75th Pittsburgh Regional Science & Engineering Fair
Intermediate Division Student Project Abstracts
March 28, 2014
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)
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Intermediate – Behavioral and Social Science (MBS), 7th & 8th Grade

**MBS100: Does Latitude Affect Tempo?**
Does Latitude affect tempo? If closeness to the Equator influences the tempo of a country’s national anthem, then the national anthem of a country close to the Equator would have a slow tempo. There was no clear differences in the tempos of national anthems whether near the Equator or not. My hypothesis was incorrect.

**MBS101: Measuring Splatter**
The purpose of my experiment was to identify the area that would be covered by a material dropped from a variety of heights. My hypothesis was that there would be a greater distance in the amount splatter in the material that was dropped from a smaller distance than a larger one. The independent variable of my experiment was the height from which materials were dropped. The dependent variable was the distance from side of the splatter to the other.

**MBS102: Brain Lateralization**
Please visit student's exhibit for project abstract.

**MBS103: Is The Earworm Effect Real?**
The purpose of this experiment is to determine if songs can “get stuck in a person’s head” which is referred to as “an earworm.” Participants will listen to music then take a short survey asking them what song, is any, is on their mind at a particular moment. This survey will be repeated 2-3 more times over the next 24 hours.

**MBS104: Right vs. Left**
If you are right handed, could your left hand be dominant? That is the question I asked when I began this experiment. My hypothesis is that your dominant hand will stay in the ice water or over the heat longer, making it less sensitive between the two hands. I recorded the times five right handed and five left handed volunteers were able to keep each hand in the ice water nad over the heat with a stopwatch. I performed three different trials of this. The results were similar to right and left handed volunteers, which made the hypothesis incorrect.

**MBS105: Does Hair Color Affect Perception of Intelligence?**
The purpose of this project is to see if an individual’s hair color affects the perception of an individual’s intelligence. If participants are shown individuals with different hair colors, then the individual with red hair will be perceived as the most intelligent and the blonde hair as the least intelligent. Participants will be shown examples of a photo containing an individual with four different hair colors. The participants will rank which individual they feel appears to be the most intelligent, if any. This will be recorded as quantitative data. Final results will be available on fair day.

**MBS106: Should You Text While Driving?**
The purpose of this experiment was to determine if texting negatively affects people’s ability to play a driving video game. Twenty-six subjects were each tested twice playing a driving game, once with texting and once not texting. The number of errors and the time to complete the video game were recorded. Subjects took an average 47.5 seconds longer (313.7 vs. 361.3 sec) and made 6 more errors (4.3 vs. 10.6 ) when texting than when not texting. The results suggest that trying to multitask negatively affects performance and that texting while driving is not safe.

**MBS107: Do Males or Females Complete a Task Faster Using a Mirror?**
Purpose: Determine whether males or females can complete a task faster using a mirror
Hypothesis: Females will complete a task faster than males using a mirror
Experimental Procedure:
1. Select a male test subject
2. Randomly select the task the test subject would complete
3. Determine and record the time required for the test subject to complete the task
4. Repeat Steps 2-3 for the remaining tasks being tested
5. Repeat Steps 2-4 for 19 more male test subjects and 20 more female test subjects
   Experiment still in progress

**MBS108: How the Color Spectrum Affects Product Marketing**
As youth leader for the BVA Race for a Track, I have created advertising signs for the last three years. In this experiment, I created signs to test which color combinations stand out the best, and therefore are most effective. My hypothesis was that signs with a wavelength difference of maximum contrast (~160 nanometers) would thus be most noticeable, and that surrounding color would influence sign effectiveness. I used twenty different sign color combinations, and placed these signs against three different background colors. The results of this experiment proved my hypothesis correct.
**MBS109: Walk the Walk**
The title of my science fair project is called "Walk the Walk". The question was "is the height of a person related to their walking pace?" I hypothesized that a shorter person's walking pace will be more related to their height more than a taller person's. In this project you need at least 10 volunteers of different heights and they will have to walk 20 meters from beginning to end. After you have recorded the steps, walk the 20 meters yourself and see if your steps compare to one of your volunteers steps.

**MBS110: Is Music Preference the Key?**
The purpose of this experiment is to determine if people’s music preference is determined by the musical key that songs are written in. The procedure is as follows: gather ten people to help; have them list their top three favorite songs; find songs that are in the same key, same genre; same key, different genre; different key, same genre; and different key, different genre; make a playlist of those four songs; have the person listen to the playlist and order them from favorite to least favorite; analyze the results to determine if there was a strong preference in key. The results were that three out of the ten people’s favorite song matched the key of their top song on the playlist. On the other hand, seven out of ten people’s favorite song did not match the key of their top song on the playlist. In conclusion, this experiment did not prove that people’s favorite songs or music preference will always be in the same musical key.

**MBS111: Do You See What I Hear?**
The Purpose of this experiment was to discover whether junior high students would remember more items when visually shown or verbally told. To conduct my experiment I took 30 participates in 6th, 7th, or 8th grade and showed them 10 items. A few weeks later I took the same thirty students and showed them the same items. My results showed that more students remembered more when I showed them, but it was only a small difference. Someone who had conducted a similar experiment prior to this event found a big difference in favor of the items being shown.

**MBS112: Beethoven on the Brain**
The purpose of this project is to see classical music can improve or hinder concentration. If a person takes a cognitive test, then the scores of that test will improve while listening to classical music. Participants will be asked to take a standard aptitude test online with and without classical music playing in the background. The scores of these tests will be analyzed as quantitative data. Final results will be available on fair day.

**MBS113: Computer VS. Paper**
The purpose of my project was to find out whether or not people remember better on computer or paper. First I chose ten pictures and showed them to my test subjects on a computer screen and then on ten individual pieces of paper. I then tallied up their results with the number correct over the number ten. My data showed that people remembered better on paper rather than computer. I also had two test subjects that got a perfect ten out of ten, and two test subjects that tied in their results.

**MBS114: Effect of Auto-Correct**
This experiment was to find the effects of autocorrect between kids and adults. My hypothesis was adults will have a better ratio of right to wrong than kids. I determined this by giving people a test. I asked them to write down a list of words. Next, I asked them to type the same words on Microsoft Word and told them for no red lines to be shown. I did this for all ages. I did this experiment because I use Word a lot, and sometimes the autocorrect affects me. I wanted to see how it affects others.

**MBS115: Age vs. Reaction**
My project tests the effects of age on how fast a person can react to a ruler drop test. Within my project I hypothesize that people in the grades of 7th-11th would have the best reaction times and my data supports this in a way that is found in my research.

**MBS116: "Eye" Witnessed**
Most people wonder what the accuracy of an eyewitness-testimony is; how is it precise? I wanted to see if this method of finding information should be used. I showed the participants a picture of a crime scene with much detail for twenty seconds on a projector then they had to answer seventeen questions about on the picture. In the end, only 53% of the answers were right, or 9 out of 17. Based on the data, half of the descriptions were right. My conclusion is that eye-witness testimony should not be relied on, but could be used as a reference.

**MBS117: Color Confusion**
My project is to determine if the way a word is written can eliminate the Stroop Effect. Participants will take a series of 5 tests. The first test will have 20 color words with matching ink color. The second test will have 20 color words where the ink color does not match the words. Remaining tests will utilize different attempts at eliminating the Stroop Effect through the organization of the words. Effectiveness of each method will be determined through time comparisons on the various tests, and will be available at the PRSEF.
**MBS118: Battle of the Sexes**
The purpose of this experiment is to find out if females can complete simple tasks quicker than males. To conduct this experiment I will compare the times of both females and males. The experimental results were measured by having my subjects complete simple tasks. The results of the experiment showed that males can complete simple tasks quicker than females. The results indicate that my hypothesis should be declined, because the males complete the asks quicker than the females.

**MBS119: Does the Color and Placement of a Package on a Store Shelf Affect Consumer Preference?**
Purpose-Determine if color of package & package placement affects preference.
Hypothesis-People will choose warm colors. The closer to eye level, the more likely it will be chosen.
1-Get 15 boxes
2-Wrap 9 boxes rainbow colors, white, and black.
3-Randomly place 9 boxes
4-Have test subject choose a box
5-Repeat Steps 3 & 4 until none are left
6-Wrap remaining boxes white
7-Place 6 white boxes on shelves
8-Have test subject choose box off shelves
9-Repeat Step 8 until none are left
Conclusion: Final results will be available at fair day

**MBS120: Help! I'm Scared**
The purpose of this project is to find out if fears are a result of life events. If a survey is administered, finding if fears are a result of life events, then most fears come from will be a result of experiences rather than not. Participants will be given a survey that questions if the participant is afraid or not. The survey will also ask if these fears are the result of a fear or not. The most common fears will be calculated for each grade level. Final results will be available fair day.

**MBS121: Do You Remember?**
The original purpose of this experiment was to determine the effect of colored versus black and white stimuli on the human memory of shapes. The manipulated variable was whether the shapes were printed in black and white or in color. The responding variable was the average amount of shapes remembered by the subjects. To measure the responding variable I counted the correct answers obtained on the tests administered 1 hour after the lists were first introduced, then I calculated the average amount of correct answers. The average of male vs. female correct response were; black correct; male 9.3, female 9.9, colored correct; male 9.3, female 9.6. The combined average of correct responses were black correct 9.6, and colored correct 9.4.

**MBS122: Do People Remember More from B&W or Color?**
This experiment will test whether people remember more details from a black and white photograph or color photograph. Both younger (3rd grade) and older (7th grade) students will be evaluated.

**MBS123: Eye Witness, You Witness**
The purpose of this project is to see if age affects the ability of individuals to recall information by eye-witness testimony. If a scenario takes place then males will recall details better than females. Participants will view a situation and then try to recall any information about the situation on a paper-form questionnaire. The amount of correct answers will be analyzed as quantitative data. Final results will be available on fair day.

**MBS124: Are You A Trained Multitasker?**
This study was done to see if we as humans can multitask, and if so does athletics, IQ, and gender affect our performance. To test this, I gathered permission from both students and parents so that they would be able to get out of their eighth period study hall, and come down to our school library. They then watched a 10 minute video while answering a text every 30 seconds, and taking an easy "pre-quiz". Afterwards, I gave each student a quiz on the video, and collected the data. The results will be present at the day of the science fair.

**MBS125: The Effect of Memory on Motion**
The purpose of my experiment was to see if exercise improves memory. I randomly assigned students to two different groups. The first group participated in vigorous exercise the second group did not. Both groups then viewed 25 common household items and then tried to recall as many as they could within 2 minutes. The exercising group recalled more items then the non-exercising group recalled. Exercise appears to help with memory.
**MBS126: Internet Addiction**
The purpose of my project is to determine who is more addicted to the internet, kids under the age of 18 or adults. My hypothesis is that adults are more addicted to the internet than kids. I used the internet addiction quiz, created by Dr. Kimberly S. Young, and handed them out to friends, family, and classmates. Each response each question was given a score from 1-5, and the total number of points for each quiz was calculated. The level of internet addiction is determined by the total number of points calculated. Over 50 points means you are experiencing occasional or frequent problems because of the internet. Over 80 points means your internet usage is causing significant problems in your life. I looked at the total scores on the surveys and analyzed the results using the scoring method designed by Dr. Young. My hypothesis was proven to be incorrect. Based on the test results, four students under the age of 18 had some of the highest scores with 50, 51, 63, and 81 total points.

**MBS127: Color Confusion**
My experiment was the Stroop Effect. The purpose was to see if the mind took longer to read colors written in a different color. Each participant was asked to identify words written, not the color it was written in. The participants took longer to read words that were in different colors on the same page. The average time to read those words was 15.37 seconds compared to 26.60 seconds when on one page. When the words matched the color and were on separate pages the average time was 13.14 seconds compared to 13.62 seconds when on the same page.

**MBS128: Which Color Is Most Easily Seen In an Urban Business Setting?**
Purpose: The purpose is to determine which colors are more visible in an urban traffic setting. This would aid city developers in determining the best colors to use for traffic signals/signs.
Hypothesis: The colors in the blue end of the visible light spectrum will be more visible.
Procedure: All subjects signed an informed consent document and indicated if they were color-blind. Each subject identified 20 colored dots randomly placed on a color photo of an urban traffic setting. Seven different colors were tested. This was timed.
Final results will be available at the student's exhibit on Fair Day.

**MBS129: The Stroop Effect**
I attempted to figure out whether someone’s age affected how well they did at the Stroop Effect test. I also attempted to figure out how the font that the word was written in affected this likewise. I wrote a program and asked children in three grades to read the words on the program. I tested five people in each grade and measured their accuracy and reaction time. I concluded that older children had better overall accuracy. Reaction time was inconclusive. More normal fonts produced better results.

**MBS130: Does Gender Bias Affect Short Term Memory?**
Purpose: Determine if gender bias influences one’s ability to remember objects associated with their gender.
Hypothesis: Males and females will remember more objects associated with their gender than the opposite gender.
Experiment:
1. Select test subject
2. Explain directions
3. Select male, female, mixed objects that will be tested
4. Uncover objects and permit subject to memorize objects for 60 seconds
5. Cover objects and allow subject 120 seconds to list as many objects they can recall
6. Repeat steps 3-5 for remaining male, female & mixed object categories being tested.
7. Repeat all steps for remaining subjects
Conclusion: Final results will be available on Fair Day.

**MBS131: It’s Written All Over Your Face**
The purpose of this project is to see if males are females are better at correctly identifying facial expressions. If I present facial expressions to females and males then females will comprehend the expression faster. Students will view a volunteer making certain facial expressions (happy, sad, angry, etc.). The amount of time the individual to correctly identify the facial expression will be recorded as quantitative data. If an audible laugh is heard, this will be recorded as qualitative data. Final results will be available on fair day.

**MBS132: Concentrating on the Beat**
The purpose of this project is to see the beat of the music affects a student’s ability to perform on a test. If tests are administered with different beats of music in the background, then the tests taken with faster music will cause the scores to go down. Participants will take three math tests that are equal in ability. Each test will be given with different beats of music playing in the background, (fast, slow and no music). The scores will be calculated as a percentage and analyzed as quantitative data. Final results will be available on fair day.
MBS133: Gender Differences in Short Term Memory
The purpose of this project was to determine if boys or girls have a better short-term memory. The hypothesis is that girls will demonstrate a better short-term memory than boys. A group of 20 students, 10 boys and 10 girls, were tested. They were given a list of 20 words and had two minutes to study/memorize them. The list was then taken away and they were given 2 minutes to write down as many of the words as they could. After analyzing the data, it was shown that the girls had better short-term memory that the boys. Therefore, the original hypothesis could be accepted.

MBS134: Who is Smarter? A Middle School Student or an Adult?
The purpose of this project is to see if middle school students are smarter than adults. If a basic test is given to students in middle school and to adults, then the 8th grade students will score the highest out of all age groups. Students and adults will both be given a basic test with information from 6th-8th grade core classes. The data will be analyzed to see which age group, if any, scores the highest overall on the tests. This data will be recorded as quantitative data. Final results will be available on fair day.

MBS135: Eye Smile, You Smile
The purpose of this project is to see if smiling is contagious. If participants are asked to view someone smiling and try not to smile in return, then smiling will be more contagious to females than to males. Students will be asked to view a smiling volunteer and attempt not to smile. The amount of time it takes the individual to smile in return will be recorded as quantitative data. If an audible laugh is heard, this will be recorded as quantitative data. Final results will be available on fair day.

MBS136: Picture Perfect?
The criminal justice system relies heavily on eyewitness identification for investigating and prosecuting crimes, but is it accurate? This project looks at the accuracy of eyewitness identification twenty four hours after viewing a video of a crime. The participants watched a video then were presented a photo line up. Half the participants’ photo line ups did not contain a photo of the suspect while the half of the photo line ups did. My hypothesis is that people will show bias and identify an individual based on appearance and will misidentify the suspect. Results will be available at PRSEF in March.

MBS137: Investigating the Golden Ratio
This experiment I will evaluate the attractiveness of celebrities using the "Golden Ratio". First, the individual facial measurements of celebrities (using photos from internet sources) will be collected. The Golden ration calculations will be compared against results of surveys of middle school students as to the attractiveness of the same celebrities.

MBS138: Basket of Memories
The purpose of this project is to see if age affects the memory of individuals. If individuals of different ages are shown sets of numbers and asked to recall as many as possible, then the older individuals will be able to recall more than the younger participants. Participants will be asked to try to remember sets of numbers. The amount of correct numbers remembered by the students will be analyzed as quantitative data. Final results will be available on fair day.

MBS139: Heavy Metal vs. Musical Instrument Sound
Some music lovers- heavy metal fans and classical music fans have always considered themselves worlds apart but this project hypothesizes they have more characteristics in common than different. First, heavy metal and classical music is listened to using an MP3 player with a headset. The beat and musical note are measured and averaged. In addition, the power spectra of music will be measured using freeware WavePad Sound Editor V5.33 (NCH software, www.nch.com.au/wavepad).

MBS140: Which is More Distracting at the Free Throw Line; a Sound or Light Distraction?
Don't you want to shoot better at the Free Throw Line during basketball games? When most players step up to the Free Throw Line they are distracted by many screaming fans that are waving their arms. So I wondered, what distracts them the most? I will distract my participants with first a sound distraction and then a visual distraction. My results and final conclusion will be available in my final project.

MBS141: Do Eyes Have It
The purpose of this experiment is to find out what type of memory boys and girls excel in. To conduct this experiment for an auditory memory test I will say a set of numbers twice next I will have them recite their alphabet then tell them to tell me the set of numbers I said to them. For the Visual memory I will show them a card and they will have thirty seconds to try to memorize the numbers. Overall the boys did better than the girls in both tests.

MBS142: Dream a Little!
The impact of conscious activity on student interaction during sleep is studied. Students complete surveys of their activities before sleep and their recollection of dreams during sleep. Survey data will be compiled and presented.
**MBS143: The Amazing Brain**
The reason I did this experiment was to see if people really do pick the number seventeen most often when asked to pick a number between one and twenty. I tested it by asking several people to pick a number between one and twenty and wrote down their answer. I did not tell them what number I was looking for or what numbers other people picked. I concluded that the numbers seventeen and five got picked the most often.

**MBS144: Does Gender Impact Color Choice?**
The purpose of this experiment will be to evaluate whether or not gender impacts color choices. Pink and blue wrapped mints will be offered to participants. Their gender and dominant hand (right or left-handed) will be recorded, along with their color choice. Participants will include middle school and elementary school aged students.

**MBS145: M&M Hunt**
The purpose of this experiment is to determine if humans can see past camouflage in "stress" or timed situations. Ten M&M candies will be placed on various pieces of colored paper, with the "M" down. Participants will then be asked to pick up as many red M&M's on each different colored paper (one of which is red). Participants will have five seconds at each piece of paper. Results will be tabulated.

**MBS146: Does Font Color Impact Memory?**
For my PJAS project I am studying what color ink do people remember more. First I will give the participants a test and they will study it for 30 seconds. Then the participants write down how many of the words they remember. They have 1:00 minute to do so.

**MBS147: Jury Decision Making**
Question: Does the appearance of a perpetrator affect the likelihood of conviction among mock jurors? If they do convict, does the appearance impact the length of sentence?
Hypothesis: The hypothesis is that the less presentable man will be more likely to be convicted and be given a longer length of sentence.
Procedure: Make flyers asking for participants.
Split the participants into two groups, Group A and Group B.
Give Group A a paper telling of a man who has been charged with robbery. The paper will include a picture of a man dressed in a coat and tie. Have participants circle if they would convict him or not. If they do convict, have the subjects circle a length of sentence between two and ten years.
Give Group B a paper telling of a man who has been charged with robbery. The paper will include a picture of the same man dressed in a hoodie. Have participants circle if they would convict him or not. If they do convict, have the subjects circle a length of sentence between two and ten years.
Add up the numbers of yes and no answers in each group and conduct a chi-square analysis to see if there is a significant difference between the groups.
Calculate the means of the sentences in each group and conduct a t-test to see if there is a significant difference between the groups.
Graph the data.

**MBS148: Do Ingredients Play a Part in Our Food Choices?**
The impact of knowledge about food ingredients, food content and packaging labels on food choices made by students will be studied. Students will be presented with food choices and details about their ingredients. Students will complete surveys of their food choices. Survey data will be compiled and presented.

**MBS149: Does Color Affect the Ability of a Test Subject to Complete a Task?**
Purpose: Determine which color has greatest positive impact on ability of test subject to complete task.
Hypothesis: Test subjects will perform tasks more efficiently using colors from blue end of visible light spectrum, rather than colors from red end of visible light spectrum.
Procedure:
1. Obtained completed parental and test subject release forms
2. Randomly select student test subject
3. Randomly select color and task
4. Explain directions
5. Record length of time required for test subject to complete task
6. Repeat steps 3 – 5 for remaining colors and tasks
7. Repeat steps 2 – 6 for all test subjects
Results: Available at exhibit on fair day.

**MBS150: How Do Fears Change with Age?**
The purpose of this project is to see if common fears change with age. If participants are given a survey of common fears, then the younger participants will have more fears. Participants will be given a survey that questions if the participant is afraid or not. The most common fears will be calculated for each grade level. This data will be analyzed as quantitative data. Final results will be available on fair day.
**MBS151: Do RS Signs Impact Speeding?**
This experiment will determine if radar speed signs have a positive or negative effect on human speeding behavior. I set about collecting data by finding roads with radar speed signs and roads without radar speed signs. To collect my data I used a pocket radar sensor which sends out radar signals to determine the speed of an object. The project is still under way to collect data.

**MBS152: Does Stuttering Affect Image Perception?**
Purpose: To determine if subjects will make negative assumptions about someone who stutters.
Hypothesis: Subject will answer negatively about individual.
Procedure: 1:Obtain materials, select subject.
2:Randomly select recording subject will listen to.
3:Explain instructions to subject, and allow them to wear headphones.
4:Allow subject to listen to recording of speech therapist reading a passage with or without a stutter.
5:Allow subject to fill out a survey about the person they heard.
6:Allow subject to listen to other recording, and ask them to fill out another survey.
Conclusion: Final results will be available on fair day.

**MBS153: Can Distractions Cause Pain?**
This experiment tested if pain affected concentration, with the expectation that pain from ice water would negatively affect the volunteer's concentration times. Volunteers first performed a memory matching card game. They repeated the game with one foot in ice water. The completion times with pain varied from being almost half of the time without the ice water to being over double the time without the ice water. The test did not support my hypothesis.

**MBS154: Swish...**
In this project I wanted to find out what hand position would be best to shoot from either chest, chin, or over the head height. I hypothesized that over the head would be the easiest. When I did my trials for this project I selected five girls to shoot from each hand position. I had them shoot ten shots at a time from each hand position. The first trial they did not make that many shots but after I did the second and third trial I could see improvement in some of the shots. In the end of my project I found out that my hypothesis was proven wrong over the head was not the easiest shot to make for the girls. When they had the basketball over the it seemed like they had no aim at the hoop.

**MBS155: Do Learning Styles Exist?**
The purpose of this project is to see if learning styles actually exist. If students are given information both visually and auditorily, then visual learners will retain the information presented visually while the auditory learners will retain the information presented auditorily. Participants will be selected based on their learning style. These participants will be shown a list of words visually and hear them auditorily. The data will be analyzed to see if the visual learners remembered more visually while the auditory learners remembered more auditorily. This data will be analyzed. Final results will be available on fair day.

**MBS156: Room Climate Affects On Test Scores**
For my science fair project I will give simple math test to a few students. The math test will test the student's concentration. I will flash the problem for about one second and they have 2 seconds to answer it. They must pay close attention to the signs. On the first week, one test will be held in a room with no posters and the other will be held in a room with a lot of posters. On the second week, one of the tests will have music and the other one will be quite. The tests will take place on Tuesday January 14 to Thursday January 23. All of the tests will take place in Greater Latrobe Jr. High.

**MBS157: Prime Time**
The purpose of this experiment is to demonstrate that psychological priming can affect the rate at which a person walks. To conduct this experiment I presented subjects with either pictures of elderly individuals and slow objects along with word lists or I presented subjects with pictures of youthful individuals and fast objects along with word lists. I then timed the individuals as they walked down a hall after completing this task. The experimental results were measured by timing my participants after being primed. The results of the experiment demonstrated that the priming did have an effect on walking rates. The results indicated that my hypothesis should be accepted because the individuals primed with slow images and words walked slower than the individuals primed with fast images and words.

**MBS158: Which Eye is on the Prize?**
The purpose of my experiment was to test which eye is dominant - the left or right eye. My hypothesis was if eyes are tested, then the right eye will have distances that are closer to the cup. My control variable was the type of cup and coin. My dependent variable was the use of two different eyes. I asked participants to cover one eye at a time and give the command for a coin to drop when they felt the coin would land in the cup.

**MBS159: A link between hunger and noise?**
Please visit student's exhibit for project abstract.
MBS160: Now You See It? The Accuracy of Eyewitness Testimonies

The purpose of this experiment is to find out if eyewitness testimonies are more accurate directly after the event or the next day. To conduct this experiment I will have my participants witness an event and take a memory test on what happened. The experiment results will be measured by the accuracy of the information. The results of the experiment show that the group of participants who took the test directly after the event had better accuracy. The results indicate that my hypothesis should be accepted because my hypothesis states, if half of my participants take a test on what happened directly after the event, and the other half take it a day later, then the people who take the test the day of the event will have better accuracy.

MBS161: Do You See What I See?

The purpose of this investigation was to determine the effect of brain dominance on visual perception. After determining if subject were right or left brain hemisphere dominant, their ability to recognize various perception and optical illusions was measured.

MBS162: How Do the Phases of the Moon Affect Your Mood?

In this project I will figure out if the moon affects your mood. With all of this research I have found out some of the moon phases affect your mood. The full moon makes you happy and hipper. The waning gibbous makes you happy. The waning crescent also makes you happy. The new moon in all of my research only a few have other moods, but the rest do not have moods. The rest of the moon phases make you happy.

MBS163: Paper or e-Reader?

The purpose of this experiment is to evaluate comprehension differences when using a traditional paper copy of story versus using an electronic format (such as a computer or electronic reading device). Middle school participants will read a story, one in paper and one in electronic format. Both of these stories will be concluded with a short test with the equal amount of difficulty. Results will be evaluated.

MBS164: Choice Blindness

If I show two pictures of women to a participant and ask which in their opinion is more attractive, will Choice Blindness prevent them from remembering which one they picked? In order to answer this I will show a participant the two pictures and ask them which is more attractive. Then, I will flip over a different pair of cards and record whether the participant notices the difference. 75% of the participants did not notice. Males noticed more than females, and adults noticed more than children. If I were to repeat this, I'd switch the pictures, not replace them.

MBS300: Brains teasers vs. Optical Illusions

For our science fair project, we wanted to know whether brain teasers or optical illusions were harder for the brain to comprehend and if the grade of the student would affect the results. We chose this because we enjoy the parts of the brain and how they work. To figure out the answer to our question, we used the scientific method. The results to our experiment concluded that brain teasers were harder for people to figure out than optical illusions. Another thing that we found was that the grade of the student partially affected the results of the experiment.

MBS301: Distracted Drivers

The purpose of this experiment is to test if distractions affect the score when playing a driving video game. The experimental results were measured by how different their times were with different distractions. The results of the experiment show that texting impacted our participants times the most. The results indicate that the hypothesis should be accepted because texting did impact their scores the most.

MBS302: Does running affect memory?

The purpose of this experiment is to see whether or not running affects memory. To conduct this experiment the participants studied a memory test, they recorded amount of words they remembered from memory test, they ran for ten minutes, they studied second memory test, and then they recorded the amount of words they remembered. The experimental results were measured in amount of words correctly remembered and percentage changed. The results showed that after running the participants memory improved. The results indicate that the hypothesis should be accepted because nine out of ten participants memory improved.

MBS303: Dumb Blondes

Are dumb blondes fact or fiction? We did our study on the perception of intelligence based on hair color. We decided to do this project because we all three have different color hair. We questioned classes in grades 6, 7, and 8. We created a fourteen question quiz to be conducted in front of the students. Test subjects predicted the blonde to come out on top, followed by the red head and then the brunette. In actuality, the brunette scored the highest, followed by the red head and lastly, the blonde.

MBS304: Extinct the Stink

Stink bugs are a big problem in today's society. This project will determine if stink bugs can be repelled by mint more than lavender. During the preparation for the project we are going to catch ten Halymorpha Hayes "Stink bugs." We will then be testing their reaction by, putting them into two different containers and releasing a cotton ball with one of the two scents on it. We will next detect and record if the stink bugs are attracted or repelled of the scent. Finally, we will repeat steps 3-5 with the second scent and with different stink bugs.
MBS305: Gender Memory
In our experiment we tested short-term memory of both males and females. In selecting pictures, half of them were more female oriented and the other half male oriented. Test subjects were shown a poster of all the pictures for five seconds and then asked to recall as many as they could. Five different age levels were tested. Our hypothesis, that gender would not make a difference in the recall, was found incorrect. Each gender group recalled more of the gender related items than the other.

MBS306: Genres Affecting Athletes
This experiment was done to determine the effects of music genres on athletes. Most athletes think that whatever their favorite music is pumps them up the most. Well that is not true; there is a certain type that affects almost all athletes performances in a positive way. In our study we had 19 female soccer players listen to a variety of genres, a different one every week. We then recorded and had the athletes fill out a survey that analyzed how the music made them feel nad how they thought their performance was. We concluded that pop music affected the athletes the most in a positive way.

MBS307: Know the Back of Your Hand?
The purpose of our project is to prove if the expression “I know it like the back of my hand” is accurate. Our hypothesis is that the expression is false. The first thing we did was, come up with the idea of our project. Then we got it approved by our parents. After that, we constructed everything that was needed for the project. Next, we came up with a procedure for taking pictures and we came up with an idea to make sure all of our pictures were taken at the same angle. We also made an eye gadget that would make sure we did not get any hair in the picture so it would not give any advantage to the test subjects when they guessed. Following that we took the picture of the test subjects’ eyes and hands. Then we printed out all of our pictures and put them together on sheets of paper. When we were done with that we, went back to all of our test subjects and we asked them if they could identify their own eye and hand. We marked down the data on a chart. After that we analyzed the data and made our conclusion. Our conclusion was that the expression “I know it like the back of my hand” is false which proves our hypothesis.

MBS308: Meditation on the Brain
This experiment was to determine if meditation helps increase overall performance on a test. We created a test that consisted of a few questions from every subject. Some of the questions were harder, while others were quite simple. We tested 3rd graders and seventh graders. We then administered the test to a select number of students (chosen at random) without meditating. After that test was over, we had them meditate for 3-5 minutes, and then had them take the same test, with jumbled answers/questions. Experimentation is still going on.

MBS309: Runner’s Luck
The purpose of this experiment is to find out if a placebo affects the time it takes a runner to complete a 91.44 meter dash. To conduct this experiment we are going to have runners run a 91.44 meter dash with and without a phiten necklace. The experimental results were measured by how quickly the runners completed the 91.44 meter dash. The results of the experiment showed that the placebo did not affect the time it took the runners to complete a 91.44 meter dash. The results indicate that the hypothesis should be null because the placebo did not significantly improve the runners time.

MBS310: The Addictive Side of Technology
Please visit student's exhibit for project abstract.

MBS311: The Power of Music
Please visit student's exhibit for project abstract.

MBS312: The Stroop Effect
The purpose of this experiment is to detect if gender affects the ability to recognize color words using the Stroop Effect. To conduct this experiment we will ask participants to recognize color words using the Stroop Effect. The experimental results were measured by how many words the participants got correct. The results showed that the boys scored higher by 5 words. We showed each participant 10 words in black and 10 in color in each trial. We gave the participant 2 seconds to read the word. The results indicate the hypothesis should be rejected because the boys scored higher than the girls.
Intermediate – Biology (MBI), 7th & 8th Grade

MBI100: The effects of BPA on fruit flies
In my experiment, I tried to determine whether or not Bisphenol A (BPA) negatively affected Fruit Flies. I added different concentrations of BPA to the fruit flies' food. I will monitor them every day. I will count the number of adult fruit flies at the end of the experiment. Then, I will do a statistical analysis. Results will be available on fair day.

MBI101: Effect of tempo on plant health
My experiment was based on ideas that I have had over the years. I wondered if we had plants that grew faster and healthier in an organic environment, many people could have access to healthy food. Possibly even the national obesity rate would go down. I questioned what tempos would best effect my plants, usually, frantic, fast-paced songs are overwhelming, and slower, more calming and therefore creating a healthier growing environment. I decided to take 20 plants, compose 1 song and altered it's tempo, and subject the separate groups to the music on a four day cycle. My data and results showed that my hypothesis was incorrect and that the plants in the fastest music group (180 bpm) grew the healthiest and best.

MBI102: Space Beans
My project is important because the world today is getting ready for a human trip in space. They will need to be able to produce food with artificial light because there won’t be enough available sunlight. I need to find the LED light that produces the most food off the plant. Then we may be able to grow food in space. I hypothesized that if I place LED lights as the light source for lima bean plants, then red light will affect the plant the most.

MBI103: Do RF Waves Affect the Growth of Plants?
Purpose: Determine if Wi-Fi affects the growth of plants.
Hypothesis: The more Wi-Fi signals the plants receive the less they will grow.
Experiment:
1. Placed 5 spinach seeds in each of 60 different cups.
2. Watered each of the cups from step 1 with 60mL of water.
3. Place 10 different cups from step 2 so that they are receiving 50% of the Wi-Fi signal.
4. Repeat step 3 so that the plants are receiving 20, 40, 60, and 80% of the Wi-Fi signal.
5. Determine growth of each of the plants every day for 30 days.
6. At the conclusion of the experiment, determine dry biomass.

MBI104: Are isopods Attracted to Various Scents?
In the experiment conducted different scented oils were used. This experiment was designed to test if pill bugs would prefer peach scented oil over other scented oils. Using oils that are scented as objects that are not things pill bugs interact with in nature impacted the result. This most likely accrued because they have never been exposed to those scents. In was concluded that the control was the area that attracted the most bugs.

MBI105: Effect of Vitamins on Plant Growth
The purpose of this experiment was to see if watering plants with dissolved vitamins inside of them would help the growth of the plants. I used three different types of vitamins. Vitamin B12, Vitamin C, and Vitamin D seemed to be the most effective based on my research. Through my research I was able to come up with my hypothesis. My hypothesis stated that if I water the plants with dissolved Vitamin D water it will have a high plant growth because Vitamin D comes from the sun and plants need sunlight to conduct photosynthesis which gives them energy. Now to get started on this experiment I decided to crush the vitamins then put them into a bottle of water and let them dissolve. The means I took 2 B12 vitamins crushed them up and then put them into a bottle of water that holds 16.9 fluid ounces. Once the vitamins were fully dissolved I would use this water to water the set of plants that got watered with Vitamin B12 water. I did not dissolve a new set of vitamins each day for each set but when the water ran out. There was more than just dissolving vitamins but also getting the plants started. I used 4 starter pots each pot was watered with a different type of vitamin if; if it was control then it was watered with just water. Each set had 24 seeds in it. Once the seeds were planted then the watering began every other day until the plants were transported to the larger containers, there they were watered once a week. Through the experiment I found that my hypothesis was not supported. The results showed that Vitamin B12 had high plant growth. Each week when I would measure the plants to see which section had the highest plant growth, Vitamin B12 always did. Vitamin C and vitamin D traded places here and there, and the control group which was just regular tap water was usually last. At the end of the experiment the largest Vitamin B12 plant11 cm, the largest Vitamin C plant was 9.5 cm. The two that had the lowest plant growth were Vitamin D with its largest plant being 8.5 cm and the control group, its largest plant 8 cm. Vitamin C had the highest biomass at the end of the experiment. 22 plants had grown in the Vitamin C section and a large population of plants led up to be a large biomass of 8. Vitamin B12 was next with a total of 18 plants, and a biomass of 7. The two lowest once again were Vitamin D with a total of 12 plants and a biomass of 4, and control which had a total of 8 plants and a biomass of 1. As you can see if you want to have large plants, or plants that grow quickly I would recommend you dissolve vitamin B12 or Vitamin C into the water that you are using to water your plants. It seems as though it is better to use “vitamin water” then tap water.
**MBI106: Laundry: The Silent Killer**
The purpose of this project is to determine if laundry detergent has an effect on the rate of regeneration of planarian. Petri plates will be labeled to identify the various laundry detergents used in this project. Planarian will be purchased. Ten plates will be labeled ‘heads’ and ten plates will be labeled ‘tails’. The planarian will be cut and the head will be put in one plate and the tail in the other. Spring water and the various laundry detergents will be diluted to simulate the pH level of the water in the washing machine to determine if grey water has an effect on the rate of regeneration.

**MBI107: Got Mussels?**
The objective of my project was to find out what impacts Zebra Mussels had on a body of water. I tested for clarity, chlorides, pH, and phosphates. I utilized the water from Pymatuning and Conneaut Lakes. Using a testing kit, I tested the water samples. I used test pillows, pH strips and liquid testers. Many different tests were needed to fulfill the requirements for all different kinds of particles. After conducting three trials, I discovered that only certain aspects were affected by the mussels. Clarity and chlorides were the only two aspects affected by the mussels.

**MBI108: Could perennial grains take over agriculture?**
This science experiment will show the effects of annual and perennial grains on the soil and environment. Also the methods of farming used to plant, tend and harvest them. The plan is to have either a real sample or to have an example of it. There will be an annual and perennialsample of corn and wheat. They will be planted or make a sample of them to show how the perennial grains roots are. Perennial grains grow all year long and roots can grow to 4 feet long. It uses led soil and conserves it when you plow and cultivate the ground.

**MBI109: Is Your Wireless Internet Router Harmful to Plants?**
This experiment was set up by growing a set of plants near the wireless internet provider and a set at an area of the home where wireless internet service doesn’t work, and by using all the same situations for growth. Although plants in the pots by the wi-fi grew quickly and were tall, they were also thin and had few leaves; the plants in the pots at the wireless free zone grew slower a first, but at six weeks their height was similar yet their leaves were visibly double that of the wi-fi plants.

**MBI110: How Does Radiation Affect an Orchids Life?**
I wanted to see how radiation affected an orchid’s life. So I took nine plants and irradiated three of them with a lethal dose and three with non-lethal dose. I also kept three as my control group. When I irradiated these orchids, I found that it took more radiation then expected to even harm these plants. I irradiated them again and still found that only one orchid was harmed. That orchid developed a reddish brown stem and the flowers became “crispy”. I have concluded that orchids are very radio-resistant plants.

**MBI111: How Long Does Fruit Keep?**
The purpose of my experiment was to find what fruit kept the longest at room temperature. My hypothesis was that if I set fruit out at room temperature then the oranges would last the longest. Controls were room temperature, duration of experiment, separation space, and environment. The type of fruit was my independent variable. The number of days before molding was my dependent variable. The orange lasted the longest. These results showed my hypothesis was supported. If I was to do this project in the future I would make it bigger with more fruit, and a larger work area.

**MBI112: Burning Calories**
Have you ever wondered how many calories are in the food that you’re eating? Of course now, you could just look on your phone, but if you really wanted to find out yourself, I have the perfect solution. In this project, I constructed a calorimeter and used it you find the amount of both calories (cal) and Calories (kcal) in a few small food items. I did this by lighting on fire and measuring the chemical energy it gives off. This project gives a new meaning to the phrase “Burning Calories”.

**MBI113: Can You Tell the Temperature by Listening to a Cricket’s Chirp?**
For this experiment I wanted to find out if you could tell the temperature from listening to a cricket’s chirp. I did some background research and found out why and how crickets chirp. I also searched a formula from the American Farmers Almanac to calculate the temperature from the crickets. Then I came up with a hypothesis; I believe you can tell the temperature from listening to a cricket’s chirp, and conducted my experiment. After conducting my experiment I found it safe to say that you could tell the temperature from a cricket’s chirp and this supported my hypothesis.

**MBI115: Carnivorous Plants**
The purpose of this experiment was to analyze growth in carnivorous pitcher plants over time. Different test groups of plants were fed different food sources over time.

**MBI116: Stress On The Human Heart Rate**
After testing my heart rate while in a resting position, I experimented with putting myself in a more stressful situation to see if my heart rate increased and how high it increased each time. I first started by running around at the same pace for 30 seconds then took my heart rate again. I then tried running around 60 seconds to see how much my heart rate increased; then I tried doing for 90 seconds. I did my other experiments that contained math problems. I did my third experiment that involved reading in front of people seeing how my heart rate increased.
**MBI118: What Effects do Electromagnetic Fields have on a Life Process?**
In this project, a biological model of growing lima beans is subjected to an electromagnetic field. Growth is measured as a function of exposure to EMF concentration treatments. This model will provide insight to the global concern-can electromagnetic fields have harmful effects on life processes?

**MBI119: Are Plants Able to Grow Well in Acidic Soil?**
My project is, “Are Plants Able to Grow Well in Acidic Soil?” The purpose of this project is to be able to help people have better gardens by knowing if acid works well with their plants. My hypothesis is, if you grow a plant in acidic soil then the plant will not grow as well as one planted in regular soil because acidic soil might harm the plant. For my project, I got two plant pots and labeled one “Regular Water” and the other “Vinegar Water”. I planted Bean seeds within each pot and watered them according to their label. I checked the pH level of the acid in the soil two times for two weeks and recorded the data. My final results will be available at the fair.

**MBI120: Hydroponics vs Traditional Growing Methods**
One growing method is to use dirt, the other uses clay balls. I drilled holes in the bottom of 6 growing pots, filled 3 pots with dirt and 3 with clay balls. I filled my water tank, added nutrients and put the pump in. I placed all pots in the reservoir, the light timer was on 12 hours, the water pump timer ran every 4 hours and the heater ran when lights were off. Each week the plants where measured. The hydroponic method produced larger plants with more edible food.

**MBI121: Red Panda: Weather vs. Behavior and Location**
In this experiment, I tested if weather affected the red panda’s behavior and location in her habitat. Each day, I would sit in front of her enclosure and observe her for 45+ minutes. I recorded the weather and then collected data using a focal sample. This was done for 10 days in different weathers. After the data was collected, I graphed and analyzed it. It was concluded that weather does not affect her behavior or location. However, weather might affect if she spent her time indoor or outdoors, but more data needs to be collected to support this hypothesis.

**MBI122: Equine Heart Rate Recovery Time Comparison**
I tested four different procedures on horses, seeing which one lowered the horse’s heart rate the fastest. I used three different horses. I lunged each horse for five minutes and tested each procedure. To get the heart rate I used a stethoscope. I took the heart rate for 15 seconds and multiplied it by four to get the “beats per minute”. I compared the averaged heart rates and came to the conclusion that giving the horse water or letting him stand work best for lowering the heart rate after exercise.

**MBI123: Bird's Gone Wild**
The purpose of this experiment will be to determine what objects can deter birds away from a feeder. Four bird feeders with the same amount of food will be installed in the scientists’ backyard. A different deterrent will be placed on each of the three of the feeders; the fourth feeder will serve as the control. The amount of birdfood “missing” from the feeders will be recorded to determine the number of birds visiting each feeder. This information could help companies that have windmills for power generation.

**MBI124: Do antioxidants protect marigolds from cigarette toxins?**
For my investigation, I will grow marigolds with 3 different antioxidant supplements (Vitamin C, Green Tea Extract, and Vitamin A) and just water, both with and without the presence of cigarette smoke for a total of 8 experimental conditions with 36 plants each. I will measure the height and color of each plant daily and compare the results across conditions.

**MBI125: Are Fingerprints Inherited?**
In my project I had to find out if fingerprints are more likely to be inherited, or randomly influenced. I compared 60 fingerprints, (15 pairs of related vs. 15 pairs nonrelated). After doing the experiment and evaluating all of the data that I gathered, I have made the determination that fingerprints are more likely to be inherited than non-inherited. 46% of related fingerprints were a match, and 40% of the unrelated fingerprints were a match. Therefore, the fingerprints were more likely to be a match if the people were related.

**MBI126: Rad Radishes**
I tested to see if irradiation affects the germination of radish seeds. I hypothesized that irradiation would affect the germination of the seeds. I used compact disk cases and labeled them by how much irradiation each group of seeds would have. I then placed a wet paper towel in the cases and put six seeds in each case and looked everyday to see if the seeds germinated or not. My hypothesis proved to be correct. The irradiation did affect the radish seeds. The irradiation caused some of the seeds to take six to eight days to germinate.

**MBI127: Does 24/7 WiFi Impact Plant Growth?**
The purpose of this experiment is to evaluate the impact that Wi-Fi has on plant growth and health. Vegetable seeds will be placed adjacent to a Wi-Fi router and a control set of seeds will be located in a room with no Wi-Fi router. Both the sample and control will be given the same amount of light and water. Results will then be evaluated.
**MBI128: Tigers winter or summer**
The purpose of my experiment was to document the behavior of the tigers at the zoo in the winter and in the summer to see how they differ. I chose the topic because I love animals and I am at the zoo every other Saturday for my zoo program. I already did a project on the tigers over the summer about the interactions between Toma and Povel. So I thought that I would combine my summer project with this one to make an even better project. My problem was: “Are the tigers at the zoo more active in the winter or the summer?” My hypothesis was that the tigers would be more active in the winter.

**MBI129: Dogs Rock**
How do dogs react to different types of music? This science fair project answers this question. I tested eight dogs, and played for each five genres of music, pop, rock, country, classical, and christian. During pop, the dogs were mostly fidgety then quiet. In rock the dogs were mostly calm. In country most of the dogs seemed sad, or asking to play. During classical, all of the dogs looked confused or unhappy. During Christian, almost every dog seemed eager to escape, and a bit sad. In all, the results are not what I thought to be true.

**MBI131: HOW DIFFERENT TYPES OF WATER AFFECT PLANTS**
For our science fair project, we wanted to see which type of water helped plants grow faster without killing them. In this project, we used creek water, tap water, soda water, pond water, and spring water. We divided 50 bean plants into 5 groups. Each type of water received 10 plants. We grew the plants for 5 weeks. The water that made the plants grow the fastest was the spring water. The water that made the plants die was the soda water. The water that did not make the plants grow at all was the creek water.

**MBI132: Plant Growth: LED vs CFL**
LED lights are replacing conventional bulbs in many current applications due to their energy efficiency, and this is beginning to occur in the area of indoor plant growing. This experiment compared the effectiveness of two different artificial light sources, one LED and one CFL, on the growth of both flowering and non-flowering plants. Light sources were matched on red & blue spectrum output, and a growing station was built to house both sources in a controlled environment. A timer was used to turn both lights on for 12-hours each day, over a 30-day monitoring period. Results from daily measurements showed that the CFL source produced slightly better overall results, but used nearly twice the energy.

**MBI133: How do different types of water affect plant growth?**
This project was to determine what kind of water is healthiest for a spider plant’s growth. The roots and the leaves were measured. The spider plants were placed into various types of water. The data showed that tap water grew the most. It grew the most because it went through a filter which gets rid of elements that harm a plant’s growth.

**MBI134: BIOMASS TO BIOGAS**
Did you ever wonder whether the banana you throw away today could fuel your car tomorrow? This project investigated biogas production using different organic materials (biomass). The experiment also examined whether the environment where the biomass was placed impacted biogas production. Plastic bottles containing four types of biomass were covered with balloons. The balloon’s diameter was measured over 16 days. It was determined that the bottles containing bananas and decomposed leaves placed in a room temperature environment produced the most biogas. These findings are important as we seek alternate ways to produce energy in the future.

**MBI135: Multicellular Regeneration**
My experiment is to test what stimulates faster regeneration on multicellular organisms, in the form of using hydras. I will add different fluids to their surroundings that will hopefully stimulate faster regeneration. I will test this by severing a limb of a hydra and test the difference in regeneration time between pure water, a high protein fluid, and a high sugar fluid.

**MBI136: Heart Racer**
Your heart pumps blood through out your body system. Your heart rate is your pulse, the rate at which your heart beats. In my experiment, I will be measuring people's heart rate. I will test to see if your heart rate is faster when you are racing someone or running alone. I conducted this project by having students run by themselves and measuring their heart rate, and then having them race each other. Again measuring and recording their heart rate. It turns out that your heart rate is faster when you are running alone. My hypothesis was proven wrong.

**MBI137: What is Your Favorite Color?**
The purpose of my project was to see if dogs can see color, then they will have a preference to a certain color. I started out by taking three dogs and setting up three days for them. then I bought three colored bowls, all the same size and placed them in front of each dog. I switched after I brought the dogs straight on. I recorded the data. I found out that the personality of the dogs is dependable on the color of the bowl they chose.
**MBI138: What Color Water Does a Dog Prefer**
Dogs drink clear water in a domestic environment. Dogs see less colors than humans. When color is added to water, which color water does a dog prefer? I think my dog will drink more red water because, to him, it will look like the dirty water that he drinks outside. Four white bowls will each be filled with 800ml of water. Three bowls contain food coloring; one blue, one red and one yellow. The fourth bowl is transparent (control). The amount of water consumed will be measured and recorded daily for 16 days.

**MBI139: CAN ELODEA SAVE THE OCEAN?**
My project was to see if an aquatic plant called elodea could soak up oil out of water. This was to see if elodea could save the ocean or other types of bodies of water when oil spills in them. My hypothesis was that the elodea might not be able to soak up the oil out of the water because the plant might get killed in about 2-3 days. My hypothesis for the elodea in the oil and water mixture was incorrect. The plants lasted longer than 2 days like I predicted. The plants lasted 4 days.

**MBI140: How Water Affects Plant Growth**
In this project you will fill 12 styrofoam cups up to the rim with soil, then sprinkle 2ml of grass seeds all over the top. Make sure you lightly cover the seeds with dirt so that they aren’t laying on top. Don’t forget to make a watering system, try to water them every three days so they don’t have too much water, but they get enough. Follow through with your planner and don’t miss any watering days because it is very important to the plant’s growth. Also, make sure to copy all the data so that you don’t miss anything. The most important thing in this experiment is to take it slow and make sure to measure everything as well as you can. Don’t try to rush the measuring because that can be the difference between a good experiment and a great experiment.

**MBI141: The Effect of Pollutants on Algae Growth**
Algae can be both very good and very bad for an ecosystem. In August, 2009, thousands of fish were killed due to a sudden growth of algae in Dunkard Creek, PA and WV. This experiment was intended to discover if acid mine run-off, fertilizer run-off, or the salty by-product of gas well drilling led to the growth of these algae. I simulated these conditions by adding fertilizer, salt, or vinegar to see if algae growth would increase, or decrease. This problem was tested by pouring 20 mL of Algae-GRO solution and 1 mL of one of the 3 different algae solutions being tested into 12 different petri dishes. By adding 1 mL of fertilizer, salt solution or vinegar to 8 of the 12 petri dishes, the problem was thoroughly tested. The last 4 petri dishes were left as control. Results are pending.

**MBI142: DNA Extraction and Restriction Enzymes**
The purpose of doing this experiment was to determine which restriction enzyme gives the best visual representation of extracted DNA from peas. The three enzymes I used were meat tenderizer, pineapple juice, and saline solution. I blended peas, salt and water, then added dish detergent. I distributed the solution into three separate viles, adding only one of the enzymes to each. The rubbing alcohol was then added to all three and they were then stirred. My observations determined that the pineapple juice was the most successful restriction enzyme.

**MBI143: THE FIGHT TO END BACTERIA ON FRUIT**
The purpose of this experiment is to determine how much bacteria is on fresh fruits before being washed. To conduct this experiment I will take culture of the different fruits and place them in petri dishes. The results of my experiment indicates that the orange and apple had more bacteria on them before being washed, but the pear before being washed but after had some. My results indicate that I both accept and reject my hypothesis because the apple and orange both have three colonies of bacteria on them before being washed.

**MBI144: The Evaluation of Hydroponically Grown vs. Soil Grown Plants**
A. Purpose of Experiment: The purpose was to document the differences in growth rate/health in hydroponically grown plants versus soil-based plants.
B. Procedures: Used: Bean seeds were grown in either a soil/compost-based medium or a hydroponic medium. The soil/compost plants were used as a control. The plants were watered, fertilized, and grown under identical conditions for 65 days.
C. Data: Data was collected on leaf and stem length and number of leafs, flowers, and beans.
D. Conclusions: The soil/compost-based medium showed increased growth and survival compared to hydroponic.

**MBI145: VITA FLIES**
My project is titled “VitaFlies.” In my project I administer vitamins to fruit flies. I view the effects of antioxidants on the fruit flies or drosophila melongastor over a two week period. The vitamins that the fruit flies consumed were Vitamin A, Vitamin C, Vitamin D, and Vitamin D. I also had one control group that did not receive any vitamins. I checked their activity level daily to see if it changed and which vitamin made them the most active. My results after two weeks were that the control group was the most active and produced the most larvae.

**MBI146: The Dirt On Dirt**
Throughout this experiment, plants’ growth will be observed and recorded to determine if the different types of soil they were planted in had any impact on their growth process. Regular soil from my backyard will be compared to potting soil purchased at the store. Each day the plants will be watered the same amount and receive the same amount of sunlight, and the growth will be measured and recorded.
MBI147: Is Age a Factor in the Ability to See Colors in Low Light?
My experiment was researching the theory that vision gets worse as you get older, especially in low light. I first taped up colored construction paper in a low-lighted room and had a blindfolded test subject stand about 0.91 meters from the wall. They then took the blindfold off, and read the colors from left to right. While they were reading the colors, I timed them and recorded the data. I also mixed the colors up each time. My overall conclusion was the age does make a slight difference in the ability to see in low light.

MBI148: SPEEDING UP THE PROCESS OF HATCHING CHICKEN EGGS
This project was done to help people who sell chickens. Chicken eggs take 3 weeks to hatch so people who sell them have to wait a pretty long time to get their money. My hypothesis was that by increasing the temperature and number of turns it would cause the chicken to develop faster. I was hoping to have them hatch in less than 21 days. In conclusion my hypothesis was incorrect.

MBI149: Is Your Phone Killing Your Plants?
The purpose of this experiment is to see how radiation emitted by cell phones affects plants. I planted two groups of bean plants, and one group was placed by a cell phone for 10 hrs each night. The group close to a phone grew faster at first, then slowed down. From this, I conclude that radiation causes plants to grow faster under lighter amounts, but then begins to damage them over longer periods of time.

MBI150: Picky Ants
I am testing to see what might attract ants. I was curious as to why ants are attracted to certain foods and not others. I have soaked cotton balls in three solutions that I will be testing and have also collected stink bugs for the experiment. I will proceed to put these cotton balls and the stink bug in the ant farm, and release a set amount of ants. I will time them for exactly 10 minutes. I will then count the number of ants on each cotton ball. At this time my experiment is still continuing.

MBI151: The Effect of Caffeine on Paramecium
The purpose of my experiment was to see the observable effects of caffeine on Paramecium. First I crushed a 200 milligram caffeine pill into fine powder. Then, I mixed the powder with 100 milliliters of purified water. After mixing the solution, I observed the Paramecium on a Dissecting microscope and at 40x power on a light microscope without the caffeine added. Then, I added the caffeine to the Paramecium's environment and observed their reactions. If I needed to, I added Protoslo (Methyl Cellulose). I observed the Paramecium's contractile vacuoles pump faster, and the direction and pattern they traveled changed. I concluded that the caffeine did have an observable effect on the Paramecium.

MBI152: The Ant Invasion
The question that I asked to conduct this experiment was: Do natural ant killers work as well as artificial ones? I conducted this to find the quickest and easiest way to rid of ants. When testing this experiment, I first bought ants and gathered all of my ant killers. I then put all ants into a bucket with apples and observed how they reacted to the chemicals. I found that artificial works better, but natural killers can work just as well in some cases. I could experiment farther by making a larger test with more ants and killers.

MBI153: Exercise Your Heart
For my project, I tested heart rate and how or if it will change after exercising. I had the testers do different exercises such as, thirty pushups, one hundred jumping jacks, two sprints, and fifty sit-ups. Before they exercised, I checked their heart rate to see how many times it beat in a minute. They all had different heart rates. The testers were all around the same height, weight, and age. Some of the exercises they did nearly doubled their heart rate per minute. Exercise does affect your heart rate.

MBI154: Safe Roads or Healthy Soil
This experiment is designed to determine the effect of saltwater runoff on the percolation rate of soil in Garrett County. A predetermined number of uncontaminated soil samples will be collected in my backyard which is located in Garrett County. An increasing amount of pre-measured salt will be added to the soil samples. Distilled water will be added to the soil samples and a percolation rate will be determined. The experiment is designed to mimic salt treated highway runoff on the surrounding Garrett County soil.

MBI155: Caffeine the Ticking Time Bomb
The purpose of this project is to determine whether the concentration of caffeine affects the heart rate of a daphnia. A 0%, 25%, 50%, 75%, 100% dilution will be created. The heart rate of the daphnia will be measured before experimentation and after a five minute exposure to the various dilutions. Results will be measured and calculated to determine if caffeine affects the heart rate of a daphnia.
**MBI156: The speed of mice**
For this experiment i was trying to see if a mouse learned its way through a maze. To measure this i was seeing if the mouse’s time decreased. I did this because i was interested in seeing if the stereotypical lab mouse actually learned its way through the maze. To do this i built a cardboard maze placed crackers at the end. Then i recorded the time it took the mouse to get through the maze. Overall its time did infact decreases however it was not a slow and steady decreases. It varied between fast and slow but the trend line was down.

**MBI157: What Attracts ladybugs Best?**
In this experiment it was determined what food attracted ladybugs best. A behavioral tray was used and in it were three foods: pollen, ladybug feed, and a honey sugar and water mixture. Six trials were taken with twelve ladybugs tested in each trial. After the data had been charted it was concluded that the honey, sugar, and water mixture had attracted the most ladybugs over all.

**MBI158: May The Best Plant Win**
On 12/4/13 I started my project, first I put dirt in my cups, then put 4 seeds in each of my 10 cups and watered them, I put plastic wrap on top of the cups, for a greenhouse effect. After the plants sprouted I removed the plastic wrap and watered them daily, when it came time to spray the plants with round-up I separated them to what was to get sprayed and what was not to get sprayed. The round-up ready corn (GM) kept growing after it was sprayed with roundup unlike the regular corn seed.

**MBI159: Effect of Mychorrizal Fungi on Plant Growth**
Mychorrizal fungi has been found to promote the growth of plant roots. This project will observe its effect on the growth of plants and will evaluate optimal volumes of Mychorrizal fungi.

**MBI160: Rot On**
Have you ever bought fruits and then they just rot and you can't eat them anymore? Well I want to see what fruit last the longest. So I got got six fruits: two bananas, two kiwis, and two oranges. One banana, one kiwi and one orange went in the refrigerator for two weeks. Same with the other fruits but they were under a lamp for two weeks. The fruits under the lamp lasted about a week, the banana lasted 5 days. the fruits in the refrigerator lasted two weeks, but the banana lasted one week.

**MBI161: Dancing Heart Rate**
My project was to test my hypothesis that exergames would increases a person’s heart rate more than using a treadmill. I recorded each volunteer’s pulse before and after they played the exergame (Dance Central 2) and before and after they walked on a treadmill. Each participant danced twice for 10 minutes with a short break between each session. I also recorded the resting heart rate after each break. Each participant also walked once on a treadmill; for ten minutes, at 2 miles per hour, on a "mountain climb" setting. I calculated each participant’s beats per minute using the equation: Heart rate = (# of pulse beats in 10 seconds) x 6 and each participant's maximum heart rate using the equation: Max heart rate = 220 - person's age (years). The data showed that my heart rate after dancing was less than my heart rate after walking. My mom's rates after both dance sessions and walking were all the same, and my dad's and sister's rates after dancing their second session were the same as their rate after walking. After comparing the results of the exergame sessions with the treadmill sessions, I proved they are both a form of exercise, but disproved my hypothesis that the exergames would increase a person's heart rate more than using a treadmill.

**MBI162: What colors are dogs attracted to?**
My hypothesis states that dogs are attracted a certain color. If I line up five pieces of different colored papers, with each holding the same treat, then the dog will show a preference to a particular color. If the dog is presented with this scenario several times, a preferred color will emerge. The colors of the papers will be the independent variable. The preferred color will be the dependent variable. The constants in this experiment will be: Dog (Miss. Lottie Da), Dog treat brand, Dog treats size, Intervals of days in between experimenting, Distance of papers from dog, and the amount of food previously eaten. First Tape the papers equal distance from each other and equal distance from the entrance the dog will go through or where the dog will be standing. I chose four feet from a fixed point. After that, place the treats exactly in the middle of the papers. Treats must be the same kind and size. Then let the dog into the room, or uncover the dog’s eyes. Before doing this, allow them to smell the treats. Be sure to record what colored piece of paper the dog goes, what trial it is, and the position of the paper. Be sure to praise the dog for picking a paper. Then place the dog where it can’t see the treats and make sure it can’t come back into the room until it’s time for the next trial. Also, shift every paper over one space to either the left or the right. Make sure every paper has a treat in the center. Redo the experiment, and rotate the papers until they get back to the original place. Finally, look for trends in the data, such as preferred color or position. Through my experimenting I discovered that there is not a preferred color when it comes to dogs. Even though some colors were chosen more than others, there were no significant spikes in the data the suggested a preferred color. In fact the data was in numerical order. Green was chosen the most with five times, yellow was chosen four times, white three times, blue two times and black once. Then I looked at the positions of the papers and saw that there were no specific trends in that data either. My hypothesis was not supported with this experiment.
**MBI164: What Brand of Energy Drink Will Increase Daphnia Magna's Heart Rate the Most?**

For my project I will first set up my microscope, slides, Daphnia Magna, pipette, and energy drinks. Then I will count 5 Daphnia Magna’s heart rates in just water and average the numbers. Next I’ll put a drop of 50/50 “Monster”, water solution, on a slide and use the pipette to put a Daphnia Magna into it. I will wait a few seconds then count its heart rate. I will do this 4 more times and averaged the number. I will repeat these steps for Amp, Red Bull, and Rockstar.

**MBI165: Cappuccino Beano**

My experiment added coffee to bean plants to discover the effect of coffee on plants. I thought the plants with water and coffee would grow the fastest. I put plants in separate pots and added different amounts of coffee to different plants over a period of time. My hypothesis was wrong because the healthiest plants were in the control group. The plants with water and coffee were close behind in plant growth, but had discolored leaves. The plants with only coffee lost height and had crumbling, discolored leaves. I concluded that coffee has a negative effect on bean plants.

**MBI166: Does Temperature Affect Bird Feeding Activity?**

The purpose of this project is see how many birds came to the birdfeeder in various temperatures.

This is my procedure:
1. Make sure that the bird feeder is filled up of black oil sunflower seeds.
2. Record the temperature (in Celsius), Barometric pressure, cloud cover, snow cover, date, and the time you start observing.
3. Observe feeder for 15 minutes twice a day and count the greatest amount of birds that arrive at bird feeder.
4. Repeat for as long as you desire steps 1-3

I concluded that birds prefer to eat under 0 degree Celsius that over 0 degree Celsius.

**MBI167: Pass the DNA Please**

My experiment’s purpose was to show how closely human DNA matches the DNA of other animals. I choose this topic because I am interested in biology and life sciences. My problem was “Which animal is closest related to humans?” My hypothesis stated that the more similar the species look the closer related they’ll be.

**MBI168: Light or Darkness**

The purpose of my experiment was to see what amount of light would grow plants the fastest and largest. At first, the temperatures of the boxes that the plants were in, varied for the first couple of days. They eventually evened out. The plants then started to grow. The eighteen hours of light didn’t grow. The roots started to grow in the soil, but then disappeared. I concluded that twenty-four hours of light grew plants faster and bigger.

**MBI169: Do Norway Maples Inhibit Seed Germination and Plant Growth?**

Purpose: find out if Norway maples possess allelopathic properties

Hypothesis: plants will not grow do to the allelopathic properties

Procedure:
1. Obtain materials
2. Sift soil to get out any rocks or litter
3. Label each 6 cup tray with tree number and concentration of leaves
4. Put 30g of soil in each cup measuring with a toothpick
5. Put marigold seed into each cup
6. Cover up seed with more soil
7. Put different concentrations of leaves on top of each of the six cups
8. Repeat with rest of trays
9. Set by a window and water regularly
10. Analyze the data
I am currently still collecting data

**MBI300: CLear Water Plants**

Our project is called CLear water plants. The purpose of the experiment is to see which plant grows faster; the one watered with chlorine or tap water. Every morning and night the plants need to be watered with a 1/2 cup of specified water. The data we have collected is chlorine kills many types of bacteria but tap water doesn’t. Our conclusion so far is chlorinated water will kill the plant. We have not yet competed the experiment.

**MBI301: Healing the Human Body**

The experiment we chose was “How does the human body heal from a paper cut?” To do this experiment one finger will have a non-bandaged paper cut and the other finger will have a band-aid and neosporin. To collect the data we ill take a picture of each cut once a day for a week. Over the days I think there will an increased growth of thin skin over the bandaged cut than the non-bandaged one.
**MBI302: HOW DIFFERENT TYPES OF WATER AFFECT PLANTS**
For our science fair project, we wanted to see which type of water helped plants grow faster without killing them. In this project, we used creek water, tap water, soda water, pond water, and spring water. We divided 50 bean plants into 5 groups. Each type of water received 10 plants. We grew the plants for 5 weeks. The water that made the plants grow the fastest was the spring water. The water that made the plants die was the soda water. The water that did not make the plants grow at all was the creek water.

**MBI303: Hybrid Fish**
So far with our studies we have learned that there is a slight possibility that the two fish (Endler’s guppy and Fancy guppy) will bred in the wild. We have only been able to have two gold fish to keep the tanks maintained due to lack of school time hours and problems finding the Endler guppies. They must be specially order and shipped to the local pet shop. We plan on getting the fish next week, hoping there is more school time. When fish arrive we plan on them breeding without doing anything special to help them in the process.

**MBI304: Screening of Radioprotectors**
Nuclear accidents, occupational exposures, and radiotherapy are reasons for the need for protection against ionizing radiation against cells. This experiment was designed to identify novel radioprotectors using drug rescue and repurposing strategies. The candidate compounds were selected from Ingenuity Pathway Analysis data based on their actions on mitochondria, particularly those Food and Drug Administration approved drugs which able to modulate reactive oxygen species generation at specific sites within mitochondria. The radio-protective effects of drug candidates will be evaluated in a well-established mouse embryonic cell-based screening model using flow cytometry. Ten compounds have been selected, and are ready for screening.
Intermediate – Chemistry (MCH), 7th & 8th Grade

MCH100: Chill Out!
The purpose for this experiment is to better gauge the amount of time that it will take a liquid to cool to a certain temperature. This can help cooks, scientists, and other people conducting experiments. Having this information can help to have precise temperatures for certain liquids. The question for this experiment is “Does the type of liquid affect the length of time that it take for the liquid to cool down?” My hypothesis is that thicker liquids will take longer to cool; that water will cool fastest, Mountain Dew will cool second fastest, apple juice will cool third fastest, and honey will cool the slowest. To run my experiment, I first heated ½ cup of water as my control and let it cool. Then I heated ½ of the rest of the liquids and let them cool to room temperature. My hypothesis was only partially supported because Mountain Dew cooled fastest, then water. Apple juice and honey remained correct as third and fourth slowest.

MCH101: Spikey Stalagmites
My science fair project is growing stalagmites crystals. The purpose of my project is to compare which materials will work best. The three materials are yarn, thread, and pipe cleaner. I picked this experiment because I am interested in different kinds of rocks and gems and I would like to learn how they grow.

MCH102: Salty Solutions
The purpose of this experiment was to see if a salt with more ions would make water freeze at a lower temperature. I made .1 molar solutions of salt, put 40 milliliters of it in a cup, put in a digital thermometer in the solution, put it in freezer, and took temperature readings every 30 seconds. Aluminum chloride froze at -2.9 degrees Celsius; the lowest average freezing point. A practical application could be to use a salt with multiple ions to melt ice on a very cold day.

MCH103: Yum Yum Jello
The question I was trying to prove was, “Which fruits would let jello gel best?” My hypothesis was that strawberries would work the best because they have less citric acid. Unfortunately I was wrong. After making jello on three trials, I added the various fruits to each jello, one type of fruit per cup and labeled the cups. After checking the jello one hour later, I saw that some were starting to gel and some were not. The ones that did not gel were pineapple and strawberries. The ones that gelled were peaches, bananas, and apples. I realized in my project that different flavors of jello did not affect how the jello would gel with fruits. I had the same results with three flavors of jello.

MCH104: The Sugar We Take In
What drink will have the highest glucose concentration level after adding the enzyme, Invertase? The purpose is to learn about how enzymes affect our bodies. I hypothesize that Pepsi will have the highest glucose concentration after adding the invertase. I first tested the glucose concentration in each drink by dipping a glucose test strip in each of them then waiting 5 seconds before taking it out and waiting 30 seconds before recording results. I then added the invertase and mixed for 5 seconds. I waited 25 minutes before recording results. This was repeated 3 times for each drink. Results will be available on fair day.

MCH106: Chemiluminescence: A Study of Color & Temperature
If glow sticks are kept in best place possible, they can be far more efficient. This project was performed to find effect of temperature and color on duration time of glow stick. Investigator made closed box system by placing dark blanket over box. Glow sticks were soaked in water baths of 0, 10, 20, 30, 40 degrees Celsius. Let sticks soak for 5 minutes, crack and record lasting time and LUX Meter results. Conduct entire second and third trial. All colors lasted the same except purple. When temperature was increased lasting time decreased, when temperature was decreased the lasting time increased.

MCH107: Boiling Point
My question is will the temperature of tap water reach the boiling point before other liquids? My hypothesis was proven correct, because molecules in a solution are less organized compared to tap water allowing them to move about randomly taking longer to reach the boiling point. Measure 236.59 mL of water and pour into pan. Place on stove, insert cooking thermometer, turn burner on high and start stopwatch. When water begins bubbling and the temperature levels off, the water is boiling. Note time after three minutes on stop watch and the temperature on the temperature. Same procedure is done for different trials - salted water, sugar water, skim milk and diet soda pop.

MCH108: How fast can UV light escape?
The purpose of this experiment is to see how temperature affects the photochromism of UV beads.

MCH109: Does The Level of Acidity in Ocean Water Effect Marine Life
The question I tried to answer in this experiment was if the level of acidity in ocean water affect marine life? My hypothesis is if I test calcium carbonate shells in ocean water with different levels of acid, then the shells tested in the most acidic water will corrode the most. The variables of my experiment were independent, the acidity of the seawater, dependent, the weight of the seashells and controlled, the size of jar, the amount of seawater, the brand of instant ocean salt, the pH meter, and the size and type of seashells.
MCH110: Conductivity of Liquid Metal
The purpose of my experiment was to answer the question of whether electricity could flow through liquid metal and what effects the process. The procedure I used was using a multi-meter to test the conductivity. The data that I collected was that electricity could flow through liquid metal and the things that affected this process where distance and heat of the metal I used; Gallium. I conclude that electricity can flow through liquid metal.

MCH111: Crystal Fudge
The “Crystal Fudge” science fair project’s purpose is to see what temperatures fudge crystallizes at. The purpose is also to see what the effect is on the fudge in different temperatures. The hypothesis was that a colder temperature will grow more or more visible crystals than the warmer areas. The procedure of this project was to bake the fudge, separate into 3 plates/pie pans, and to put one plate in the freezer, one plate in room temperature, and one plate in the refrigerator. The main materials were a candy thermometer, three regular thermometers, and a magnifying glass.

MCH112: Crazy Crystal Creations
For my experiment, I grew sugar, salt, and baking soda crystals. The purpose was to show how water can deposit materials to create crystal formations. I had six cups filled with 375 mL of water. I added 113.4 grams of table salt into two cups, sugar in two cups, and baking soda in the last two. I mixed all the solutions. Then, I put string with paper clips connecting two cups together with all the experiments. After four weeks, the salt grew the largest, then the baking soda, and finally the sugar crystals.

MCH113: Melt Now or Melt Later
Rock salt has been a key factor for the city of Pittsburgh. This experiment was to determine if the amount of salt in a solution affects the freezing point of a solution. Water solutions were made with either one, two, or three cups of rock salt. The solutions were placed into a freezer and as soon as they were frozen solid, they were taken out and immediately melted. When the solutions were fully melted, the temperatures were recorded. Additional tests are being conducted, and results will be available at PRSEF.

MCH114: Up, Up, and Away
The purpose of this experiment was to demonstrate how the gases from yeast can be used to blow up a balloon. Using vials and bottles, I tested three substances, using the same time allotments, comparing the results. After conducting this experiment the yeast, mixed with water, came to life. The water and sugar mixture made the yeast cells grow. The warm water provided heat to the yeast, accelerating it to inflate the balloon. As yeast grew, it produced a bubbly substance. By being “bubbly” the yeast gave off carbon dioxide, which is the same gas that your body produces when you breathe. This same gas inflates the balloon.

MCH115: Does ice cool any drink to the same temperature?
This experiment was conducted to find out if four test drinks would cool to the same temperature after an ice cube had melted in them. Each drink (water, milk, orange juice, apple cider) was poured into three separate glasses. Every glass had 200 ml volumes of the drink and had one ice cube put into it. When the ice cube was done melting, the drink was stirred and its temperature was recorded. It was concluded that, on average, water cooled the most and orange juice cooled the least.

MCH116: Why so rusty? Clean it up!
The purpose of my project was to figure out what sodas can remove rust. The first I did was weigh them. The next thing I did was rust my steel wool with in a cup of muriatic acid overnight. Then I sprayed the steel wool with hydrogen peroxide and they instantly rusted. Then I weighed them. Then I put the steel wool in three different sodas: diet coke, coke and mt.dew. I weighed them after that and they weighed less than when they were rusted.

MCH117: What is the Best Product for Whitening Teeth?
The purpose of my experiment is to find the best whitening product or solution. The procedure I used includes the following:
1. I heated water on a heating plate.
2. I placed 3 black tea bags into the water along with eleven eggs to sit for 24 hours.
3. I took all of the eggs out and placed them each into their own individual beaker with different whitening solution, Colgate, Listerine, hydrogen peroxide, and a solution of baking soda and water.
4. I left all of the solutions to sit for 48 hours and monitored the solutions, I collected data by taking photographs every 24 hours.

My data could not be numerical data because the data of the whitest teeth were collected by eye. The solutions follow from best to worst, hydrogen peroxide, Colgate & Listerine (tied), baking soda and water, and water (control). My conclusion is that the hydrogen peroxide is the best whitening solution. As a consumer this information is valuable when purchasing the right products.
Intermediate – Chemistry (MCH), 7th & 8th Grade

**MCH118: Recycling Fracking Fluids**
The water that returns to the surface during the process of hydraulic fracturing (fracking) is called flowback water. The flowback water is dirty and unsafe for the environment. This investigation was conducted to determine how to recycle the flowback water to be reused in fracking. It was hypothesized that sedimentation and filtration alone would not be enough to adequately clean the water. To test this hypothesis, flowback and river water were tested for pH and conductivity/total dissolved solids in three trials following sedimentation, sedimentation and filtration, and sedimentation, filtration, and distillation. The data showed that all three steps, sedimentation, filtration, and distillation, were needed to recycle the fracking water.

**MCH119: Tums vs. Pepto Bismol**
Antacids are an important type of medicine for treating discomfort from the acid that is within your stomach. However they have varying degrees of effectiveness at neutralizing that acids based on their ingredients and the size of the dose. In this project I will introduce Tums and Pepto Bismol to 200 ml of hydrochloric acid (which is the main digestion fluid in your stomach). After I introduce them I will wait 10 minutes and then use a pH probe to measure the pH. The antacid that increases the pH the most will be the most effective at neutralizing stomach acid. The antacid that is most effective would be the antacid that would be better to purchase.

**MCH121: RUST REMOVAL**
The purpose of my project was to test the effectiveness of different rust removers. The problem I solved was which of the four rust removers; Rust Mort, Naval Jelly Rust Dissolver, Lemon Juice, or Vinegar worked the best. For each trial, I applied the removers then analyzed the results after a 24 hour period. In my experiment Naval Jelly Rust Dissolver worked the best, Rust Mort was second, Lemon Juice was third, and Vinegar worked the fourth best. This experiment utilizes the principles of chemistry by testing how the metals reacted to the rust removers.

**MCH122: Now You See It Now You Don’t**
The purpose of this experiment is to find out if sun paper images are more distinct with different sources of light. To conduct this experiment I will be testing different sources of light to see if they make a more distinct image on the sun paper than the other light sources. The experimental results were measured on a darkness scale of 0-10. The results of the experiment show that sun makes the most distinct picture on sun paper. The results indicate that the hypothesis should be accepted because the sun made the most distinct image on the sun paper.

**MCH123: Burr! It’s Cold!**
Today you can go into any drug store and purchase an instant cold pack. They are very popular with parents as well as coaches and trainers. You can easily treat minor bumps and bruises without having an ice chest around. Instant cold packs are not already cold. You have to squeeze the cold pack and a chemical reaction occurs and the cold pack begins to get cold. In this experiment you will investigate the chemical reaction that occurs in the instant cold packs. You will also be able to determine how the temperature of a mixture of water and ammonium nitrate changes with the amount of ammonium nitrate dissolved in the water. My hypothesis will show that the more ammonium nitrate dissolved in the water the longer it will take to reach stabilization. The experimental results supported my hypothesis by showing that the ammonium nitrate dissolved in cup three took the longest to reach stabilization.

**MCH124: How much gas do certain liquids give off?**
For my experiment, I did how much gas certain liquids give off. I did this project because I thought it would be interesting to see the gas levels these certain liquids give off in your stomach. For my project, I got five different beverages, placed each into separate bottles, mixed vinegar into each to represent the stomach’s acid. Then put balloons over the top. Then I measured at certain time points. In conclusion, I saw that the beverages with the higher carbonation levels gave off the most gas.

**MCH125: The Electrolyte Challenge**
The purpose of my experiment was to find out which drinks/sports drinks have the most electrolytes. I got Gatorade®, Powerade®, Vitamin Water®, and Tropicana® high pulp orange juice. I took a digital multimeter connected to a 9 volt battery and a conductance sensor and put it into bowls filled with the drinks. Then I recorded the results and repeated the experiment three times for each liquid. The results were surprising because my hypothesis had said that Gatorade® would be the dominant drink, but I was wrong. The drink that had the most electrolytes in it was the Vitamin Water®.

**MCH126: Does Changing pH Levels in a Microbial Fuel Cell Increase Electricity?**
This research seeks to define a relationship between pH in the anode of a microbial fuel cell and the amount of electricity produced. Independent variable pH levels of 6, 6.5, 7, 7.5 and 8 were evaluated.

**MCH127: Does Temperature Affect Viscosity of Motor Oil?**
The viscosity of motor oils at various temperatures will be investigated.
MCH128: Column Chromatography: Can I Separate the Dyes in Grape Soda Using Space Sand?
This experiment was based on the question: Can I separate the dyes in grape soda using Space Sand™? So I used my homemade column chromatography system and a children’s toy, called Space Sand, to put the question to the test. I attempted to separate the purple colored dye into red and blue dyes. I found out that you can do it with the inexpensive supplies! I also decided to see if different brands of soda would change the results. This project will explain how to do it.

MCH129: Marinade Madness: Exploring the Science of Marinades
I chose five common marinade ingredients to see how marinade flavors the food we eat. I marinated tofu for one and two hours in the five test ingredients, comparing the tofu’s adsorption and absorption, and measured the pH level of the test ingredients. The ingredients with lower pH levels did a more effective job adsorbing. I found that vinegar, with the lowest pH level, adsorbed onto the tofu cubes the most effectively. Hardly any of the ingredients absorbed into the tofu. The major result in my experiment is that marinating really only flavors the exterior of your food.

MCH130: Battle of the Electrolytes
The purpose of my experiment was to see if Gatorade® or orange juice had more electrolytes. I set up a conductance measuring circuit. Then I filled small bowls with orange juice, Gatorade®, tap water, and distilled water. I put the conductance sensor in each of the liquids and measured the conductance. The one with highest conductance is the one with the most electrolytes. Surprisingly, orange juice ended up having more electrolytes than Gatorade®. That means orange juice is a better source of electrolytes than Gatorade®.

MCH131: Plant pH Drama
The purpose of my experiment was to find out if plants grew better in acidic, basic, or regular water. The procedure was to water the plants with there individual solutions A=neutral water, B=Basic water, C=Acidic water. And every morning I watered them with 40 mL Of their special solutions. My data is very interesting. I actually had to redo my experiment because the first set of seeds didn't germinate and grow. The basic plant and the neutral plant and the basic plants grew, not the acidic plant. In conclusion, the basic plant grew faster than the other ones.

MCH132: Sugar, Sugar, Sugar
The purpose of this experiment is to find out which drink has the most sugar. To conduct this experiment I am going to use a sugar testing kit to measure the sugar in different drinks. The experimental results were measured by comparing the test strip to the color chart to find the sugar content. The results of the experiment show that Gatorade has the most sugar out of the four drinks. The results indicate that the hypothesis should be accepted because my hypothesis states if four drinks are tested for sugar content, then Gatorade will have the most sugar content.

MCH133: Vitamin C Concentration in Various Orange Juices
Research has shown that Vitamin C can help against major illnesses later on in life such as Alzheimer’s. The problem to be studied in this investigation is which orange juice contains the highest concentration of Vitamin C. It was my hypothesis that the Minute Maid frozen concentrate would have the highest concentration of vitamin C. To figure out the concentration I performed a titration on eight different juices three times. This resulted in 24 trials in all, with Minute Maid Frozen Concentrate in first place, Fresh oranges from California bought in PA were second best and fresh oranges from Florida were third. Minute Maid had the highest vitamin C concentration because it was frozen. This way the ascorbic acid could not oxidize as quickly.

MCH134: How does temp affect the size of crystals?
During this experiment my goal was to determine whether or not temperature has an affect on the size of crystals. My hypothesis was I hypothesis, that I warm up the maple syrup and place it on the frozen pan that the crystals will be larger, than the room temperature pan this will happen because the crystals will be able to form more since its on ice. My hypothesis was supported because the crystals on the frozen pan were larger.

Procedures
1. Fill a pan with about ½ inch of water and place it in the freezer until its completely solid
2. Now place a pan on the counter at room temperature
3. Get a pot and pour the maple syrup into the pot
4. Stir the maple syrup, and make sure it doesn’t burn
5. Once brought to a boil get the frozen pan out
6. Get your spoon and put about a spoonful of maple syrup on each pan
7. Watch as they set and cool
8. Then begin to measure each and record the size of each crystal in a chart
9. Repeat steps 1-9 until you have measured at least 3 of each crystal.(room temperature and frozen.)
MCH135: Fast-Tracking A Way To Pain Relief
The purpose of this experiment is to determine how different coatings on a pain-relief medication will affect the time it takes to dissolve in stomach acid. Using a mechanical stirrer, three different types of coatings on Advil (ibuprofen) pills will be tested to see how long it takes them to dissolve in a mixture of muriatic acid and water. A second phase of this experiment will test how the traditional Advil pill will dissolve in stomach acid with a higher pH level, to simulate taking the medication with milk to prevent stomach upset.

MCH136: Lights, Chemistry, Reaction
The purpose of this experiment is to determine if light affects the reaction time of an iodine clock reaction. To conduct this experiment I will test two iodine clock reactions, each in series of three trials. I will test one reaction in the dark, and one under a fluorescent light bulb stand. The experimental results were measured by if the reaction time differed between the two reactions under the different lighting conditions. The results of this experiment show that light does affect an iodine clock reaction. Under a fluorescent light bulb stand, it took longer for the reaction to take place, having an average of 23.96 seconds. When I tested in the dark, the reaction took a shorter amount of time to take place, having an average of 7.71 seconds. The results indicate that the hypothesis should be accepted, light does affect an iodine clock reaction. After a series of three trials of experimentation, I proved that light slows down the reaction time of an iodine clock reaction.

MCH137: A Permanent Solution
The purpose of my experiment was to determine if Permanent Markers are as permanent as their manufacturers claim. If something was stained with permanent marker, could it be removed with a solvent? If so which solvent, Isopropyl Rubbing Alcohol, Apple Cider Vinegar, Hair Spray, or Nail Polish Remover with acetone would be most successful in removing the stains? I chose five marker brands to conduct my experiment with. I placed marker stains on cloth and applied the solvents. My results showed that rubbing alcohol was the most successful solvent, and the Dollar General® brand was the most resistant marker.

MCH138: An Analysis of Whitening Toothpastes
This experiment was designed to find which of 9 toothpastes would whiten teeth stained with cranberry juice the best. 70 teeth were sterilized, then obtained from an oral surgeon. Six brand name whitening toothpastes, 3 homemade toothpastes, and distilled water were tested, 7 teeth were tested in a group for a total of 70 trials. 7 teeth brushed without toothpastes served as a control group. These teeth were then compared to a Vita dental shade guide after 7 days. All the following conditions were held constant throughout the entire experiment: all teeth had the same stain color at the start of the testing, and the amount of toothpaste, number of strokes, pressure, and type of toothbrushes (one per testing group) used for each group were all the same. The teeth brushed with Crest 3D whitening was found to whiten teeth the best, which may be due to the added amounts of a pyrophosphate compound which lifts the stain and hydrated silica, which is shown to be a more effective abrasive for whitening than baking soda in this experiment.

MCH139: Rainbow Flames
The purpose of my project was to see how substances burned differently. I filled seven glass bowls with 1oz. of a various substance mixed with 1oz. of Methanol as an accelerant. Most of the substances I used are used in everyday life. I tested Boric Acid, Copper Chloride, Apple Cider Vinegar, Hair Spray, or Nail Polish Remover with acetone. Aver with acetone would be most successful in removing the stains? I chose five marker brands to conduct my experiment with. I placed marker stains on cloth and applied the solvents. My results showed that rubbing alcohol was the most successful solvent, and the Dollar General® brand was the most resistant marker.

MCH140: Dye Hard
My question was which fabric is most difficult to dye? Cotton, silk, nylon, spandex, or wool? I thought that spandex would be most difficult because of how tightly the fabric is woven. First I boiled water and put the dye in the water. I then put the fabrics into the dye and checked them 10 minutes. Once after 30 minutes I washed the fabric until no color came out. I let the fabrics dry out afterwards. I came to the conclusion that the spandex was the most difficult to dye. It did not take in the color as well as the other fabrics did.

MCH141: Wow Wow White Candles
My experiment was to figure out if the color white had an affect on the rate the candle burned at. I burned five candles, all of different colors for one hour and measured them. My hypothesis that the colored would burn much faster was proven wrong because white never burned at a slower rate after running the experiment three times through. The reason I did this is experiment is that what would be more useful for the same price, a candle that burned slow or fast.

MCH142: Race Your Marbles To Discover A Liquid’s Viscosity
The purpose of my experiment is to determine which of my liquids have the lowest viscosity to the highest. To conduct this experiment, I will put a marble in a test tube with the liquid in it. I will time the marble when it gets from point a to b. The experimental results were measured by the amount of viscosity each liquid has. The results of the experiment showed that the vegetable oil had the lowest viscosity, olive oil second, maple syrup third, honey last. The results showed that my hypothesis should be accepted.
**MCH143: METAL CORROSION**
The following will be a summary of my science project. The purpose for conducting my experiment was to see what metal corrodes the fastest in water, salt water, or lime juice. The hypothesis I investigated was aluminum corroding the fastest in lime juice. The approach I took was filling twelve beakers with water, salt water, and lime juice evenly. I then placed each metal in the liquids and waited two weeks. The result I received was that zinc corrodes the fastest in lime juice. In conclusion, my hypothesis was incorrect. The passage above summarizes my science fair project.

**MCH144: Fabulous Fabrics: What Should You Wear and When**
The main goal of this science fair project was to answer the question: How does the type of fabric affect how much heat is retained? After researching subjects like textiles, heat, and temperature five fabrics were selected: wool, cotton, silk, nylon, and polyester. The hypothesis was that fabrics retain heat with wool retaining the most heat followed by cotton, silk, polyester, and lastly nylon. To test this hypothesis an experiment was performed that included materials such as boiling water, a temperature probe hooked up to a computer, and specially made fabric pieces that could slip on and off the end of the temperature probe. The temperature probe was placed in the boiling water. Once the temperature reached 95 oC the probe was removed and dried. At 80 oC the probe was placed inside a fabric “pouch” and the program LoggerPro started recording the time and temperature. At 30 oC the recording was stopped. This was done three times for each type of fabric and also three times with no fabric (control). The results were a slightly different than what was expected. Wool retained the most heat followed by silk, nylon, cotton, and polyester. The least heat was retained with no fabric.

**MCH145: What Melts Ice First?**
This year for my project I wanted to see what would happen if you added substances to ice. I mostly wanted the ice to represent the ice on a driveway to see what substance would be most effective on a driveway. I added calcium chloride, table salt, and sand to the ice. I put them in the freezer at the temperature of 24 degrees. When the temperature of pure water drops to 32 degrees Fahthenheit, ice begins to form. This temperature is referred to as the freezing point. In order for water to freeze, the molecules must line up in an “orderly fashion”. When substances such as calcium chloride, table salt, and sand are added, it prevents the water from reaching this “orderly fashion” as easily. In order to see what substance would melt ice first, I froze 3 sheets of ice. After I froze the sheets of ice, I took the sheets of ice out of the freezer and added the substances to the sheets. I put all of the sheets of ice back into the freezer at 24 degrees Fahrenheit. I did this because the temperature stays the same when you add substances to the driveway. As I did my research, I found that when you add substances to ice, it effect the time it takes to melt. It will take longer for ice to melt depending on the chemical makeup of each added substance. I found that the calcium chloride melted the ice first, table salt melted second, and the sand melted last.

**MCH146: How Long Do Glow Sticks Glow?**
Glow Sticks are luminescent sticks. Glow sticks hold two chemicals, Hydrogen Peroxide and Phenyl Oxalate with dye for color, separated by a membrane. Bending the stick cracks the membrane, allowing the chemicals to react, emitting a glow. Glow sticks are often used for mining and diving, when other conventional light sources are useless. Two tests were performed with 100 sticks with colors red, green, blue, purple, and yellow, with the conditions cold, room temperature, and hot. Results showed that cold slowed down the reaction, making the glow sticks last longer. The color yellow lasted longest.

**MCH147: Which Paint Upholds Better on Wood**
What I'm doing is painting three pieces of wood with three sections. The first section has one coat of paint, the second section has two coats of paint, and the last section has three coats of paint. The paints I used are Behr, marine, and Rust-Oleum. Then after it dried I took them down to my pond in my yard and left them over night and came back in the morning and took them out of the water and put them in front of my wood burner. I did this for one month, after that I looked at the wood and saw that the paint on the first coat that there was some places where you can see the wood, on the second coat there was less of the wood shown, the third coat there was very little wood shown, but on the marine paint third coat there was no wood shown.

**MCH148: What Beverage has the Most Effect on Human Teeth?**
My experiment is to show the harmful effects of popular drinks that most people drink more than 2 times a week. The drink with the most decay is coke. Coke's tooth was completely demolished. It was brown all over and had a few little cracks. Second was Hi-C. Hi-C's tooth had a lot of tiny cracks and the root of the tooth was blood red. Rootbeer came in third place. Rootbeer's tooth was a little yellow but not much else. Sprite was pretty obvious - a white drink on a white tooth would show the least visible damages or cracks.

**MCH149: How Clean is your Water?**
The purpose of my experiment is to find what type of water has the least amount of chlorine. Chose five types of water to test, and make a hypothesis of which will have the most chlorine. Make a negative control by mixing tap water and chlorine water. For each water, dip the strip into the substance, wait 15 seconds and compare to test indicator on the back of the bottle. Tap water had 0.5 ppm of chlorine. The Giant Eagle water had 0.5-3 ppm of chlorine. All of the other waters had 0 ppm of chlorine. This proved my hypothesis inaccurate.
**MCH150: The effects of type of liquid on melting speed**

I tested to see what liquid out of three different liquids melted the fastest. I did this because, I really like ice and I wanted to do a project that involved ice. This project is interesting because, I don’t believe people have tested to see how slow or fast different liquids melted. People have probably seen what the can freeze before, but they haven’t looked at what melted first or what froze the fastest. My testable question is: What are the effects of type of liquid on speed of melting? My hypothesis was that the water would melt the fastest because, it is the least dense liquid. I just bought several of the same ice trays. I chose liquids to freeze and then, I put the cubes out to melt and recorded how long it took. The average melting time of the water was 22 minutes making it the fastest melting liquid out of the selected liquids. The second fastest liquid was the diet pop with an average melting time of 27.45 minutes. The juice was the slowest melting liquid with an average melting time of 40.4 minutes. In conclusion, my hypothesis ended up being correct, water is the fastest melter.

**MCH151: Can fruits produce enough energy to charge an electronic device?**

In my experiment, can fruits produce enough energy to put off an electric charge, I was testing the voltage in fruits. I had come with my idea when I was doing my daily scroll on YouTube. A couple of months ago, a YouTuber had posted a video of them putting water and ice in a pot, and adding salt. I had thought to myself how cool would that be to try. For safety reasons I had took away the water and the salt. I am not finished with my experiment yet, but I hope for good results.

**MCH152: Are there pesticides in organic foods?**

The question I was testing in my experiment was whether or not organic foods contain pesticides. After research on the topic, I hypothesized that if I tested 8 organic fruits and vegetables for the severity of the amount of pesticides they contain then at least 50% of the fruits and vegetables tested will contain either unsafe or strongly unsafe amount of pesticides in them, because of the great amount of “organic pesticides” used by farmers when growing and harvesting organic crops, such as organophosphate and carbamate pesticides. To test my hypothesis I used a Rapid Pesticide Detection kit, from RenekaBio. I tested 8 fruits/vegetables for their presence of organophosphate and carbamate pesticides. After testing, I found out that 50% of the fruits and vegetables that I tested, tested positive for either unsafe or strongly unsafe levels of pesticides. In conclusion, my hypothesis was proven correct since 50% of the fruits/vegetables tested in my experiment showed that they contained unsafe to strongly unsafe levels of organophosphate and carbamate pesticide residue.

**MCH153: I’m Melting**

The goal of my project is to see what materials melt ice the best. Six materials will be tested. The ice cubes were weighed and one gram of each material was placed on individual cubes. After fifteen minutes, the cubes were reweighed. So far, magnesium chloride has been the most effective, melting fifty four percent of the ice. Calcium chloride has been the second most effective in my tests. Tests are still ongoing and full results will be available at the PRSEF.

**MCH154: How does table salt affect distilled water’s cooling rate?**

My experiment was conducted to figure out how table salt affected distilled water’s cooling rate. When running this test, I used one hundred milliliters of water in each of the four cups. One of the cups had no table salt, one ten grams of salt, another twenty grams, and another thirty grams. Three tests were conducted in this experiment. It is concluded that more table salt in distilled water will help the water cool faster. However, the ice amount was less when more salt was added to the distilled water.

**MCH155: Gold from Trash**

The purpose of my experiment was to determine which way of extracting gold was better. I went through 2 different methods of experimentation. My first experiment was getting gold using a hydrochloric acid and hydrogen peroxide solution. My second experiment was extracting gold using a more complicated method. I used a type of starch extract to precipitate gold from hydrobromic acid and nitric acid. The first method went mostly as planned, etching the gold off the boards with minor difficulty. The second method is still in experimentation, but will be available for reference at the science fair.

**MCH156: From the Backyard to the Sky**

His project was to determine which homemade rocket fuel works best for homemade model rockets. I determined the results by cooking each type of fuel and loading it into different rockets then recording the air time. I then burned strips of fuel and recorded their time. It was concluded that the uncooked fuel worked best.

**MCH157: Sizzle**

My question is which drink dissolves aspirin the fastest. I hypothesized that water would dissolve aspirin the fastest. My hypothesis was found incorrect because Monster dissolved aspirin most quickly. To do this selected project you had to follow the steps given. First, you pour eight fluid ounces of any selected drink into a cup. Next, in the same sup you will put one uncoated aspirin. Then, you will press start on a timer. After that, record your data on a column chart. Finally, repeat these steps until you have tested all of your selected drinks. Monster dissolved it the fastest. Then, water, SunnyD, and milk dissolved it slowest.
**MCH158: Can You C the Difference?**
The purpose of this experiment was to find out if vitamin C levels differ in non-organic, frozen, or organic broccoli. To conduct this experiment, I will make a vitamin C indicator. Next, I will make the three different broccolis into pastes. I will separate the vitamin C indicator into three glasses. I will then test the vitamin C levels. My experimental results were measured by the color. The results show that I should reject my hypothesis. The organic broccoli had the most vitamin C, not the frozen broccoli.

**MCH159: Tiny Bubbles**
My initial question was “Does the temperature of water affect the production of carbon dioxide gas when an Alka-Seltzer tablet dissolves?” I hypothesized that hot water will dissolve the Alka-Seltzer tablet the quickest and therefore affect the production of carbon dioxide gas produced by the Alka-Seltzer tablet when it is dissolves in water. When the Alka-Seltzer tablet dissolves, it gives off bubbles. These bubbles are carbon dioxide which is produced by a chemical reaction. Sodium Bicarbonate is one of the main ingredients in an Alka-Seltzer tablet. I discovered in my research that when water temperatures increase, sodium bicarbonate decomposes faster. The decomposition consists of carbon dioxide. My hypothesis was proven correct. I filled a plastic container and plastic bottle with water and put the bottle in the plastic container face down. I inserted the open end of aquarium tubing inside an opening at the top of the bottle with the other end inserted into a graduated cylinder that was also partially filled with water. Using hot, cold, and ice water respectively, I dropped an Alka-Seltzer tablet inside the bottle. I measured how much carbon dioxide filled the graduated cylinder while pushing the water out. Decomposition of the Alka-Seltzer tablet happened the fastest with hot water. I repeated my experiment twice and recorded the results. For each experiment, I found that Alka-Seltzer tablets decompose the fastest in hot water than in cold or ice water.

**MCH160: When it Snows, it Erodes**
150 ml of distilled water will be added to 30 labeled cups. 1 gram of rock salt, calcium chloride, Morton table salt, Blizzard Wizard, and Ice Melter was added and dissolved. The solution will then be poured into the cup. A steel nail will be massed, recorded, and placed in the solution. The nails will be removed and allowed to air dry for 4 hours before being massed and recorded. Steel nails will be added to 150 mL of vegetable oil which will serve as the positive control, and 150 mL of distilled water which will serve as the negative control.

**MCH161: To Dye For!**
My experiment was to find what fabrics took the tie-dye in the best. I dyed all the fabrics together. This experiment was hard to determine what fabric took the dye in the best. I found after testing my project 3 times with the different fabrics and different dyes. I found that the dyes attached differently to each fabric. The fabrics had all different shades. The cotton and spandex blend had the best result in this experiment.

**MCH162: How Would You React?**
This experiment was done to determine whether combining different compounds would create an endothermic reaction. I did this by performing seven different experiments. I started with a liquid at room temperature then added a solid. I checked the temperature again 30 seconds and 120 seconds later. I recorded the results. In the endothermic reactions the temperature rose. It showed that endothermic reactions absorbed heat and endothermic reactions released heat.

**MCH163: Starch-tastic Plastic**
In this experiment I tested which starch created the strongest biodegradable plastic. To do this I tested 4 different types of starches: Potato, Corn, Arrow-root, and Tapioca. For each starch, three samples of bio-plastics were made. Once all the plastics were solid I had to determine the weight, thickness, area, and force of every sample. Then, I used a spring scale to determine the tensile strength of each plastic. The plastic with the highest average tensile strength is the strongest. I believe this experiment allowed me to have a greater understanding of not only Chemistry, but Math too.

**MCH164: Magic Markers**
The purpose of this experiment is to see if plant extract markers or synthetic markers have better colors. To conduct this experiment I had to run the two dyes of the markers on chromatography paper. Then, I had to determine which colors are better based on the qualities of the colors. The experimental results were measured by comparing the saturation and brightness of the two marker dyes. The results of this experiment showed that the synthetic marker has better colors. The results indicate I should accept my hypothesis. I accept my hypothesis because the synthetic marker had full vividness in all three trials. Also the synthetic marker absorbed more light making it have a darker, richer hue.
**MCH165: Electrolyte components in drinks**
Companies spend a great deal of money on advertising electrolyte drinks. Where as in the past there used to be only one electrolyte drink now there are hundreds to choose from. Now you have drinks that are advertised as having the right amount of electrolytes before you work out, during your work out, and after your work out. But how many electrolytes do these drinks contain? I am testing different drinks to see which one contains the greatest number of electrolytes. I hypothesize if I test different drinks that contain electrolytes, then Gatorade Recover will have the most electrolytes because it is designed to replenish electrolytes after training so it would be ideal that it would contain the most electrolytes. After I performed the experiment and tabulated my results and made the graphs I concluded that Pedialyte actually contained the most electrolytes.

**MCH166: HOW WHITE ARE YOUR TEETH?**
My project showed how beverages stain and disintegrate teeth. People are insecure about their smile so my project will help show what drinks to cut out. My hypothesis is that coffee would be the worst strainer and soda would disintegrate the worst. I tested my project by leaving eggs in the beverages for a week. My project showed that Dr. Pepper is the worst over all with disintegrating. Coconut coffee is the worst staining agent. Tea is the least affective staining or disintegrating agent but Half and Half is the worst.

**MCH167: How Can Different types of light Effect Water's Evaporation**
This experiment was to determine which the light source is evaporated the most water. The lights used were a black light, a compact florescent light, and a natural light. Fifty mL of water was put in a beaker and placed under each different light. The water was left for one day and once the day was over the information was recorded. The same steps were repeated twice, with a total of three trials. The results of all three trials were recorded. It was concluded that more water was evaporated by the natural light.

**MCH168: PUMPKIN DEHYDRATION PRESERVATION**
This science fair project is to preserve pumpkins through dehydration. Everyone has the same problem in the fall when you carve pumpkins and they decompose too quickly. In this project water was removed with salt, vermiculite, charcoal, silica gel, and rice. If the hypothesis was correct, people could preserve their pumpkins by just adding the material that preserved the pumpkin the longest. Results of this project were that pumpkins with salt lasted for nineteen days opposed to the other pumpkins that molded in less than 15 days. These results met the hypothesis.

**MCH169: Will the Luminol glow Last Longer if the Water is Hot or Cold?**
My experiment was the chemical glow of luminol. First I laid all the materials out on the table. Then add the chemicals which are luminol, perborate, and copper sulfate. After that I poured the hot water and the cold water in the cups at the same time. I then stirred them with popsicle sticks until the hot water started to glow. Hot glowed for a total of 24 seconds cold glowed for a total of 32 seconds. After that I cleaned the materials up. My conclusion is if you were to use luminol you would want to use cold water.

**MCH170: Cooking Method and Fat in Egg**
Eggs are consumed for their protein content, but they are also high in fat. Heating eggs during cooking can alter the chemical structure of the fat in eggs, causing health problems including heart disease. Lipid solvent extraction with acetone was used to test the hypothesis that hard-boiled eggs will contain the least total fat and the most oxidized fat compared to raw and fried eggs. The results supported the hypothesis and showed that heat oxidizes the fat in eggs. This information can be applied to raise awareness of harmful health consequences of consuming eggs exposed to high temperatures during cooking.

**MCH171: How Can You Tell Real God from Fake Gold**
How can you find out if you have real god or fake gold? For the magnet test, if you touch each metal it will stick to each metal. For the acid test, if you put a drop of acid on each metal mark, the mark will disappear. My conclusion states that my experiment did not support my hypothesis because I said everything would stick and it didn't all stick, and that every mark would disappear and they didn't.

**MCH172: Getting the Soap Out**
I will be filtering the soap out of .95 liters of soapy water. In order to do this, I will be using 4 different substances. Epsom salt, salt, sugar, and baking soda will be used along with coffee filters. These trials will not need any human participants to collect data. I will be taking all necessary safety measures to do this project such as wearing an apron, safety goggles, and rubber gloves. To collect my data, I will be measuring the amount of soap I administer to it and measuring the amount that gets filtered out.

**MCH173: Glowing Brightly**
I chose the topic of electricity as I have always been interested in how light is produced and what would affect bulbs brightness. There have been studies conducted on what makes the best filament and how durable the filaments thickness is in burn time, but I wanted to see for myself. I researched electricity, parts of a light bulb, their function, and how electricity is produced. Learning how the light bulb actually works was really interesting and kept me motivated to continue with my experiment. Choosing a variety of filament thicknesses I conducted the experiment to see which one would have the best color, burn the brightest and longest. I conducted, observed, and documented the results for each test. I was surprised at the results and if you read on maybe you will be too.
MCH174: Analysis: Vit. C Content in Conventional vs. Organic Oranges
This experiment was conducted to discover if organic or conventional oranges contain more ascorbic acid. I hypothesized that organic oranges would provide more Vitamin C. My research indicated that conventional oranges are grown with nitrogen fertilizers, allowing for the uptake of more water in these oranges. 5 organic and 5 conventional oranges were tested from 5 different states for a total of 50 oranges tested. I titrated 5 mL of each type of orange with indophenol indicator solution until a rose-pink color appeared, signifying the endpoint of the reaction. In my results conventional oranges from all states were found to have more Vitamin C. This could be because organic oranges are more expensive, so they may sit on the shelf for a longer period of time. More time on the shelf allows a greater chance of oxidation and loss of Vitamin C.

MCH175: Do Different Liquids evaporate at the same Rate?
In this experiment I chose to determine what liquid could evaporate the most in different temperatures. I decided to do this because when I was learning about weather and evaporation, I did not understand it, so I wanted to do a project that could help me understand weathering and evaporation more. I did this project by pouring 220ml of three different liquids into 3 beakers. After that I placed each beaker in the incubator provided, and weighed them. I will be doing this with three different temperatures, but the project is still in progress

MCH176: Speed of Burning Paper
This experiment was conducted to find out which type of paper (computer, construction, notebook, or wax paper) will burn at the fastest rate. Time was measured by the time it took from the three centimeter by three centimeter to be lit to the time the flame either died or burned up the whole piece of paper. The distance was measured by lighting each paper from the top left corner and measuring the distance the flame traveled to the bottom right corner. The time was divided by the distance and speed was recorded. In the end, wax paper burned the fastest

MCH177: How Sweet Are the Sweetest Fruits?
The glucose concentration of various fruits will be measured. In a second phase, frozen, room temperature and warmed fruits will also be evaluated for glucose concentration.

MCH178: Can Baking Soda Substitute for Baking Powder in a Muffin Recipe?
In my experiment, I used chemistry to test if I could substitute baking soda and cream of tartar for baking powder in a muffin recipe. I made one batch using baking soda, three using different amounts of the ratio two parts cream of tartar to one part baking soda, and one using the original amount of baking powder. I recorded the average height and weight. My results showed that the muffins made with cream of tartar and baking soda weighed more and were taller or had a similar height compared to the muffins made with baking powder.

MCH179: Solution from Potatoes
Imagine a massive power outage; radio communication is critical. This project evaluates the feasibility of constructing a battery from materials found in your home: zinc, copper, potatoes. The battery is constructed and tested. Design of an optimum battery network is considered.

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MCH181: The Ice Cold Shoulder
Can the reaction created in an instant cold pack be replicated with simple and safe ingredients? Add 50g NaHCO3 to a beaker. Add 100 mL distilled water and monitor temperature for 10 minutes. Repeat with KNO3, NaCl, and NH4Cl. Repeat 5 times. Cut open an instant cold pack and pour 50g NH4NO3 into a beaker. Repeat step 2 and 5 5 times. Only NH4Cl and NH4NO3 lowered the temperature enough. The other chemicals didn’t suffice the required temperature.

My hypothesis was denied. The required reaction didn’t occur. Harsh chemicals are necessary because they meet requirements. (96 words)

MCH182: pH of Different Types of Water
Thru testing the pH of different types of bottled water was found. The results would be used to determine if there was a pH difference between the more expensive water compared to tap water. The results were shocking. It was found that tap water has a better pH level for the body than two of the other four samples. With water, the more alkaline the water is the better it is for the human.

MCH183: Supercooling Water
I performed this experiment to find out if water supercools faster if it is pre-heated. To get my information I had to use different water temperatures for my experiment. I tested how long it took for water to reach 3 degrees Celsius. My data showed me that the hotter the water, the shorter amount of time it took to supercool.

MCH184: Thermal Distillation
I did this experiment to find out the answer to the question “Can the sun be used to purify salt water into clean drinking water?” The sun was used to take the salt water, evaporate it, condense it, and purify it to make clean drinking water. Over a period of six days, using heat lamps instead of the sun because of the freezing temperatures, I put my desalinators under the lamps to heat them to the point of evaporation. This purified the salt water and left me with clean drinking water.
MCH185: Colorful Evaporation
Colorful Evaporation – The purpose of my experiment was to find if the color of water affected its evaporation. Three beakers of various colored water were placed on a windowsill. The amount of water remaining was measured after 4 days for each trial. Interesting results were obtained.

MCH186: Corroded!
The purpose of my project was to see which metal out of copper, aluminum, iron, zinc, and steel corroded the most and if using distilled or salt water affected that rate. My hypothesis indicated the metals would corrode in the order of iron, copper, steel, aluminum, and zinc from most to least. In the experiment, cups were filled with distilled or salt water and each metal was placed in them. I observed any changes and repeated the procedure three times, determining on average, the metals corroded in this order: zinc and steel, iron, copper, and aluminum. My hypothesis was incorrect.

MCH187: Can Water Effect Alcohol Freezing
For this project we tested how different amounts of alcohol could affect the freezing properties of water. We did this to see how different alcoholic beverages with equal percentages of alcohol would freeze overnight. We tested this by mixing different percentages of ethanol and water up to 50% ethanol and freezing for 14 hours. The data showed that even in samples with low percentages of ethanol the sample did not freeze. We conclude that this was mainly due to the fact that alcohol has a much lower freezing point than water so the ethanol did not freeze.

MCH188: Hydrogen Generator
My project to split a molecule of water was a success. It support my hypothesis: 12 volts, rather than six, would create the most amount of hydrogen. After two hours, I carefully removed the bottle of hydrogen from the thread and let the water run out, knowing that hydrogen is lighter than water. My project proved that sending an electric current through water could split the molecule.

MCH189: Water, Water, Everywhere Not a Drop to Drink
Water is needed in daily functions and this study tested which water filter purifies water the most effective way. Three water filters, and three different drinks were tested on four variables. These four variables were color, taste, specific gravity, and volume. Each different drink was tested in each filter. It was concluded that the British Berkefeld water filter is the most effective and efficient.

MCH190: Does DEET Decrease the Strength of Monofilament Fishing Line?
Purpose: To determine if DEET decreases the strength of fishing line.
Hypothesis: As concentration of DEET increases, the strength of the mono fishing line will decrease.
Procedure:
1. Prepare 0%, 25%, 50%, 75%, and 100% different DEET solutions.
2. Cut 450 equal length pieces of mono fishing line
3. Place 120 different pieces of fishing line in a 0%(Control), 25%, 50%, 75%, and 100% DEET solutions.
4. Remove 30 pieces of mono fishing line from each container of DEET solution being tested, and determine and record its strength using the testing apparatus after soaking for 0, 24, 48, and 72 hours
Conclusion:
Experiment still in progress. Final results will be available at the fair.

MCH300: A Colorless Skittle
Please visit student's exhibit for project abstract.

MCH301: Crystal Fudge
The purpose of "Crystal Fudge" is to find out how cooling time affects the crystalization process. If cooling time affects crystal size, then the crystals will be smaller the faster it cools. We made fudge in three identical pans and cooled them at three different temperatures. We examined the results qualitatively with a magnifying glass. The fudge that cooled the fastest had the smallest crystals and the smoothest texture while the fudge that cooled the slowest had the largest crystals and a grainy texture. I conclude that the faster the cooling time, the smaller the crystals.

MCH302: Fabric Fire
The purpose of this experiment was to see if fabric softener affects flammability in clothes. To conduct this experiment we needed to test the flammability of clothes with and without fabric softener. We did that by laying them on top of an alcohol lamp. We measured how long each fabric took. The experimental results were measured by how many seconds it took for the fabrics to visibly burn. The results of the experiment indicated that fabric softener made fabrics burn much faster, about half the regular time. The results indicate that we should accept our hypothesis because the fabric softener made the fabrics much more flammable.

MCH303: Gasoline vs Battery
This project will explain which device consisting of an iPod or engine will last longest before running out of battery life or gasoline. After the experiment we will know which one lasts the longest. We think the iPod will last longer since it is a lithium battery. This is an older engine so it will more likely use the gasoline quicker. As a result the iPod lasted much longer than the engine.
**MCH304: GELATIN**
How long does it take gelatin to melt? Well, not very long. Gelatin isn't just a fruity dessert! It's also used to hold certain products together. The problem was that gelatin got watery and soft if you left it out for a little while. Our hypothesis is that the salt will increase the rigidity of gelatin. We placed 5 quarters onto each gelatin filled cup and we measured the difference after one minute. We concluded that the salt increased the rigidity of the gelatin. We also concluded that the lemon juice made the gelatin become a liquid.

**MCH305: Plop, Plop, Fizz, Fizz**
We decided to do this experiment because we were interested in chemical reactions. In order to conduct this experiment we made a data table and labeled the different temperatures and the number of trials for each temperature. Next, we filled each cup with the temperature of water required and dropped the tablet into the water and started our timer. After the tablet stopped fizzing completely we stopped the timer. Then recorded the time for each of the four trials in each temperature of water. The tablets dissolved the fastest in the hot tap water at 54°C.

**MCH306: Potency of Antioxidants Among Various Beverages**
This experiment determines and compares antioxidant levels of beverages, such as teas, juices, and carbonated drinks. Because polyphenols are naturally occurring chemical compounds that are powerful antioxidants, we used a UV/visible spectrophotometer to determine polyphenol content of each beverage sample. We prepared a calibration curve using gallic acid as the standard of phenol and compared the absorbance of each sample to the calibration curve to obtain total polyphenol content. Because of being less-processed and more natural, tea and fruit juice have higher antioxidant levels than carbonated drinks. Complete results will be available at the Science Fair.

**MCH307: Saving the Head of the Horseman**
The purpose of our experiment was to figure out which household product was the best pumpkin preserver. We carved the pumpkins, coated them in their correct household product, and then set them on a covered porch. As they slowly decayed, we took pictures to monitor their progression. Each pumpkin weighed around the same amount. We noticed during our experiment that the pumpkins started to get darker and they also started to collapse. Over twenty-eight days the pumpkins had rotted and collapsed. The vinegar and control pumpkins just happen to last longer.

**MCH308: THE COOLING PROPERTIES OF MINT**
The purpose of our project was to see if different mints had stronger cooling properties than others. The fact that mints were commonly shown with ice in advertisements made us wonder if it could cool water like ice does. We found that mint does cool water, but only by a few degrees. It was found that Altoids were the type of mint that cooled the most. The experiment procedure consisted of filling cups with water and placing a different type of mint in each cup. Then finding the temperature of the water in five minute intervals for twenty-five minutes.

**MCH309: The Proof is in the Prints**
This experiment was to determine what fingerprints would show up the clearest on different surface temperatures. We tested temperatures at 10-50 degrees, with 10 degree intervals. We test each temperature 3 times each. What we concluded was that the colder the temperature, the better the fingerprint appeared. The cold surface fingerprint appeared clearer, more distinct, and more detailed. Fingerprints result from a series of ridges that are unique to each individual. We wanted to find the best possible way to get the clearest, precise, and distinct print.
Intermediate – Computer Science & Math (MCM), 7th & 8th Grade

**MCM100: Latencies, Haptics, and Passwords**
With the increasing amount of personal data being stored online, there is an urgent need for ensuring its security. Passwords can be easily stolen or hacked, therefore, a secondary form of authentication is necessary. This project will test keystroke dynamics (the manner in which users type) alongside the ordinary password. Study participants will be asked to type various passwords and a single sentence multiple times. Keystroke latencies and typing pressure data will be collected and analyzed using clustering and neural networks. The project will identify the optimal method of using keystroke dynamics for authentication. Experimentation is currently in progress.

**MCM101: Play a Game, Train Your Brain**
The purpose of this project is to see if video games improve certain qualities in individuals that play them. If reaction time and hand-eye coordination times are tested in individuals, then the longer the individual plays video games on a weekly basis, the higher they will score higher on both tests. Participants are selected based on the amount of time playing video games weekly. Participants will then be asked to take two online tests. These tests will calculate the individual’s reaction time and hand-eye coordination expressed in seconds. Final results will be available on fair day.

**MCM102: Wi-Fi Strength**
Everyone always looks to improve their Wi-Fi signal, but what is really the correct way to go? This project looks at the Wi-Fi signals that can go through walls made of plastic, wood, and metal. The purpose of the experiment was to see which material Wi-Fi could connect through better. The Wi-Fi router was tested in one wood box, one metal box, and one plastic box. I put the router into the boxes and recorded the signal. The results supported my hypothesis that plastic would give the best signal. I concluded that plastic was the best conductor of Wi-Fi.

**MCM103: Sorting Unusual Data Sets**
For my experiment, I am running unusual sets of data through several sorting algorithms to see how they perform with unusual data. For example, I will use sets of data that are nearly sorted, are backwards, or contain few pieces of data. I hope to find out what basic sorting algorithm deals best with unusual circumstances.

**MCM104: From Tables to Graphs: Restructuring Highly-Connected Data**
The exponential growth of social media has changed the world tremendously. More businesses than before are utilizing the massive amounts of data flooding the internet. Yet, many applications use databases built upon the traditional relational data model. Most real-world data, however, is irregular and interrelated in parts while uniform and rigid in others, and is not effectively represented by a relational model. Conversely, graph databases, based on graph theory, are naturally expressive of highly-connected data. In this project, Neo4j, a leading graph database management system (GDBMS), was compared to MySQL, a relational database management system (RDBMS) in terms of performance. Friend-of-a-friend traversals (FOAF) from a depth of one to a depth of five were executed multiple times on two differently sized datasets stored in each DBMS. Neo4j was approximately fourteen times faster than MySQL for a depth-4 query on both datasets. Furthermore, Neo4j finished a depth-5 query in roughly twelve seconds on the larger dataset and 360 milliseconds on the smaller dataset, while MySQL did not finish the same query on either dataset. Based on the comparison results, Neo4j was proven to be faster than MySQL. Therefore, a tool, named âœGraphistâ¢, for converting data stored in a RDBMS into GDBMS data was developed and it was used to successfully migrate two sample RDBMS datasets from MySQL to Neo4j. This project will demonstrate the necessity for enterprises to adopt a graph database management system and give them the necessary tool to migrate existing databases with ease.

**MCM105: Modeling a Traffic Warning Signal**
I will develop a mathematical model to describe an optimized plan for the active advance warning signal at a traffic light. The warning light informs motorists of the traffic light condition due to low visibility. I have noticed that cars have clogged up the intersection even when the warning light is off. This creates an increased possibility of accidents. I have observed the warning signal on, but the light is green and the intersection is clear. This creates a conditioned response such that people start ignoring the warning signal. Safety could be improved if the warning signal was more meaningful.

**MCM106: What is the Fastest Way to Solve a Rubik’s Cube?**
The purpose of my experiment was to figure out which beginner/intermediate method for solving the Rubik’s cube is the fastest for beginners. I narrowed it down to two of the most popular beginner/intermediate methods (Official and Petrus methods) and practiced them each for a day. Then I performed each method five times and calculated the averages. On average, it took 00:10:22 to complete the cube using the official method, and it took 00:28:25 using the Petrus method. Therefore if you are a beginner and you want to solve the cube as fast as possible, go with the Official method.
**MCM107: Runs Predictor in baseball**

After watching the World Series, and Big Pappi, David Ortiz, hitting in runs left and right, I got interested in run production and which batting statistic predicts it best. To find this out, I had to import data, and then I found correlations. Then I made graphs and developed lines of regression to determine how strongly the stat and runs are correlated. I found out that OPS, or On-base plus Slugging, predicts run production best.

**MCM108: Single Elimination vs Double Elimination**

Double elimination was designed as a fairer alternative to double elimination at the expense of time. Double elimination requires a team to be beaten twice, while single elimination only requires a team to lose once. A computer model was created to simulate tournaments with varying number of teams and probabilities of teams winning. Each tournament was simulated 100 times. Double elimination was much better when the first place team had a winning probability of about 75%, but they were very similar when the first place team had a winning probability of 50% or 95%.

**MCM109: CRASH!**

There are many existing packing materials, but which prevents the most breakage? I believe bubble wrap will prevent the most breakage because it allows the plate to slide the least, as well as cushion the plate's fall. I tested 4 packing materials, bubble wrap, packing pillows, newspaper, and styrofoam peanuts and used 3 glass plates per material. I also had 3 glass plates as a control group. I packed each plate in a 2 gallon ziplock bag using one of the 4 materials. I then dropped each bag from 3.65m high. I made conclusions based on how many scratches there were, and how many pieces the plate broke into. My results will be shown at PRSEF in March.

**MCM110: DietWatcher**

In today's world, it is not uncommon to have health issues. Every diagnosis from diabetes to heartburn has health consequences. I have created an application that will control the owner’s diet and keep health problems under control. I postulate that when people start using my app, they will notice an improvement in their health. They will not have to worry about what foods they should eat because the app will provide alerts when food intake exceeds daily recommended requirements.

**MCM111: A Problem Solved?**

The purpose of my experiment was to find out if there was a way to make an algorithm to solve a Rubik's cube faster. I choose this topic because I always was fascinated at people who could solve Rubik's cubes very quickly and I wondered if I could do so. My problem was: "Is there a more efficient way to solve a 3x3 Rubik's cube?" My hypothesis was: "If I develop an algorithm for solving a 3x3 Rubik's cube, then I will be able to solve a Rubik's cube faster."

**MCM112: Application of JAVA to Text-Based Games**

For this project, the video game "21 Sticks" will be in Java format. The source of this format will then be edited by the scientist to determine if a more effective algorithms can be made. In addition, it is anticipated that the original can be "debugged."

**MCM113: A Web Archiving Library For Ruby**

A simple and cross-platform web archiving library was created in Ruby and released as an open source Ruby gem.

**MCM114: Tracking Swimmer With Software**

The goal of my project is to develop a computer program that does video analysis and will track my arm while swimming. The first step in tracking my arm was to find it in a frame (image). To find my arm, I used several image processing techniques such as thresholding and color based segmentation. After finding my arm, I stored the coordinates and analyzed the data. As a result of my analysis, I can then find metrics like the optimal stroke count in which I swim the fastest.

**MCM115: Web Design and Human Science**

I have built and engineered a fun science website for tweens and teens to go on. There are multiple sections to this website including: A home page, about us page, contact us page, a comments page, a question box page, a polls page, a video of the week page, and a topic page. Though there are only eight pages, there are many more to come. This website tries to combine teaching subjects with having fun, because what kid doesn't want to have fun. Let's get more technical with this subject. Our brain basically makes decisions based on experiences. The human senses make decisions on two levels, the unconscious and consciousness mind. Websites are about technology and attracting people. We can use this to help make the web and phones an educational experience, and make teens look for sites that teach information while they chat and surf.
MCM116: The Science of App Development
Apps, there are millions of them out there in various markets, such as the App Store for iOS devices, and the Google Play Store for Android devices, but how are they created? What is app development? These frequently asked questions are addressed by this project and explains the process of app development and uploading an app to an app market by developing an app. I did this project because although many people use mobile apps in their everyday lives, a large majority of those people do not know how the apps were created, or the work that was put in to the development of those apps. At the end of my experiment, I was successful in developing an app and uploading it onto the Google Play Store. Also, I am able to explain the process of app development and uploading an app to an app market.

MCM300: Exploring Pascal's Triangle
The purpose of this project is to discover if patterns in Pascal's Triangle correlate to events in nature or to socio-economic statistical data. We hypothesize that when the patterns in Pascal's Triangle emerge in a data set, this could be a prediction of future events or outcomes. We will obtain various data sets, such as seismogram readings, stock market data, and population growth data. We will graph the roots of Pascal's triangle and then seek to identify any correlations between it and the data sets. We will present our findings at the Science Fair.
MCS100: Lettuce Grow by Wi-Fi
Wi-Fi is everywhere, almost everywhere we go. Since it is everywhere, I wondered if it could affect us humans as well as plant growth. The purpose was to find out if Wi-Fi can harm us. I chose lettuce seeds and used shaved coconut and paper plates to grow the plants in. I put one plant in the room with Wi-Fi and one away from it. The lettuce seeds grown near the Wi-Fi did not grow as much as the lettuce seeds grown away from the Wi-Fi. Plants will grow near Wi-Fi with almost no effects.

MCS101: What Fruit Packaging Keeps Fruit the Longest
This project was based on how to keep fruit fresh the longest. There are many different fruit that require different packaging to keep fresh. I tested different brands of plastic bags. The conclusion is that a banana can be kept fresher longer depending on the packaging.

MCS102: Nail Polish-Durability vs. Price
The purpose of this experiment is to see if paying a higher price for nail polish will result in longer wear and durability. To conduct this experiment I will be comparing different brands of nail polish at different prices. The experimental results were measured in how many days it took the nail polish to chip. The results showed that the medium price nail Polish took more days to chip, and the more expensive nail polish and least expensive nail polish took the least amount of days to chip. The results indicate that my hypothesis should be rejected. I disagree with my hypothesis because Sally Hansen Diamond Strength took an average of four days to chip, when Essie and Funky Fingers took an average of three days to chip.

MCS103: Are All Lunchboxes Created Equal?
This project is to determine what type of lunchbox is the best for maintaining hot temperatures. This was determined by microwaving 1 cup of water for 2 minutes then checking the temperature and recording it. Then I set the thermos in one of the lunchboxes for a set amount of hours (2, 4, 6 hours). After that, the temperature of the water in the thermos is tested and recorded. I did this with for different lunchboxes. The lunchbox that made the water’s temperature drop the least is the best. Results will be available at the PRSEF in March.

MCS104: Which Form of Insulation is Most Effective?
This project is to determine which form of insulation is the most effective. I will test four different types of insulation: foam, reflective, fiberglass, and polystyrene. I will build a wooden box and place each type of insulation inside the box, one at a time. A heat lamp will be placed inside the box and the temperature will be recorded every five minutes for a period of one hour. A thermal imaging gun will also be used to show how much heat has escaped from the box. My results will be available at PRSEF in March.

MCS105: Does Whitening Toothpaste Work?
My experiment is, "Does Whitening Toothpaste Work?" The purpose of my experiment is to find out if whitening toothpaste works and if so, what brand works the best. My procedure was to soak 50 eggs, then brush each with a different toothpaste. Then, I compared all the eggs to see which brand worked the best. I found out that whitening toothpaste does work, and the Colgate Optic White toothpaste worked the best.

MCS107: Which brand of batteries lasts the longest?
The premise of this experiment is to find which brand of batteries lasts the longest. Three brands of batteries were tested; Duracell, Energizer, and Panasonic. One set of each brand of batteries were placed inside flashlights and turned on. They were tested until each of the flashlights power stopped. The data was recorded it was concluded that both Duracell and Energizer lasted the longest.

MCS108: Does Green Really Clean?
Green is in! Green, or environmentally friendly, has become the wave of the future in many products. Disinfectants are no exception. This experiment was intended to discover if green cleaners are as effective as chemical cleaners. Therefore, the problem to be studied in this investigation is: are green cleaners as effective in killing bacteria as chemical cleaners? My hypothesis is that green cleaners are not going to be as effective because they use less effective biocides than traditional cleaners. This experiment has a very practical application because it will help people decide what disinfectants they want to use in their house. The procedure that will be used is: Prepare plates and streak with bacteria, then immediately transport to incubator and set at 37 degrees Celsius. Remove plates from incubator, measure zone of inhibition and record type and count. Repeat three times. This project required the guidance of a research microbiologist and the use of a science lab at an area high school. The data and conclusion are yet to be determined.

MCS109: Which Popcorn Pops the Most
I did this experiment because it would be nice to eat and do my science fair project at the same time. However, this experiment showed why I picked it in the first place—because of how challenging the math was. I counted popcorn kernels before popping and after popping. I put the counted popcorn into bags, and put and sorted them. After that I got the calculator and did the math. The math used formulas for percentages needed for averaging the popcorn. The results surprised me.
**MCS110: Carpet Stain Removing**
I tested four carpet cleaners on coffee stains to see which cleaner worked best: Austin's Carpet Cleaner, Resolve, Spot Shot, and a homemade carpet cleaner. I predicted that Spot Shot Carpet Cleaner would work best due to ingredients and previous experience. At the end, the results I got were surprising, and did not support my hypothesis. The homemade carpet cleaner worked best.

**MCS111: Fry or Filler?**
My project is on which brand of French fries has the most preservatives in them. I did this experiment because I wanted to see which French fry brand was healthiest to eat. I did this by leaving each fry brand in a jar and seeing which ones molded the fastest. My conclusion was that frozen fries have the most preservatives in them. As a follow up on my experiment I will test more brands of fries and other frozen varieties.

**MCS112: Need for Speed**
I did my project to see if the brand of a running shoe would make someone run faster. I took five runners and had them run 402 meters, then change into a different shoe and run another lap. They did this three times, and all times were recorded. I learned that the heavier the shoe the slower the runner, and that the more closely related the shoes the closer the times. My results show that more time should be spent picking out a running shoe, and that some runners’ favorite running shoe doesn’t necessarily give them the best running results.

**MCS113: Analyzing Moisturizer Effectiveness**
Many people have dry skin in the wintertime. I want to know how to prevent dry skin by finding out which moisturizer will keep skin hydrated most. I will observe five different moisturizers’ effectiveness over the course of two weeks to find the most active one for dry skin.

**MCS114: Do You Like It?**
The purpose of this project is to see if labeling affects an individual’s preference of a product. If a participant tastes water samples from the same source, then they will think the one with the best label tastes the best. Participants will rank water bottles on both the preference of the label and the preference of flavor. All water samples will be from the same source to guarantee that any difference is strictly influenced by the label preference. This data will be analyzed and recorded as quantitative data. Final results will be available on fair day.

**MCS116: Which is Denser?**
The purpose of my experiment was to answer my question of which type of egg, organic or non-organic, was denser. I wanted to find out since I couldn’t find any other research about this topic. I used 6 brands of eggs: 3 organic and 3 non-organic, with 12 eggs to each brand. I found the mass and volume of each egg, calculated the density, then found the average mass, volume, and density for each brand. My conclusion is that there is no big difference in density between organic and non-organic eggs. There are very small differences, but no extreme difference.

**MCS117: Which Brand of Craft Glue Has the Greatest Adhesive Strength for the Lowest Cost?**
Purpose: Determine if more expensive brands of glue have a greater adhesive strength than least expensive brands. Hypothesis: As the price of the glue increases, the adhesive strength of the glue will increase.
Experimental Procedure:
1. Obtain needed materials and construct the testing apparatus
2. Using 0.1 milliliters of glue A glue 21 pairs of test dowel rods together.
3. Determine mass required to break glue bond between the test dowels rods after allowing the glue to dry for 30, 60, 90, 120min.
4. Repeat steps 1-3 for the remaining 4 glues being tested.
Conclusion: Final results will be available on fair day.

**MCS118: How Long Does**
In this experiment, I will be using many different fruits to see which one molds the fastest. My experiment will help produce managers know when to rotate certain produce. It will also help customers decide how quickly to eat the produce.
**MCS120: Good to the Last Pop!**

My project was to find out which brand of microwave popcorn and cooking time left the least amount of unpopped kernels. I used three different microwave popcorn brands; Orville Redenbacher, Act II, and Pop Secret. The suggested cooking time for Pop Secret was four minutes. The suggested cooking time for Orville Redenbacher was two minutes. The suggested cooking time for Act II was two minutes and thirty seconds. With using the suggested cooking time, I took it out as soon as there was one to two seconds between each pop. But, when I pressed the popcorn button, I let the popcorn cook longer and the microwave set the cooking time at four minutes. I removed the popcorn from the microwave as soon as it was done cooking. When I used the popcorn button, I removed Orville Redenbacher from the microwave after it cooked for 2 minutes and 25 seconds. I removed Act II from the microwave once it cooked for 2 minutes and 39 seconds. I removed Pop Secret from the microwave once it cooked for 2 minutes and 30 seconds. My hypothesis was correct. When I increased the cooking time, the amount of unpopped kernels decreased because the popcorn had a longer cooking time. When pressing the popcorn button and allowing the popcorn to cook, Pop Secret was scorched and burnt. Act II was burnt slightly. Orville Redenbacher did not burn. With cooking the popcorn for the suggested time, Act II and Pop Secret both left the least amount of unpopped kernels at one teaspoon. With cooking the popcorn longer and pressing the popcorn button, Act II and Pop Secret left the smallest amount of unpopped kernels at one-fourth of a teaspoon. But, Act II wasn’t burnt nearly as much as Pop Secret was.

**MCS121: Which Energizer Battery Lasts the Longest?**

Four types of Energizer Batteries were tested. Energizer Ultimate Lithium was expected to perform the best because of its high charge density. Each battery’s voltage was measured before and after the test period. Two batteries of each Energizer brand were put into three flashlights, which were turned on for two hours at a time. These steps were repeated for each type of battery. All data was entered into charts and graphs. Energizer Rechargeable lost the least amount of voltage and had the highest hours of battery life. The hypothesis was not supported by this investigation; Ultimate Lithium had the second highest voltage loss. Energizer Rechargeable is the best value because you can reuse them extending their battery life, making it more cost effective.

**MCS122: Is Organic Better?**

Oranges and orange juices are great way to start your morning, but which ones are the best? This experiment was intended to find the oxidation rate of vitamin C in one week of organic oranges and orange juices compared to the oxidation rate of conventional oranges and orange juices. The purpose of this experiment was help people to know what type of orange or orange juice is healthiest. 25ml of juice freshly squeezed from organic and conventional oranges and 25ml of bottled organic and conventional orange juice was titrated with indophenol indicator solution until a rose pink color appeared (endpoint of reaction). Wait one week to determine the loss of ascorbic acid. Repeat tests. Four different types of oranges and four different types of oranges juices were tested for 3 trials each initially and after one week for a total of 48 trials. It was determined that the ascorbic acid content in organic oranges and juices was less than that in conventional oranges and juices, and that all organic juices also lost more Vitamin C due to oxidation after 1 week. It was thought that because the organic oranges and juices cost more, they might have sat on shelves for a longer time than their conventional counterparts, leading to this outcome. Future work is planned to test additional oranges and orange juices.

**MCS123: Does the Cost of Ski Wax Indicate Its Ability to Decrease Frictional Resistance?**

Does Cost Of Ski Wax Indicate Ability To Decrease Friction?
Purpose-Does ski wax cost affect friction.
Hypothesis-As the price increases its ability to reduce friction increases.
Procedure:
1. Construct testing apparatus.
2. Clean ski with wax solvent (Control).
3. Determine time required for control to travel 548 cm.
4. Repeat Step 3 29 times.
5. Select wax for testing.
6. Apply wax using sponge.
7. Let wax dry for 15 min.
8. Determine time required for ski to travel 548 cm
9. Repeat Step 8 29 times.
10. Repeat Steps 5-9 for remaining waxes.
Conclusion-Final results will be available on fair day.

**MCS124: Chocolate Meltdown**

The change of phase from solid to liquid is known as melting. Rate of melting can be critical in preparation of delicate foods. In this project, the melting characteristics of three types of chocolate are compared. The hypothesis is that melting will occur at the fastest rate for chocolate with the fewest ingredients.
**MCS125: DECAFFEINATED TEA AND CAFFEINE**
This science project was to determine which decaffeinated tea contained the least amount of caffeine after it was brewed. Various types of decaffeinated tea were brewed in mugs. The tea was tested for caffeine using a Tannic acid solution. It was added by drops until a white precipitate formed. The more tannic acid that was used indicated the least amount of caffeine. Four trials were completed. The data was recorded and analyzed. Based on the results, it showed that Black tea contained the least amount of caffeine.

**MCS126: Which Energy Efficient Fluorescent Light Bulb Produces the Greatest Amount of Plant Growth for the Least Cost?**
Purpose: Determine which lightbulb has greatest positive effect on growth of plants for least cost.
Hypothesis: As price of lightbulb increases, growth of plants will increase.
Procedure: Fill cups with topsoil
Place 2 seeds into cups
Add 25 mL water to each cup
Place 18 cups prepared under a grow light
Place 20 of the cups prepared under each lightbulb
Every 3 days, apply 25 mL water to cups throughout experiment duration
Determine date when seed germinated and growth of plants in three days for experiment duration
After 16 days, determine dry biomass of plants in every cup.
Conclusion: Final results available at fair.

**MCS127: How Sweet Is It Really?**
Our bodies break down nutrients we intake into glucose. Glucose is the fuel that sustains our brains, muscles and other tissues. Excess glucose can lead to high blood sugar and long-term health problems such as diabetes. In this work a framework for rating the glucose content of 8 foods and drinks is developed. Rankings are confirmed with measures of glucose content.

**MCS128: Out of Charge?**
Electronic devices such as mobile phones provide assistance to the daily activities of living. A major disadvantage is the tether otherwise known as a charging cord. A vision of the future will include the capability to charge devices by direct sunlight. My hypothesis is that current mobile phone designs do not have the capability for direct charging by sunlight.

**MCS129: How Do Eggs Affect Brownies?**
The importance of eggs in a typical brownie recipe will be investigated. Batches including 0-4 eggs will be prepared and the resulting brownie thickness will be measured.

**MCS130: Are More Expensive Golf Balls Worth It?**
First, I gathered 5 brands of golf balls with 3 of each type of ball. I hit one of each type of ball with a pitching wedge, taking a short break after each swing so I didn't get tired. I repeated the previous step two more times. Then, with three 100 foot tape measures I measured how far each ball traveled. I found the average distance of each type of ball. I concluded that the middle priced balls go the farthest.

**MCS131: The Fight to White**
The purpose of my experiment is to see whether white strips, whitening toothpaste, or whitening rinse will whiten teeth more effectively. To conduct this experiment, using hard boiled eggs as a substitute for human teeth, I gathered 15 eggs for each whitening product. I treated the egg shells with the specific product for the recommended amount of days and recorded observations. Using a teeth color shade chart, the eggs were then compared to the chart for overall improvement in whitening (ideally to revert to original color). The results of the experiment indicate that a rinse agent showed the most significant improvement. The white strips performed well, within one color shade of the rinse. The toothpaste showed improved whitening however it was two color shades off from the rinse. The results indicate that the hypothesis, if comparing 3D White toothpaste, rinse, and white strips, then the white strips will whiten teeth the best, should be rejected.

**MCS132: BRITA VS ZERO**
My project will benefit, both, Brita and Zero Water filter owners. Brita filter owners may want to talk another look at what they are drinking from. My hypothesis is that the Brita filter will purify the liquid better than the Zero Water filter. I tested 2 cups of each liquid. I did 10 trials for each. After I checked the liquid with the meter, I put it through the filter, and checked it again. The zero water filter works purified the water better. Brita and Zero Water owners should take a better look at what they are buying.
**MCS134: Which is whiter?**
The purpose of this experiment is to investigate which whitening toothpaste whitens the best; crest 3d white, Colgate total white, or arm and hammer advance white. To conduct this experiment I compared the toothpaste and how much each whitened. The experimental results were measured by placing 9 eggs in red wine, then using each whitening toothpaste to each whiten 3 eggs. The results show that the crest 3d whit whitened the eggshell the most. The results indicate that I agree with my hypothesis because crest 3d whit worked the best.

**MCS135: Viscosity Of Motor Oil**
Motor oil is used to lubricate various parts in the internal combustion engine. This experiment tested 8 motor oils, 4 synthetic and 4 non-synthetic oils at 3 temperatures: room temperature, cold temperature, and high operating temperatures. I did three tests per motor oil at the 3 different temperatures. Results of the 72 trials were averaged. The viscosity equation was used to calculate my final results, using acceleration due to gravity and density of the marble. Finally, a cost analysis showed the best oil at the best price for your car.

**MCS136: Burn Baby Burn**
During my project this year, I tested the theory that white candles would burn faster than colored candles. During the first trial, I burned three candles of the same size and weight, but three different colors. Burned each one for an hour and a half, and took measurements at fifteen minute intervals. During that trial I found that the yellow candle burned the fastest. During the second trial, I followed the same steps. This time the red and white candles burned the same amount, leaving the yellow to be the slowest.

**MCS137: Polish Your Mind**
In my project I tested which color of ‘L.A. Colors’ brand nail polish would stay on the best over a span of 4 weeks. My hypothesis was that ‘Coral Reef’ would stay on the best. My procedure is 7 steps. First, I take off any nail polish that the subjects are wearing. Then put on a clear coat and let it dry. I then repeat that with two coats of the color, and a single clear top coat. I concluded that my hypothesis was right. ‘Coral Reef’ proved to be the best.

**MCS138: Analysis of Acidic Beverages on Teeth**
Recent studies have shown that acidic beverages such as sport drinks and other popular drinks have added acids that can cause demineralization leading to tooth decay. Research showed that the most common acids used in such drinks are citric, ascorbic, phosphoric, and carbonic acids. This experiment was conducted to see which drink would cause the most tooth decay. Thirty-five sterilized teeth were obtained from an oral surgeon. Before the experiment was started the mass of each tooth was taken using an electronic balance and the pH of each drink was taken with a pH meter. The drinks used in this experiment were lemonade, Gatorade, Pepsi, Red Bull, Grape Juice, and Sunny D. The teeth were soaked in 6 different acidic drinks and the control group, water, for 3 days over a month period (5 trials for each beverage). Each tooth was then taken out: the mass of the teeth was taken, the pH of each beverage was measured, and each set of data was averaged for each group. My research found lemonade, which contained a large amount of citric acid and ascorbic acid, caused the greatest amount of tooth decay in this experiment.

**MCS139: Commercial Vs. Homemade Cell Phone Chargers**
Commercial cell phone chargers will be compared to homemade cell phone chargers by measuring amount of time required to fully charge cell phone and the amount of time cell phone is operable between charges.

**MCS140: Durability of Paint**
The purpose of this investigation is to find the most durable paint brand under various weathering conditions. My hypothesis was that the Behr paint would be the most durable brand because it was the most expensive. To test this, I cut 24 blocks of wood and painted 6 different types of paint: 3 different paint brands in two finishes of each - flat and gloss. I placed these boards and 6 non painted boards as the control groups at each of 3 weathering stations (acid rain, sun and extreme cold). I rotated each group every six days for 2 months. My results showed that the most durable paint was Valspar with only 9% average chipping. Also, it was the least expensive of the three brands. Thus, my hypothesis was incorrect. Valspar is a very durable paint brand and is recommended.

**MCS142: Will Monster Eat My Teeth and Food?**
A common known problem of drinking energy drinks is caffeine overload. However, a lesser acknowledged issue is that they cause tooth corrosion and can interfere with the digestive system. An experiment will conducted to determine how the human body is impacted using energy drinks such as Monster, Red Bull, and Rockstar. To test this, eggshells will simulate the tooth’s enamel. Shrimps represent protein being digested. Lemon juice takes the place of hydrochloric acid, of stomach acid. The experiment of immersing these objects in energy drinks and comparing the weight lost should be able to shedding some light on these questions.
**MCS143: Do More Expensive Brands of Duct Tape Have a Greater Adhesive Strength Than Less Expensive Brands?**

**Purpose:** Determine if more expensive brands of duct tape have greater adhesive strength than less expensive brands.

**Hypothesis:** As the price of the duct tape increases its adhesive strength will increase.

**Experiment:**
1. Obtain materials.
2. Construct testing apparatus.
3. Select a brand of duct tape for testing.
4. Install 24 duct tape test samples in apparatus.
5. Test samples in numeric order.
6. Record mass required to break adhesive bond of duct tape sample.
7. Repeat steps 3 - 6 for remaining 23 duct tape samples.
8. Repeat steps 3 - 7 for remaining brands of duct tape.

**Conclusion:** Final results will be available on Fair Day.

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**MCS300: Balloon Burst**

The purpose of this experiment shows the reaction when you put vinegar and baking soda together. The procedures for this project are:
1. Fill a bottle half way with vinegar.
2. Measure 1 tsp of baking soda, and pour it into the balloon.
3. Attach balloon to top of bottle.
4. Pour baking soda into vinegar. Some data is that we poured baking soda into vinegar and it reacted chemically causing the balloon to blow up. This mixture resulted in a chemical reaction producing enough force to blow up the balloon.

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**MCS301: Double Stuffed**

We wondered if Double Stuf and Mega Stuf Oreos have double and triple the cream stuffing as compared to original Oreos. We hypothesized that Mega Stuf will have twice the stuffing as original Oreos and that Double Stuf will only have 1.5 times the stuffing than the original Oreos. Using a kitchen scale, we measured the stuffing in each kind of cookie. We found that Double Stuf have 1.83 times the stuffing of original Oreos. Additionally, we found that Mega Stuf have 2.83 times the stuffing of original Oreos. In conclusion, we found that Double Stuf isn’t actually “double stuffed”.

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**MCS302: Dry Dyes**

This experiment was to determine what types of hair dye dry out your hair. We bought different types of hair dye/color. Then we will test them on different color hair extensions. After that we will examine the extensions and determine which brands dry your hair out the most.

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**MCS303: FERTILIZER FUN**

The experiment we did was to compare two different fertilizers. We compared Miracle Gro and Vigaro and Vigaro by far worked a lot better. It seemed to grow a lot faster and be more consistent. Miracle Gro seemed to grow a lot slower and inconsistent because some plants would be very tall and others are very short and look died. Also, we had plants that had no fertilizer at all. These plants grew at different time periods. The fertilizer kept the beans growing at a consistent pace. So, by the end of our experiment Vigaro worked a lot better.

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**MCS304: Insert Foot Here**

We tested six different handmade inserts to find out which insert was the most durable and caused the least amount of pain. This experiment was performed due to a friend that has Sever's Disease and we wanted to create a better insert for him. The insert testing consisted of biking for five minutes, treadmill running for three minutes, and walking a quarter of a mile. This was repeated three times. Our results were that the foam was very durable and the bean bag was the best for pain relief. Future studies would consist of different materials.

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**MCS305: Mayhem Myths**

Common household chores can be very tedious, and people are always looking for ways to make them easier. This experiment is designed to put some of these ‘corner-cutters’ to the test. Can Coco-Cola be used as a anti-rust tool? Will freezing batteries cause the charge to last longer? Can undiluted vinegar be used as a cleaner on plastic? Does adding salt to water make it boil faster? Tests will be conducted in sets of three, according to the respective ‘trick’. Results will be available at the PRSEF.

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**MCS306: PAINT DURABILITY**

We will test paint durability by putting four different paints under a weed whacker. We are doing this to help people save time and money and to make a difference in how paint companies test durability. In our hypothesis we said that the best paint would be “Rust-Oleum” brush paint, instead of its spray paint, and the brand "Do It Best" paint and spray paint. In conclusion we will be testing paint durability with a weed whacker to see which paint is most durable. To save people time and money, and to make a difference in paint testing’s.
**MCS307: THE BATTLE OF THE SUNBLOCKS**

Have you ever been sun burnt? I know you have! After multiple times of being burnt while swimming or being outdoors in the summer, we wanted to figure out which of the common brands will prevent us from being burnt the best. We used four different sun blocks along with a neutral when testing our experiment. The types of sun block we used were Banana Boat, Coppertone, Neutrogena, and CVS. Our result was that Neutrogena works the best.

**MCS308: Urgent Detergents**

This experiment was to determine what laundry detergent is the most effective on different types of stains. A lot of detergents are similar to each other in taking out stains. To do this experiment we have to take common everyday stains on different white cotton t-shirts and dispense different types of detergent on the different stains to see which one is the most powerful in taking out the stains. We do not have the results yet because the experiment is continuing.

**MCS309: Which Salt Melts Ice Faster?**

Please visit student's exhibit for project abstract.
MES100: Some Like it Hot, Some Like it Cold
30 beakers were filled with 300 grams of spring water. 2 grams of #2 fuel oil will be added to each set of 30 beakers. 1 gram of Archaea bacteria and pseudomonas putida will be added to the oil. To determine if temperature affects the rate of oil consumption by the bacteria the beakers will be tested at were 37°C, 6°C, 21°C. The control, 300 grams of spring water, will be used with every trial to allow for evaporation. The decrease in mass was measured every 24 hours and this value, which accounted for oil consumption by the bacteria.

MES101: Does the pH of Soil affect the pH balance of Water
pH is the measure of acidity or basicity in a solution. That is what I did my project on. I found out does soil affect the pH or water. In my results, I found that the pH of soil does affect water. I also found that pH and the pH of water and soil play an important role. When the pH of soil and the pH of water combine they play a major affect in the world. pH helps organisms in the wild to stay alive. Finally, it helps with human health, digestion, and energy.

MES102: The Accuracy of an Astrolabe
The purpose of this project was to create a working astrolabe that could measure the position of celestial objects. The astrolabe was also accurate in measuring longitudinal position.

MES103: Wave Formation
This experiment was to determine how waves are formed. It was performed to find out exactly how waves are formed and to see waves be formed. The experiment was performed by following the procedure, so materials were purchased and the model tank was set up. The results were that waves were formed, but experimentation is continuing. Results will be recorded such as how the waves formed, how long it took for them to form, and the height of the waves. In conclusion, we will soon know how waves are formed.

MES104: Solar Chef
Solar Energy is energy that is from the radiation from the sun. This energy can be collected in many ways. One of the major ways to collect solar energy is through solar panels. Solar energy is one of the cleanest energy source that there is. It may be costly, but it is worth it. Once the solar panels are installed there are no more payments that have to be made. You can do anything with solar energy. If you are ever are in need of energy use the sun’s radiation to fulfill your energy needs.

MES105: Composting Galore
Composting is a way to decrease the amount of material going into landfills. Worms speed up the process of composting. Knowing which combinations of foods worms need to make more compost may help people maximize their compost. Seven combinations of banana, carrots, and brussel sprout leaves were tested with the same number of worms, including comparing mashed, cut, and whole banana. All worms in the banana cups died. The cup containing all materials had the darkest soil. Worms do not care about the texture of the material and produce the best soil with a balanced mixture of different materials.

MES106: Which Direction Should You Point Solar Panels?
The purpose of this project is to find which direction solar panels should be pointed. The procedures are the following:

Making the "Solar Box":
1. Tape each of the four thermometers to the tissue box, one to each side, with all bottoms facing the same direction.
2. Place the box:
   1. Find a spot outside that you know will get sunlight all day.
   2. The next day wake up before the sun rises.
   3. Place the box in your sunny spot and wait until the sun rises.
   4. Once the sun rises, wait an hour and check the temperature and collect the data.
   5. Check the temperature and collect the data each hour until the sun goes down.

The data and conclusion will be available on fair day.

MES107: Soil Showdown
My testable question was “What effects do different types of enriched soils have on the growth, height, and color of Cosmos plants?”. My hypothesis was if the height and color of the plant is related to the different type of soil then the plants watered with the Miracle-Gro solution will grow larger and more colorful. My hypothesis was supported because my assumption was correct. At the completion of this experiment I believe I would test the soils by growing the plants in the summer for better results. Different vegetables would also be good plants to test. This experiment shows people that soil enhancers aid your plants growth. Plants depend on the nutrients from the soil to help them to grow big and full. Overall I think I did well on testing my question.
MES108: Dangerous Soil

The question for my project is, "Are there dangerous levels of lead in local soil?" I chose this project because lead can be hazardous to people, especially small children. My hypothesis was that there would be lead in my area, because of pollution and bad use of lead in the past. In my project I had to collect lead from various locations in the area. I tested all the soil samples I collected from each area and came to a conclusion that there was lead in my area, although for the most part they were not dangerous amounts.

MES109: Effects on Indoor Radon In Homes

Radon is a naturally occurring radioactive gas that is the second leading cause of lung cancer in the United States. Around 43 percent of homes in Allegheny County contain elevated levels of radon. Ten local homes, each in a different zip code area, were tested to see the effect of basement conditions on indoor radon levels. Directional data, compared to PA DEP data, indicates that the age of the home may be a more important factor than the condition of the basement, due to air exchange rates. Fortunately, testing for radon is easy and radon can be mitigated.

MES110: Go Green with Solar Energy!

The project that I decided to complete was Go Green with Solar Energy! So much of what we do in the world is driven by electricity and we need to find more ways to produce electricity in an environmentally friendly manner. My hypothesis was that higher levels of solar light energy will result in higher levels of generator production and higher levels of produced electricity. I wanted to see if I could use solar energy power to run a solar motor and generate even higher levels of electricity in a wooden electric generator. For my experiment I located a solar battery panel and solar motor, and built a wooden electric generator. I then combined the battery panel, solar motor and wooden electric generator. In order to make them work best together I had to add a pulley to both the solar motor and the wooden rotor. I then tested to see how many volts of electricity would be generated for the solar motor and the wooden electric generator each from five different sources of light, all of which had varying strengths, as measured by lumens. The results of my experiment were not consistent with my hypothesis. With each light source I was able to generate 3 volts of electricity to power the solar motor which in turn helped generate 2 volts of electricity from the wooden electric generator.

MES111: Tides Turning Turbines

In my experiment, I wanted to determine the best way of making energy from tidal power. I used three different sized holes, and three different size propellers, spinning water through for each combination. I found that the largest hole combined with the most flat propeller created the most spins, and therefore the most energy. My original thought was that the smallest hole with the largest propeller would have the most spins due to the water being more concentrated in one area. Now, looking back, the more water coming at once would provide more spins.

MES112: Seismograph

The purpose of this project was to create a seismograph that could detect and record movement. Using various materials, a working seismograph was created that provide written record of movement.

MES113: Rock, Acid, Water; Shoot!

Did you know that acid rain falls everyday? My project was to see what rock (metamorphic, igneous, or sedimentary) weathers the fastest in acid rain. I hypothesized that the sedimentary would weather the fastest because it's made of weathered sediments. During the experiment, I put the rocks (sandstone=sedimentary, marble=metamorphic, and lava rock=igneous) in hydrochloric acid for two hours and measured the weight changes. In the end, the metamorphic rock lost the most. The metamorphic rock lost an average of 5 grams, igneous gained 1 gram, and sedimentary gained 3 grams. This can help scientists keep the environment healthy.

MES114: Percolating Predicament

Study into the percolation rates on different soil types and it's impact for flooded regions. Final results will be at Sci. Fair.

MES115: How Does a Wind Meter Work?

My experiment was How does a wind meter work? I made two different wind meter and held them in front of a fan with three different speed. The smaller wind meter went faster than the larger one.

MES116: Warm, Wet, and...Compost

As concerns for impacts on our environment increase, more people are composting their organic waste. My experiment was to determine what additions to compost help break down items faster. I made 11 simulated compost bins and added common materials, like oatmeal and vinegar. I observed them frequently, and I added indicators like paper towels. A few of my composts seemed to dry up very easily, but what continued to break down the indicators and stay consistently moist were the grain products, bread, and oatmeal. I concluded that these two help to break down waste in compost faster than other materials.
**MES117: Solar Blossoms**
The purpose in conducting this experiment is to see what works best to grow a houseplant. In addition, if covering your plant with a lid helps to supply the plant with a good amount of sun light. I used three solar ovens, each with a different lid (clear Plexiglas, no cover, and thermal film). I planted marigolds in pots and placed them each in a different sub-chamber. Plants were watered daily and temperature/growth was recorded. My data showed me that plants grow the best with no cover. However, the thermal film plants grew pretty well too.

**MES118: Let it Shine**
For this experiment I would put my tripod outside, set up my materials and would measure the amounts of solar energy and cloud cover. I did this to determine the type of cloud formation that allows the most amount of sunlight to pass through and to find out which angle and direction produces the most amount of energy. My results showed me that on the days with few clouds did the best with partly cloudy and no clouds doing the second best. On days with few, partly and no clouds were all many cirrostratus, cirrus, and cumulus clouds.

**MES119: Algae: the Fuel of the Future?**
The purpose of my experiment was to find if algae could be a plausible source of oil as fuel. First, I grew the algae in water bottles in a special culture. After that, I soaked and boiled the algae in alcohol to extract the oil from the cell walls. Only a tiny amount of fuel was extracted. Based purely on my results, my answer is no, algae could not be a sustainable source of oil. Other experiments, however, have proved this to be untrue. I believe my failure was because of a flawed method.

**MES120: The Effectiveness of Water Retention Ponds**
One method of determining the effectiveness of a retaining pond is to test the pH level of the water for contaminants using a calibrated pH meter. I measured the pH level at the inflow and outflow points of my backyard pond immediately after a rain/snowstorm and then one day later over a several month period. I collected data for eight separate storms. Some samples showed increased acidity at the outflow point of the pond when compared to the inflow points which was contrary to what was expected. Overall, the data showed the inflow readings taken each day reflected lower pH (more acidic) when compared to the outflow readings after pollutants had settled, which was as expected and indicates the pond is functioning properly.

**MES121: The Astronomical Cuckoo Bird**
Most galaxies contain supermassive black holes (SMBH), but it is not known how they affect each other’s evolution. I hypothesized that the SMBH and galaxy grow together until a point at which the SMBH consumes the galaxy. Mathematically, I postulated that the ratio of SMBH mass to galaxy mass would grow exponentially as the age of the galaxy increased. I collected data from published sources and analyzed it using linear and nonlinear regression. I found that the mathematical relationship was true, and estimated the average lifespan of a galaxy at ~40 billion yrs.

**MES122: rooftop garden**
The purpose of my project is to determined if the peas plant was best plant for outside or the cherry tomato. I made a model of a green roof and I tested to see if they peas were the best for a rooftop garden in the winter. I determined that the peas plants grew the best because they grew the tallest in the cold weather.

**MES123: Comparison of 4 types of light bulbs**
The objective of this project was to compare the properties of different types of light bulbs to discover experimentally which light bulb is the most efficient. The light intensity, voltage, current, power, and temperature of each light bulb were measured. The luminous efficacy was calculated from the ratio of light intensity to electrical power. Light Emitting Diode bulbs use low electrical power, provide high luminous efficacy, and convert low electrical energy to heat energy. Therefore, LED light bulbs are generally more efficient. However, in this particular experiment the 60 W Daylight LED bulb was the most efficient light bulb.

**MES124: Do green-roof tops really keep you cool?**
The purpose of my project is to determine how the temperature inside a house changes when using a green roof. To test this, I created two models of houses. I placed a green roof on one of the models and I left the other roof plain. I took the temperatures of the models. In conclusion, my hypothesis was not supported because both models had the same temperature.

**MES125: Recycling in America**
I wanted to determine on average per household per year how many pounds of waste could be kept out of landfills by recycling. My family found it easy to recycle. We recycled glass, cans, and paper. We separated all of our recyclables and weighed it weekly. Our weekly recyclables total was approximately 16 pounds. We still fell below the national average of 30 pounds per week per family per year. My family alone can keep approximately 900 pounds a year out of landfills. Imagine how much could be done if everyone recycled!

**MES126: Reinventing Oil Spill Clean Up**
The feasibility of separating oil from water with ferrofluids is studied in this project. Four different experiments will determine optimum process parameters for pilot plant design. This investigation has scientific origins in the physical chemistry of nanotechnology and engineering design applications.
**MES127: Tapped Out: A test for clean water**
My experiment was drawn from the movie Gasland, a movie showing how everyday communities’ drinking water are affected by fracking for natural gas. The purpose of this experiment is to find out whether or not local communities drinking water is safe for everyday use. I chose this topic because there is no alternative for our drinking water, we cannot live off of anything else. My problem was: “Is water we use in our everyday lives suitable for drinking and cleaning?” I also chose the secondary problem “Does the time of the day affect the pH of water?” My hypothesis was that if I tested tap water and local snowfall the pH of both would be in between 5-7. Filtered drinking water will have the pH of 7.

**MES128: Global Warming Bioremediation**
Imagine a world in where the air is clean and birds are melodiously chirping. A world where everyone is happy and the problem of global warming has been eradicated. This is the world I am trying to create from my project. In my project, I will be using two types of iron(iron sulfate and iron chloride) and one type of algae(coccolithophorid algae). This algae carries an extremely unique trait which is found only in this algae alone. With the use of lab grade materials, extreme precision, and ingenuity I hope to construct a project that will wipe out global warming and revolutionize the world. See my project board for more information.

**MES130: Mineral Water**
This experiment is planned to test if the AMD treatment system at Winfield Pines is cleaning the water in order to support aquatic life in Chartiers Creek, the water discharge site. To conduct this experiment, the researcher will test and compare the levels of dissolved oxygen at the beginning and end of the treatment system to an average stream. The data will be collected using a Vernier dissolved oxygen probe to collect accurate data. In conclusion, experimentation for the system at Wingfield Pines is continuing to determine whether the system is operating satisfactorily to support aquatic life in Chartiers Creek.

**MES131: Does Water Depth affect the Height of Waves?**
My experiment was to test if water depth affects the height of waves. This would be important information for cities on the coast because they could predict the wave height and predict and avoid natural disasters. When a city or town floods, it has an effect on the whole community. I wanted to find this information to see if this problem could be stopped. My hypothesis was incorrect. Once I finished my project, I concluded that water depth does not have an effect on the wave height. But, wind and the breakage of the water have more of an effect.

**MES132: Banana Peels to Bio-Plastic**
Millions of banana peels are thrown in the garbage each day. I desire to make the world more eco-friendly and conduct simple experiments that research which hydroxide is most effective in the creation of bio-plastic from banana peels. By making a puree out of banana peels dipped in sodium metabisulfite and combining the pureed paste with specific concentrations and volumes of hydrogen chloride, glycerol, and a hydroxide, I will create an applicable quality and quantity of bio-plastics. This experiment evaluates novel ways to use a waste product in the production of bio-plastic as a replacement of traditional petroleum based plastic.

**MES133: Paint Faint?**
The impact of using sunscreen to limit paint fading will be investigated in this experiment. Samples of wood painted with an exterior house paint will have sunscreen applied to them. Other wood samples will be painted with a paint-screen mixture. Painted wood samples will be exposed to typical outdoor conditions for an extended period of time. Control samples will be included in the experiment to evaluate fading.

**MES134: Wow! It’s Hot! Exploring the Greenhouse Effect**
Has it been getting warm or cold in your house lately? This could be the greenhouse effect. . The greenhouse effect states that gases in the atmosphere, such as CO2, might increase the surface temperature of Earth. In this science project, I will build a small greenhouse and see if trapped infrared radiation affects the temperature within.

**MES135: Water Water Everywhere, Let’s Make it Safe to Drink**
Two water purification methods—boiling water and filtering water through sand are compared. Bench scale purifiers are used to treat water and final water purity is measured. My hypothesis is that boiling the water will be the most effective way of purifying water while sand filtration will be a less expensive method. The overall goal of this research is to provide solutions to people living in third world countries.

**MES136: Radon and Its Variables**
For my project, I will be testing to see if there is a correlation between a home’s location and condition and its’ radon level. I expect that homes with cracks and imperfections in the foundation and with certain bedrocks as a foundation will have a higher radon levels than homes without those specifications. I will be distributing short-term radon test kits to educators at my school that will follow the kit instruction and return an anonymous sheet detailing their findings. I will then collect the data and graph it into a chart and compare and contrast my findings.
**MES137: WHAT’S IN YOUR RIVER?**
This project was done because my dog gets a rash every time he swims at my camp along the Kiskiminetas River. The immense amount of mine drainage may be the root of this problem. To find out, I tested samples of water from various locations for pH, dissolved oxygen, alkalinity, turbidity and nitrates. I also observed the temperatures. The results showed that the water from the mine drainage pipe was just as healthy, if not healthier, than the actual river water.

**MES138: This Little Light of Mine**
Label 60 bottles. Fill the bottles with 25 ml of algae. Add pollutants: lead, copper, zinc, chromium, and iron. Before adding them, mass them, and then add 500 mg of pollutant to each bottle. After that, set up my experiment using my samples, a fluorescent light, a temperature gage, and a box. Monitor the algae for 2 weeks, checking the glow rate every night using a scale that I created. 3 separate people will rate the algae’s glow. Opinions will be averaged and used to determine the fluctuation rate per day/night cycle and the percent reduction. Conclusion will be drawn.

**MES139: Can Nanotechnology Help Clean Oil Spills**
Cleaning up oil spills isn’t an easy job. It requires huge amounts of money, is very time consuming, and most of the time the spill is only cleaned up partially. However there might be a solution to cleaning up oil spills, Nanotechnology and Magnetism. In this experiment I will test how efficiently I can separate oil from water using Nanotechnology and Magnetism.

**MES300: Acid Rain**
The purpose of this experiment is to find what affect acid rain has on plant growth. We want to know if acid rain does harm to the environment and all the plants and animals in it. Acids can fall to the ground in other forms other than rain. They can come in forms of snow, fog, mist, dust, and smoke. Acid rain occurs when chemicals for in the atmosphere with oxygen and other chemicals. The hypothesis is the plant watered with the acid rain solution will not grow as normal, it will not grow anymore and will die. The plant watered with water will grow as normal. The experiment will have two plants, one will be labeled “acid rain” the other will be labeled “water.” Then measure the height of both plants and record the data. The plant labeled acid rain will be watered with an acid rain solution which is 5 drops of lemon juice in a liter of water. The other plant will be water with regular water. We will water and record the height each day for 14 days. To find if the hypothesis is correct or incorrect compare the appearance and the heights of the two plants. This project is ongoing.

**MES301: Eco-Friendly Ways to Clean up Oil Spills**
Eco-friendly methods are needed to remove oil from seawater. We created absorbents consisting of: pet hair in panty hose, human hair plus mushrooms in panty hose, and peat moss and compared them with detergent, all placed the surface of an oil film on salt water. After one hour, the absorbents were removed, weighed, oven dried to remove contaminating water and re-weighed determine the amount of oil absorbed. Our data show that pet hair was twice as effective as other absorbents, including detergent. These findings suggest that eco-friendly methods can be more effective and that they should be explored further.

**MES302: Hydroelectricity**
When we turn our lights on, run our garage door, cook on the stove, among other things, we wonder what kind of energy we use. The energy we use is probably either bad for the environment or non-renewable. So as partners we set out to find a realistic and some-what clean source of energy and we found that hydroelectricity is the most feasible. Our experiment was a hydroelectric power plant model. We needed to make water spin a wheel that spins a generator fast enough to make electricity. First, we constructed the water wheel that was being spun by the water. Second, we built another wheel, the same size, on an axle that was being spun by the water wheel. Third, we built a tower that holds the axle out of cardboard. We had to make it sturdy, so we made a big tower with sturdy foundation. Lastly, we constructed a holder for it all. We also made a board and report for the project. We learned that it is possible to make electricity, but the plant needs a steady source of water or else you won’t be very efficient with making the electricity. Also because of much friction our model was not the most efficient. Hydroelectricity is somewhat inefficient with the amount of water it uses to produce electricity. We used a lot of water to make a small amount of energy. In a real power plant, you would need a large source of water.

**MES303: Rocket Fins: Highest Altitude**
For the science fair this year, we launched 15 rockets to find which fin design would help our rocket reach the highest altitude. We predicted that the “Heron” fin will go the highest. For every 3 rockets, there was a different fin design. We built the rockets from scratch and launched our rockets on an appropriate day according to the safety code. Then we measured the angle altitude with a theodolite, and calculated the tangent of the angle times the distance from the launch pad (33 meters). The “Egret” fin design reached the highest altitude with the average of 36.66 meters.
**MES304: Rockets Reaching the Highest Altitude**

We launched 15 rockets, for every three rockets there was a different fin design. We hypothesized that the aerodynamics of five different fin designs would impact the altitude heights. Of the five fin designs: Eagle, Egret, Heron, Mockingjay, and Jabberjay, we predicted the Jabberjay would cause the rocket to reach the highest altitude. With repeated trials, we launched three rockets with each fin design and calculated the height of each rocket. With averaged results, Egret fin flew to 36.67 meters, Jabberjay -- 34.00 m, Mockingjay -- 20.67m, Heron --13.34 m, and Eagle --10.67m. We can conclude that our hypothesis was wrong, the Egret fin caused the rocket to reach the highest altitude.

**MES305: We've Got The Power**

Purpose: The purpose for this experiment is to compare and contrast the effectiveness and efficiency of using alternative energy sources, such as wind and solar power, to charge household electronics (i.e. cell phones). Our results can be used to better inform consumers and the general public. Procedure: In order to conduct our experiment we will set up a control and the two independent variables. The control will be a cell phone plugged into an ordinary electrical outlet. Independent variable “A” will be wind power and independent variable “B” will be solar power. We will place our experiments where we believe they will be able to work the best. We will then time how long it takes for the cell phone to charge to 0%, 20%, 40%, 60%, 80%, and 100%. The results will be put into a table and then later a graph for us to analyze. Hypothesis: Our hypothesis is that it will take the solar panel less time to charge the phone than the wind turbine, but the control will be the quickest.
**Intermediate – Engineering/Robotics (MER), 7th & 8th Grade**

**MER100: Lift Off**
The purpose of my project was to determine if I could design a better helicopter rotor. I will build my rotors out of wood. I will then experiment using a motor in a wooden contraption. I will then analyze the data. Results will be available at the fair.

**MER101: Noise from Home Appliances**
Modern homes use increasing number of appliances and devices such as dehumidifiers, air filters, fans, dryers, grinders etc. They all generate significant amount of noise. People generally take it for granted the disturbance from these equipment. The objective of the study is to measure, document and analyze the disturbing noise levels. The results can be used in the future to study the long term impact on humans. They can be also used in designing better equipment.

**MER102: Producing Electrical Energy with Piezoelectric Crystals from Electromagnetic Waves**
The purpose of my experiment was to see if it was possible to create substantial amounts of electricity from electromagnetic waves. I am using a point and contact diode made from graphite and steel. My hypothesis was that if a crystal diode can detect ambient radiation, then it might be able to produce electric power. At the moment I am producing current in the milliamps, so my hypothesis was correct.

**MER103: The Bug Bot**
The purpose of this experiment is to find out if adding additional motors and their placement affect the robot's steering and speed. To conduct this experiment I am going to test a robot's steering and speed. The experimental results were measured by how accurate and fast the robot was. The experimental results showed that the robot with more motors was faster yet had worse steering than the robot with less motors. The results indicate that the hypothesis should be accepted and rejected because the robot with more motors was faster but had worse steering than the robot with less motors.

**MER104: Distracted Driving Alarm**
Distracted driving is a major problem in the world today. I set out to create a device that will prevent distracted driving by alerting the driver when one hand is off the steering wheel for a set amount of time, when the car is in motion. I successfully designed and simulated devices using pressure, infrared, and radar/sonar sensors. In order to finish my experiment, and test my conclusions, I must build a physical prototype of the three methods I designed. Once prototyped and tested, I will compare and evaluate the three products.

**MER105: Dome Strength**
I will be building different models of geodesic domes out of newspaper and testing their strength. I will use a strength to weight ratio when comparing different domes. I will be using sand bags when testing the strength of domes. My hypothesis is that the tighter the newspaper is rolled the stronger the dome will be. Final results will be available at the student's exhibit on Fair Day.

**MER106: Charging Appliances in the Dark**
Bad weather was always a nuisance – this experiment is to see how long it would take for a laptop to work with a twelve volt Duracell battery. After setting up the battery, the laptop would run solely on the battery's power. When the battery ran out, the time was recorded. This was done to see whether it was worth it to work on your laptop with a car battery there supplying power. The tests showed that it would take over eleven hours to drain all the power from the battery.

**MER107: Melon on the Rise**
The purpose of my project was to determine which brand of hand warmer can be used to safely create a heated hat. I placed various brands of hand warmers into hats that were then placed on watermelons and placed outside. I recorded the internal temperature periodically. I determined that the Hand Warmer brand worked the best to raise the internal temperature safely without burning the watermelon.

**MER108: Bristlebots: The Toothbrush Racecars**
The purpose of my experiment was to find out if I could build a robot out of a toothbrush, a motor, and a battery. I first made a toothbrush robot, or bristlebot. I then built a track for them and raced them to see which one had a faster time. The bristlebot with straight bristles beat the bristlebot with slanted bristles by almost double the time to prove my hypothesis that the slanted one would win incorrect.
**MER109: Paper Armor vs Steel Armor**
There are many forms of body armor used during a battle, from familiar steel armor to the unfamiliar paper armor. Paper armor caught my attention. It seemed to be an outrageous and deadly body shield to use during a battle. However, when I read an article from the "Mythbusters" it was clear that paper armor existed in China around 2,600 years ago and was very protective. Actually, the first paper armor found was created around 800 BC, but soldiers in China continued to use the technology through the Ming and early Qing Eras. In this study I decided to test the strength of paper armor versus the steel armor. I found that the paper armor was made out of a certain type of paper called Mulberry. The Paper Mulberry Tree grows in China, Korea, Thailand, Pakistan, and SE Asia. (What is Mulberry Paper?) It is a very productive tree, some people may even call it a weed, that's how fast it can grow. The fibers from the bark make the paper almost feel like cloth. The Chinese would use this paper and weave it together making small squares and layering them into a body of armor. Some articles mentioned that they would also cover the paper armor with a shellac or sewn into cotton. (Mythbusters) The paper was able to withstand arrows, swords, and even bullets from flintlock weapons and since it was cheaper and lighter, the Chinese army would use this as their choice of body armor. The steel armor in the 17th century was thinner than it is now, it wasn't until the 18th century that it became thicker and stronger. So, I gathered information on the type of weapons used in the 17th century and I decided to test mulberry paper against steel armor. In this study I will strike each armor with the two different assault weapons and compare the damages done to each one. This experiment will demonstrate which body armor is more protective.

**MER110: Strap Attach**
My invention was a strap cover for a truck strap, and I did this because the truck straps get hard to use when they get dirty. I was able to do this by sewing a waterproof bag together with a strap to go under the metal. This will help truck drivers by them not having to wash them as much. Even though some moisture got in, I'm planning to fix that with eyelets. In conclusion, the Strap Attach can help truck drivers with their straps.

**MER111: Robotics Challenge**
The purpose of this project was to determine whether autonomous robots are faster and more precise than human controlled robots. My hypothesis was yes, autonomous robots will be faster and more precise. I built a robot and performed two different tests for each type of robot. The results are still being collected.

**MER112: Breaking Bridges**
Looking around Pittsburgh, you see many types of bridges. This project was conducted in order to see which of these bridges was the strongest. A model truss bridge, a model arch bridge, and a model suspension bridge were built out of lightweight wood products. It was found that the truss bridge was the strongest because of its rigid triangles. The truss bridge always held more than triple the weight that the second strongest bridge was able to hold. This project showed that the truss’s structure is stronger in this scale than either the arch’s or the suspension’s structure.

**MER113: Wind, Hydro, and Solar Energy Oh My!**
For my science project I have constructed three generators that conduct electricity to power LED light bulbs. I have used the sources of wind, hydro, and solar energy power. The project tests which source is the best and most efficient to use. For wind power I built a wind mill. For hydropower I made a waterwheel. For solar power I got a solar panel to power the light. I thought that solar energy would be the best source because of stability and I was correct. My project shows that solar energy is the best source of power for LED lights.

**MER114: Mousetrap Madness**
In my science project, Mousetrap Madness, I discovered how the size of wheels on a mousetrap car affect the speed and distance of the car. While performing this project I made three cars, exactly the same, except the size of its wheels. I use a 45° record as the biggest wheels, 120 mm as the medium size wheels and an 88 mm as the smallest size wheels. This affect the distance and speed drastically. My project concluded with the biggest wheels going the farthest and slowest, and the smallest wheels going the fastest and shortest distance.

**MER115: Machine Vision & Manipulation**
The purpose of this project is to improve a speech-controlled robotic arm so that it has computer vision and advanced manipulation capabilities. By using object recognition, pose estimation, and machine learning algorithms, I will be able to make the speech-controlled robotic arm autonomous and self-reliable. I will collect data on the recognition accuracy and manipulation accuracy. Based on the data collected, I will revise and refine the program in order to enhance the computer vision and manipulation of the robotic arm. This arm will be able to function autonomously, providing a much-needed aid for people with disabilities.

**MER116: Exhaust Pipe Filter**
The purpose of my project was to clean the emissions that come out of a car. To do this, I created an attachment that could be placed on the end of an exhaust. I tested a coffee filter, air filter and oil filter in the attachment and observed the air that came out. I determined that the oil filter worked the best.

**MER117: Autonomous Robots vs. Humans**
The purpose of my project was to determine whether autonomous robots are faster and more precise than human controlled robots. My hypothesis was yes, autonomous robots will be faster and more precise. I built a robot and performed two different tests for each type of robot. The results are still being collected.
**MER118: Archimedes Screw**
My science fair project was to see if bigger vinyl tubing wrapped around the PVC pipe could lift more water than a smaller piece of vinyl tubing wrapped around the same size pipe. The problem was to see if a 15.875mm outer diameter x 12.7mm could lift 118.29ml more water than a 9.525mm outer diameter x 6.5mm diameter. My hypothesis was that the bigger vinyl tubing would lift more water. My hypothesis was supported. I got two 9.5999mm long, 50.8mm outer diameter PVC pipes and wrapped around the two different sizes of the vinyl tubing around the pipes. After that I got two big bowls filled one with water and put the other one on a few books to make it higher. Then I put one of the screws in the bowl filled with water and I turned it the correct direction and started to lift the water. The first water that went into the dry bowl I started counting the number of turns. After so many turns I put the water that was in the bowl into a graduated cylinder and measured the amount of turns it took to move 12.7mm of water. Then I repeated these steps with the other screw. My hypothesis was correct. The bigger vinyl tubing did lift more water. The bigger one lifted 12.7ml of water in 9.01 less turns than the smaller one. This project contributed to see if a bigger screw lifted more or less water than a smaller one and to see if big Archimedes screw is needed. Everything that I wanted to meet I did meet.

**MER119: Alert Device for Cardiac Failure**
The goal of this project is to create a device that can alert the user if they might be having a heart attack. By making use of the time before the heart completely stops, sensors powered by a microcontroller will read and record common heart failure symptoms, and if there are any irregular records, the microcontroller will send the results to an app. The app will then display a notification to the user, with the symptom type and importance. The prototype will have all these capabilities, and also include a wearable design. See project board for final results.

**MER120: Step Right Up and Test Your Strength**
The purpose of this project is to see if the Beam Bridge or the Beam Leg Bridge is stronger. To do this project, I built two Beam Bridges and two Beam Leg Bridges and tested which bridge was stronger. I then put individual objects one at a time on the bridge and tested how much the bridge flexed. The Beam Bridge held all of the objects, but the Beam Leg Bridge didn't flex at all. My hypothesis was proved wrong and the Beam Bridge won.

**MER121: Introducing C.I.D. Criminal Investigation Drone**
The CID is a small drone that is meant to protect Police forces from running into a situation blindly. This is the second drone to the CTP (Criminal tracking Probe) which was meant to find the criminal. The CID's job is to investigate the criminal once found. The CID id made out of: Hex bug spider, Small pads, Web camera, and Mosquito Alarm. The Mosquito alarm is a security system that generates a high pitch sound which anyone's first instinct is to run from. This would be to get the small drone out if seen.

**MER122: Potato Time**
The purpose of this experiment was to see if electricity could be produced by potatoes. We set up the experiment in 2 tests, the first test involved 2 sweet potatoes and the second test, we used to white potatoes. After, performing the tests, I can state in the results that if you were to perform this experiment you must use 2 zinc-coated nails and 2 copper nails for the reaction to work with the wire and potatoes. In conclusion, 2 sweet/ white potatoes if combined with zinc/copper coated nails can power a small 1.5 volt clock.

**MER123: Going, Going, Gone!**
The purpose of this project is to see if the density of a baseball bat will affect the distance a baseball will travel. If a standard sized baseball is hit with a wooden and an aluminum bat, then the balls hit with the aluminum bat will travel further. A swinging device will be created to ensure each swing uses the same amount of force, and hits the ball at the same angle. Baseballs will be hit with each bat for a total of 50 trials each and the distance will be measured. Final results will be available on fair day.

**MER124: What's In Your Water**
The purpose of my project is to determine how to create a mini version of my invention from last year's science fair. I did that by building 2 prototypes. I tested their ability by seeing how well they could lower chlorine levels, raise the hardness to and raise the Ph. to their normal standards. I tested a concoction that I made. I rain it through two prototypes. And compared how much impurities I got out.

**MER125: Pulley Wheel Efficiency: Is Bigger Better?**
Pulley wheels are used in many modern applications, from cars to cranes, so efficiency gains in this simple machine hold the promise of large scale energy savings. This experiment was conducted to determine the effect of pulley wheel diameter on the efficiency of pulley systems. Coaxial pulley sets, consisting of 3 different diameter pulley wheels mated together in a single unit were constructed and used to measure the efficiency of each pulley size under 4 different loads, and 3 configurations. Results consisted of 108 data points, and showed that the largest diameter pulley delivered the greatest efficiency over all loads and configurations tested, and that the relationship between pulley diameter and efficiency was non-linear.
**MER126: Robot Art**

My project was made to find out if a robot could make, random, or abstract art based on the sound in its environment. I chose this as my experiment because I was interested if a robot could do random things similarly to emotion. The Problem was, can a robot make random turns based on sound while holding a marker to make random art? My hypothesis was, If I Program a robot to make random turns based on the surrounding sound while holding a marker, then it will make random art.

**MER127: The Domino Effect**

The hypothesis for “The Domino Effect” is the time will increase while the space increases. My project used materials like my data book, ruler, stopwatch, and dominos. I measured one centimeter between each of the ten dominos and knocked them down and I did it four more times increasing the space between the dominos by .5 centimeters. My results showed that as the space between the dominos increases so does the time at which the dominos fall. By the end of my project I concluded that as the space increases between the dominos so does their fall time.

**MER128: Shake Light**

The purpose of these experiments was to show and prove how a flashlight could work without the use of batteries. Using basic scientific principles (Faraday’s Law, AC and DC current and magnetism) it is possible to create a flashlight without needing batteries. The basis of this experiment is how mechanical energy can be converted to electrical energy. Designing a mechanical device (coil and magnet) generated AC current. Using electronic components (diodes or a bridge rectifier) converted the AC voltage to DC voltage. This DC voltage is used to power the LED (light emitting diode). To reduce the amount of mechanical energy needed to power the LED a capacitor was used to store the energy created by the circuit. The LED then only needs to use the energy stored in the capacitor in order to operate. Experiment #1 failed to create enough voltage to power the LED. Experiment #2 proved that changing the size of the coil and the strength of the magnet was all that was required to generate enough voltage to light the LED. In conclusion, it was proven that it is possible to create a flashlight that uses mechanical energy by which to operate.

**MER129: Capture It!**

This experiment was conducted to determine if different shutter times on a pinhole camera effect the picture in any way. The camera that I made was a matchbox and some film. I made the times three seconds two seconds and one second. I found out that three second shutter times make the picture look more blurred, lighter, and more faded, two seconds was a little better but still faded and one second was the best and a lot clearer than the other two.

**MER130: Wild Reactions**

This project was on how chain reactions react. To show me chain reactions I built a machine that used an electric car track, a domino stair case, a tube for a ball, a teeter totter, and two cups. I used these things to make a bottle pour into a cup. This experiment is a really fun way to learn all about reactions. When I researched this topic I saw a lot of things about Isaac Newton and his theory on gravity and laws of motion. This is why I chose to do this it was a fun and interesting topic.

**MER131: Which Propeller Chord is More Efficient?**

I am fascinated by airplanes and helicopters and I want to understand more about how they fly. Propellers are important for different aircrafts and if I can determine the most effective design then better, more efficient aircrafts can be built. The purpose of my project is to examine the efficiency of different propellers and to see if different efficiency levels impact flight distance at different angles. My hypothesis is that the chord length will affect the glider flight but I am unsure now if this effect will be the same in different flight angles. Before the project I learned about aerodynamics and propeller designs.

**MER132: What structure can bear the most stress?**

This project was designed to find the strongest support structure. I built 4 structures and a test jig to make a conclusion. When I tested the structures the data showed that the Base frame bared 2.72 kg of stress, Interior corner braces bared 6.13 kg, Horizontal brace bared 7.26 and X braces bared 22.69 kg. This concluded that the X braces are the strongest support structure. It even broke the test jig so I had to stop the test! After doing research I then found that X braces can bare the most stress.

**MER133: The Power of Water; Water Generated Electricity**

The purpose of this experiment was to engineer a working hydro-electric generator. A small scale model was designed and built that could generate electrical energy from mechanical energy.

**MER134: Bridging Over Troubled Waters**

The purpose of this experiment was to conduct a structural analysis of two basic bridge types (truss vs. arch). The bridges were measured for their ability to hold certain weights.
**MER135: Battery Effects**
The purpose of this experiment was to find out if changing the sizes of batteries affects a robot's speed. To conduct this experiment, I will change the batteries in my robot from AAA to AAAA. The results were measured by a series of tests. The results of this experiment showed that the robot went faster with the AAA than AAAA batteries. My hypothesis stated that if changing the size of batteries will make a robot move faster, the AAAA batteries will go faster. My hypothesis should be rejected because the AAA batteries went faster than the AAAA batteries.

**MER136: Water, Wind, or Sun**
The purpose of this experiment was to test the efficiency of small hydro, solar, and wind powered generators. Small scale models were created to generate small amounts of electric power.

**MER137: Crank Power**
Electricity is an energy source that can be acquired in different ways. I tried to get electricity from turning a hand crank charger into a Mini U.S.B. phone charger. I predicted that the hand crank charger would take longer because it gives of a lower voltage. The charger took on average ten minutes more that the using the wall charger. In the end the charger worked but due to the fact that one would need to be constantly spinning the charge lever. It takes longer to charge the phone.

**MER138: “Hot Music” Thermoacoustics: Sound made from heat**
Introduction: Thermoacoustics is the science of turning heat energy into sound energy.
Problem statement: What if heat could be converted into sound and that sound could do something useful by making music? My project is to convert heat directly into sound, and then use the sound to make musical notes.
Procedures: I built a thermoacoustic device. I tested it. I then tuned it to a musical scale. Then I built a second one. I tested them both for frequency, sound level, and waveform. I recorded the results.
Results: The thermoacoustic device was able to generate sound. The device was tuned to the musical note A4. A second device was built and tuned to note D4.
Conclusions: This instrument design shows that it is possible to turn heat directly into sound and then tune those sounds to a musical scale. The design goal was met.

**MER139: Want Music? Got Robot!**
Throughout the years, machines, or robots, have been replacing old technology. This experiment tests if there is a significant device (robotic snare drum) to practice music pieces with instead of a metronome. One group of participants will practice with the robotic drum and the other group will practice with the metronome. Accuracy of the notes will be recorded in a performance to conclude which practice method is better. Experimentation is still continuing.

**MER140: Stringles**
My project's purpose is to make getting the Pringles from the bottom of a can to raise up so people with bigger hands can eat Pringles with less hassle. I did this by crating a pulley like system to go into the can. My results showed that many people liked my invention. They also thought my invention was useful. Further places I could take my invention is getting patented and brought into public views.

**MER142: The Stethophone**
This project will demonstrate feasibility of a portable device that will transmit medical data from lungs and heart through a stethoscope fitting to a standard cell phone. The hypothesis is with this device, an individual will become more responsible for their health. A pilot device will be built and demonstrated.

**MER143: The Winds of Change**
Providing safe, clean, and renewable energy has become a pressing problem in recent years. Eventually, the earth will run out of fossil fuels and we will have an influx of requests for renewable energy. In my project three different types of blades were tested to determine which was the most effective. Blade #3 was the most effective blade. Additional future projects are planned to test other variables on Blade #3 such as mass, width, length, and variations to the original shape.
**MER144: Arduino Based Portable Pulse-Oximeter with Mobile Data Access**

Expected outcomes: have a Arduino that sends information (spo2, and heart rate) to a web app that also works on mobile device. Also to have it send mail or text for notifications.

Project: a spo2 sensor for the elderly who have breathing problems and their families. So when the elder has a problem or the families just want to check up on them they can get answers.

1. Purchase parts needed for the build, such as an Arduino, sensors and accessories.
2. Find out how the components and sensors are used specifically the wiring for the SpO2 sensor.
3. Start trying to turn on the lights using the wiring and programming techniques researched. One specific method that will be used is called Charlie-plexing, a technique for wiring diodes.
4. Try to read voltages or amps from the sensors.
5. If I run into any programming problems, I will look through Arduino.cc for some examples to try.
6. Find out how to use voltages and measure SpO2 and heart rate from the two led lights in the sensor.
7. Put them into a single program that displays them on an lcd.
8. Find out how to send info through wifi shields. Or other shields we need to send information.
9. Implement them into the program.
10. Create an app for mobile devices (web app).
11. Send sensor info into app.
12. Create notifications (through the app, texts, email, etc.).
13. Put it all together and run tests.
14. Use it with test subjects to see how it works out until competition.

**MER300: Bristle Bots**

The purpose of this experiment is to see which type of bristles on a Bristle Bot goes faster. To conduct this experiment we raced two types of Bristle Bots 3 times. The experimental results were measured by the time it took a Bristle Bot to go down the 109 cm track. The results of this experiment showed that a straight bristled Bristle Bot will go faster than a slanted one. The results indicate that the hypothesis should be rejected because the straight Bristle Bot went faster then the slanted one.

**MER301: Energy-Angle or Design?**

In this experiment, I tested what was the most energy efficient type of windmill. I wanted to figure out what type of windmills should be used more often to create the most energy to give electricity to use as an alternative power source. I tested the Modern HAWT windmill with the blades at 15°, 45°, and 60° angles. I also tested the Savonius VAWT windmill and the Giromill VAWT. In this experiment, I concluded that the modern HAWT windmill with blades at an angle of 15° was the best windmill.

**MER302: ROCKIN WIND POWER**

We chose this project to find which blade design and count on a wind turbine would create the most energy. We tested 3, 4, and 5 blades at lengths of .6096 meters and 1.2192 meters. We thought 5 blades at a length of 1.2192 meters would produce the most energy. Based on our data, 5 blades at .6096 meters would produce the most energy. Our data did not support our hypothesis. The 5 blades at .6096 meters have an average voltage of 3.75. The 5 blades at a length of 1.2192 meters have an average voltage of 2.6285.

**MER303: Smooth Sailing**

This project will show how much weight a four-foot-in-diameter hovercraft can hold. We feel that the army would improve if they could carry their weapons on larger-scale hovercrafts. We will put two-pound weights on the hovercraft to find out the total of what our hovercraft will hold. The weights we will use will weigh only a fraction of army weapons. We predict that our hovercraft will hold fifteen weights/weapon.

**MER304: Which wind turbine blade is best?**

Our project is designed to determine how the size of a turbine blade affects the amount of energy that it produces. The turbine will be constructed out of soda bottles, paper, and drinking straws. A fan will provide the necessary wind in the experiment. Blades of various sizes and shapes will be constructed and tested. Weights will be attached to the turbine and lifted to determine the amount of energy produced. Our hypothesis is that the larger the blade, the more energy produced. Our results will be available at PRSEF in March.
Intermediate – Medicine/Health/Microbiology (MMH), 7th & 8th Grade

**MMH100: Counting Our Sleep From A-Zzz**

This project will explain how the amount of sleep will determine how you act during the day. We have taken a survey among a group of students in a cafeteria full of 7th and 8th grade students. The hypothesis states getting less sleep than needed will cause you to be less active. After the survey was complete we looked at the results and found how they act differently with the amount of sleep. We have determined that it is true that the less sleep you get the more tired and less active you will be the next day.

**MMH101: Drug Solubility**

In order for a drug to work and appeal to people, it must be able to dissolve and dissolve quickly. To be able to understand drug solubility allows us to know which medical drugs can begin work fastest allowing for quick pain relief. In this experiment, I will use lemon juice to act as stomach acid, and I will use Acetaminophen, Gel Ibuprofen, and regular Ibuprofen as the medical drugs. The drugs will be placed in the solvent and timed to see which drug is the fastest to dissolve. Then, the experiment will be repeated to insure the results.

**MMH102: i Vitals**

This experiment was to determine if an ihealth sphygmomanometer is as accurate as the traditional aphygmomanometer. I tested 30 people using the wireless cuff two times. I did the same for the traditional cuff i then took their pulse with my hands and compared it to the one taken on the ihealth cuff. I compared my results. There was no significant difference above 3%. Therefore, the iHealth wireless blood pressure cuff is as accurate and consistent as the traditional cuff.

**MMH103: What Catheter Material is the Least Permissive to Biofilm**

Purpose: The purpose of this experiment is to see which catheter material grows the least number of biofilms over the course of three days. Procedure: Catheter samples were placed in growth media with E. coli bacteria for three days. The biofilms were vortexed off of the sample and plated. Data: Latex had the lowest average colonies, then silver, and silicone had the highest average. Conclusion: Latex is the least permissive material to biofilms that was tested.

**MMH104: E. Coli’s Resistance to Ampicillin**

The purpose of this experiment was to test bacteria’s resistance to ampicillin, showing why this is a concern. To conduct this experiment I swabbed a petri dish with E. Coli. I put four ampicillin disks in a petri dish. After 24 hours in an incubator, I measured them, repeating this process twice. The data showed an obvious increase in the bacteria’s resistance to ampicillin. This is the threat. Humans use antibiotics at a very high rate, especially to grow meat. We are already seeing these effects in the “superbug,” a DNA in bacteria that is resistant to all known antibiotics.

**MMH105: Do the Electrolyte Slide**

The goal of my project is to determine whether sports drinks have more electrolytes than juices. I hypothesized that sports drinks will have more electrolytes. I created a conductance sensor and used wires and a battery to create a circuit. I then used a digital multimeter to measure the conductance of each drink. I measured three sports drinks and three juices, and repeated the experiment three times for each drink. I then calculated the average conductance level for each drink to determine which had the most electrolytes. I will report my results at the PRSEF.

**MMH106: It’s A Real Heart Stopper**

In this experiment, a solubility test was performed using cholesterol as a solute and dietary nutrients, calcium, potassium, and magnesium, at varying pH levels, similar to blood pH, as solvents. Calcium at a 7.8pH performed best because of its average solubility rate: 1,060mg of cholesterol/100mL. Using data collected from this experiment, we become one step closer to developing a better way to make people less susceptible to heart disease.

**MMH107: Heart Health**

Have you ever wondered how much your heart increases during physical activity? Well now is the time. The purpose of my project is to find out if physical activity affects your heart rate. I first picked out three activities. Then I found my maximum heart rate (207) and my resting heart rate (72). After I did this I set a timer of 15 min. I then shot basketball, ran, and jumping rope. Once the timer hit 1 min I checked my rate. I repeated this process for all three activities. Shooting basketball had increased the heart rate the fastest.

**MMH108: Can Amoeba Proteus be used to Kill E coli bacteria?**

The purpose of this experiment is to see if a harmless and common protozoan known as Amoeba Proteus can be used to kill E Coli bacteria. Amoeba and E coli were placed together on a microscope slide and using one of CMU’s high powered microscopes. Then photos were taken every two minutes over a ten minute period of the amoeba to see if there was an increase in E Coli bacteria within the amoeba. All three trials had an increase of E Coli bacteria inside of the amoeba. This proves Amoeba Proteus can be used to kill E Coli bacteria.
**MMH109: Effectiveness of Fluoride in Prevention of Tooth Decay**

Studies have shown that sports drinks as well as other beverages cause tooth decay. Starting at an early age (approx. 1 year old), children will consume fruit drinks (i.e., apple juice). During teenage years, sport drinks (i.e., Gatorade) and soda (i.e., Coca-Cola) are ingested. Caffeinated drinks (i.e., Red Bull (energy drink) and coffee) are consumed during college years and throughout adulthood. All these drinks mentioned above are acidic beverages. Depending on where a person resides their city water may or may not contain fluoride. Fluoride aids in the prevention of tooth decay, although there is controversy in the scientific community as to how it works. This experiment was conducted to test the effectiveness of fluoride in preventing tooth decay from acidic drinks (Mott’s Apple Juice, Glacier Freeze Gatorade, Coca-Cola, Red Bull and Starbuck Brewed Coffee) in vitro. I predict that the teeth exposed to fluoride will decay at a much slower rate than those not coated in fluoride. Using 12 extracted and sterilized human teeth obtained from a dentist, six of the twelve teeth were coated in fluoride over a 5 day period-- while the remaining six were not treated with fluoride. The pH of each substance was determined. A separate cup was used for each tooth. Each tooth was exposed to the liquid for 30 minutes each day. This was repeated for 30 days. Every 5 days, each beverage was disposed and each cup washed with antibiotic soap and refilled with 60 mL of the selected beverage. Over the 30-day period, the mass of each tooth was measured and each tooth was photographed. The data recorded showed that the teeth coated in fluoride definitely prevented tooth decay more than those not treated. My research found that the tooth coated in fluoride and soaked in Starbucks brewed coffee was the least decayed tooth of the group analyzed.

**MMH110: The Carb Crusade; Comparing Carb Cycles**

I will be comparing carb cycles by trying 3 different combinations of high carb and low carb days, one each week. For the first week, my pattern will be:
- Sunday - high carb; Monday - low carb; Tuesday - high carb; Wednesday - low carb; Thursday - high carb; Friday - low carb; Saturday - cheat day.

For the second week, my pattern will be:
- Sunday - high carb; Monday - high carb; Tuesday - low carb; Wednesday - high carb; Thursday - high carb; Friday - low carb; Saturday - cheat day.

For the third week, my pattern will be:
- Sunday - low carb; Monday - low carb; Tuesday - high carb; Wednesday - low carb; Thursday - low carb; Friday - high carb; Saturday - cheat day.

I will eat the same portions of food on all high carb days, eat the same portions of food on all low carb days, and follow the same exercise program throughout the experiment to keep my data and experiment consistent. Every day, I will keep track of how many calories I eat, how many grams of carbs I eat, how many calories I burn exercising, and what my weight is. Then, I will use compare this data and therefore be able to determine which carb cycle pattern is most effective.

**MMH111: How Far Can the Average Human See?**

The science experiment was to find out how far the average human could see. The hypothesis was if the eyesight of 10 subjects, who do not wear corrective lenses, was tested then the average line that the test subjects could read was line 8, and has20/20 vision. After the experiment was concluded it was found that the average human could see to line 8 and have 20/20 vision, therefore the hypotheses was correct.

**MMH112: Can Spices Inhibit Bacterial Growth?**

The purpose of my experiment was to find out if spices inhibit bacterial growth. I have seven spices in my procedure; Swab E.Coli bacteria around the agar plate, then poke four holes into an agar plate, and fill each hole with a liquid spice. Measure the zone of inhibition for 24 hours and 48 hours. The data I collected was that, for each three trials, the numbers differed. Some spices had higher amounts then others. My conclusion is that the cinnamon spice inhibited more bacterial growth than the other five, and the control, water, did the worst.

**MMH113: Oh My Aching Head: The Physical & Chemical Conditions That Affect Drug Absorption**

When you have a headache, you want fast relief. This experiment will prove which pain reliever delivers the fastest relief. I tested five pain relievers to determine the fastest disintegration and greatest absorption at two different acid levels. My hypothesis was that ibuprofen will dissolve the fastest and have the greatest amount of drug absorbed in the more acidic fluid. Four tablets of each product were placed individually in hydrochloric acid (stomach acid) and water (small intestine fluid) and average disintegration time was calculated. Then, the Henderson-Hasselbalch equation was used to calculate how much drug is absorbed. Overall, aspirin had the fastest disintegration time and the greatest amount of drug absorbed.

**MMH114: Glasses or 20/20 vision**

The purpose of my experiment is to find out if people with glasses or people with 20/20 vision will be affected by the computer screens. In the experiment I had the subjects read an eye chart then use the computer for twenty minutes. After the twenty minutes is up they read the chart again. The people with glasses had more of an irritated and dry affect; also they had their vision accuracy worsen. The people with 20/20 vision had almost no affect. In conclusion the subjects with glasses had more of a difficult time after the use of computer.
**MMH115: Does Yogurt Contain More Aerobic or Anaerobic Bacteria?**
The purpose of this experiment is to find if yogurt contains more aerobic or anaerobic bacteria. To conduct this experiment, I disinfect all materials. I drop two drops of yogurt on the petri dishes. I then drop two drops of distilled water on the petri dishes. Then, I place three petri dishes in an aerobic environment and three petri dishes are placed in an anaerobic environment. The experimental results were measured by comparing the number of bacteria colonies in the petri dishes.

**MMH116: Opening Up to Tooth Decay**
The purpose of this experiment was to determine what type of drinks can lead to tooth decay. I took four old baby teeth and put each of them into four different drinks. I used Turner's Iced Tea, strawberry flavored water, Sierra Mist, and orange Sunny D. I left the teeth in the drinks for one week, recording results every few days. Then, I took them out to record my final results. It was concluded that Turner's Iced Tea is the worst for your teeth.

**MMH117: Antacids on the Neutralization of Gastric Juice**
Antacids are a great way to relieve stomach discomfort, but which one works the quickest? The problem to be studied in this experiment is: Which antacid is most effective and fastest acting? My hypothesis for this experiment was that Tums Extra Strength Antacid would raise the pH of gastric juice the most in the shortest amount of time. The practicality of this experiment is to discover which antacid is the most cost effective. During this experiment, I used hydrochloric acid to simulate the acidity of gastric juice. During testing, I placed 2 antacids in the beaker on the magnetic stirrer, and took the pH of the solution every thirty seconds for 7 minutes. I repeated this test 2 more times, then tested the remaining 5 antacids 3 times each. After testing, I reviewed the results and saw that Walgreens generic brand performed the best. So in conclusion, my original hypothesis was incorrect. My hypothesis was that Tums Extra Strength Antacid would raise the pH the most, but Walgreens generic brand antacid raised the pH the most in all three tests. An ingredient and cost analysis was also done after further research.

**MMH118: Ice Served at Restaurants Contaminated With Bacteria?**
**Purpose:** Determine if water sprayed on fresh produce is contaminated with bacteria.

**Hypothesis:** As customer traffic in a grocery store increases the water sprayed on produce will be less contaminated with bacteria.

**Experimental:**
1. Determine customer traffic at one store being tested at noon on a Saturday.
2. Obtain a water sample from the water being sprayed on the produce.
3. Repeat Steps 1-2 for each store.
4. Inoculate 4 nutrient agar plates with 1mL of water obtained from one of the stores.
5. Incubate for 72hrs at 37°C and determine the bacteria colonies present.
6. Repeat Steps 4-5 for the remaining stores.

**Conclusion:** Experiment still in progress.

**MMH119: Compatibility of Propofol**
**Background:** Etomidate and Propofol are the two most commonly used drugs for sedation and anesthesia. They both have untoward but opposite side effects. The aim of combining two drugs is to improve efficacy and safety.

**Methods:** This study will evaluate the combination of the two drugs for chemical (Chromatography) and physical stability (visual examination). Once ex-vivo compatibility is confirmed, the combination can potentially be used in human subjects. Stability of two drugs (Etomidate 20 mg + Propofol 50 mg) will be compared to individual drugs (Propofol 50 mg alone and etomidate 20 mg alone).

**Preliminary results:** Physical stability of etomidate-propofol mixture is given in Table 1. We did not observe any physical compatibility issues with this drug mixture on gross examination. Chemical compatibility will be tested in near future with chromatography. Data will be analyzed using Statistical package SSPS 12.0.

**Summary:** Preliminary results show that there are no physical compatibility issues. Chemical compatibility is being tested and will update the results soon.

**MMH120: Do More Expensive Hand Sanitizers Inhibit Bacterial Proliferation Better Than Less Expensive Ons?**
**Purpose:** Do more expensive hand sanitizers inhibit bacteria better than less expensive ones?

**Hypothesis:** More expensive sanitizers will inhibit bacteria better.

**Experimental Procedure**
1. Inoculate 50mL of sterile nutrient broth with S.epidemidis & incubate.
2. Inoculate 20 nutrient agar plates divided into quadrants with 1mL of the broth solution from step 1.
3. Dip a sterile disk into sterile saline(+Control).
4. Place the disk in the center of a quadrant.
5. Repeat steps 3-4 using 3 more disks.
6. Repeat Steps 2-5 for peroxide(--Control) & each sanitizer and incubate.
7. Record the average zone of inhibition for each disk.
**MMH121: Can Micro. Radiation Affect an Organisms Growth**

The title of this project is Does Microwave Radiation Affect Bacterial Growth? The purpose of the experiment was to create a bacteria-free environment in the kitchen. The procedure was to swab a clean sponge, swab a dirty sponge, which had been used in the average kitchen, and microwave the sponge. The heated sponge was swabbed and all of the samples were put onto agar plates. The agar plates were checked for differences in bacteria. The data showed that microwaving sponges did kill most of the bacteria on every sponge.

**MMH122: What hydrates an athlete better?**

I tested ten subjects over two days exercising and hydrating with water one day and Gatorade another day. I learned to take pulses after research. I separated the girls into two groups for Gatorade and water, then switched the groups for the second day. After documentation and observation of pulses, Gatorade was supported to work best. I recorded the data.

**MMH123: Heads Up!**

My purpose for this experiment is to find a superior hockey helmet to help protect hockey players from head injuries. I used three helmets, Bauer, CCM, and Reebok. To perform this experiment I obtained the materials, placed the accelerometer in the helmet and dropped a standard hockey puck onto the helmet from a height of 60cm. Repeat for each helmet. The Bauer helmet performed the best, followed by the CCM, then the Reebok. They were very closely matched though. These results denied my hypothesis. In conclusion Bauer was superior.

**MMH124: The Science of Heart Disease**

This research and study was to find out what affects a person’s chances for heart disease the most. Through the research I have done so far it is shown that heart disease is affected by race, gender, and much more. I have looked at reliable online resources, books and I will interview my father’s cardiologist very soon. Out of the research there are many factors that come into play for heart disease risk. Since I am not yet finished with all of the research and planning, I will continue to do so and complete it.

**MMH125: Which Acne Cleanser Works Best?**

The experiment was to figure out which acne cleanser is most effective when inhibiting bacterial growth. First spread staphylococcus aureus bacteria onto an agar plate then use a sterile straw to poke four holes into the plate. Fill the holes with 3µL of one acne cleanser. Next, incubate for another 24 hours then measure the zone of inhibition and record the data. Incubate for another 24 hours then measure and record the data. Repeat with all of the cleansers and water. The data supported the conclusion that the CVS medication was more effective and best priced which disproved my hypothesis.

**MMH126: Effects of Ionizing Radiation on Lifespan**

Purpose of experiment was to compare lifespan of young worms (with meiosis) to adult worms (no meiosis) in comparison to stem cells in activated vs. non-activated state after ionizing radiation exposure. Worms were treated with LD75 (radiation); survival documented every 24 hrs. for 5 days. Data showed large decreases in survival (50%) for young worms at 72 hrs., however, adults experienced only 10% survival decrease at 72 hrs. Controls remained at 100%. Data concludes that organisms with activated stem cells (worm meiosis model) are more susceptible to DNA damage through irradiation.

**MMH127: Microbial Fuel Cell- Energy out of Bacteria**

The purpose of my two experiments was to see if the voltage of a microbial fuel cell equaled the average microbial growth rate, and to see if the microbial fuel cell’s voltage will go up or down depending on the air temperature around it. I chose this topic because I am interested in alternate energy sources. I have two experimental problems. My first problem is: “Does the voltage of a microbial fuel cell match the expected microbial growth rate?” My second problem is: “Does air temperature around a microbial fuel cell affect the amount of voltage it can produce?” My two hypotheses are as follows: if I construct a microbial fuel cell and measure its voltage, then it will be the same as the microbial growth rate, and if we raise and lower the room temperature, then the hotter the temperature, the more voltage the microbial fuel cell will produce.

**MMH128: Which Deodorant Inhibits Bacterial Proliferation the best?**

Purpose: Do more expensive deodorants inhibit bacteria better than less expensive deodorants.

Hypothesis: More expensive deodorants will inhibit bacteria better than less expensive deodorants.

Experimental:
1: Divide 28 MacConkey Petri plates into 4 equal size quadrants using a sharpie and inoculate with 1mL of a E. coli/nutrient broth.
2: Dip a sterile disk into one of the deodorants being tested and place one in the center of each of the quadrants a petri dish.
3: Repeat Step2 for other deodorants.
4: Repeat steps 2-3 for a 25%, 50% and 75% solution of each deodorants.
5: Determine/record the average zone of inhibition.

Conclusion: Experiment in progress.
MMH129: The Effectiveness of Mouthwash
This experiment was conducted to see if alcohol free mouthwashes were as effective as alcohol based mouthwashes when inhibiting bacteria. Five mouthwashes were used. In this experiment, oral bacteria was wiped onto agar plates and then 3 &μL of the mouthwashes were pipetted into the holes made in the plates. They were immediately covered, sealed and placed in an incubator. After 24 hours, the zone of inhibition was measured, and then measured again after another 24 hours. The hypothesis was that alcohol free mouthwashes would be as effective. The results and conclusion supported this idea.

MMH130: Making Plaque Visible
Plaque is a common hardship among young kids as it constantly forms on the tooth surface if not attended to. It hardens into tartar and causes cavities in teeth. This study will help identify plaque and minimize it before it turns into tartar. The baseline plaque score was recorded using a disclosing tablet and then the procedure was repeated after 2 minutes of brushing. The difference of before brushing and after brushing plaque scores is analyzed.

MMH131: 5 Second Rule…How Clean is That Really?
This experiment was to determine if there was more bacteria on surfaces at a school or surfaces at a local hospital. I tested this by swabbing five different places around the hospital and five different surfaces around the school. Once swabbed, I grew the bacteria on ten different petri dishes. After a period of two days to grow, pictures were taken of the dishes, and I examined the dishes and recorded my results. It was concluded that there was more bacteria at the school compared to the hospital.

MMH132: Frozen Fungi
I want to do this project because of all of the germs at fast food restaurants may spread to the ice. Once I collected my ice samples, I allowed them to melt. Then I poured the water onto sterile swabs and transferred them to petri dishes. I let them grow for three weeks, and then recorded the results. Sample 3 produced the most bacteria. This experiment showed which restaurants and ice distributors let the most bacteria pass their filters. My results showed what sources care most about sanitation and ice filtration. This leads me to think of the tables’ dirtiness.

MMH133: Germ Growth in a science classroom
For my project, I tested the germ growth on surfaces in and around my science classroom. The purpose I had in this experiment was to see the amount of germ growth in schools and how safe students and faculty are in schools. In my experiment, I hypothesized that if I swab different surfaces in my science classroom, then the cold water handle will have the most amount of germ growth because people have dirty hands before they go to wash them, and should collect a lot of germs. The surfaces that I tested in my experiment were: cold water sink handle, 16 petri dishes, cotton swabs, teacher’s lounge microwave, hand sanitizer bottle handle, boy’s bathroom urinal handle, water fountain button and a laptop (used to record data). I did this by dipping Q-tips into sterile water and then swabbing it into a petri dish filled with agar. I conducted 3 trials for each surface that I tested, making 15 petri dishes in all. I then let the petri dishes sit in an incubator for 48 hours to allow the germs to grow. I then looked through the surface of my petri dishes and applied a formula (2πr^2). I then recorded my results for each trial and found the average amount of germ growth for each surface. After conducting this experiment, I concluded that the microwave in the teacher’s lounge had the most amount of germ growth, rejecting my hypothesis.

MMH134: Do healthcare workers carry home more bacteria on their shoes than non health care workers?
The purpose of my project is to see if health care workers carry home more bacteria on their shoes than non health care workers. To conduct this experiment I will swab the bottom of healthcare workers and non health care workers shoes to find the amount of bacteria.

MMH135: Spirulina and Vitamin B-12 Tablet
Over 13% of the American population is vegetarian. However, many vegetarians have a hard time obtaining necessary proteins that are only found in meat. Spirulina, a cyanobacteria, made the process of obtaining proteins much easier. But, Spirulina greatly lacks in vitamin B-12 which is also only found in meats, and is necessary for the body. The purpose of this experiment was to create a tablet which contained both Spirulina and vitamin B-12 that passed standard tablet quality tests. This was done through three different trials. Each trial had the same amount of Spirulina, vitamin B-12, and magnesium stearate, however the amount of binding agent (microcrystalline cellulose) was changed. After six tablets of each trial were made they were put through dissolution and hardness/friability tests (three for each). Trial two, which had 1.25 grams of microcrystalline cellulose turned out create the most successful tablet.

MMH136: Dandelions vs. Penicillin
The title of this project is Dandelions Verses Penicillin. The purpose of this project is to see if the conventional way of treating diseases in modern day society is the best way to treat them. For the procedure, put 3μ of E. Coli onto two agar plates, then cutting four holes into the agar, put 3μ of dandelion extract into four holes. On the other plate put four penicillin discs onto the plate. Place plates into incubator at 37 degrees Celsius for 24 hours, measure, for another 24 hours, measure. For a control, put 3μ of water into the holes.
**MMH137: Effect of Area of School on Bacteria Sum**

The reason I chose to do this experiment is because I felt that it would be beneficial to know just how sanitary a school really is. When you think about it, you spend a majority of your youth life in school. Especially considering it’s cold season, I wanted to see how much bacteria is growing and living in the school, and that it wasn’t somewhere you could easily get sick. I was genuinely curious since this is something lots of people wonder about, so I thought I’d find out for myself. My testable question was asking if out of four common bacterial areas in a school, which place would be most contaminated: the Girl’s Bathroom, Boy’s Bathroom, Cafeteria, or the Girls Locker Room? To be more specific, I will be swabbing one of the corners of each room. Nevertheless, if the amount of bacteria relates to area of the building, then the cafeteria will be most contaminated with bacteria, because bacteria is found on food and dirt more than other surfaces or objects. Basically, for my procedure I filled 12 Petri dishes with agar, and then swabbed 4 areas with sterile cotton swabs (3 trials for each area). I then wiped the swabs against the agar, and placed the sealed dishes into an incubator, and I let them grow there for 2 days. On the 2nd day, I placed them into a refrigerator so that the bacteria wouldn’t grow anymore. This way I could measure the areas accurately. In the end, the lunchroom was most contaminated with bacteria. The average area of coverage on the Petri dishes (For the Cafeteria) was 872.839159033 mm2, which was a lot larger than any of the other averages. In conclusion, my hypothesis was right. The lunchroom did end up being the most contaminated area out of the 4 areas tested.

**MMH138: Does Body Wash Damage Skin?**

This project will explain whether or not body wash really damages skin. Dove body wash is known to not damage skin. To perform this experiment you must have litmus paper and a variable. The variable will be the body wash in which you will have to test 5 different times for each of the 5 body washes. The body washes will be Castile, Dove, Olay, Soft Soap, and Suave. The litmus paper test will be used using small glass cups with body wash in them. The litmus paper will tell us what body wash damages skin.

**MMH139: Chew on This!**

The purpose of my experiment was to conclude if restaurant machine ice and, or drinking fountain water is dirtier than toilet water. I had this idea when I was chewing on ice at a restaurant. I developed the problem: “Is toilet water cleaner than restaurant ice, and, or school drinking fountain water?” My hypothesis was: “If I grow bacteria using samples collected from toilet water, restaurant ice, and school drinking fountain water, then the school drinking fountain water will grow the most bacteria and be the dirtiest and the toilet water will grow the least bacteria and be the cleanest.”

**MMH140: Researching Cystic Fibrosis**

The purpose of this scientific study was to investigate the relationship between genetics and cystic fibrosis. Data was allocated from the Human Genome project in order to conduct a comparative analysis.

**MMH141: Eye See the Light**

Does eye color affect the ability to see in low light and bright light? I collected the items used in my project. I collected permission slips and organized them into groups: Hazel, Blue, and Brown. I set up my materials needed and tested each participant. Each participant had to identify the objects on the wall in the light setting provided. I repeated these steps with each participant in both light adjustments. My results are that brown eyes see the best in low light. Hazel eyes see the best in high light. My conclusion is that eye color can affect eye-sight.

**MMH142: Natural V.s. Prescription**

Divided an agar plate into 4 equal quadrants. A test tube of Bacillus cereus and passed the end over the flame and streaked. The plate was streaked with a nicrome wire loop. Since the Amoxicillin, Sulfamethoxazole/Trimethoprim, and Cephalexin are in powder form, a dilution of 500 milligrams to 40 milliliters was created and stirred for 5 minutes. A sterile paper disc was soaked for 1 minute, let it drip for one minute, and then place it in the middle of one of the quadrants. The plate was taped shut, inverted, and placed in an incubator set at 37° C.

**MMH143: Probiotic effect on Antibiotic**

Does probiotic supplementation and concentration mitigate the impact of antibiotic introduction to good bacteria? If I were to increase the concentration (volume) of probiotic then there will not be a change in percentage ratios of healthy and dead bacteria because the purpose of an antibiotic is to destroy life which results in the bacteria dying either way. In conclusion, my hypothesis was neither supported nor rejected. In the results the close proximity of some of the ratios supports but at the lower concentration it rejects my hypothesis. Even if this is so, there are still promising data. One variable that may have differed my results was that I performed an in vitro experiment and not an in vivo experiments. During this experiment I learned that microbiology is a hard field of science. It takes a lot of patience, time and effort. I now understand why many medications go through a large amount of testing and time before reaching the consumer. There is so much precision that goes into getting accurate results. The probiotic increased the bad bacteria and the antibiotic kill the good. Either way the bad bacteria came out on top. Sample Procedure- Gram Staining- Dunk slide in crystal violet. Remove and allow to stand for one minute. Rinse gently with water. Dunk slide in Gram iodine. Remove and allow to stand for one minute. Rinse gently with water. Dunk slide in decolorizer for approximately 10 seconds. Rinse gently with water. Dunk the slide in safranin. Remove and allow to stand for one minute. Rinse gently with water. Blot dry and observe with microscope.
**MMH144: Good Blood, Bad Blood**
The purpose of this experiment was to investigate the effect of antigens on human blood type. A synthetic non-toxic blood kit was used to perform the experiment.

**MMH145: Which Technique Works Best to Relieve Delayed Onset Muscle Soreness After a Workout**
My study was designed to find out which technique works the best to relieve DOMS pain after a workout. I will test 2 techniques: icing the muscle group after the workout and stretching the muscle group after the workout. For each trial I will choose one muscle group to ice, one muscle group to stretch, and one muscle group will be my control. I will alternate my techniques based on the muscle groups so that I will test every theory on every muscle group.

**MMH146: Watch it Disappear**
The purpose of this experiment was to find out which pain reliever would act fastest to an ache or pain in a person’s body. For my procedure, I tested 3 types of pain reliever (naproxen sodium, ibuprofen, aspirin) in a mixture of toilet bowl cleaner and water at a pH of 2.0. I also made the mixture at a temperature of 98.6o F. At 30 seconds in the experiment, I started to stir the mixture with the pain reliever in it. My results were that the off-brand aspirin dissolved the fastest in the mixture. This experiment was amusing to do.

**MMH147: Antioxidants - The Real Superheros!**
When starting my project my mission was to find out which one of the tested antioxidants provides the best protection for apples from the harmful effects of oxidation — browning and wrinkling. My hypothesis from the start was that Vitamin E would protect the apple the best since Vitamin E is used in prevention and treatment of the most widespread list of medical conditions. I had 7 samples of apple covered by the corresponding tested antioxidant, 5 apple slices in each. I tested a control (no antioxidant solution covering it), Vitamin A, Vitamin C, Vitamin D, Vitamin E, Pomegranate juice, and Blueberry juice. Each apple slice was covered with the solution it pertained to and observed at specific time points within a week. My results didn’t turn out the way I expected them to; Vitamin D protected the apples the best! Though Vitamin E, my prediction, finished in second place. Compared to the other tested antioxidants, Vitamin D kept the apple slices at a much lower wrinkle rate and they didn’t brown as much as the others. Antioxidants are an essential part of preventive measures and it’s crucial to get your daily dosage of them through both foods such as peppers, seeds, berries, and leafy greens and through antioxidant supplements in order to protect our body from the harmful effect of free radicals.

**MMH148: Does Honey a Day Keep the Doctor Away**
I will sterilize my work space with alcohol. I will put on gloves, an apron, and goggles. A nicrome wire loop and forceps will be flamed and allowed to cool before being used. The E. coli will be streaked across a plate containing nutrient agar. A sterile paper disc will be inserted into honey, The disc will be place on a quadrant of the agar plate. The plate is taped shut, inverted, and placed in an incubator. This will be repeated 328 more times for a total of 32 samples per product. Results will be recorded, averaged, and analyzed.

**MMH149: Regular Soap vs. Antibacterial Soap**
The problem tested was to see if antibacterial soap was really antibacterial. Since many soaps are antibacterial, I wondered if they did what they said they did. This was tested by using dirt mixed with water as the bacterial property. There was a control antibacterial liquid soap, antibacterial bar soap, non-antibacterial liquid soap, and non-antibacterial bar soap. They were incubated for 4 days and checked for bacterial growth every day. This was repeated 2 times. What I found was that on the first 2 days, the antibacterial soaps did better than the regular soaps. The regular soap also had less bacteria than the control. However, on the 3rd and 4th days, all the plates seemed the same. There was also fungal growth on the plates.

**MMH300: Do you hear what I hear?**
The purpose of this experiment was to see if gender had any affect on hearing ability. To conduct this experiment, we took five males and five females of the same age group and played 5 frequencies to them. The results were measured if the test subject could hear the frequencies that were played to them at about 35 decibels. The results showed that there is no difference in hearing ability based off of gender. All but one of our test subjects heard every frequency, ranging from 500Hz to 18,000Hz, showing that there is not a difference in hearing ability between genders.

**MMH301: Keep Calm and Wash On**
Our experiment was to see which hand cleanser got rid of the most germs. We thought that anti-bacterial soft soap was going to get rid of the germs the most. We tested ten different hand cleansers, recorded results and took pictures. In the middle of testing we found out that Dove Bar Soap actually was the best hand cleanser and was safe on your hands. In our research we found out that the Anti-Bacterial Soap had an ingredient that could be harmful to your hands.
**MMH302: The Effects of Video Games on Your Body**

Our purpose was to test if people play video games beyond the healthy limit. We got multiple test subjects and tested their pain tolerance, heart rate, breathing rate, reactions, and blood pressure. Our data showed that everybody’s measurements got higher, they had better reaction skills, and a higher pain tolerance. We concluded that people do play video games to a point of unhealthy blood pressure and should take breaks every twenty minutes or so.

**MMH303: What is the Dirtiest Place in the Movie Theater?**

Our project was to determine what the dirtiest place in a movie theater was. We wanted to know where not to touch so we don’t get any germs. We did this by swabbing six different places in the theater and grew it in a lab. The theater door handle ended up being the dirtiest place. In conclusion when you go to the movies you shouldn’t touch the door with your hand.
Intermediate – Physics (MPH), 7th & 8th Grade

**MPH100: How does temperature affect magnetic strength?**
My experiment was to find out if extreme temperatures would affect a magnet's magnetic forces. I measured paper clips to find out a relative force of my six magnets. While freezing amplified the forces heat made it weaker.

**MPH101: Experimenting With Blowing Bubbles**
The purpose was to make bubbles bigger and see what happens if you dilute the soap. I diluted various types (national and house brand) of liquid dish soap. Solutions were pure soap, 1:8, and 1:64. I blew on a flat surface to take measurements of the size of the bubbles. I charted the average sizes and compared the results of the solutions and brands. The data indicated that the 1:64 solution and a house brand made the largest bubbles. I found out that using 1:64 solution made the biggest bubbles. You can use any type of dish soap.

**MPH102: How Does the Wind Meter Work?**
My project is on wind meters the reason I did this is because I wanted to know more about how you measured wind speed. How I did this project was I built my own homemade anemometer. I tested it using a fan with three different speeds. My hypothesis was pretty much exactly right. When the fan was on high it made more turns per minute. When the fan was on medium it made average turns per minute. When the fan was on low it made less turns per minute. This was an easy project and it was cool to make my own wind meter.

**MPH103: Bouncing Off the Wall**
Angles and trajectories are important in many areas our everyday lives. In my experiment I tested different angles and trajectories of a marble by rolling it at a flat wood block from eight different angles and tracing the path of each roll from the marble’s starting point, bounding point, and ending point. I then measured each bounding angle and compared it to its incoming angle. My experiment will help people who are involved in activities that relate to angles and trajectories, especially people who play sports involving trajectories.

**MPH104: Can You Lower That Noise Down?**
Which insulator is most effective for soundproofing? I also wondered if the volume of the room where the sound is contained affects its intensity. I hypothesize that the thickest insulator is the best sound proofer and the smaller the container, the lower the sound. The control variable is the sound of a timer going off measured inside both boxes without insulators. I then put an insulator on the inside of both boxes and measured the noise of the timer (decibels), outside the boxes. I subtracted that measurement from the control and I compared. I repeated these steps with other insulators. Results will be available on fair day.

**MPH105: Is Copper the Best Conductor of Electricity**
The purpose of this experiment is to measure the resistance of wires of different materials by using these measurements to demonstrate how resistance depends on length and area and figure out if these results should help me to understand which material is the best conductor of electricity and measuring some of the wire samples on my display board. The first, second, and third experiment is to talk about the formulas and the effect of changing the diameter of conductors or number placed in parallel and is also intended to determine the effect of wire length on the resistance wire.

**MPH106: How Heavy is a Bubble?**
I got a bowl and filled it with bubble solution. I put the bowl aside. I had to make my bubble pipe by poking a hole with a pencil through the side of the foam cup near the bottom. Then I removed the pencil and I pushed the drinking straw through the hole so it went all the way inside the cup and that was my bubble pipe. I turned the entire bubble pipe upside down and placed it into the bubble solution, and I lifted up the bubble pipe. I blew into the straw very gently to make a bubble form on the top of the cup. After a small bubble formed I twisted the cup to release the bubble. At the same time, I hit the “Start” button on the stopwatch. I timed how long it took for the bubble to hit the ground, and I recorded my data on a chart. I blew nine more small bubbles, and recorded how long it took for them to fall as well. I then blew ten large bubbles using the technique described above and recorded how long it took for them to fall in the second column of the chart. I calculated the average time it took for each type of bubble to hit the ground by adding up each column and dividing the sum by 10. Then I compared the results.

**MPH107: Using Thermoelectrics to Harness Household Waste Heat**
The focus of this work was to determine if household waste heat could be harnessed in order to generate enough electricity to power small electronic devices. Thermoelectric devices were attached to the top three heat producing appliances in the house. These Seebeck thermoelectric devices operate by using a temperature gradient to generate an electrical current. The amount of electricity needed to power select small electronic devices was calculated and compared to the electricity produced by the Seebeck devices. This comparison allowed for the determination of whether or not household waste heat could be used to power small electronic devices.
**MPH108: CURVE IT LIKE CARLOS**
How does kicking a soccer ball with different spins affect its flight. I used two nets and a bench to make a structure that helped to ensure that all strikes started with the same general trajectory. I found that striking with the outside of my foot caused more miss hits and substantially shorter distances. The project helped me understand the effect of spin on kicked balls and gave me an idea of which kicks I could use in a game and when.

**MPH109: Resistance is Futile!**
This experiment was performed to determine what wires, of different metals and gauges, had the highest and the least resistances. The procedure begins by connecting an ammeter to the negative terminal of a 9 volt battery and a piece of wire. Connect one end of the wire to the positive end of the 9 volt battery. Use a voltmeter to find the voltage drop for each. Use the equations \(V=IR\), \(R=\rho \frac{L}{A}\), and \(\sigma=\frac{1}{\rho}\) to find resistance, resistivity, and conductivity. The resistances from least to greatest are copper, silver, aluminum, brass, steel, nickel, and nichrome. Thicker gauges had less resistance.

**MPH110: The Perfect Pitch**
Have you ever wondered how a baseball moves? Now is the time to find out. The purpose of this is to find out about the physics of a baseball. Each grip changes how the ball spins and moves. Five different pitches were thrown a few times and then the data was averaged and recorded. I hypothesized that the fastball moved fastest and broke the least. Every pitch had different actions and results. I have concluded that my hypothesis was correct. My results were exactly as I had predicted.

**MPH111: Building a better projectile launcher**
The purpose of my experiment was to see how different ways of launching a projectile from the same launcher affects the distance the projectile travels. This will be useful for people shooting things with similar projectile launchers. My testable question is: what are the effects of the distance the launching mechanism is pulled back and the position of ball in the launcher on the distance the ball travels? I hypothesized that the farther you pull back the launcher the more distance the ball will travel. I also hypothesized that the position of the projectile in the launcher will not affect the distance the projectile goes. I fired my projectile launcher 40 times changing how far the launching mechanism was pulled back and the position of the ball in 8 different setups. My results show that pulling back the launching mechanism farther back makes the projectile go farther. My results also show that if the projectile is located farther away from the launching mechanism it goes farther than if the projectile is right up against the launching mechanism. One of my hypotheses was correct. The farther I pulled back the launching mechanism the farther the projectile went. My other hypothesis was wrong because the back ball position went farther than the back ball position.

**MPH112: Baseball Cheating**
In my experiment, I tested which bat would hit a ball the farthest: BB bat, corked bat, or a regular bat. The three wooden bats started out weighing 22.5 ounces. The BB bat weighed 30.25 ounces. I placed the bags on a skeet thrower, released it, and the bats hit the balls off a tee. In my hypothesis, I said that I thought the BB bat would hit the ball the farthest, and I was correct. The BB bat hit the ball an average of four more inches than the other bats.

**MPH113: How many russet potatoes will it require to fully illuminate a 2V red light-emitting diode?**
The purpose of this experiment is to see if certain amounts of russet potatoes can be fully illuminate a light-emitting diode for a short amount of time. To conduct this experiment I connected different amounts of potatoes (starting with four and continuously adding one on) together and use their electrolytes from their acid to illuminate a light-emitting diode. The experimental results were measured on a brightness scale from 1-3. One being a very dim flash, two being a halfway lit up flash, and three being a fully illuminated flash. The results of the experiment show that six russet potatoes can fully illuminate a light-emitting diode for a short amount of time if connected properly. The results indicate that the hypothesis should be rejected because the light-emitting diode was fully illuminated after connecting six russet potatoes instead of my hypothesized twelve.

**MPH114: WHICH TYPE OF FABRIC EVAPORATES MOISTURE QUICKER?**
My project is about testing which fabric evaporates the most amount of water over 25 minutes long. I use 6 different types of fabrics and see which one evaporates the most amount of water by percentage. The 6 fabrics I use are cotton, flannel, polyester, spandex/lycra, denim, and wool. My hypothesis was that smooth and light fabrics like spandex/lycra and polyester would evaporate the most amount of water and I was correct. The fabric that evaporated the most amount of water is the polyester and the spandex/lycra fabric.
**MPH115: The Science of Ballistics**
The purpose of this experiment was to determine how the weight of a projectile (tennis ball) would impact the distance it would travel when launched at a constant angle and a constant force. To test this, a launcher was built from PVC pipe that used air pressure to propel a tennis ball. Three tennis balls were used in the experiment. One tennis ball (Ball “A”) had no additional weight (it weighed 2 ounces) while the weight of the other balls was increased by inserting quarters into a slit cut into the ball. The second ball (Ball “B”) weighed 3 5/8 ounces and the third ball (Ball “C”) weighed 5 ¼ ounces. The angle of launch was held constant at approximately 45 degrees and the force was held constant at 70 pounds per square inch (psi). For each ball, 3 trials were run for a total of 9 data points. The stated hypothesis “If the mass of an object affects the amount of gravitational pull it exerts, then the tennis ball with the greatest mass will travel the shortest distance when shot from a cannon.” was proven to be correct. The heaviest tennis ball (Ball “C”) traveled a shorter distance than the lighter balls (Ball “A” and Ball “B”) with the farthest distance achieved by the lightest ball (Ball “A”). It is interesting to note that there was some variability on the results (i.e., distance traveled) that indicates that there are other factors for which we could not control (e.g., the wind or the effect of weather on the balls). In addition the relationship between the weight and distance traveled was not proportional – a doubling of the weight of the projectile didn’t result in a halving of the distance traveled.

**MPH116: MELTING ICE**
My project was to help people stay safe on the roads by telling them how long to stay off the roads when snow and ice hits the area. I put salt on the ice and saw how long it would take to melt in different temperatures. The three temperatures I used were -1, -4, and -7 degrees Celsius. So when I was finished with my experiment it took 27 minutes in -1 degree Celsius. And in -4 degree Celsius it took 41 minutes and lastly it took 53 minutes for all ice to melt in -7 degree Celsius.

**MPH117: Which Trash Bag is Strongest?**
The purpose of this experiment is to find out which type of garbage bag is strongest. For the first test conducted, weights were placed into a garbage bag to see how much weight it could hold. For the second test, weights were dropped onto the garbage bags to see which one would break. The data showed Hefty performed the best on the first test while Glad performed the best on the second test. Giant Eagle performed the worst on both tests. The conclusion stated Hefty would perform the best on both tests, but it only performed best on test one.

**MPH118: What is the Maximum Intermediate Height of a Siphon?**
This experiment was to measure the maximum height of a siphon. I started off by setting the pulley at 104 cm and started to siphon. I then moved the pulley up and the water continued to flow. Once I got to 165 cm the water stopped flowing through the siphon and it was concluded that the flow of a siphon stopped at 165 cm. Then, I tried to start the siphon at 120 cm and it wouldn’t begin. Then, I timed how long it takes to siphon all the water. I repeated these steps with food coloring added to water.

**MPH119: Tidal Energy: Effects of Changing Pitch**
In my experiment I tested the effects of pitch angle (15°, 20°, 25°, 30°, 35°, 40°, 45°, 50°, 55°) on a tidal turbine. By testing each angle on a turbine model by using the same method with different angles. In my testing I found that range of 30° to 40° was most efficient. When the angle was increased beyond that, the model began to behave erratically.

**MPH120: The Magic of Static**
This experiment is to determine if wool can cause enough static to separate a mixture. Taking a plastic comb, which is a conductor of static, and wool, the mixture is salt and paper. Using the static from the comb, the mixture is separated and the salt hopefully is on the comb, because it’s lighter. It worked, but only when the moisture in the air is low. The wool worked making static and proceeded to separate the mixture.

**MPH121: Boyle's Law**
My experiment was based off of Boyle’s Law. It shows how Boyle’s Law works and how the Law relates to the experiment I chose. I took a syringe and put soda inside of the syringe to measure where the marking line was. Then I added different pressures that made the volume decrease as the pressure increased. I kept the temperature inside constant. When more pressure was added, the volume began to get smaller, confirming Boyle’s Law philosophy.

**MPH122: Does PSI Help It Fly?**
In this experiment, testing was done to see if the amount of air pressure in a ball affects its distance when kicked. The answer was to be provided by dropping soccer balls from a raised platform. This experiment could be useful to any soccer fanatic, coach, player, referee, etc. It helps to inform them of one way to keep a fast and exciting game through the physics of ball pressure. After the experiment, my hypothesis was proven correct based off of my results, which showed dramatic changes in ball height.
**MPH123: The effect of types of bridge on strength**

The purpose was to test different types of bridges and their strength to see which bridge is stronger and that was a success. My hypothesis was supported because the average for the bridges was 54.6 for the suspension and 46.2 for the beam that is an 8.4 newton difference.

**Brief Procedure**
1. You take Popsicle sticks and build the two types of bridges with the same amount.
2. Let the glue dry for 24 hours
3. Use another material to test how much weight they can hold.
4. Collect data
5. Repeat 9 more times
6. Compare

The trends in my data in every trial but 1 the suspension bridge was the bridge that could last with the most amount of newton's force. I can further investigate this by testing if different types of materials can be used to determine what type is stronger.

**MPH124: Crystal Clear**

Radio reception can be a problem for listeners. In my project, I wanted to figure out if weather can affect the clarity and reception of a crystal radio. For my project, I built a crystal radio out of items from a kit and tested the radio. During testing, I went outside during different types of weather and recorded the data. I recorded humidity, temperature, pressure, visibility, and precipitation. Since I had no efficient way of measuring the reception, I rated it on a scale of one to ten. In the end, weather does affect the reception of a crystal radio.

**MPH125: That’s the Way the Ball Bounces**

A Vernier motion detector will be used to determine the height a golf ball bounces. A structure will be built to control the force at which various balls are hit. The distance will be measured and the correlation will be determined.

**MPH126: Top Performance**

My experiment will be on the physics of table tops. I am going to collect many tops of different shapes, sizes, materials, and designs and time how long the tops spin on various surfaces and temperatures to see which tops spin longest in different conditions and why. I believe that a light top will spin longer than the rest because a heavier top will be slower and stop faster.

**MPH127: Tee It Up**

In this experiment we went to a driving range. We set a tee in the ground so that 5.08 centimeters of the tee was above the ground. Then, we put the ball on the tee and hit the ball. We hit two times off each tee height. The heights we used were 5.08, 2.54, and 1.27 centimeters. We measured the distance of the drive after each ball was hit off the tee. After we measured, we recorded the information then moved on to the next height. The conclusion was the middle tee height produced a longer shot.

**MPH128: Magnetometer Magic**

The purpose of this experiment was to measure the effect and strength of an object's magnetic field. A magnetometer was engineered using household materials that could detect weak magnetic fields.

**MPH129: Does Temperature Effect a Magnets Strength?**

This project is to determine if temperature will effect a magnets strength. Eight magnets were split into four pairs of two then put into different temperatures. The temperatures that they will be tested in are -75 degrees Celsius, 0 degrees Celsius, 20 degrees Celsius, and 100 degrees Celsius. Once they reach temperature, they will be used to pick up metal BBS. The BBS will be counted and recorded. Tests will be repeated multiple times to assure accuracy. Results will be available at PRSEF in March.

**MPH130: Magnetest**

I will conduct multiple experiments to see which factors affect a the magnetic forces in magnetic materials. The first will adjust the temperature of known magnets to see if it has any effect on the their ability to attract objects. Magnets of different sizes will also be tested to see which is stronger. I will also use various barriers to see if an obstructing force can alter the magnet's magnetic field. Results will be collected, and available at the PRSEF in March.

**MPH131: Sweet Lasers**

A laser was shone into a half moon container full of gelatin with different sugar concentrations and noted the angle of refraction. Then using Snell's Law to calculate the index of refraction and compare the results. With this data it was determined that the sugar content of a liquid like gelatin changes the index of refraction.
**MPH132: Over the Dark Side of the Moon**
My experiment was to find out how a thin white light could produce a continuum of colors after being refracted, and why the visible light spectrum occurs in the same order every time. My experiment also tested for the different wavelength energies of the colors in the spectrum by using angles and trigonometry. My problem for my experiment was: “How does a beam of light after going through a glass prism produce a continuum of different colors? Why do the colors occur in the same order every time?”

**MPH133: Does Temperature Affect the Kinetic Energy of a Rubber Band?**
**Question:** To determine if temperature affects the amount of kinetic energy rubber band possesses and distance it fly’s when stretched and released?
**Hypothesis:** As the temperature the rubber band increases the amount of kinetic energy it possesses will increase and it’ll fly farther.
**Procedure:**
1. Place 30 rubber bands in container and store the container stored at 22°C for 1 hour.
2. Remove one of the rubber bands from the container instal it in the rubber band gun and fire and determine the distance it flew.
3. Repeat step 2 for the remaining bands.
4. Repeat steps 2-3 38°C and at 0°C.
**Conclusion:** Experiment still in progress.

**MPH134: This Flame is on Fire**
My project is what part of the flame would ignite the toothpick the fastest. I had to get materials. Next, light a candle, take one toothpick and stick one end of the toothpick in the center of the candle flame while the helper simultaneously starts the stopwatch, and the toothpick ignites so the helper stops the stopwatch. Place the toothpick in a bowl of water, stick the end of another toothpick at the base of the flame; follow the steps for a lighter and match. My results showed that the matches were the slowest all of the times to ignite.

**MPH135: The Best Stainless Steel Cup**
The purpose of this experiment is to see which type of stainless steel travel cup keeps beverages the warmest over time. During the experiment multiple stainless steel travel cups were tested from three different categories: single wall, double wall, air insulated and double wall, vacuum insulated. Water was heated to 100 degrees Celsius, and poured into each cup. The temperature of the water in each cup was recorded every ten minutes for 6 intervals. Two trials were completed. The data and conclusion supported the hypothesis that the double wall, vacuum insulated cup would keep beverages the warmest over time.

**MPH136: Does Temperature Affect the Amount of Kinetic Energy a Golf Ball Possesses After a Force Is Applied?**
**Purpose:** Determine if temperature affects the height a golf ball bounces when a force is applied
**Hypothesis:** As the temperature of a golf ball increases the height that it will bounce will increase
**Experimental Procedure**
1. Randomly select one of the 5 golf balls that were stored at 22°C (Control) for testing
2. Place the golf ball from step 1 in the testing apparatus.
3. Determine the height that the golf ball bounced
4. Repeat step 3 for 29 more tests
5. Repeat steps 1-4 for the remaining golf balls
6. Repeat steps 1-5 for the golf ball at each of the temperatures being tested

**MPH137: Airborne**
The purpose of this experiment was to test what shape has the best aerodynamics. The shapes I tested were a sphere, cylinder, plate, flat circle, and a rectangle. I used a trebuchet to launch the projectiles. I hypothesized that the sphere would go the farthest, and it did. The data from this experiment can be used in engineering. If an engineer were to build a rocket or a missile, what shape would the tip be to make it go farther and faster?

**MPH138: Does Temperature Affect the Strength of a Magnet?**
The purpose of my experiment was exploring if and how temperature affects the strength of a magnet. To measure that, I exposed four different magnets to four different temperatures and measured their strength using paperclips. I counted the number of paperclips attached to a magnet in each temperature condition and compared the results. My experiment showed the strongest magnetic pull for the magnets exposed to freezing temperature, while the magnets that were kept at room temperature showed the lowest pull. One application where these results can be useful are Maglev trains; the temperature could reduce the number of magnets needed.
### MPH139: The Pterosaur Flight Simulator: The Physics to Fly

How did having a head crest affect Pterosaur flight distance? This question, first posed by National Geographic, sparked an intriguing curiosity in me. Dwarwinopterus, Dimorphodon, Tapejara, and Quetzalcoatlus lived during the Triassic, Jurassic, and Cretaceous Periods. Simulated glider models will represent their different head shapes. It is my hypothesis that crested head Pterosaurs would fly further and straighter than non-crested heads because they would be able to navigate more effectively, acting similar to the tail and rudder of a plane or the crest of a hornbill.

### MPH140: Sweet Refraction

The goal of my experiment was to see which kind of sugar water would create the greatest angle of refraction. I decided to conduct this experiment because I am interested in Physics. My problem was: “Which type of sugar water will create the greatest angle of refraction: plain water, Sucrose, Aspartame, Saccharin, Sucralose, or Rebiana?” My hypothesis was: “If I test six types of sugar including pure and artificial, to see their angle of refraction, then sucrose will create the greatest angle of refraction because it is the densest and is pure sugar - not mutated.”

### MPH141: The Effect of Tennis Racquet String Tension

My project was the effect of tennis racquet string tension. I am an amateur tennis player. I chose the project to answer a pondered question. Does tennis racquet string tension affect the speed of a tennis ball? I performed 10 trials. In each trial I served a tennis ball 10 times each with loosely-strung and tightly-strung racquets. To avoid misleading data, I took a short break in between each trial. My data showed that the loosely-strung racquet made the ball travel faster. My hypothesis was not supported. Although the numbers were close, the loose racquet came out on top.

### MPH142: What is the Most Accurate Spot on a Basketball Court?

The reason I did this project is because I wanted to determine where the most successful spot on the basketball court is. I want to know if you shoot the ball from the top of the key, you will have better accuracy than if you shot a ball from the corner or wing. Then, I will make every person shoot 2 shots from the wing, corner, and the top of the key. Experimentation is still in progress.

### MPH144: Charger Power

My experiment tests if the charge rate of an iPhone changes depending on the computer conditions. I tested this by measuring the charging rate of an iPhone with the computer plugged in and unused, plugged in and used, unplugged and unused, and unplugged and used. The results show that the more charged the iPhone is, the slower it charges. The slope dramatically changes after the phone is 65% charged. I conclude that before the batter was 65% charged all conditions charged equally. In contrast, after 65%, having the computer plugged in and used charged the phone the fastest.

### MPH145: Boomerang Science

In this experiment, an experiment was done to help conclude which design or shape of boomerang worked the best (came back the closest to the thrower’s hand). In preparation for this experiment, three boomerangs were constructed out of plywood, and were thrown about twenty times each to determine the average flights of each. Surprisingly, they worked fairly well, and, depending somewhat on the throw, each could return consistently within fifteen yards of the thrower (being thrown about thirty to forty yards). The results were, again, averages, and the omega boomerang returned closest, followed by the triple-armed and the right-angled boomerangs. The boomerangs all worked, and helped the contestant achieve a higher understanding of the physical forces at work in wings, gyroscopes, and other aerodynamic topics.

### MPH146: Effect of Electrolytes on Magnetism

Magnetism and electricity are very similar, and electrolytes (Salt) are a good conductor of electricity. If magnetism and electricity are similar, and electrolytes are good conductors of electricity then they might also be a good conductor for magnetism. The goal of this experiment is to determine if the amount of salt in water affects the magnetic field of a magnet.

### MPH147: Through My Telescope

This experiment was to see how a telescope works and is structured. After some research on the base and structures of different telescopes I was able to come up with a simple but affected way to make a homemade telescope. From there on I evaluated the homemade telescopes clarity to see the results were clear. These results were able to determine that with the telescopes specific base and structures allowed it to work like a regular telescope.

### MPH148: What Position Do You Best Shoot a Basketball From?

The reason I did this project is because basketball is my favorite sport. I will take my subject and make them shoot a basketball from three different positions. They will shoot that shot three times. The positions are from the chest height, from chin height, and over the head height. While they are shooting I will record data. Then add them to my power point.
**MPH149: Weight Behind Closed Doors...**

How does the Movement of a One-Story Elevator Effect the Weight of an Object? Did you ever wonder if weight changes in an elevator? If so, my project will definitely interest you. The purpose of my project is to determine the weight change if any, of a 200 gram calibration weight while moving up and down a one-story elevator. My hypothesis was that the weight would change at the beginning and end of the ride because the acceleration would increase/decrease during these times. My hypothesis was proven correct. The results showed that the weight changed dramatically at the beginning and end of the elevator ride, and stayed constant during the middle of the ride.

**MPH150: The Biefeld-Brown Effect**

The purpose of this experiment is to attempt to lift an equilateral triangle into the air using electricity. The procedures used explain how to create the high voltage generator needed, how to create the lifter, and how to test the lifter using the generator. The data that was collected was based on the properties of the four lifters that were constructed relative to how they reacted with the high voltage used in the experiment. In conclusion, the fourth lifter that was constructed was able to be lifted 9 cm into the air using the high voltage generated for the experiment.

**MPH151: Air Resistance**

My project has to do with materials affecting air resistance. The materials that had the most amount of resistance when falling from a specific height was the t-shirt. The materials with the fastest times and the least amount of air resistance was the plastic bag. Due to the height, all materials were close in time traveled. The base of the parachute was the same for every material. This made the project reliable without changing factors.

**MPH152: At What Diameter does an Aluminum Ball Sink?**

My experiment was “at what diameter does an aluminum ball sink?” I made three different aluminum balls and put them into a bowl of water. I put each of them in eight times. From my results the ball sank at a diameter of 2 cm. For all three of the aluminum balls it sank at the diameter of 2.0 cm and it almost sank at a diameter of 2.2 cm.

**MPH153: Protect and Serve**

The goal of “To Protect and Serve?” was to test the effectiveness of walls and structures used to prevent tsunami damage. A large plastic bin was used to contain the experiment. A piece of cardboard was set on the end of the pool, and was marked at the still water line. Then the structure was placed in front of the cardboard and a wave was sent down the pool using a wooden board. The highest point of the wave was marked and then measurements were taken. The average increases in height for each structure were: No structure: 11.6 cm, Tsunami Wall: 2.9 cm, Flat wall: 3.4 cm, Curved Wall: 7.9 cm, 3 Spires: 12.7 cm, Mound: 5 cm. Some of the walls (mainly the flat wall and curved wall) splashed, thus ruining their average. The mound wall would have done better, but the water washed around the edges. Overall, the end result was that the tsunami wall blocked the wave most effectively, proving the hypothesis. The flat wall would’ve been the better, had the water not splashed behind the wall. The tsunami wall caught the wave as well as the splash in its crescent curve. In terms of reliability, the tsunami wall worked best.

**MPH154: Supercharged Electric Car**

The purpose of this experiment is to investigate the effects of a capacitor added to an electric powered vehicle. The experiment had 3 trials and measured the elapsed times of both the charged capacitor car and the battery powered car against a control car. The average of these trials show that the charged capacitor car had an improved elapsed time over the battery powered car. The results indicate that the hypothesis should be accepted because the charged capacitor had a quicker elapsed time than the battery powered car, which is indicative of improved performance.

**MPH155: Effect of Water as a Conductor**

Water will more effective in smaller volumes but not as good of a conductor as copper. Procedures: Connect a small amperage power supply (Batteries) to a covered copper wire. Place this on a grounded wooden base. Run six inches of the wire from the power supply to a small cylinder with two holes in the ends. Run six more inches of covered wire to the end of the base back to the battery pack to complete the circuit. Fill the cylinder with different volumes of water and record after every volume change. Create a base identical to the first and mount a battery pack in the same place as the first. This time run twelve inches of wire from the battery pack in a loop back to the base. Measure the amount of electricity in ohms using a multimeter at the end of the circuit. Record all data and compare ohms in each volume then to the baseline with the copper wire.

**MPH156: Bombs Away**

The goal of my experiment is to determine how different weights affect the launch distance in catapults. Keeping the launch angle the same, at 45 degrees, and the length of the sling, I will determine what the most effective weight will be. I speculate that a very light weight will not go very far due to wind resistance and a lack of momentum, and a heavy weight will also fly short because of the heightened amount of force needs to move it. There will be a weight in the middle that will be a happy medium, and depending on the size of the catapult and the force it can generate to propel the object. I hypothesize that this medium weight object, the marble, will go the farthest.
**MPH157: MEASURING MAGNETISM USING THE HALL EFFECT**

The main problem on which the experiment was based was how to find the most accurate magnetic field of a household ceramic magnetic. My hypothesis was that I could measure the magnetic energy using a gaussmeter based on the Hall effect. The gaussmeter measures the magnetic energy as the difference in voltage using a special chip for the breadboard. Some of the magnets had two separate orientations, such as two north and south poles. The analysis suggested that the denser the magnet the more powerful it would be. I was able to measure the magnetic energy of several household magnets.

**MPH158: Float On**

I am exploring magnetic levitation because I wanted to do something unexpected. I wanted to prove that cobalt and neodymium could be levitated between human hands, glass, and wood, but not snow, rubber, or cement. I placed each material 7-9 centimeters away from each other vertically. I put the cobalt or neodymium in between the materials and the levitator magnet above the materials.

My observations were:
- Both can levitate through human hands, glass, and wood.
- Cobalt can levitate through snow and rubber.
- Neither could levitate through cement.

**MPH159: Shot Clock Cheese**

My hypothesis for my experiment was that shooting over you head will be more accurate than shooting from your chest or chin. For my experiment I took three kids from fifth grade and had them shoot five warm up each before they started shooting, made them shoot from five different spots on the court, and wrote if their made shot. They shot one shot from chest, chin, and overhead from each spot. Also I took down if they made their shot as they were shooting. After this I repeated with grades sixth through eighth.

**MPH160: 40-love##8232;**

Does temperature effect a tennis ball’s bounce? Well, that is the subject my experiment focused on. I dropped 12 tennis balls from the top of my stairs. Three were in my oven, three in my freezer, three in my refrigerator, and three were left in room temperature conditions. I used a tape measure to measure the height they bounced, and recorded it. My data showed that the tennis balls experiencing the oven’s heat bounced the highest. My hypothesis was correct. Tennis balls bounce the highest when they are warm!

**MPH161: Energy Efficient Nuclear Fusion Reactor**

This experiment was created to find a way to use nuclear fusion in a clean, efficient, and safe method. I would use a software development system such as java to create a software that would help me complete my project. For the model I would use household items to show what the fusor would look like. All of this would represent an energy source for the future.

**MPH162: Snap, Crackle, Pop**

To determine how long it takes until a dropped 12oz can of carbonated drink can be safely and cleanly opened, I dropped each can from a 37.5inch mark and waited two minutes before quickly opening the can over the sink. If the carbonated drink rushed out of the can I lengthened the wait time by 15 seconds for the next test. If the drink didn’t rush out I shortened the wait time by 15 seconds, and so on. For this experiment only Sprite, Coca-Cola, Diet Coke, Dr. Pepper, and A&W Root Beer were used. Results will be available in March.

**MPH163: Wingtips To be or not to be**

The reason I did this experiment was to see if putting wingtips on small planes would help them fly more stable and fly higher. The procedure was make 4 wooden airplanes, each with a different component and test with a wind tunnel. The plane with no wingtips or propeller went 8 inches and was very unstable. The plane with wingtips but no propeller went 23 inches and flew more stable. The plane with a propeller but no wingtips flew 21 inches and flew unstable. In conclusion, the plane with both went 24 inches and flew very stable.

**MPH164: Potential Energy vs. Kinetic Energy**

The purpose of this project is to see if an object’s potential energy ever is exceeded by that object’s kinetic energy. If the potential energy of a marble is calculated, then the calculated kinetic energy of the marble will be closer to exceeding the calculated potential energy when dropped from a higher height. A marble’s potential and kinetic energy will be calculated through the use of a roller coaster design. The data will be analyzed to see if the kinetic energy every exceeded the potential energy of that object. Final results will be available on fair day.

**MPH165: Water Makes It Go**

My project is about lifting weight by using mechanical energy produced by a water wheel. In my experiment I built a water wheel inside of a bucket. After it was built I conducted 3 trials. For each trial I had to lift 3 metal bolts from the ground to the wooden dowel. I used a hose-like tube to spray water onto the blades of the water wheel. This caused the blade to spin which caused the 3 metal bolts to lift off the ground. In each trial I changed different thing to change each outcome.
**MPH166: The Great Catapult Experiment**
My project was about which catapult projected the ball the farthest. The items I needed for my project were tongue depressors, rubber bands, dice rods, glue, paper, markers, posterboard, ping pong balls, whiffle balls. What I did for my project was I used 3 different types of catapults to see which one would project the ball the farthest. The steps of my project are construct 3 different types of catapults, then use the same ping pong ball to see which catapult projected the ball the most.

**MPH167: In FigureSkating, Will You Glide Further With or Without Weights?**
Ice skating is a big sport, especially during Winter Olympic Games. For this experiment, I got my mother and father to participate. We went to the skating rink, got weights added to the participants, and recorded results. As it turns out, the heaver the subject, the shorter the ice skating glide.

**MPH168: How Much Can Your Boat Float?**
The purpose of my experiment is to find out if the shape of the boat affects how much weight it can hold. I made aluminum foil boats, put them in water and filled them with marbles until they sank. I tested four boat shapes; the shapes are square, triangle, half a cylinder, and rectangle. The square looked like it could hold the most and after all the testing the square came out on top. The testing went smoothly and the results were consistent with Archimedes’s water displacement theory.

**MPH169: How does size affect how far a ball goes?**
This experiment was conducted to determine which size of ball would go the farthest distance. To conduct my experiment I launched the balls. I launched each ball five times for the best results. It was concluded that the soccer ball went the farthest distance.

**MPH170: Bang! For Your Buck**
The purpose for this experiment was to see what kind of ammunition you should buy for your handgun. To find out, I shot two types of custom rounds and factory rounds through a chronometer to tell me the velocity. I hypothesized that the factory .38 special rounds would be the fastest, but I was proven wrong. I found that the factory .357 rounds were the fastest. This allows the average ballistics buyer to know that if they want speed they should buy factory ammunition and that factory rounds are more reliable.

**MPH171: Keeping Cool (+ Warm) with Insulation**
The question I tried to answer in my experiment was which insulation would be the best at keeping and holding heat. The independent variable of my experiment were different types of insulation that were used. The dependent variable was the amount of heat that was contained by measuring the temperature of the insulation after being heated.

**MPH172: Type of Fabric Water Resistant**
This experiment can help the public by identify what type of fabric is most water resistant. The procedures that are needed to perform this experiment are the experimentation instructions and the procedure to create and specialized tool that allows the fabrics to be laid and lifted without hands touching the fabrics themselves. After the experiment was performed, certain conclusions were reached. After the test, the fabric, polyester was the most water resistant, for it absorbed 0.6 grams of water. Wool and Nylon both absorbed 1.6 grams of water and cotton absorbed 5.5 grams of water.

**MPH173: Does the length of a bat effect the distance the ball will go?**
In this project I was looking to see if the different size bats effect the distance the ball will go. I studied to see if the length would affect the distance the ball will go by keeping the force the same. I found out that the longer the bat the farther the ball went.

**MPH174: Concrete Stability**
I am going to test the ratio of sand to cement and the drying time and the affects on the strength of the concrete. The concrete mixture will be poured into equal sized frames using a variety of ratio mixes. Five ratio mixes will be made to create three bricks each for a total of 15 blocks of concrete. The same amount of water will be used in each mixture. Each block will be set up so that weight can be applied to find the concrete’s breaking point.

**MPH300: Basketball Shots**
Do you think that your basketball shot can be improved by how you shoot it? That question is the base of what we are testing. We are going to test whether jumping straight or sideways affects your shot. We are going to experiment this by going to the Upper St. Clair Township Recreation Center.

**MPH301: Dirt to Mud, Mud to Energy**
The purpose of this experiment was to find out whether or not it is possible to create energy from mud using a Microbial Fuel Cell. This experiment helps people discover the benefits of using an MFC and how, in the future, it may be used to power small electronic devices and perhaps even a home someday. This was tested by using two different soils to see which ones produced the best energy. The hypothesis states that if the natural soil lacks the processed chemicals that are found in the processed Scotts soil, then it will produce more energy. Creating the MFC required several materials and involved numerous steps and procedures. It started by creating the mud by using both
**MPH301: Dirt to Mud, Mud to Energy (CONTINUED)**

The natural and processed soils in different tests then assembling the fuel cell by following the instructions included in the set. It then involved creating the Hacker Board that would sit on top of the cell which would harness the energy and use it to power the small light bulb connected to it. The results of the experiment proved very interesting. Using the data collected from the two experiments, it showed two very different results. The data, however, was not collected as promptly as hoped due to a slight error involving the wires that connected the anode and the cathode pads from the cell to the Hacker Board. They were not connecting due to the insulation on the wire impeding the wires from fully connecting. After part of the insulation was removed, it started to work smoothly. The amount of energy collected from the natural dirt experiment by using a voltmeter showed that the energy fluctuated in the amount of time between the testing of the electric current. The processed soil showed that regardless of how much time between the testing intervals, the electric current remained the same. After these findings, the conclusion is that the processed soil is more effective in creating energy because of its consistency and dependability.

**MPH302: Explosive Candy**

The purpose of this experiment is to see if crushed Mentos increases the explosive reaction of diet coke compared to whole Mentos. To conduct this experiment we needed crushed Mentos and whole Mentos. We needed a 6 bottles of diet coke and they had to be 2 liters. And we needed measuring tape so that we could mark the measurements. The experimental results were measured by every ten centimeters. The results of this experiment show that whole Mentos caused a better explosive reaction than crushed Mentos did. The results indicate that our Hypothesis should be that whole Mentos caused a better explosive reaction than whole Mentos. We are rejecting our Hypothesis because we said that crushed Mentos would cause a better explosive reaction than whole Mentos.

**MPH303: Fast Curve**

Our project was to find out if the curve of the hockey stick made your shot harder. Our prediction was that the deeper curve made your shot harder. We found out how hard each shot was by using a radar unit. We got six shooters and each shooter shot six times with each curve. We labeled four curves one through four (one with no curve and four with the most curve. We recorded the data and found out that curve number three was the hardest shot for five out six shooters.

**MPH304: Flat-footed vs jumping**

The purpose is to determine if jumping or standing flat footed affect % of baskets. A boy and girl got 2 practice shots before taking 10 flat footed and 10 jumping shots. This was done twice. Results were boy got 8 and 6 jumping and 6 and 1 flat footed. The girl got 5 and 8 jumping and 3 and 4 flat footed. The results support our hypothesis that more baskets are made jumping at ratio of 27 to 14.

**MPH305: Jacob's Ladder**

The experiment is conducted on a Jacob's ladder. The experiment will show how a Jacob's ladder works and what happens when an object that is not a conductor of electricity and an object that is a conductor of electricity interrupts the current that the Jacob's ladder creates.

**MPH306: Motion Machine**

Through making our Motion machine we made many attempts and failed, but through the process we learned many things. The purpose of this machine was to test the ability to create motion using a magnetic field connected to battery power causing a static magnetic field. We decided to do this project to see how few materials can create motion. In the procedure we constructed a coil and a base and then put them together. We concluded with the use of few objects, motion can occur.

**MPH307: Radiation in a Cloud**

The progressing experiment is to identify which lid for common food products is the most absorbent of radioactive decay. A cloud chamber will be built using plastic, glass, and silicone lids. We will observe the lead needle source ($^{210}$Pb) and smoke detector source decay from the alcohol vapor in the chamber. We will recognize which lid absorbs the most particles when the source is above the lid. Our hypothesis is that the glass lid will be the best absorbent because many glass lids are used to view radiation. This can be used to determine the best material for food packaging.

**MPH308: Using Light to Detect Stealth**

We wondered what made stealth planes stealthy. We each created five shapes out of cardstock and tested them each by using light as a proxy to radar. We put the shapes in a black box and shined a light on it. We recorded ten trials for each shape. Our expected outcome was that the shape with the most creases and folds would be the least visible to radar. Our hypothesis that the shape with the most folds was incorrect. The best shape had one fold. We could use different colored and textured paper next time as a follow-up. We also could put the pieces of paper in different spots in the box, and try different flashlights.