. This value would serve as the initial stain value. The egg was then placed in 3mL of each mouthwash; Crest 3D White, Act Restoring, Crest Scope, Equate Whiten and Restore. Listerine Healthy White, and distilled water, which served as the control, for 1 minute before being allowed to air dry. Once again the color scale was used to determine how much of the stain was reduced. Percent reduction was calculated, and the results were graphed and analyzed. Since Crest 3D White contains sodium hexametaphosphate and hydrogen peroxide; two whitening ingredients; it reduced the amount of coffee stain better than the other mouthwashes.

MCS131: What bag can hold the most weight?

So many people go to the grocery store every day. So the purpose for this experiment is to find out what bag is the best for carrying a lot of weight. I tested paper vs plastic. The hypothesis stated that the Whole Foods bag will hold the most weight. The Giant Eagle bag held more weight then the Whole Food and Fresh Market paper bag.

MCS132: Rainwater Harvesting and Usage

I will be determining what the cleanest and cheapest water collection system could be constructed out of at home.

MCS133: Protecting Ungalvanized Nails

Rust is a chemical reaction. Iron nails rust because iron comes into contact with water and oxygen, forming a new compound called oxide. Oxide means loss of electrons. This experiment was intended to find which material protects ungalvanized nails from rust the best. This experiment is useful because in industry and homes these coating products can be helpful when working with ungalvanized metal. I hypothesized that LPS Cold Galvanize Inhibitor would perform the best because it is 99% zinc, it can withstand temperatures up to 212 degrees F, it works and repairs metal, and it has a tough flexible coating that doesn't crack or peel. The nails were divided into eight groups of three, to conduct 3 trials for each of the 6 protectors tested and the 2 control groups (24 trials in all). I recorded the mass of the nails before I coated them. Next, I coated the nails with two layers of their rust protector. The nails were each coated in exactly the same amount of protector and in exactly the same manner. I put the nails in room temperature water for 14 days. Then, I let them dry for 30 minutes before measuring the mass again. I then calculated the amount of rust formed. My hypothesis was shown to be incorrect for this experiment. It was determined that Krylon Pro Professional Galvanizing Primer, which was the most expensive, inhibited the presence of rust the best.

MCS134: What's in your Water?

The purpose of my project is to find the pH of different water bottle brands. I took six different water bottle brands, ranging from artesian water, spring water, and even filtered tap water, to find which was most healthy for our bodies. I used pH drops and had six trials for each water bottle brand. Our blood is maintained at a constant 7.3-7.5, which is what our water we drink should be. After the experiment, I recognized that my hypothesis was supported by saying that artesian water is better for your body than filtered water.

MCS135: Hot or Cold: Which Tumbler is Best?

The purpose of my experiment is to find out which tumbler is best to determine if I should pay more for a certain model, or pay less for a different model. My hypothesis is that the Yeti tumbler will be the best. My procedure for the cold experiment starts by: Put 9 grams of ice cubes in each tumbler. Record the room temperature. Check the temperature at 4 hour intervals for 12 hours. Record results. For the heat experiment: Put boiling water in the tumbler. Record room temperature. Check the temperature every 2 hours for 6 hours. Record results.

MCS136: Does the Shoe Fit?

This project will test how shoe type affects how fast they can run and how well they can make turns. It is predicted that if the runner wears high top shoes then they will run faster because these shoes have better support and have more traction, making turning easier. The researcher count the number of times they can run between the two side lines on a basketball court in 60 seconds with each type of shoe: running shoes, flat bottomed shoes, and high tops for three trials. Data will be analyzed. Results will be available on fair day.

MCS137: Which Orange Juice has the Most Acid?

My project is on testing the amounts of acidity in orange juice. I took four ph strips and put it in four different brands of orange juice. I matched the darkness of the ph strip to the scale and got darker colors for orange juice with more acidity. I picked this project because I have orange juice almost every day and I thought it would be cool to know.

MCS138: What Diaper Brand Is The Most Absorbent?

The purpose of the experiment was to determine which diaper brand was the most absorbent. If Pampers, Luvs, and Parent's Choice diapers are tested then Pampers will absorb the most liquid because Pampers have extra absorb channels. To do the experiment get 800 ml of water. Clip a diaper to a container and pour water on it. Do this until water starts leaking from it. Measure how much water leaked and add it to how much water is left from the 800 ml. Luvs held the most liquid and Pampers held the least.

MCS139: How Well do Water Purifiers Work?

The purpose of this project was to determine which type of water filter is most efficient at removing dissolved particles. It was predicted that Brita filters would work the best. Water samples were collected from well-water sources before and after passing through a filter and tested for various dissolved compounds. Results available at the fair.

MCS140: Most Effective Brand of Waterproofer

In this experiment, different brands of waterproofer are being tested. For testing, the student applied different brands of waterproofers to bricks and tested the amount of time the bricks then resisted water. The student hypothesized that the Rust-Oleum LeakSeal brand would repel the most water because of the fact that its ingredients were rubber-based instead of mineral-based.

MCS141: Insulation of Shoes

For snow boots to be effective, they must have insulation to preserve heat inside the boot. If Primaloft, Thinsulate, polyethylene, and flannel are tested against each other, then Thinsulate will be the most efficient due to its thermal conductivity and its low price point.

MCS142: Dirty Lies

In this project, I tried to test the best stain remover. I did it to find out the best overall way to get stains out because there are so many different ways. I mixed baking soda, vinegar, dish soap, and soap and water. In the end, my hypothesis was correct. The bleach, water, and soap works the best. Next time, I would not use the baking soda in two different mixtures because each time I did it discolored the whole shirt.

MCS143: What permanent marker brand is the most permanent?

People know Sharpie brand as the permanent marker to buy, but is it the best? This experiment tests different brands of permanent markers to see which one is truly the most permanent. My results may surprise you!

MCS144: Which Fabric Most Effectively Blocks Out UV Light?

Please visit student's exhibit for abstract.

MCS145: Egg-celent Teeth Whitening

This experiment tests the effects of whitening toothpastes on stains. The student substituted eggshells for teeth, and stained the shells with different common staining liquids, such as coffee and wine. The student hypothesized that the toothpaste with the most fluoride content would remove the most stains.

MCS146: Homemade Sunscreen vs. Various Types of Store-Bought Sunscreen

Please visit student's exhibit for abstract.

MCS300: Fresh Fruit

We would like to find out which substance allows fresh fruit to stay fresher longer.

Engineering / Robotics (MER)

MER100: Optimal Design of Paper Glider

This experiment tests the optimal design of a paper glider. The student constructed different paper glider models, as well as a launching machine to produce the same amount of force for each plane launch. The student hypothesized that a plane with certain sturdy features would fly the farthest distance.

MER101: Conserving Water with an Electronic Moisture Sensor

It may not seem like it, but water is a valuable resource, and many areas throughout our world have limitage of water. This problem gets worse because of people who waste water. The bulk of this wastage comes from taking care of plants and lawns also known as irrigation. One way that we can fix this problem is with an electronic soil moisture sensor. For my project, I am going to build a device that senses the amount of moisture in the soil of a lawn or plant.

MER102: Operation Earthquake Proof

What shape of house stands the longest against earthquakes? I thought that an L-shaped house would stand better than a round or square house. I was wrong. After building my houses out of sugar cubes and peanut butter mortar, I tested them on an earthquake table. The L-shaped house fell first, then the square. Only the the round house remained standing. The houses were obviously not the most stable, being made out of sugar cubes and peanut butter, but they worked on the scale that I needed them to. Overall, I think that this was an informative, educational experience.

MER103: The Durability Factors

I did my project because I wanted to discover what the most durable building supply is. I tested each material's durability with natural termites, rock salt, a sledgehammer, and a pressure washer. I learned that through the experiments that I have conducted that particular building supplies have certain weaknesses. My results reveal that wolmanized wood is the most durable material. My results give me the idea to experiment with different building supplies and tests (including wolmanized wood) to more accurately determine the results.

MER104: Testing Novel Approaches to Bridge Design Using a 3D Printer

The purpose of my project is to assess if changes to a traditional Warren-Truss bridge design can improve its performance. Four bridges were designed, analyzed, constructed, and tested to failure. My hypothesis is that adding vertical supports and increasing the height of a standard Warren Truss will have the greatest weight-bearing capacity. Procedure: 1. Design bridges in SOLIDWORKS. 2. Import the SOLIDWORKS files into ANSYS and analyze the max stress. 3. 3D print the bridges using a MakerBot printer. 4. Install the bridges into an Instron 5500R tensile testing machine and test them to failure. 5. Record data.

MER105: Stable Flight

Problem: Which airplane design will be most stable in the wind tunnel? Hypothesis: I have hypothesized that the Harrier design will be the most stable in the wind tunnel. Procedure: Buy materials, Assemble wind tunnel, Cut plywood 4' 2' repeat three times, Cut 2x4 to 4', Drill the screws to assemble wind tunnel, Flip to bottom to attach wheels to wind tunnel, Make paper airplanes, Cut dowel rod in half, Drill small hole in both dowel rods, Put string through small hole in dowel rods, Make hole in front of paper airplane, Tie knot with string in airplane hole, Drill hole at top of wind tunnel, Feed dowel rod through hole, Put fog machine at back of wind tunnel, Put liquid in fog machine, Turn fan to 3 and turn on fog machine, Pull up dowel rod to make paper airplane stable, Watch how paper airplanes fly in wind tunnel, Record data, Repeat steps 13-16 3 times for 3 trials.

MER106: Which Pinewood Derby Car Is the Fastest?

Pinewood Derby cars were evaluated for shape, added weight and wheel lubrication to determine which factors had the greatest impact on speed.

MER107: The Robotic Car

In my project The Robotic Car. I am trying to get my car to go through a virtual reality. In this virtual reality the car is trying to go through maze. Just like how we humans drive cars today through a maze. In my experiment I am trying to see how fast the car will go per minute and if it will be able to go through the town on my phone. If the car can through the town without any problem. My purpose is to find out if car can go through the windy road.

MER108: Pneumatic Muscles: Airflow and Pressure

I will build two artificial pneumatic arm muscles and a wooden arm model. The system will be loaded to allow accuracy in arm model position. The controlling computer is an arduino. I believe that loading the system will allow it to be more accurate in arriving at resting position. This work will allow patients with polio more freedom.

MER109: Bristol Busters

My project is about the light tracking bristle. My steps were to make to robot and every day to run the bristle. The reason of doing this project to see how insects works on a day to day basics and to finally get my answer on why insects go towards light. My project is continuing but my hypothesis is that at first it would not do exactly what was supposed to happen it would move away from the light but after a while keep testing it every day and it would eventually more towards the light.

MER110: Up Up and Away

We all see planes flying thru the sky. Some seem to soar by faster than others. This is what led me to my question " Does the size of the plane affect the speed and distance ? I would think it would . To find out if size does matter , I decided to make some paper airplanes three different sizes and fly them to which one flew the farthest . After running a few trials, I've come to find that the larger planes did fly the farthest distance .

MER111: Remote Control Mars Rover

The purpose of my project is to determine how changing the type of remote can affects the way a Littlebits rover drives. I built a rover using Littlebits and other household materials. I then tested how quickly to rover would travel a distance using different remote controls. My hypothesis was If I use a certain type of remote to control a Littlebits rover then it will affect the amount of time it takes to drive a certain distance because all remotes are different. My hypothesis was supported. I learned that you need to take your time if you want something to turn out right. It was supported because I thought that the LG remote would take the least amount of time and it did I know this because the LG remote took an average of 15.67 seconds and the other averages are 17.05 seconds and 17.35 seconds and 15.67 seconds which was the average of the LG remote was the shortest amount of time.

MER112: Going with the Flow

The point of my experiment was to find out where the most effective point in the stream to put a small hydroelectric generator. This is something that can be useful towards the public for multiple reasons. With these small portable generator running on renewable fuels there sometimes comes issues. The most popular generator for renewable fuels is of course the solar generator, but it is not always sunny. This is where my project comes in. You can find the effective point in a stream near you say if your camping to spend the least amount of tie charging when using a generator like this. This is information most useful to the general public.

MER113: Does bridge design affect weight bearing capacity?

Does bridge design affect weight bearing capacity? Hypothesis I hypothesize that the arch bridge will be able to hold the most weight. Sources for research: www.sciencebuddies.org www.differencebetween.info www.historofbrdges.com www.sitesgoogle.com https://civilengineeeringsite.com Materials: Popsicle sticks, binder clips, wood glue, gram weights, boxes of the same measurement, and wire. Procedure: Build 4 different types of bridges arch, truss, suspension, and plank. 1. make the section of each bridge let it dry 2. glue the section of each bridge together 3. put 2 boxes as far away from each other as the width of the bridge 4. put weights on top of each bridge until the bridge collapses 5. record how much weight it takes to make the bridge collapse 6. do this for each bridge

MER114: Water Energy

What I want to do is make power using water that goes through a syphon. I think that the little bit of pressure that the siphon puts out will make just the right amount of electricity to light up a light bulb. Through out this project I think I will learn more about hydroelectricity also, more on electricity than I do now.

MER115: Is It Sturdy?

The purpose of this experiment was to determine the occurrence of soil liquefaction of different soils when dry and mixed with water. If water is added to six test soils, then sand would have the greatest amount of ground failure due to soil liquefaction. This project was conducted by adding water to different soils and creating disturbances with a shaker table. The data and results showed that the soil that had the most ground failure was topsoil with a sinking depth of 4.85cm, and the soil that had the lowest depth was clay. The hypothesis was not supported.

MER116: Stronger Bridge

The purpose of my project was to determine which type of bridge was stronger, the suspension bridge or the girder bridge. I built models of each bridge out of straws and popsicles sticks. I tested how much weight using dumbbells and bundles of coins. When I was done with my experiment I found out that the total opposite of what I expected happen. I expected my wood suspension bridge to be the strongest and my straw girder bridge to be the weakest. I think the cause of this is the amount of hot glue I put on each Bridge. I also think I could have done further the research on my wood suspension bridge.

MER117: Variables Affecting Solar Water Still Output

It is estimated that 2.3 billion people do not have access to clean water or electricity. Solar stills provide clean water without electricity, but they are slow and inefficient. Different ideas were explored on how to make them more efficient as measured by amount of water per day. Different chemical coatings on the glass were evaluated to understand their effect on efficiency. In addition, mirrors were placed around the solar still to reflect the sunlight onto the glass to increase the water evaporation. The idea that purifies the most water per day after all the trials will be the best candidate to use on the solar still.

MER118: The Sweet Spot

This project will determine which baseball bat will hit a baseball the furthest. This project will use a researcher-made machine to keep the swing consistent. The researcher will go to a baseball field and test how far each bat can hit a baseball for a total of five trials. The bats that will be tested are wooden bats, aluminum bats, and composite bats. Aluminum is predicted to hit the ball the furthest because it is the hardest material. A measuring wheel will be used to calculate the distance. Results will be available on fair day.

MER119: Forces as Renewable Energy Sources

This project was designed to study the comparison of 2 alternative energy sources. I was curious in determining whether wind or water power would create the most usable voltage when comparing equally sized structures.

MER120: Most Elastic Common 3D Print Material

In this experiment, the student 3D printed a human heart valve from materials with varying elasticity. The elasticity of the valves was then tested in a room with fixed temperature. The experimenter hypothesized that the heart valve made of TPU material would prove to be the most elastic because it contains silicon rubber.

MER121: Using Rotational Energy to Power Electric Cars' Batteries

In my project "Using Rotational Energy to Power Electric Cars' Batteries", I will be conducting an experiment on whether the same turbine motor on a wind turbine can effectively turn the rotation of an electric car's axle into energy to power the car's battery.

MER122: Homemade Speaker

The purpose of this engineering project was to design and build an acoustic speaker. In addition, the effectiveness of the speaker was tested in terms of its decibel production. The speaker was successfully created using magnets and various household materials. A test was conducted to measure the relationship between the number of magnets and the produced decibel loudness. This project would benefit scientists and engineers in the applied fields of audio technology and communications.

MER123: Can You Bear the Suspense?

My project tested which bridge style would hold weight before bending. To test this, I used a suspension bridge and a beam bridge. I built the bridges using wooden dowel rods for the main deck. I attached a cup to the bridges and dropped quarters in until the beam bent below a level ruler. I chose to do this project because I like engineering and physics. This experiment could help engineers decide which type of bridge to use across different obstacles.

MER124: Electronic Prevention of Rust

Rust has always been an enemy of steel, in particular any steel used in road construction. Rust weakens steel. When oxygen reacts with steel, the electrons of the iron inside the steel are transferred to the oxygen, producing iron oxide. My solution to this problem is to induce a potential difference between steel and another metal object with a dielectric constant in between to create a massive capacitor. Through the process of induction, there would be an excess number of electrons in the steel, which would satisfy the oxygen's need.

MER125: Solar...Now in Color

This experiment tests the productivity of different colors of light on photovoltaic cells. During testing, the student used different colored light on a solar panel and measured the amount of energy produced in volts. Based on his research, the student hypothesized that red colored light would produce the most energy.

MER126: Soccer Golaie jersey design

The purpose of the project is too design a soccer goalie jersey to lessen soreness and bruising. After soccer games the goalie normally comes out of the game with soreness and some bruises. The hypothesis was the jersey that was designed would lessen soreness and bruising. Buy a reebok long sleeved shirt and 1 inch padding. Sew in the padding to the injury prone areas and test it in games and practices. In conclusion, the jersey did lessen soreness and bruising but the jersey was too stiff and hard to move in.

MER127: Are Trebuchets Really Medieval and Can They Be Improved?

The pouch material and the launching finger angle of a constructed trebuchet were evaluated. This evaluation was based on distance an object traveled after being launched by the trebuchet.

MER128: Solar Energy: A Panel Closer to a Bright Future

Schools around the world have limited budgets that can restrict students learning experiences. So by calculating how much energy is needed to fuel a full school day by using scale models, I can explore and identify the possible benefits of solar panels in different areas, which allow schools to save energy and essentially money.

MER129: Hurricane Houses

In the experiment called Hurricane Houses I will be attempting to figure out a solution to the conflict with hurricane winds and their effects. I have built two models and have observed how the air reacted to them when air was blown from a hair dryer. I have collected data that allows me to visualize the wind patterns. This data has allowed me to conclude that my design prototype is better suited for hurricane environment.

MER130: Free Energy!

Fossil fuels are becoming short in supply. To solve this problem, I am creating solar cells out of a piece of circuitry to flow in one direction, called a diode. I soldered together ten different types of diodes, each in a lime of ten, and taped them on a piece of cardboard. In my graph, I compared voltage over time. The avalanche diode produced the highest voltage so the data did not support my hypothesis that the zener will create the highest voltage. Why not try this energy source on your own house.

MER131: How Does Mass Affect the Performance of a Drone?

Rotor speed of a drone was measured a tachometer under conditions in which various masses were attached to the drone. Battery life versus mass added was also evaluated.

MER132: Which Building Design Will Best Withstand An Earthquake?

Many homes, buildings and shops, etc. have been ruined by many natural disasters this year, mainly from the collapsing buildings. While we can't stop the earthquakes, but we can help by improving the construction of buildings to prevent them from collapsing and possibly injuring many people. It thought it will be possible to design and build an earthquake machine that will test the stability of different buildings. Some structural modifications might make buildings more stable, including overlapping the blocks; also, building height might affect the building stability. I hypothesized that cross braces could help the structure stay up in an earthquake. I simulated an earthquake by building an earthquake machine out of 2 pieces of plywood connected by springs so that it can shake when you pull the handles. On top of the machine I placed different building designs and constructions made of wood to test which ones would last the longest. I tested 6 building designs 5 times each first. My control groups constructions had 3 blocks overlapped by 3 blocks, 6 blocks overlapped by 6 blocks, and 9 blocks overlapped by 9 blocks. My variable groups constructions had 3 blocks non-overlapped, 6 blocks non-overlapped and 9 blocks non-overlapped. Next, for the construction tests, I also tested cross braces and a base isolator which is made up of marbles and tested those 2 construction types each with 3,6, and 9 overlapped blocks for 3 trials each. There were 30 trials in all. The 3 layered building with overlapped blocks on top of the base isolators lasted the longest and would be best to withstand an earthquake. Also, the 6 layered building with the overlapped blocks and using the cross braces would also be a good choice to use for a building, which showed my hypothesis to be correct in the investigation. This project is important to many engineers or building designers to be able to build a building design and construction to stand an earthquake by knowing which construction sites would be more prone to fall.

MER133: Gesture Recognition to Control Digital IO

For this project I basically wanted to make a program where I could control the computer without touching it. Hand gestures was a good place to start. I eventually made a program where the computer could recognize my hand gestures. It could be applied in a hospital where you can't touch anything, sign language translation, and games. An example of this is the Xbox Kinect.

MER134: Angles and Stress on the Knee

In this experiment, a machine was created to simulate the human knee. The experiment tests which angles add the most stress to the knee joints and tendons. The wooden structure that simulated the knee uses a guitar string to simulate the patellar tendon. The experimenter hypothesized that the largest angle measurement would cause the most stress on the knee.

MER135: Levitation!

When I did my project I wanted to know the power of magnetic repulsion. I plan to build an enclosure for the magnets and then place the items on top of them. Over the course of my project I found out that magnets ruin electronics and wipe flash drives and hard drives. My results prove that most rare earth magnets are very powerful and could see commercial and industrial use in the near future. This project gave me the idea of a possibly electrically based future project since magnetism and electricity are surprisingly similar.

MER136: I Scream You Scream

Have you ever had an ice cream cone that melted in your hand? Well, I did some research to find out how long you have to eat 2 scoops of ice cream without it melting in your hand. I took 2 scoops of chocolate ice cream and put it into different cones. I timed them each with a stopwatch to see which one melted the fastest. I recorded the times that each scoop started to melt. I compared all the times to see which is the best cone to choose on a hot day. I hope you like.

MER137: Solar Drone

I want to make drone flying cheaper and more efficient. i will first make the drone and then make a small solar station. I will use the solar station to power the drone while in flight and while not in flight. I will test to see how longer a drone would fly with a solar panel and a standard battery.

MER138: At What Angle Can A Goal Be Scored?

Using a constructed kicking device, the optimum angle for scoring a soccer goal is evaluated

MER139: How much weight can a foil boat hold?

I will be testing different types of self-made aluminum foil boats for weight-bearing potential. I will design different boats and add pennies to them until the boat sinks. I will chart my results.

MER140: Optimal Wind Turbine Design

This experiment tests the optimal configuration of a wind turbine. Each experiment tested a different number of blades placed at different angles. The experimenter hypothesized that a configuration of 3 blades at 60 degrees each would harness the most energy.

MER141: Riding On Air

During my experiment I tested, in increments of 22 kilos pounds, how much weight can a homemade hovercraft hold and how does it affect the craft itself. I measured, for every 22 kilos put on the craft, how many centimeters the skirt of the hovercraft extended. Through testing I concluded there was not a drastic change in the height of the skirt. I also concluded that the homemade hovercraft can hold 660 plus Kilos. In the future I would like to test on a larger scale by adding more weight and testing how it affects the integrity of the craft.

MER142: Automating a Robotic Tank

This project is about automating a small robotic tank to navigate a course of gates. I will be entering it into the Carnegie Mellon Mobot (“Mobile Robot”) competition. I will be exploring topics such as sensor fusion, PID controllers, and processing large amounts of sensor data. I will also be building the robot and looking at some of the engineering challenges that occur while building. This will have applications in larger scale autonomy, as well as being a fun project for me.

MER143: Solar Powered Vehicle for Soil Testing

Abstract- My project is a solar powered vehicle that can be used for soil testing. Soil is very important in all kinds of fields- especially agriculture. Over 60 percent of the food consumption in the world comes from crops, so this a very big industry. Most farmers have many acres of farmland used for growing crops, and it is inefficient and difficult for farmers to test the soil of all of their cropland. Therefore, I plan to make a robot that will be able to do this job. A robot powered on a renewable source would be very helpful to farmers, so I made my vehicle solar-powered. The robot would be able to test for two main properties of the soil that affect the growth of crops the most: acidity of soil and salinity of the soil. This robot would be able to to test for these properties in the soil and collect this data. Also, it would be able to collect (and deliver) the samples of soil to the farmer, if he/she needs to do additional testing. Overall, this robot could help farmers all over the world tremendously and maybe even change the future of agriculture.

MER144: The R.S. Sensor: is it Better than the Average Smoke Alarm?

My goal is to create a device that will be capable of identifying young students in middle or high school that plan on starting or continue vaping or smoking during school hours. The R.S. Sensor will hopefully decrease the amount of students that start smoking at a young age. After the R.S. Sensor is installed in schools, it will begin to send notifications to staff members if there has been a sign of vaping or smoking in a nearby restroom. The R.S. Sensor is not only available to schools but company offices, or even homes.

MER145: Odometry and Dynamic Collision Avoidance

Autonomous vehicles need to be able to: Move in a straight line & “follow” the road. Avoid stationery & moving obstacles. Return back onto the original path after swerving Procedure 1. Assemble the robot. 2. Write a program that gets the robot to move, turn, and detect obstacles. 3. Write/investigate computer programs to test multiple swerving algorithms. 4. Write a swerving algorithm for the robot to use. 5. Test the swerving algorithms accuracy. 6. Test the robot’s ability to turn accurately. 7. Repeat steps 5 and 6, debugging along the way, to tune the program 8. Report results.

MER146: A Bright Idea: The energy usage of three popular light bulb types

The purpose of this project was to evaluate and compare the performance of different light bulb types. An LED, CFL, and incandescent light bulb were each compared in terms of the volts, amps, and watts. The LED bulb was the most effective at providing the most lumens while requiring the least current. This project benefits any scientist or engineer in the applications of electrical energy.

MER147: Do Cell Phones Emit radiation?

The reason for doing my project was to answer the question many people that use cell phones ask: Do cell phones emit radiation? To test this I used a radio frequency meter which picked up the radio frequency waves from the cell phone. The information I learned was cell phone radiation may be dangerous depending on the type of radiation the cell phone emits: ionizing or nonionizing. My results show cell phones are not completely safe and can be dangerous. My results give me the idea of exposing cancer cells to cell phone radiation to see if they grow.

MER148: Unsolderable: Finding the Best Type of Solder

I believe that in this experiment, the solder containing a 60/40 ratio of tin to lead will perform the best because it has been used for a long time and has less fumes in it. I will conduct this experiment using different brands and types of solder, measuring with a multimeter.

MER300: Harvester Robot

We got the idea to make the harvester robot because we were going to enter a competition with a braccio robotic arm. To enter the competition we needed to create an idea that would incorporate the robot arm, but also helped people. We brainstormed and came up with the idea of the harvester robot. Since the end of the 2016 school year we have been working on this and we have been working on a physical model of it. This idea when brought to life, will help the harvesting and farming world, taking a step into the future.

MER301: R.C. Volcano

Are you able to control a model volcano with a simple remote control? If our remote control is linked to the motor of the volcano and the tubing is attached and functional, then the volcano should act how we want it to. What we want to accomplish at the end is a volcano that erupts on our command using a remote control. The lava material erupts and flows out from the top, reaches the bowl, and then gets fed back into the cycle.

MER302: Wind Turbine Models and Production of Electricity

The purpose of our experiment is to find the most efficient windmill design. We will 3d print 3 designs and test test them using a mini generator. We will find our data with a volt meter.

MER303: Two Track Roller Coaster

The project is to create a roller coaster that can have more axes of motion than a traditional style roller coaster. This idea developed from watching a car drift around a corner and thinking ‘gee, wouldn’t it be cool if a roller coaster could do that.’ We came up with a basic design of how this was to work, then launched into our research phase. We searched the web and the US patent database for anything remotely similar to our design concept all while continuing to develop our design. After we were sure that we were the first ones with this idea, we started to simplify and improve a crude 3D model on a program called TinkerCad By adding a third rail, the front and rear wheels should be able to move independently. This gives us more axis of motion to give riders increased and more realistic G forces along with simulations of drifting and freefall.

MER304: Hydro-Wheels

1. The purpose of this experiment is to create a basic design for hydro-wheel/water-wheel. This will help to develop the use of renewable resources. 2.) Add certain amount of paddles. 3.) Test speed of hydro-wheel. 4.) Add or subtract paddles. 5.) Test again. 6.) Repeat 8 times. 7.) Determine most efficient amount of paddles.

MER305: Project Rocketman

The purpose is to see if temperature affects the height of the rocket launch Procedures 1. Set up the launch 2. Start the camera 3. Launch the rocket 4. Repeat 1-3 another time5. Repeat 1-5 many times for 20, 30,40,50,60 degrees

Earth / Space / Environment (MES)

MES100: SOUNDPROOFING: Which Recycled Material Works Best: Plastic bottles or Plastic bags

Can two problems be solved at one time? This project tackles soundproofing a room while using recycled materials. As a musician, it is left to me to figure out how to annoy my family less by soundproofing my music room. Also, as a person who cares about the environment, I thought I would try to use every day materials that are in excess and that take a long time to decompose. In this experiment, I tested whether plastic bottles or plastic grocery bags would restrict decibels in a model of a room. My results surprised me!

MES101: Testing Ozone Levels

Please visit student's exhibit for abstract.

MES102: It All Depends On The Weather

Before you head out to start your day do you check the weather? The weather is very simple to predict now with modern day technology, but have you ever thought of how people predicted it before technology? So how did people do it? Well, they used everyday objects and nature. In my experiment I am going to be putting that to the test! In my experiment I am going to create modern day weather predicting devices and use the ways from the past and see which is the most accurate. Which method will win? It all depends on the weather.

MES103: Mud Into Energy?

Turn Mud Into Energy. In this experiment I will be using a microbial fuel cell to see if it can charge a radio. Doing this I will be able to learn that you can use a fuel cell to charge a radio. The procedure is that I will use different kinds of soil to see which will charge it the best. Then I will then wait a week for it to finish and make my measurements. My conclusion is that the soil with the most electrons will have the best job charging the radio.

MES104: Can Hydrophobic Coatings Prevent Corrosion?

Marble chips were randomly selected, massed, and placed in labeled cups. They were then coated with a hydrophobic coating; a commercially produced product which claims to prevent corrosion and a homemade coating consisting of 10 parts paraffin wax and one part bees wax. The marble was placed in varying pH levels of 1, 3, 5, and 7. Sulfuric acid was added to distilled water to create simulated acid rain. The marble chips rested in the "acid rain" for 7 days and allowed to air dry for 17 hours before being massed. The procedure was repeated for 6 weeks for all 300 samples. The chips coated with the homemade hydrophobic coating actually increased in mass and had a yellow tint verses the commercially produced coating, which penetrated into the marble reducing the rate at which the marble corroded. The control, marble chips without a hydrophobic coating experienced the most corrosion.

MES105: The Power of Potatoes

I will determine what kind of materials can be powered by potatoes.

MES106: Env imp of pwr line herbicides

The purpose of this experiment is to determine whether herbicides used under power lines are water soluble, which may lead to environmental problems. It was predicted that the herbicides would be water soluble. First, soil samples were taken at various distances under high-voltage power lines in western PA. The samples were soaked in water, then filtered. The filtered water samples were then used to grow monocot Winter Wheat and dicot Marigolds. The height of germinated plants was measured daily for 25 days. The plants were dried in a desiccation chamber and biomass was measured. Final results available at the fair.

MES107: Why do we lose our balance?

Would you like to have the balance of a tightrope walker? Try the more close–to–the–ground balancing test in this easy experiment to learn a few trade secrets of the high wire experts. In this project, you'll find your center of gravity and explore the physics of balance at the same time. No net required for this balancing act!

MES108: Energy Production from a Wind Turbine using Solar Assist

I tested a vertical axis wind turbine, which I added a concept I call solar assist. This concept utilizes the radiation the sun gives off. The point isn't to turn the blade, but to add to the energy it takes to turn the blade. During the testing I came across that when the UVB light was shined on the reflective concave part of the turbine it went faster by .1 volts, then if you were to shine the light on the black convex half of the blade. I have concluded that the UVB rays do assist the wind power.

MES109: What Makes Ice Melt the Fastest?

Do different substances affect the melting of ice? I tests salt, sugar, and sand over ice and observed and documented my results.

MES110: Take a Peek at What's In Your Creek

Water samples upstream and downstream from a local wastewater treatment plant were collected and evaluated for water quality parameters. The data were compared to limits set forth in the treatment plant's NPDES permit.

MES111: Sinkhole Detection Using Ultrasound

Sinkholes occur suddenly without notice and can be devastating to structures. This project devises a model to identify cracks in bedrock that could lead to sinkholes by using ultrasound. Rock and soil formations are simulated using bricks and sand. Cracks in rock formations 4 cm below the surface can be accurately detected with a combination of 50 kHz and 200 kHz signals. This technique uses inexpensive equipment and works on a small scale. Using a large-scale system can prevent people from building homes on sinkhole-prone areas.

MES112: Determining How Fast the Sun Rotates by Observing Sunspots

Please visit student's exhibit for abstract.

MES113: Different H2O impact on P. Vulgaris

The purpose of my experiment was to test whether different kind of water affected the growth and overall health of Phaseolus vulgaris, red bean plants. I watered the plants biweekly with equal amounts of gray water, tap water, distilled water, spring water and rainwater. I measured the height of each plant and notes the coloration of the leaves. I conducted my experiment with ten plants in total, and watered two with each type of water. My hypothesis is that rainwater will provide the best results because plants, which naturally grow outside, have adapted to this kind of water. This experiment is in progress.

MES114: Keeping Fleece Fluffy

Recent studies indicate that manmade fabrics such as polyester can release microscopic particles of plastic into rinsewater during washing. Using fleece fabric squares, three different detergents were evaluated to determine if one might have a greater or lesser impact on the release of these plastic microparticles.

MES115: What is Hydraulic Fracturing

The purpose of my project was to learn how Hydraulic Fracturing works, and what affects your oil outflow. My hypothesis was that the smaller the material and the lower you drill, the more oil you'll get. I used 4 bottles filled with different materials to resemble the earth and poured water into each one, recording how much water I got in 10, 20, & 30sec. I found that my 2nd to last hole and my biggest material yielded the most. My hypothesis was right and wrong, because the lower you drill, the more you get. But bigger materials have higher porosities.

MES116: Remediation of Oil Contaminated Soil

Remediation of oil-contaminated soil was evaluated. Remediation agents included shredded newspaper, sawdust and activated charcoal. The amount of grass blades that grew in a designated pan was used to evaluate impact of the remediation agent.

MES117: Parachutte Construction

I started out with an interest in parachutes and constructing them. I then used my interest to create my science experiment. The main thing I did was dropped parachutes of different sizes, made with different colors, with different weights. I tested the air resistance measured in time it took the parachutes to land and wrote it down. I had three types of parachutes and two types of balloons; black and green. The two balloons had different weights. I collected data from all three parachutes with the different weights to demonstrate how air resistance had an effect on gravitational forces. I made three drops with each combination. Blue parachute with black balloon, red parachute with black balloon, yellow parachute with black balloon and so on till all combinations of the three parachutes and two weights were used. I also measured the time of the weights with no parachutes to show the effects of gravitational forces with less or no air resistance. I then tabulated the data to validate my hypothesis and formulated a conclusion. I would like to thank my teachers for inspiring me and my parents and grandparents for assisting me with this experiment.

MES118: Effect of Radiofrequency Radiation on Plants

To study if radiofrequency pulses have an effect on plants, I planted two clay shaped Chia Pets, a packet of wheatgrass seeds, and a packet of pea shoots. I then evenly distributed the wheatgrass and pea shoot seeds into eight cups, four of them would be exposed to radiofrequency pulses and and four of them would be at very low exposure. I evenly distributed the chia seeds onto 2 clay dog “chia pets”, one would be on the first group and the other would be in the second. I placed the group labeled “exposed” on a tray that was on top of a router, and placed the group labeled “not exposed” farthest away from the router but with about the same amount of sunlight as the plants on top of the router. What I found out is that the exposed group of plants grew at a lesser rate and then eventually died.

MES119: What Materials Can Make Environmentally Friendly Plastics?

The purpose of this project was to determine if a basic environmental polymer could be made stronger and more flexible by adding flour, sugar or cornstarch.

MES120: Impact of Sound Waves in the Ocean

Project : Effects of Sound Pollution in the Ocean The experiment was to determine what type of material cancels out sound moving through water best and how much the remaining sound will affect ocean life. A PVC pipe was elevated and filled with water, while a speaker played sound and a decibel meter measured the amount of sound at the other end of the pipe when different materials (Wood, plastic, and foam) and were placed in front of the speaker. Experimentation still in progress.

MES121: Oil Spills and Wildlife

What is the effect that oil spills have on wildlife that lives beneath the surface of the water? I think that if the Daphnia magna do not survive in a 10 day period, then oil spills do have a significant impact on wildlife that lives beneath the surface of the water, because Daphnia can live up to 100 days without predators in their environment. The results for my experiment were what I expected; there was a significant drop in organism population when oil was added to the bottles.

MES122: Improving Recyclability of Pizza Boxes

Three billion pizza boxes get sold in the U.S. every year but only a fraction of them are recycled properly. This is because they get contaminated with grease/oil from the pizza that it is transported in. The objective of my experiment is to improve the recyclability of pizza boxes by evaluating different pizza box liners to absorb oil/grease and to keep the base of the pizza box clean from soiling so it can be recycled efficiently. My experiment will be conducted to prove or disprove my hypothesis. The work is currently in progress and conclusions will be available thereafter.

MES123: Bioplastics are Saving our Environment

Plastic pollution is a major problem, so I decided to make plastic that would decompose itself. I made 12 spoons - each with a different type of starch such as corn starch, potato starch, and tapioca starch. From there, I put them into molds and placed them into dirt. I made the dirt moist by using water about once in 2 weeks. I have not yet finished my project because I need to watch the spoons within 30 days. After 30 days, I will weigh the spoons. If I do this project again, I will use different types of starches.

MES124: Combating Carbonic Acid: Preventing Oceanic Calcification

The increase in carbonic acid in Earth's oceans is an increasing problem. Few ways to combat this issue exist. Growing oceanic plants is a viable solution, with the plants acting like a purifying filter by eliminating carbon dioxide. I sought to identify, through research, which species of marine plants produced a higher pH. I chose thalassia testudinum and halimeda opuntia as my test subjects. To accomplish this, seagrass and macroalgae will be placed in tanks containing high amounts of carbon dioxide. The pH of the tanks will be measured daily. Final results are to be posted on Fair Day.

MES125: Nine Mile Run Watershed Quality

I researched how upstream Nine Mile Run changes downstream, with regard to a number of factors. I hypothesized that Nine Mile Run will have more pesticides downstream which would cause the pH to be more acidic. Because of this, I think that the invertebrates will be more pollution resistant than upstream. I am performing a variety of chemical tests and surveying aquatic macroinvertebrates at different sites in the stream. My data collection is still in progress.

MES126: Sound Waves in Space

Have you ever wondered what sounds you can hear in space? The answer is simple: none! In outer space, there is utter silence. My experiment will prove why you can't hear sounds un the vast outer space. I will be making a device that proves why you can't hear a buzzer in a vacuumed container. To do that, I will place a buzzer and a 9V battery inside of a flat bottom flask. Then, I will record the sound intensity on my buzzer through the Google science app on my mobile device. After that, I will be repeating the process 5 times to receive an accurate result. I hypothesized that we would not be able to hear the sound of the buzzer and my results will be available at the fair.

MES127: Solar Max

This experiment is to test if a moving solar panel will absorb more solar energy and produce more electric power than a stationary solar panel. Two solar panels were setup outside. One of the solar panels was setup to move and track the sun and the other solar panel was setup in a stationary position. Using a multimeter, the voltage and current were measured and recorded for both solar panels every half hour. From calculations of the recorded measurements, it was found that the moving solar panel produced more power than the stationary solar panel.

MES128: Global Warming and It's Effects

Purpose: The purpose of my experimentation is to inform others what is happening in the world around us and how this could eventually affect us. Global Warming is a worldwide crisis that could soon not only affect many species of animals but us. Since a lot of people don't know the dangers of global warming or how we could help I feel that it's very important in informing others about global warming. Hypothesis: I hypothesize that this year's temperatures will be colder than last year's however they will still be higher than the normal. Based on the data I have collected so far the temperatures aren't that cold. In the month of January the temperatures are pretty high, December's average was cooler than Decembers so far. Procedure: I plan to gather the temperatures from outside and compare them to previous years to see for myself the real temperature changes. Then I plan to do a demonstration on how we can use the waste (carbon dioxide) and make use out of it. First I plan to generate some carbon dioxide by putting baking soda in vinegar and collect it through a straw into a plastic empty water bottle. Then I plan to light a candle and finally extinguish the wick of the candle. The final results will be at my exhibit on fair day.

MES129: Creating an Eco-Home

We can not rely on fossil fuels together, so we must look into practical clean energy for our homes. I designed the Eco-Home to model this on a residential scale. I gathered data on clean energy sources, energy usage, and efficient appliances. The annual energy consumption was 2,937.735 kilowatt hours. Only 1.3325 metric tons of CO2 would be burned for this energy, rather than the American average of 9.26. This data shows that improving our carbon footprint is absolutely possible.

MES130: What Blocks UV-A Rays?

What is the effect of sodium alginate and calcium chloride on different liquids when added? I think that if you add sodium alginate and calcium chloride in different liquids then some of them will turn into gelatinous balls because of their ph level. The Coca-Cola and Apple cider vinegar went pretty well and got good measurements for the balls diameter. Orange juice and timing wasn't the best part of it and hopefully I can change that later my experiment was pretty successful I found the thing I want to find and I learned a few new things while on the way, and finding which liquids work with the chemicals. My hypothesis was correct that because of their pH level other liquids work differently with the chemicals Coca-Cola which was 4 pH worked pretty well. Orange juice which was also for pH 4 is acidic which turned out the worst. My apple cider vinegar work out as well as the Coca-Cola but at 2 pH, and it took a while for it to turn flat using sodium citrate.

MES131: The negative effects of food scrap on Global Warming: (and what to do about it at a household level)"

While people readily associate recycling with plastic, paper, cardboard, glass and metal, very few know about the problems we are facing with dumping the food waste in landfills. Ironically, from a 2007 study (Oliver, 2007), 34% of the United States' greenhouse gas emissions are due to food waste cycle, yet the knowledge about this fact remains scarce among the public.With my project, I am studying the recycling practices of food waste across the US and figuring out what can be done to best avert the food waste from our landfills. For this, I have prepared a survey of 7 questions that focus on the recycling practices that are currently in place across different cities/states in the US. I also personally interviewed 6 restaurant managers from around Cranberry, PA area and found out that none of their workplace is recycling the food waste. Consistent donation by these 6 restaurants of the unsalable but edible food is also unheard of. I am using Google Forms for the survey and Excel to analyze the data. Powerpoint is used for visual representation of the results.

MES300: Effect of Color on Solar Water Heating

I tested the effect of colored containers on solar water heating. I built a solar panel by wrapping foil around a foam board, and placed double layered bags of each color under a heating lamp. I set it under a heat lamp. Then, I measured how much the temperature increased under the heat lamp by using a thermometer. My hypothesis was that the blue bag would heat up the water the most because the heat would get trapped inside. The clear bag was the control and it was also the most efficient. The least effective bag was the red bag.

MES301: From Waste to Watts

The purpose of our experiment is to find under which set of conditions our microbial fuel cell produces the most electricity. We will test our microbial fuel cell under a certain condition (cold temperatures) three times and find the mean of the data. We will then change the condition (hot temperatures), get the results three times, and find the mean of that data. These procedures will allow us to determine which set of conditions is optimal for producing electricity. We plan to begin experimentation on February 5, 2018, and we expect to finish by March 4, 2018.

MES302: The Water Pollution Project

For our project we chose to test to see if there is any water pollution in different points in a creek. We chose this because we strongly believe that this is a big issue and that people, not only in our community, but the world should be aware of what is going on.

MES303: What affect does North Atlantic ACE have on temperatures in Pittsburgh in December?

Our project's purpose is to determine whether North Atlantic ACE (Accumulated Cyclonic Energy) shares a relationship with temperatures during December in Pittsburgh. During our experiment we will observe the temperatures each day in December and record the highest temperature. Then we will compare recorded data to years past

MES304: Can N.T. Help Clean Oil Spills?

Can nanotechnology help clean oil spills? If nanotechnology can help clean oil spills, then it will make cleaning oil spills easier. Variable – oil. Constant – nanotechnology.

MES305: Conducting Electricity Through Household Objects

Rationale: There has been a power outage and the power is not going to come back on for a while. You still need electricity to help you do everyday tasks such as, cooking, cleaning, working, etc. The main necessity is light. Some people have found ways to make a light for their needs such as, lighting a candle or turning on their flashlight. What if you do not have these materials at hand? How is it possible to make a light source when there is no power to supply it? If there are simple enough ways to make everyday household items into conductors, then handling power outages will be much easier. Hypothesis: Can household items be or be modified to become a conductor strong enough to light up a lightbulb with just a battery? We expect that we will be able to find at least two ways to light up a lightbulb with a simple circuit containing a item that you can find lying around your house. This will be expected because as stated above people have found ways to light their way in a power outage with simple tools. Procedures: We will take six household items to test: three that we think will conduct on the first try and three that we think that we could modify to make them conduct electricity. We will test them each one at a time in our simple circuit to see if they are conductors. If not we will make a change and try again. Final results will be available on fair day.

MES306: Effect of water pH on Soybeans

Our study examined how water's pH affected soybean growth. Our hypothesis was that a pH of 5 would be the best because the preferred level is 6 and 5 is a little more acidic than 6. We grew 15 beans in total, 3 beans per the following pH levels: 3, 5, 7, 9.5, and 11. We grew each bean in approximately 60 cm2 of soil and watered them with approximately 5 mL of their pH water each day. We found that after 14 days, pH level 5 was the only plant that grew, and was sprouting within 3 days.

Medicine / Health / Microbiology (MMH)

MMH100: Got Gluten?

The purpose of this experiment is to see if gluten-free flour is the only flour a person who is trying to eat a low amount of gluten can eat. The hypothesis is that gluten-free flour will have the least amount of gluten in it. First you weigh 50 grams of flour. Then you add 20 ml of water to the flour to make a dough. After the dough is made you wash the dough over the sink with a strainer underneath. Once the dough is done washing you weigh the gluten on the scale. In conclusion my hypothesis was correct, gluten-free flour has the least amount of gluten in it.

MMH101: Maple Extract...For The Better or For the Worse?

To determine whether the presence of maple extract effects an antibiotics ability to eliminate bacteria a 5:1 dilution of 500mg of amoxicillin was dissolved in 100 mL of sterile saline. Sterile paper discs were placed into the dilution with sterile forceps for 15 seconds and allowed to drip for 10 seconds. Sterile petri plates containing nutrient agar were streaked with Bacillus cereus. The antibiotic was diluted with and without maple extract. The entire procedure was repeated for E.coli as well. The entire procedure was repeated for the second antibiotic, cephalexin. Cephalexin was more effective in eliminating Bacillus cereus with maple extract. However the cephalexin was more effective when applied to E. coli without the maple extract. Amoxicillin was more effective with maple extract when applied to both bacteria.

MMH102: How Safe is My Yoga Mat?

Problem: What is the bacteria-killing affect of different types of cleaners on yoga mats? Hypothesis: If the cleaner has a higher level of bleach/alcohol, then it will kill the most bacteria. Procedure summary: 1. section off never used mat with tape into five sections. 2. label sections as 1,2,3,4,5. 3. take part in heated vinyasa class on divided mat. 4. After class swab section 1 of mat. 5. inoculate agar plate with the swab. 6. repeat steps 4 and 5 on each section of mat. 7. clean each section with its corresponding number cleaner. 8. swab each section with new swab on each. 9. inoculate agar plates with swab. 10. grow bacteria incubator at 27 degrees celsius. 11. analyze bacterial growth.

MMH103: Does Artificial Sugar Affect E. coli Proliferation?

The purpose of this experiment was to determine if E. coli proliferate more in artificial sugar or natural sugar environments. It was predicted that Splenda artificial sweetener would produce the greatest number of E. coli colonies. 40g of natural sugar, Splenda, Sweet N' Low, and Equal were added to individual nutrient broth solutions. The broth was inoculated with E. coli and incubated for 48 hours. After incubation, a Spec 20 was used to compare turbidity and serial dilutions of samples were plated and incubated for 72 hours. Colony counts were performed after incubation. Results available at fair.

MMH104: Which Dosing Device is Accurate?

The purpose of this experiment was to determine which medication dosing device is most accurate. It was predicted that the syringe will be the most accurate to measure liquid medication. 30 adult subjects who are not healthcare professionals were recruited as well as healthcare professionals . Each subject measured 5 mL of distilled water using a spoon, measuring cup, and syringe. Each device containing the liquid was weighed and he volume with a graduated cylinder was measured. The density of each liquid was then calculated. The steps were then repeated using Ora-Blend. The results to be discussed at the fair.

MMH105: The Five Second Rule

Nick CooleyAbstractMy project is called The 5 Second Rule. I testedthree different floors bathroom,living room,andkitchen. I predicted that the bathroom floor would bethe dirtiest but actually the apple that wasn't on thefloor at all was the dirtiest.And I tested the inside of the apple so it has nevereven seen the outside world. I think the reason that itwas the dirtiest is because of the sugars that areinside the apple. Everytime that we looked at thetrays we were waiting for the floors to be really dirty.

MMH106: Which brand of Ibuprofen dissolves the fastest?

The purpose of this project was to find a way for people with bodily pains to find relief fast. People should know which ibuprofen brand to trust to get the best quality and price. It concluded in the experiment that Top Care dissolved the fastest. Originially thinking that Advil would dissolve fastest, but that was not the case.

MMH107: 5 Second Rule: True or False?

The purpose of this investigation was to determine if food dropped on the floor for less than 5 seconds is safe to eat. I hypothesize the longer that the sample of food is on the floor, the greater number of bacteria will be present on the food. Procedure: 1. Collect materials. 2. Swab floors to confirm bacteria is present. 3. Swab uncontaminated ham (control group). 4. Drop ham on floors for 5 seconds, swab, and place in petri dish. 5. Repeat for 1 minute and 10 minutes. 6. Keep warm for 5 days. 7. Count bacteria colonies and graph data.

MMH108: Essential Oils on Oral Bacteria

This project will determine which essential oil kills the most oral bacteria: cinnamon, spearmint or peppermint. The researcher will swab the inside of the researchers mouth and rub it on all the prepared plates. Paper discs will be soaked in each oil and placed in each petri dish except for the control. After five days count the number of colonies in each in each petri dish. The cinnamon oil is predicted to kill the most bacteria. Results will be available on fair day.

MMH109: Maze Runner

Microorganisms help to decompose waste using a spatial memory. Maze Runner was conducted to learn the intelligence of simplistic microorganisms with the use of a spatial memory. The microorganism was placed on three different mazes to test if it knows sense of direction. It was predicted to reach the oatmeal the fastest on the square maze because it is challenged by circular areas and sharper edges. After conducting this experiment, the average results were the following, triangle maze 514, circle maze 604, and square maze 608. In conclusion the microorganism reached the oatmeal the quickest on the triangle maze.

MMH110: Magical Toothpaste

I want to know if there is a way to see plaque while brushing teeth to decrease gum disease and dental decay.

MMH111: Watch Out for Those Drinks!

My project tests the effect of pH (of different beverages) on tooth erosion. To simulate a tooth, I will use eggshells. I will find the mass of the eggshell, submerge each eggshell in various beverages for a specified amount of time. I will find the mass again after the eggshell has been removed from the beverage and allowed to dry. I will then record and analyze the difference in mass. This can be applied to the world to educate the pubic about the impact of their drink choice on tooth erosion.

MMH112: What Music Does Bacteria Like the Best?

This project will study the effects of various types of music on bacteria. Pop, classical and rock music will be played for 4 petri dishes containing bacteria from the girl's school bathroom faucet, plus 4 petri dishes without music to act as the control group. The music playing from headphones will last 5 days, and the researcher will be recording the data from each sample in a chart. Classical musical will have the most bacterial growth due to the high frequency. On the fifth day, the petri dishes will be autoclaved before disposal. Results will be available on fair day.

MMH113: The Five Second Rule!

Have you seen someone drop food on the ground, pop it in their mouth, and say "five second rule"? This project investigated if the Five Second Rule is safe by examining what foods and surfaces produce more bacteria. Swabs of food items dropped on various surfaces were taken and rubbed in petri dishes with nutrient agar. The hypothesis predicted that turkey on a hardwood floor would produce the most bacteria. The turkey was correct, but the carpet produced more bacteria. The Five Second Rule is safe since it took at least four days, not five seconds, for bacteria to grow.

MMH114: Vagus, Baby!

Do you want to be more relaxed and less anxious? Did you know there is a nerve in your body that helps you to stay calm? The vagus nerve affects your ability to stay relaxed. There are ways to make sure you stay calm by stimulating your vagus nerve. I tested to see if listening to classical music stimulates your vagus nerve. My results were that it worked just as well as another proven method, yoga. So if you want to stay relaxed, my suggestion is that you listen to classical music.

MMH115: Yeast In Different Enviornments

1. Prepare and label bottles for experiment. Rinse each bottle thoroughly and remove any labels.Number each bottle 1-5. 2.Add 30 ml of sugar to bottle 2. 3.Add 30 ml of salt to bottle 3. 4.Add 30 ml of baking soda to bottle 4. 5.Add 30 ml of vinegar to bottle 5. 6.Fill a large pot with at least 4 liters of very warm tap water. 7.Using water from the pot,to each bottle add 600 ml of warm water,replace lid, then shake to dissolve contents. 8. to each bottle,add 2 packets of dry yeast, replace lids, then shake to dissolve yeast. 9.Remove each lid then stretch a balloon completely over the opening of each bottle. 10.Leave bottles to rest in a warm location for 1 hour. 11.After 1 hour,look at the balloons. Record results. 12.Number each balloon so it matches the bottle it's on. 13.Tie a string around the base of the balloon so no gas will escape when removing the balloon. 14.Tie a not where the string is so that the balloon is completely sealed. 15.Fill a large pot or bowl completely with water. 16.Completely submerge balloon 1 in water. Pour water from pan into a metric beaker. record amount of water the balloon displaced in the beaker. 17.Repeat steps 13-16 with balloons 2-5. 18. Repeat steps 13-16 with balloons 1-5 two more times for a total of three trials. Calculate the average water displacement for each bottle. 20. record results.

MMH116: How Dirty is Your School?

The purpose of this project is to determine how clean the school is. Two samples of five objects around the school were tested by being swabbed with a cotton swab and put into a petri dish, then left in an incubator for four days. The samples were observed for bacteria. My hypothesis was proven incorrect because the desks had the most bacteria. Lockers had the least. My results mean that there are some objects that need to be cleaned more often. Future experimentation would include using different objects, and running more trials.

MMH117: Carpal Tunnel Syndrome

Carpal Tunnel Syndrome (CTS) is becoming increasingly common in the general population. Although there is a lot of research out there, and there is a cure for CTS the symptoms can be unbearable. Living with symptoms like pins and needles, sharp pain, numbness, and the weakening of muscles. Surgery does have a 90-95% success rate, but after surgery one must take special care to make sure the recovery process is effective and speedy. Doing hand exercises can help and with the aid of a product they can be even more effective. My project is to try to develop an exercise device to help people before or after surgery with Carpal Tunnel Syndrome.

MMH118: Testing Bloodtype Reactions to Antibodies

In my experiment I tested to see what blood types would have a reaction with Anti-A, Anti-B, and Anti-Rh serum. Antibodies help scientists determine the blood type because if the patient gets the wrong type of blood then the antibodies in the body will fight off the new blood, killing the patient. Once I tested all of the reactions three times I was able to determine what blood type each blood was by comparing my observations to a chart online that is attached to this experiment. This experiment can help scientists know what blood to give to patients

MMH119: BAP:A Cure for Diabetes

The purpose is to see the struggles of an insulin pump, and if glucose levels could be reached at standard rates. Building the pancreas circuit with all potentiometers and resistors is one procedure.Then I tested the circuit in solutions until the pump stopped running.The results are that the artificial model could run as though an insulin pump.The equation used to explain the results was NaHCO3+CH3OOH=CO2+H2O+CH3COONa.The model’s purpose was achieved.These results show that a pancreas system is not easy to deal with. In future times, I would change the layouts of experiment.

MMH120: How Much Radiation Does Your Cell Phone Emit?

Please visit student’s exhibit for abstract.

MMH121: A Moldy Mess

Problem: Which type of bread gets the moldiest in a seven week time period?Hypothesis: It is hypothesized that the Pepperidge Farm's 15 grain bread will mold the fastest.Research: www.education.com, www.prezi.com, www.sciencebuddies.org, www.reference.com, www.osh.govMaterials: Pepperidge Farm's white, Italian, 15 grain, whole wheat, seedless rye bread, and sourdough bread. Sandwich bags Notebook/chart for recording amount of moldProcedure:Get white, Italian, 15 grain, whole wheat,seedless rye,and sourdough breadPlace each bag in the same area.Leave in bag for seven weeks recording the amount of mold on each slice of bread each day in notebook.On day 49, observe the amount of mold on each slice of bread. Record findings.Project idea: www.sciencebuddies.org

MMH122: Bacteria Level in Dog Food - Does Price Really Matter?

The Purpose of this experiment is to test weather cheaper dog food has a higher bacteria level compared to higher priced counterparts.The researcher will test 5 different dog foods varying in price. 15 petri dishes will be labeled. Then they will swab one of each dog foods kibble and repeat that three times for each brand. They then will take each swab and streak it on its correlating petri dish. The researcher will then observe the number of bacteria colonies and collect data on them for 5 days. Results will be available on fair day.

MMH123: BRAIN- A Novel Neurodegeneration Diagnostic Incorporating Brain-stripping, Region-growing, Analysis of Imaging, and Neuroanatomical Technologies

Neurodegenerative diseases are detrimental to our society, destroying the lives of over 55 million people. My project incorporates the ideologies behind several technologies to create a diagnostic for Alzheimer's, Huntington's, and Parkinson's diseases. My experimentation is continuing, and I am utilizing data sets of healthy brains of various ages and genders as controls. I will create a program, BRAIN, to compare a patient's brain scan with a healthy control of the corresponding age and gender. It will target specific regions (cerebral cortex, hippocampus, substantia nigra, and basal ganglia) for each of the diseases. BRAIN could help millions of lives worldwide.

MMH124: Are Call Bell Systems Effective in Getting Timely Medical Help?

Healthcare facilities utilize call bell systems for patients to call for help when needed. This seems like an ineffective way of communication in the current era. I believe that call bell systems are ineffective.

MMH125: Going for Speed

Cross Country Running and Track are two activities I enjoy, but they require running different distances and often different speeds. I wanted to find out how running different speeds impacts the body. I ran a mile-long course three times at a pace of 9 minutes per mile and then repeated this course three times running at a faster 7 minute pace. Using the Nike Run App, I measured my heart rate and calories burned for each run. I found out that my heart rate was indeed higher and I burned more calories per minute when running faster.

MMH126: Effects of UV radiation on SODIS

I researched the effects of various wavelengths from the ultraviolet spectrum on a water treatment method (SODIS). I knew from previous experiments (science fair 2017) that UV-A light was an efficacious solution, also the reason SODIS is functional. I hypothesized UV-C light would be the most effective, however, because it is germicidal. I thought UV-B light would be a poor decontaminant, as my research did not show otherwise. Experiments are still underway.

MMH127: Bactericidal

The purpose is to determine which acne medication works the best. The hypothesis is that clindamycin will work the best because bacteria causes acne and it's the most effective at killing the bacteria. Results are still being calculated. Procedure: 1. Swab your face and let the bacteria grow for three days. 2. You will swab and divide your petri dishes in to four quadrants wait to label them with the name of the medication, after you can label the medication. 3. Let them grow for 96 hours. 4. Then measure the diameter of the zone of inhibition in millimeters.

MMH128: Spinbrush vs. Manual Toothbrush - Which will Clean Stained Teeth the Best?

This project is testing if a manual toothbrush or an electric, spinning toothbrush will clean stained teeth better. Twelve teeth will be stained and then brushed with the two different types of toothbrushes for ten days, two minutes each. There will be three groups of four teeth- a group for the spinbrush, manual toothbrush, and control group. To determine how well the toothbrushes work, a homemade color palette will be used to measure the leftover stain, if any. It is predicted that the spinbrush will clean the teeth better than the manual toothbrush. Results will be available on fair day.

MMH129: The 5 Second Rule: True or False?

The 5 Second Rule: True or False?Procedure:1. Collect materials2. Cook hot dog, and cut cantaloupe3. With one, clean hand, pick up the piece of food and place it on the surface for exactly five seconds,then pick it up with the same hand and smear the side placed on the surface on the petri dish4. Repeat this process on 6 surfaces (kitchen floor, bathroom floor, living room carpet,sidewalk, grass, and control) with 3 foods (cantaloupe, jelly bean, and cooked hot dog)5. Let the petri dish sit for seven days and record the number of colonies shown each day6. Make a data table and graph

MMH300: Parkinsons Key Assist

Parkinsons is a disease that affects mainly older people and includes symptoms of constant tremors in the hands, being unbalanced on feet, rigid limbs, and overall slowness. Specifically the tremors. It makes a lot of simple tasks much more difficult such as putting a key in the doorknob. Our project is to develop a small 3D printed device to assist people with Parkinsons. The device will be used to help individuals unlock doors.

MMH301: Heads Up!

In this experiment, we tested how effective the guards are. We believe the most expensive band will give the most protection. First, cut out part of a melon. Next, you will put an egg in it. Then, put a concussion band around the melon. Then, hang the melon from the crossbar. Next, set the launcher power. Sixth, set the ball in the launcher and launch it. Eighth, repeat steps 5-6 until each melon breaks. Finally, if the melon or egg breaks, repeat steps 1-4. In conclusion, our hypothesis was correct. The most expensive band gave the most protection.

MMH302: The Effect That The Five-Second Rule Has On People's Health

Please visit student’s exhibit for abstract.

Physics (MPH)

MPH100: Aluminum versus Composite and Wood bats

The purpose of the experiment is to determine whether aluminum, composite, or wood bats can create higher exit velocities.The hypothesis is that if aluminium bats are used then exit velocities are higher because they have thinner walls than composite or wood creating a more flexible and powerful hit. After the base was set up the bats were all tested. It took 412 pitches and 3.5 hours. In conclusion aluminum was the best followed by composite than wood.

MPH101: Measure the Splatter

The purpose of my project is to determine if the height of blood drops when they are released affect the size of the splatter. I tested this by making fake blood out of dyed corn syrup and dropping drips from different heights. Then I measured the size of the drops of the blood where they landed. My hypothesis was the higher the blood drops are dropped, the bigger the splatter it will make. My hypothesis was not supported because the splatter did not increase, it was in the same range as the other blood drops. I learned that the blood splatter did not increase when you change the height of the drops.

MPH102: Different Heights of Football Blocks

The purpose of the experiment was to determine if the different sizes of kicking blocks affect how far a ball will go. The hypothesis is if the ball is elevated at different heights off the ground, then there will be no difference in the distance traveled because when the ball is consistently kicked in the sweet spot the ball will go the same distance. The kicking contraption simulated a kicker and the data showed that the 2.5 cm block kicked the ball the farthest.

MPH103: May The Force Be With You

The purpose of my experiment is to determine how much weight an electromagnet can pick up. I will test this by making an electromagnet, and using ten, twenty, thirty, forty, and fifty coils of wire, and weighing metal balls.

MPH104: Measure the Splatter

NCIS and CIS are both television shows involving a series of distinct fields of forensic science. One field of forensic science is known as Criminalistics. Someone who studies criminalistics focuses on the background of a crime scene, including everything that happened during the crime taking place. One thing the criminalistics study is blood impact. This example measured the diameter of the blood droplets at different heights. Heights versus diameter was graphed. The results of this experiment turned out not exactly as planned. The hypothesis was supported by the data.

MPH105: Will It Stop?

In today's world, many rely on transportation. However, when using transportation, collisions between objects are possible. These collisions could increase the chance of several casualties. To help prevent this accident from occurring, the experiment conducted, involves a prototype of a maglev train and a magnetic stopper. Trials include adding numerous magnets to the stopper to see the difference between the distance of the "train" and the stopper. Each magnet added to the stopper will establish as one trial. Experimentation is continuing. Further knowledge of the experiment will appear on display at the fair on March 23, 2018.

MPH106: Go Green

Can a potato,cucumber,and a carrot power a light bulb? In my research I discovered that if a vegetable was dipped into citric acid the vegetable will give off my energy. First in my project I placed nails inside cucumber,potato, or carrot, attach wire to nail, attach both copper wires to the 12 watt light bulb. Record results in increments of five minutes.

MPH107: Making An Impact On Football Helmets

American football is one of the most popular sports. With the increasing number of Chronic Traumatic Encephalopathy cases, there is a need for further research. The purpose of the experiment is to test and see: do helmets provide proper protection for players? A test was created to relate impact force to damage. Watermelons were dropped, varying heights, to see what damage occurred. The results supported my hypothesis; impact force, when increased, resulted in a higher degree of damage. To show the results a rating scale was created to best fit the data, the result being a positive correlation in damages.

MPH108: How does the weight of a coaster affect how fast a roller coaster goes?

This project will test different weights of carts on a track to find the minimum and maximum successful weight.

MPH109: Does Weight Affect a Drone's Battery Life?

Please visit student's exhibit for abstract.

MPH110: The Life of a Stored Battery

The purpose for doing this experiment is to find the ideal storage temperature for battery life. The three temperatures used were 74℃, 49℃, and 4℃. Since batteries are used so commonly, and they are very expensive, it was questioned on how to get the best out of your money. The batteries were put in the desired temperature for 12 hours, in order to fully acclimate them. Then they were put in flashlights and timed to see how long the flashlights ran. This was repeated for a total of six trials. It is thought that the hotter the storage temperature, the shorter the lifespan of the battery will be. This is caused by the faster chemical reactions, which will lead to the chemicals being consumed faster. In conclusion the cold batteries lasted the shortest followed by room temperature and then warm. The cold had an average time of 32:47.00, the warm had 36:45.00, and the room temperature was 35:15.00. This is because the chemical reactions in the cold batteries slowed down to a stop.

MPH111: Distance of Car by Different Angles

The purpose of the experiment was to find out what type of angle ramp would make the car go the furthest. The ramp measured at forty degrees will make the car go further than the ramps measured at thirty degrees and twenty degrees due to the effect of friction, the pull of gravity, and speed. The first thing that was done in the project was to put the cedar type ramp on the ground, and set it up for 20 degrees. Then put the car with rubber wheels on the line marked on the ramp which is 64 centimeters from the bottom of the ramp. Then let go of the car and start the stopwatch and then stop the stopwatch when the car stops. Then record the time and then measure the distance in centimeters adding on the 64 centimeters for the cars total distance and repeat it for 4 more times. Then do the same thing for the 30 degree angle and repeat it 5 times. Then do the same thing for the 40 degree angle and repeat it 5 times. The results determined that the hypothesis did not support the results. In the results the 30 degree angle made the car go the farthest and fastest. The reason the 40 degree angle did not make the car go the farthest and fastest was because when the car hit the main surface it made it slow down.

MPH112: Roller Coaster Marbles

In this project, the student tested the amount of potential energy necessary for a marble rollercoaster to pass through a loop in the track with a 2:1 height ratio. The experiment tested varying heights for the starting point of the marble and measured success as if the marble made it completely through the loop or not.

MPH113: BASEBALL: Which is Better, Wood or Aluminum?

My science experiment is called which is better wood or aluminum. It consisted of taking a aluminum, and a wood bat of the same size. I had to hit 30 balls with each bat, 10 balls above, below, and in the sweet zone. I put tape on the bat to see where the ball was hit. I rolled the balls in chalk and hit them off the tee. I also had to measure out the field. The aluminum bat hit the balls father than the wood bat. I think that was because the aluminum bat was lighter. The aluminum bat won.

MPH114: Magnetic and Physical Properties of Ferrofluids at Low Temperatures

Ferrofluid is a liquid suspension of nano-magnetic particles in vegetable oil carrier fluid. A limitation of ferrofluid is it cannot perform well at temperatures near vegetable oil freezing point (-15℃). I hope to determine if alternative carrier liquids could be used that retain ferrofluidic properties. Using different carrier fluids with lower freezing points will enable the use of ferrofluids in temperature ranges where vegetable oil freezes. I will develop stable suspensions of iron nanoparticles using different carrier fluids and further determine their ferrofluidic properties at a range of temperatures.

MPH115: Batter Up!

The purpose of my project, Batter Up!, was to identify which baseball bat material (composite, aluminum, ash, maple), independent of swing speed, can produce the greatest average distance of a pitched baseball. After doing research, I predicted the average distance produced, from greatest to least, would be composite, aluminum, maple, and then ash. A pitching machine was set up 20 feet from home plate and calibrated to throw 35 mph. The batter was set up at home plate and bunted the ball without exerting any forward momentum. After measuring each attempt, and averaging the distances, my prediction was confirmed.

MPH116: Soundwave Obstruction; Is CO2 Behind It?

The purpose of this experiment was to determine if increasing CO2 gas levels in the oceans could obstruct marine mammal communication by changing the frequency and intensity of sound waves used in echolocation. This project was derived from the recently increasing levels of CO2 in the atmosphere. The hypothesis of this project was that as the level of CO2 increases in the water, the intensity and frequency of sound waves should decrease. Since CO2 is less dense than water, its presence in the water should cause sound energy to be passed along less easily. For the procedure of this experiment, a marble was dropped from a constant height onto a piece of metal which was set inside a plastic bin. The plastic bin was connected to another bin with a pipe, and the bins were filled with either fresh or salt water. The manipulated variable was the amount of CO2 in the water. Three levels of CO2 were tested: no CO2 (pH of 8.53), a small amount of CO2 (pH of 7.15), and a large amount of CO2 (pH of 7). Sound waves traveled from the piece of metal in the first bin, through the pipe, to the end of the second bin. Both the intensity (in dB) and frequency (in Hz) of sound waves were measured, using an application on an iPad tablet. The three highest intensity measures, and their corresponding frequencies, were recorded and averaged for each sample. pH was measured to reflect the amount of CO2 dissolved in the water, since CO2 reacts with water to produce carbonic acid, which releases H+ in the water and reduces pH. The results showed that the average sound wave intensity measures across all types of water were -81.3 dB, -86.65 dB, and -89.6 dB for conditions of no CO2 in the water (pH of 8.53), a small amount of CO2 (pH of 7.15), and a large amount of CO2 (pH of 7). The average sound wave frequencies under these same conditions were 5,000 Hz, 3,625 Hz, and 3,600 Hz, respectively. The conclusion of this experiment is that with more dissolved CO2 in the water, particles in the medium cannot be disturbed as easily. As sound was generated in the water, both the sound wave intensity and frequency got weaker as CO2 levels increased. The hypothesis was supported by the data.

MPH117: The Heat is On

Are you always cold in the winter months? The purpose of my experiment was to discover way to help keep my brother with congenital heart disease warm in the winter. I tested to identify what type of material would help him retain the warmest body temperature. I hypothesized that polypropylene would maintain the warmest temperature over time when placed in a cold environment. My results proved my hypothesis incorrect because wool maintained the warmest body temperature over time, followed by polypropylene, 50% cotton/50% polyester blend, cotton, and polyester. So, pull on your wool sweater; I wool if you wool!

MPH118: Does the temperature at which a magnet is made affect its strength?

My project determines if the temperature at which a magnet is made effects its strength. My hypothesis was that as the temperature increases, the magnetic strength will decrease. To do my experiment, I made a gauss meter, cut my samples to 2.54cm long and 1.27cm round pieces. Then, I'll heated/cooled them and magnetized them. I will use a magneto magnetizer to magnetize my samples, and use 8620 round stock steel to test. Finally, I will collected my data and analyzed it. You can see my results at the fair.

MPH119: Charging an Electric Car Batery with a Solar Panel

Solar Energy is being used more and more every day. Its various benefits make it a more popular choice of energy. For my project I am modeling a solar panel on an electric car to see how much more efficient the electric car will become. So far I have chosen a car to model my experiment with custom solar panel based on the size of the roof of the car. Now, I have to measure the amount of increase of efficiency on the car. I plan to do this by calculating the power my solar panel emmits and translating that number into miles. Then I will calculate the efficiency by dividing the miles per full charge and the additional miles from the solar panel, giving my final number as a percent.

MPH120: Does the Infinity Mirror Work?

Does the infinity mirror work? I found out that even though I only saw a certain amount of rows other people saw way more than I did, which I thought was pretty interesting because why did my friends find more rows than I did? This topic peaked my interest because then I started to wonder, does the infinity mirror illusion have different effects on people with different kinds of vision. My project tested the limits of the human brain to see how many rows they can see. This project worked better on people with better vision.

MPH121: Shooting for Accuracy

Have you ever been hunting and saw a 10 point buck and you had a shot but you missed? In my tests I found that accuracy can affect the shot. Many people miss because of accuracy. Accuracy can be affected by the amount of gunpowder that is in the bullet. The smaller the Caliber, the more accurate the shot. I proved my hypothesis and my data showed that using a 22, 223, and a 30-30, the 22 was the most accurate. So the next time you are hunting think to yourself accuracy is something that I can control.

MPH122: Are All Baseballs Created Equal?

As a player I always wondered why they built the baseball fields different sizes. I am testing what ball goes the farthest. I predicted that the Major League Baseball would go the farthest because the fields are the biggest and the ball is the firmest. To test it I made a hitting contraption to hit the ball equally each time. I tested a practice ball, little league ball, Pony League ball, and MLB ball. I put each ball on a tee and had the hitting contraption hit it. Each ball was hit 6 times. The MLB ball went the farthest.

MPH123: Hockey Stick Flex: Does it matter?

For my experiment, three of my friends and I took 10 shots at a target three times for the accuracy test. First, all players used sticks of their proper flex. The second and third rounds consisted of the players using sticks with improper flex. Players used two different sticks in the second and third rounds. The players then took 10 shots with a radar gun clocking the speeds for the power test. The first round, the players used sticks with their proper flex. The second and third rounds, the players used two different sticks with the improper amount of flex.

MPH124: How does the tread on car tires affect the traction with a wet road?

The purpose of this project is to determine which pattern tire tread would allow for the most traction on a wet road. It was predicted that Douglas Performance Tires would be the best. First, a container was built using cement as the traction surface. Then holes were drilled in the tire and container to allow for a string pull to pull a weighted tire tread over the surface. The force in kilograms was measured over a set distance. Final results of this experiment will be available at the fair.

MPH125: Can U.V light change color?

The purpose of this paper is to find out whether U.V light affects the shade of color. If the time the crayon's color is under the UV light increases, then the lighter crayon's color amount should decrease because lighter colors do not have a lot of pigment so it would not take as long for the color to fade. A U.V lamp was used for a certain amount of time to shine on squares of different colors. The hypothesis was refuted. Darker colors fade faster than lighter colors.

MPH126: Bottle Rockets

This experiment will test the length of a rocket to see if it affects the height and distance that the rocket can travel.

MPH127: How Temperatures affect the Volume of Liquids

I chose this topic because I wanted to see how much temperature can affect liquids. I learned how the molecules of hotter things expand while colder thing shrink so I wonder if this will have the same effect on liquids.

MPH128: Parachutes Are A Big Drag

The purpose of this experiment is to determine which shape makes a parachute descend the slowest. Three parachute shapes were dropped five times each from the same height. An average drop time was calculated each shape. The results showed that the circle descended the slowest, while the triangle descended the fastest. The drop times were converted to drag coefficient for each shape and is shown in a bar graph. In conclusion, the results showed that a circular parachute works best at slowing down a falling parachute.

MPH129: Light Will Win the Race

My experiment's purpose is to identify how an object's density affects the speed at which light passes through it. In my experiment I shot a beam of light from a laser pointer, into gelatin, and added sugar to change the densities. I then proceeded to apply Snell's law to the angle that I measured. I thought that the denser the gelatin was the slower the speed of light would become. I then found this thought to be correct for the speed of light decreased as the amount of sugar that was added increase, as did the density of the gelatin.

MPH130: Are more expensive golf balls worth it/

Problem: there are some very expensive golf balls with many claims to advantages, but are they true? Hypothesis: It is hypothesized the expensive golf balls will bounce higher when dropped from a 2 meter ladder. Research: ScienceBuddies.org, Successtory.com, twogolfguys.com, hagginoaks.com, golfalot.com., Hyperphysics.phy-astr.gsu.edu/hbase/Newt.html. Materials: Callaway Hex Black Balls Tour, Callaway Hex Diablo Tour Titleist Pro V1, Titleist Pro V1, Titleist Velocity, Volvik Vivid, Volvik Golf DS-55, Ladder, and 2 Meter Sticks. Procedure: 1. Drop one golf ball from a two meter ladder ten times. 2. Have the spotter measure how high the ball bounced using a meter stick. 3. Repeat this process with each golf ball up to three times each. 4. Average the results. Analyze the results and draw conclusions. The idea originated from ScienceBuddies.com.

MPH131: How High Does It Take To Loop the Loop?

Project : How High Does it Take to Loop the Loop? The average roller coaster is based on mechanics and physics. Usually,the roller coaster will take you up a hill- and maybe a few others- and then they will put you through a loop. In my experiment, I will use a marble roller coaster to see how high the hill has to be for the marble to completely "loop the loop." I will use a marble, a foam pipe, and a ruler, and measure the height for every test. My hypothesis is that the loop will have to be at least 3 ft. off the ground for the marble to completely loop.

MPH132: Does Temperature Affect the Energy Output of Solar Cells?

Please visit student's exhibit for abstract.

MPH133: How Do Materials in Swimsuits Affect Performance

The purpose of my experiment is to discover what kind of swimsuit provides the least resistance in the water. I will conduct this experiment by acquiring multiple swimsuits of different materials before testing their efficiency through multiple tests in the water.

MPH134: Fabric vs. Fire

The purpose of this experiment was to find out what fabric is most fire resistant. The hypothesis was that if different types of fabric were burned at the same temperature, silk would take the longest to burn. The types of fabric tested were cotton, linen, silk, polyester, nylon, and rayon. The fabric was cut into 30cm. by 5 cm. strips making 10 strips of each kind. Metal wire was used to make a hook from which I hung a clothespin that held a piece of fabric. After burning the fabric, I found that silk was the most fire resistant.

MPH135: How Drag Affects Different Car Models

I am interested in the wind-drag of cars because it is related to fuel efficiency. I am going to measure the amount of drag of different car models using modified model cars, an incline, and a stopwatch.

MPH136: Which shape of a Pinewood Derby Car is Fastest?

I joined cub scouts when I was 6 years old. Every year in February was the pinewood derby (Each scout was given an identical kit to create a car inside was a block of wood which would become the body of the car.) My dad and I would research to find the best shape possible for speed. The purpose of this experiment is to find the fastest aerodynamic shape. My hypothesis is that the simple wedge shape will be the fastest car. The experiment will be conducted as follows. I purchased 4 pinewood derby car kits. All 4 cars will weigh 5 ounces (weights will be added to make up the difference.) All cars will be timed using a racetrack. One car will be a wedge shaped, one will be flat, one will look like a regular car, and the last one will look like a regular car, and the last one will look like an I overhead. Results will be available at the fair.

MPH137: Power With Panels

I chose this project because I wanted to see how the sun changes its position through a long period of time and how it affects the power output of the solar panels. It may help the environment. The purpose for this science experiment is to see how much the sun's positioning in the sky affects the amount of power output from the solar panels. The hypothesis is that the power output of the solar panels will decrease as the seasons change from summer , to fall, to winter because the angle of the sun will be lower in the sky as the seasons progress. For my procedure: 1. A solar panel will be laid flat on a surface, outdoors with the multimeter connected to it to take measurements. 2. Measurements of the power output of the panel will be taken 1-2 times a week at 4:00 pm during the months of September, November, and December. 3. The outside temperature will be taken as well. 4. The angle/positioning of the sun will be recorded, using the website listed in the materials, because over the time it changes in the sky. This could affect the power output of the panels. 5. All of the data will be recorded in a notebook and later on in an excel spreadsheet. The controls I will have in place are the location and position of the solar panels. The data being collected is the power output of the solar panels, using a multimeter, and the positioning of the sun, using a website. This data will be summarized by being put into charts and compared. This is going to help draw conclusions by determining if the sun's positioning has an effect on the power output of the solar panels. The final results will be available at the student's exhibit on Fair Day.

MPH138: Get A Grip

Imagine that you could make a real robot hand with materials you have at home. In my project I teach you how to make a hand with drinking straws, sewing string and a little bit of glue. I then will see if it can pick up a ball, play the piano and hold a pencil. I think at the end of my project it will be able to work like a real human hand.

MPH139: Levitating Magnets

When magicians make objects float in the air does it ever make you wonder if it's really magic after all? Levitation (making things float) may just be a magic trick, but the truth is you can use an invisible physical force to levitate a magnet. My hypothesis is that If two magnets are slowly brought together, then the magnetic force will attract or repel one another depending on the combination of the positive or negative charges. The final results will be available on the Science Fair day.

MPH140: Vaulting Ions

The purpose of this experiment is to determine how increasing voltage affects the rate of electrolysis of salt water. Voltages between 1 and 25 VDC were generated. The time to generate 10 mL of gas at the cathode was measured. My hypothesis was that increasing the voltage would increase the rate of electrolysis, with chlorine gas being generated at the anode and hydrogen gas being generated at the cathode. The data proved that increasing voltage increased the rate of electrolysis. However, only hydrogen gas was generated because the copper anode reacted, suppressing gas generation.

MPH141: Strings Vs. Tuning Stability

The purpose of this project was to find which type of string held the tune the longest on a ukulele. The hypothesis was that the nylon strings would hold the tune the longest. Strings bend less the thicker they are. To do this project, restring the ukulele to the titanium strings, tune the ukulele five times within a half hour, then test the tune every twelve hours over three days, record how many hertz it went out of tune each time, and repeat this with the nylon and nyltech strings. In conclusion, the nyltech strings held the tune the longest.

MPH142: Blocking Radio Frequency Identification Signals

This experiment was conducted to find out how density affects an radio frequency identification signal's transmission range. The hypothesis of this experiment is that the wood will block the RFID signal the most because it is the most dense, compared to the copper foil, aluminium foil, and acrylic plastic. This experiment used two different RFID tags, of different size and shape. Mounting the RFID reader on a block of wood the mount one of the RFID tags to another wood block. Slowly move the wood block towards the block with the RFID reader, and when the RFID reader reads the tag rapidly measure the distance between the tag and reader. That is the RFID's signal transmission range. However the results of this experiment disproved part the hypothesis statement, due to any errors in my calculation of the density of the wood, the copper foil was the most dense and the results of the experiment show that the most dense material blocked the RFID signal the most.

MPH143: Under Pressure

Have you ever wondered if there was a better way to get electricity that is greener? My experiment was to show how many volts are generated from piezoelectricity. Piezoelectricity is when a special material changes electric polarization caused from mechanical stress. I did this experiment to see whether or not we should put these under the road and, possibly put them in a house as a cheaper source of electricity. My data revealed that it's a possibility but still needs more testing.

MPH144: Musical Instrument Waveforms

What is the effect of radar on different objects? I think that objects that are smooth and large will be detected and objects with many sharp edges and are small won't pick up on radar. Radar is sent by bursts of radio waves and tends to be used to detect aircrafts. If it is smaller, or has a smaller radar cross-section the smaller the waves are produced. If there are sharp edges on the aircraft the waves that hit the edges, scatter away from the receiver. Therefore, aircrafts with sharp edges, and have a small cross-section will be "invisible" to radar.

MPH145: Testing for Electrolytes

My research was on which liquid contained the most electrolytes. I did this by testing the conductivity of the liquids to see which had the most electrolytes. I tested this using a multimeter and some copper wire. Sports drinks ranked second and third in terms of conductivity. So, while it seems the sports drinks companies were not really lying, why are we not drinking orange juice before marathons.

MPH146: Whoa H2O!

My experiment is Whoa! H2O! I decided to do this experiment because I participate in lots activities and would like to know which bottle work the best for the liquid of my choice. I tested three different bottles to see which bottle would keep cold water coldest and hot water hottest. The bottles I used where 20oz. Contigo Snapseal, 18oz. Gaiam Stainless Steel, and 20oz. Yeti Rambler. When I conducted this experiment I first got cold or hot water. Then I recorded the temperature of the water. After I poured the water in and waited the set time (3:00hr, 6:00hr and 12:00hr) I recorded the temperature again to compare how much the temperature dropped or rose. The results of my experiment are that the Gaiam bottle kept cold water coldest and hot water hottest. The mistakes that could have occurred during my experiment were that the bottle size varied. The end goal of my experiment was to find which bottle kept the cold water coldest and hot water hottest I succeed in this experiment.

MPH147: The Effect of Air Temperature on Time Pressure and Mileage

In this project, I studied the effect of low temperature on the volume of an air-filled balloon in order to understand the relationship between atmospheric temperature and car mileage in cold weather. I left two sets of three balloons filled to same volume for 12h at two different temperatures. By measuring the balloon volume at the end of 12 h time period, I found that as the air temperature decreased by unit of 1.42 Fahrenheit (F), the volume of the air-filled balloon decreased by about 1 mL. If we assume the car tire as an air-filled balloon, the cold weather reduces the volume of air in tire, leading to the tire pressure being below recommended inflated pressure units. This is supported by Charles' law, which states that the volume of a gas is directly proportional to its temperature when the mass is constant. Using the data from the Volume-Temperature experiment conducted at different temperature conditions, by measuring tire pressure of our car on different days of winter season and studying the miles per gallon from the dashboard of our car for every trial, I conclude that for a decrease in ambient temperature of 1 Fahrenheit, the tire pressure is reduced by one psi, which ultimately reduces the mileage by 1.5, or about 2 miles per gallon(mpg). Therefore, I conclude that air temperature affects tire pressure, directly affecting the car mileage. My experiment supports the advice given by Department of Energy that for each unit drop of psi in tire pressure from the recommended psi, the mileage goes down. Therefore, keeping tire pressure inflated to recommended psi units in cold weather can help you save money, conserve fossil fuels and protect the environment.

MPH148: Momentum or No-Mentum

In sports, hitting a baseball is one of the hardest things possible. In my experiment, I am looking to see which way of hitting the ball will produce the best results. One way is stopping the swing at the exact point of contact and the other way is swinging through the ball after the point of contact. Though hitting a baseball is incredibly hard, the way you hit the ball ultimately determines the ball’s hit speed and hit distance off of the bat, the two main factors of hitting.

MPH149: How Does Temperature Affect the Speed of Sound?

The purpose of this experiment is to determine how temperature affects the speed of sound. I predicted that sound will move faster in warmer weather. I will be testing this creating an echo and calculating the speed of sound. 1. Find a large building. 2. Create an echo by hitting the metal pipe and hammer together. 3. Create steady beat, hitting the hammer at the time of the previous echo. 4. Match the metronome to the beat and record the BPM. 5. Measure the distance between you and the building. 6. Calculate the speed of sound. 7. Record the temperature.

MPH150: Does Size Matter?

My science fair project, Does Size Matter, will test three catapults of different sizes to see if the size of the catapult changes the distance an object is thrown. I was attempting to show that bigger catapults will throw objects further regardless of what type of object is being thrown. The larger catapult threw the objects the furthest, showing that size does matter although the distances were not easily calculated. Therefore although distances were increased, building very large catapult devices might not throw objects much further then smaller devices.

MPH151: What colors in the light spectrum are best for plant growth?

The purpose of my project is to determine how plant growth is affected by being exposed to only one color in the visible light spectrum instead of the full spectrum of light (a combination of all colors). I completed my experiment by planting seeds and then exposing them to only one color of light by using colored filters. My hypothesis was: if I grow plants using only one color from the light spectrum, then the plants will grow at different rates. I thought that plants grown exclusively under blue or red light would grow more effectively than plants grown under green light.My hypothesis was partially correct: the plants grown using only blue light, in both trials, germinated and sprouted sooner and grew more quickly than the plants grown using only green light. In Trial 2, the blue light grew quicker and more efficiently than the plant grown using clear. However, the plants grown using only red light germinated and sprouted later than the green light plants and also grew the shortest. And the green light plants actually grew very well in both Trials; at an almost equal rate as blue and clear.

MPH152: The Strengths of Different Metals

My project started with me choosing that I wanted to test certain metals by adding weight to them. I decided to use a jig to do so. Before I could test anything I had to research the sizes and what kind of metals I wanted to test. Once I obtained my metals I built the jig and began testing. I found that steel is my strongest metal. I also found that only one of my metals had permanent damage. That metals was annealed aluminum. I was very surprised that I did not get all of the metals to deform permanently.

MPH153: Which bridge holds the most weight?

I will construct different models of bridge designs in order to test them for weight bearing capacity.

MPH300: The Science of Calorimetry

Lays, Doritos, and Fritos to see who has the most accurate calorie count then Lays will have the most accurate because they would be inspected by the FDA the most. Using our home made calorimeter we found that Frito's was the product that had the closest calorie count and not lays.

MPH301: Diamagnetic Demons

The purpose of our experiment is to see how water flow changes with differing salinity under the influence of magnets. We will use a dripper in a burette with two neodymium magnets next to it, and drip the water through. We will record this with a camera in slow motion for a more precise measurement.

MPH302: Trajectory Change of Angle on Potato Gun

Is there a best angle for maximum distance a potato gun can shoot a potato? This experiment will test the different angles and the distances a potato will travel.

MPH303: Does Tee Height Affect Driving Distance

We did this project because we're interested in golf, and wanted to know how to improve our game scores. If you like golf, you should care about our project because this can help you perform better in the game. Our hypothesis stated that the medium tee height would, on average, go the furthest. To complete the investigation we started with the first tee height and hit it 25 times. We did the same with the medium and tall tee height. When we were finished, we found that the medium tee height went the furthest.

MPH304: How Weight Affects Drones?

For our science fair project, we decided to see how weights affect drones. We believe that weights will affect flight time, but not by large amounts. This is because the drone will work harder to carry the weights, so it will drain the battery's energy faster. We attached a ten-gram, five-gram, and no weight to the drone and flew it twenty-five times with each to get an average flight time. In conclusion, our hypothesis that the drone's battery life would decrease with more weight was proved correct during this experiment. The flying time decreased with the more weight we added.

MPH305: Does Weight Matter?

For our project we tried to figure out if weight affected the speed of a rollercoaster. We discovered that the more weight the rollercoaster has, the slower it will go. This might help engineers because they will make lighter rollercoaster cars so that it is faster and more enjoyable for riders. We made a rollercoaster out of Hot Wheels tracks and attached different sized weights to the car to see how they affected the speed. Also, if roller coasters were faster the lines wouldn't take as long, which would also make amusement parks more fun.

MPH306: The Power of Fruits & Vegetables!

The purpose of this project was to see if the amount of voltage in each fruit and vegetable is enough to light up an LED. Are project was testing if there is enough voltage in fruits and vegetables, and in the process of doing that we made 250 metal batteries. After further research we concluded that the reason it didn't light up because there wasn't that much power. If we would have used more fruits and vegetables then the voltage would have been high to the point where are project would have succeeded.

MPH307: Capability of Solar Mirrors

The purpose of this project was to analyze the heating capability of a solar mirror. A small sample of water was measured for temperature increases after exposure to a small scale solar mirror. After directing a light source on to the solar mirror's curved surface, it successfully converted that light energy into the heat energy that was needed to increase the water temperature. This project would benefit scientists and engineers looking for renewable solar energy resources.

MPH308: The Best Airplane Design

The purpose of this experiment is to help engineers design better and more efficient airplanes. The procedure includes the following: Make multiple airplane designs, test them to see which is more efficient, analyze the results, and make a conclusion.

MPH309: How Much Sugar Are We Drinking?

The purpose of our project is to determine if the sugar content is accurate on a label as compared to our experiment. The problem is that we believe labels are not correct. Our approach used a laser to measure sugar content of a liquid according to Snell's Law. Our result could not determine an exact comparison with the labeling, due to variations in amounts of liquid during the experiment.

MPH310: Under Pressure!

In our experiment we wanted to see how tire pressure effects the way a tractor and its implements work. We used the implements on different soil types. We also used different tire pressures to see how the implements were effected. We found out that the less tire pressure in the tire the more traction. So if you need to drive on a slippery surface then you should let out some air in your tire. If you need to drive on a rough surface then you use more tire pressure.