



67th PITTSBURGH REGIONAL SCIENCE & ENGINEERING FAIR

INTERMEDIATE DIVISION ABSTRACTS

March 31-APRIL 1, 2006



Pittsburgh Regional Science & Engineering Fair is a major event of the SciTech Spectacular

TABLE OF CONTENTS

	PAGE
INTERMEDIATE DIVISION	
BEHAVIORAL AND SOCIAL SCIENCE.	1
BIOLOGY.	11
CHEMISTRY.	19
COMPUTER SCIENCE/MATH.	30
CONSUMER SCIENCE.	31
EARTH/SPACE/ENVIRONMENT.	40
ENGINEERING/ROBOTICS.	45
MEDICINE/HEALTH/MICROBIOLOGY.	51
PHYSICS.	58

Note: Additional projects may have been added after the printing of this book. Omissions should not be considered as a negative reflection on the student or their project.

INTERMEDIATE DIVISION – BEHAVIORAL AND SOCIAL SCIENCE

Project Number: MBS001

Grade: 8

Title: Music For Your Heart

Abstract: Please visit student's exhibit for abstract.

Project Number: MBS002

Grade: 8

Title: Do color and animation affect learning?

Abstract: The experiment's purpose is seeing if students learn more from a PowerPoint presentation with color and animation (c/a) or one that is only black and white (b/w). I randomly picked which of six classes received which presentation and which students were in a control condition with no presentation, and then tested them. I averaged and graphed their scores: b/w-56%, c/a-66%, and control-36%. After considering the data, I reject my hypothesis. Although both conditions beat the control, showing they both learned, c/a did better than b/w. Even if c/a has higher cognitive load than b/w, it may hold students' attention better.

Project Number: MBS003

Grade: 8

Title: Classical Verses Rock

Abstract: The purpose of this study was to determine if students perform better on tests while listening to classical music, rock music, or no music at all. To test my subjects I made two separate tests for each style of music. Each test contained four different pictures that the students had to observe in a designated amount of time. After studying each group of pictures, a test was given to determine what details could be remembered. It was determined that there were more correct responses to the test given after observing the pictures while listening to classical music.

Project Number: MBS004

Grade: 7

Title: Monkey See, Monkey Do

Abstract: I did my experiment because I wanted to know how and why people react differently from one individual to another. I did this by observing and experimenting. I have found that one person has a great effect and the effect differs from reaction to sex. This could help teachers and other doctors and scientists. It could change people's point of view on society and open a new world to human behavior, helping us in fulfilling our own wants and needs. It could show us the reasons for our actions and reactions and who we should hang around and if it has an effect and why.

Project Number: MBS005

Grade: 7

Title: Weight Loss

Abstract: My problem is how does weight loss (while dieting) affect a person's energy? The purpose of choosing this question was to find out if losing weight could be a good or a bad thing. I first chose two people that have different exercise plans or have a huge difference in weight. I then graphed the energy before they exercised and after they exercised. My hypothesis was correct. I found that losing weight (while dieting) does affect your energy.

INTERMEDIATE DIVISION – BEHAVIORAL AND SOCIAL SCIENCE

Project Number: MBS006

Grade: 8

Title: Music Influence Dress

Abstract: My problem statement was does the music you listen to influence the way you dress? My hypothesis was that the music you listen to does, in fact, influence the way you dress. In my experiment I made two surveys, one for female students and one for male students. Both surveys consisted of a page of different music genres and two pages of various clothing styles. I tested forty female and forty male students. To test them I had them chose a combination of the music genre that was closest to what they listened to and a clothing style that was closest to their own. In my testing I found that my hypothesis was correct because there was a distinct pattern in combinations chosen.

Project Number: MBS007

Grade: 8

Title: Gender & Visual Selective Attention

Abstract: This investigation was intended to see if gender had an effect on visual selective attention. This was done by giving each subject a Stroop test. During the test, 24 flashcards were shown, each including a name of a color in either an appropriate or inappropriate color font. The subject was directed to say the color of the word. 25 female subjects and 25 male subjects were tested. It was concluded that the females tested in this experiment were faster and had fewer mistakes than males. Future work is planned to see if age will also have an effect in this test.

Project Number: MBS008

Grade: 7

Title: Music Versus Human Cognition

Abstract: Different genres of music have different effects on cognition. The investigator purposed to determine which music genres would have a positive effect on college students' cognitive ability. Twenty sheets of multiplication problems at a time were placed out on tables, and students were asked to solve as many problems as they were able in sixty seconds. It was determined that hip-hop music had the best influence on the subjects' mathematical ability, followed by classical music, then alternative rock. Literature, however, suggests that classical music has a better effect on human cognition. Future work is planned to determine the correct source.

Project Number: MBS009

Grade: 8

Title: Mind of the Music

Abstract: Does music really affect your memory? This work intended to see if music helped your memory. Two study guides and two tests were created to test this theory. Ten people were then tested with and without music. The results were recorded and analyzed. The results showed that there was some advantage if music was used while studying and testing. The average correct responses with music were 60% and the average correct responses without music were 52 %.

Project Number: MBS010

Grade: 8

Title: Visual Perception: Additions vs Deletions

Abstract: Some philosophers have proclaimed that why something exists rather than nothing is the deepest issue one could confront. This experiment intended to find if subjects could easily detect additions rather than deletions. Fifty subjects from the seventh and eighth grades were tested for a series of three tests to see if they could detect additions faster and more accurately than deletions. It was determined that subjects recognized more additions than deletions. This is because an added stimulus excites the mental neurons and a deleted stimulus does not.

INTERMEDIATE DIVISION – BEHAVIORAL AND SOCIAL SCIENCE

Project Number: MBS011

Grade: 7

Title: To Press to Not to Press

Abstract: Pedestrian crossing lights are equipped with a press button. Pressing the button stops the traffic, and makes it safer to cross. The assumption for this experiment was that most pedestrians will press the button and more women will take advantage of it than men. The experiment was concocted in several crossing locations over a two-week period by monitoring and recording how many people actually press the button. It turned out that both assumptions were wrong. Most pedestrians did not press the button, and among them, more men pressed than women. No other work is planned at this point.

Project Number: MBS012

Grade: 8

Title: Do Birds of a Feather Really Flock Together?

Abstract: Cliques and social groups are a large part of our teenage years. This project intended to discover if human physical appearances affect approachability. During my interview with thirty-three students, I asked them to select two photos, one male and one female photo. Students selected one photo from each gender based on what the model was wearing. I believed that the hip/prep style would be most widely selected. It was determined that punk was the style that most subjects would approach. Television and other media sources suggest that punks are actually frowned upon in our society. However, from experimentation I have found that is not always the case.

Project Number: MBS013

Grade: 8

Title: The Music Effect

Abstract: The purpose of this experiment was to determine if "The Mozart Effect," the ability of Mozart's music to make a person's intelligence/memory increase, a scientific possibility or a myth. The student tested approximately 60 people, some adults and some children. Each person took an IQ test in silence and then took a second IQ test while listening to either The Beatles or Mozart. The student then graded all of the IQ tests and averaged the scores. The student determined that music did in fact raise the IQ.

Project Number: MBS014

Grade: 7

Title: The Effects of Sleep Deprivation

Abstract: I did this project to see if losing sleep would affect how well my mother did everyday things. I did this experiment by getting word search puzzles with 40 words and then had my mom complete them. I found out in my mom's case it did make a difference. I think that in this stage of life more people are being deprived of sleep and we should decrease that number. I could've improved my project by having the each amount of words on each word search, and I could've used more subjects, like math.

Project Number: MBS015

Grade: 8

Title: IQ and School Performance

Abstract: IQ can be a good indicator of School performance. The purpose of this investigation was to determine if the assumption is correct. Materials were gathered. The IQ's of 60 students were tested and recorded along with the student Grade point averages. Data suggests that the 6th Grade students have higher Grade Point averages and IQ scores than 7th grade students

INTERMEDIATE DIVISION – BEHAVIORAL AND SOCIAL SCIENCE

and 8th grade students. The results suggested that students with a higher IQ also had a high Grade Point Average.

Project Number: MBS016

Grade: 7

Title: Write Left Right

Abstract: Because most people are right handed, lefties have to use their non-dominant hand more often than righties do. This work tested whether lefties have more ability in their non-dominant hand than righties. Ten lefties and ten righties were asked to write a sentence on two separate pieces of paper, once with their dominant hand and once with their non-dominant hand. A judge rated the 20 writing samples on a scale from 1 to 10. The results showed that overall, lefties had a smaller difference between their dominant and non-dominant hand's writing samples, showing that the hypothesis was correct.

Project Number: MBS017

Grade: 7

Title: TV, Video Games, Affect Your Memory?

Abstract: Many kids today play video games and or watch television. I also know that many kids at the middle school have many tests to study for. I wanted to find out if video games or television affected a kid's memory. I also wanted to see if one of these activities affected memory more than others. I compared kids who played video games at my house to the kids who watched television at my house, then compared those kids to the kids who did neither. I found that video games affected the memory most, and television the second most.

Project Number: MBS018

Grade: 8

Title: Can Females Perceive Details Better Than Males?

Abstract: The object of the experiment was to determine if females can visually locate objects more quickly than males. The testing consisted of presenting the subject a list of twenty items hidden in a picture scene. The subjects had two minutes to circle as many items as possible. Each subject was tested on six different scenes. The sex of the subject, the number of objects circled, and the title of the picture scene were recorded on a data table. The data collected supported the hypothesis females are able to find specific objects in a picture scene more quickly than males.

Project Number: MBS019

Grade: 8

Title: Does Email Make You Dumber?

Abstract: IQ testing is an important way to test the knowledge of an individual. This experiment tested the IQ of two different groups of students depending on their use of the internet. The purpose was to determine if internet use can affect a person's IQ. The procedure consisted of gathering 20 students from 6th, 7th, and 8th grade with similar grade point averages for both groups to take an IQ test. Their scores and comments were recorded. The data collected suggests that using the internet makes a difference in a person's IQ.

Project Number: MBS020

Grade: 7

Title: What primary color do people naturally gravitate towards?

Abstract: The purpose of this experiment was to see if humans have a color preference. I put a selection of items in random colors on a table then asked each subject to choose one object from each group of items. After testing 77 people I found that blue items were chosen 46 % of the time,

INTERMEDIATE DIVISION – BEHAVIORAL AND SOCIAL SCIENCE

red items 29% of the time, and yellow items 25% of the time. My hypothesis was supported by this investigation

Project Number: MBS021

Grade: 7

Title: Playing With Confidence

Abstract: Poker is played by millions of people around the world, I wanted to test the bluffing aspect of poker. In this experiment I played poker with 24 test subjects. I wanted to know if my body language affected their decision to bet or fold. The results are that when I acted confident most of them folded and when I acted like I had bad cards most of them bet. I enjoyed this experiment immensely.

Project Number: MBS022

Grade: 8

Title: Does A Lack Of Sleep Affect Human Mobility?

Abstract: Sleep is the basic need for survival. Today many people stay awake late at night and have to wake up early for various activities. Has this affected the way people move or speak or have humans become accustomed to this constant lack of sleep? The investigator will have participants stay up for a twenty-four hour period. The investigator will, also, test the participants on walking a straight line, catching a ball, and speaking three times to help prove this question. After doing this experiment, the investigator found that people have become accustomed to a constant lack of sleep.

Project Number: MBS023

Grade: 8

Title: Brand Equity and The Consumer

Abstract: As consumers we have to choose whether to spend more money on name brand foods, or to buy the less expensive store brand foods. In my project, I want to find if taste was a component in their decision. I am testing if brand equity affects the consumer. My subjects will be faced with identical foods that will be marked with a brand name and a store brand name. The subjects will tell me which they preferred. In my experiment, I found that the taste is not the biggest component in a consumer's decision; it is brand equity that is accountable for their choice.

Project Number: MBS024

Grade: 8

Title: Too Close for Comfort

Abstract: Personal space is a problem for many people. In this experiment males and females were tested to see which gender has a smaller personal space. This experiment was used to prove which gender is more prone to personal space anxieties. Fifty female and male subjects were tested, having the same sex experimenter approach them. Data was collected by taking their pulse rate before and after their space was invaded. The space between the experimenter and the subject was also measured and recorded. The data collected suggested males had a smaller personal space compared to the females.

Project Number: MBS025

Grade: 7

Title: The Effects of Odors

Abstract: My experiment's purpose was to see if scents effect the ways people think/feel and ways this information can be used. I did my project by researching aromatherapy, finding out how/why scents often bring back strong memories, and giving people scent cards to be tested. The sense of smell is tied to the limbic system, the emotional part of the brain. You should care

INTERMEDIATE DIVISION – BEHAVIORAL AND SOCIAL SCIENCE

because our opinions are affected by scents. I want to extend my experiment to include how scents affect us and if it's avoidable. I'll improve my project by having more scents, asking more people, and using percentages.

Project Number: MBS026

Grade: 8

Title: Through the Eyes of a Canine

Abstract: This experiment explored how colored moving objects in a dog's peripheral vision will affect a dog. The purpose of conducting this experiment was to find out which color would distract a dog the fastest. The procedure consisted of waving ten different colors of paper past a dog, five times each, timing the reaction, and repeating this for ten days. According to the data, the color orange distracted the dog the fastest.

Project Number: MBS027

Grade: 8

Title: Action Reaction

Abstract: My question was "Is reaction time different between a person's two hands?" I thought that it is. I used four volunteers in my experiment. The volunteers extended their thumb and index fingers. I then dropped a ruler between their fingers and they pinched the ruler as fast as possible. I recorded the marking that the volunteer pinched for five trials with each of their hands and used a formula to determine their reaction time. My hypothesis was correct. The volunteers surprisingly did better with their recessive hand. I would use more volunteers if I did this experiment again.

Project Number: MBS028

Grade: 8

Title: A Study of Eyewitness Accuracy

Abstract: The purpose of this experiment was to test the accuracy of eyewitness reports. To complete this experiment the following procedure was used:

1. Select 30 students for testing.
2. Design an interview area.
3. Select 24 items to place around the interview area.
4. Interview each student for 5 minutes.
5. Give students a test asking them to recall the 24 items.
6. Record and analyze results.

It was found that the highest recall was of items on the table, followed by the items on the back wall and finally the items on the body of the interviewer. When comparing males and females, females recalled a much higher percentage of items than the boys. This study has shown that eyewitness reports are not completely trustworthy. It was discovered that females would be more reliable in eyewitness reporting than males. The results of this study would be of interest to the criminal justice system.

Project Number: MBS029

Grade: 7

Title: Ready, Set, Remember

Abstract: Many students do homework with music on. This experiment was conducted to test whether music actually helps with the work. Two sets of note cards each containing six note cards were made. The first note card of each set had two random letters, the second four... until the sixth containing twelve letters. Each subject one at a time was given each note card for five seconds. After the five seconds the note card was taken away and the subject wrote down the letters they remembered. The testing was done again with music playing. It was found that four

INTERMEDIATE DIVISION – BEHAVIORAL AND SOCIAL SCIENCE

out of ten subjects remembered more letters with music, three remembered less with music, and three of the subjects were not affected by the music.

Project Number: MBS030

Grade: 7

Title: Eyewitness Testimonies

Abstract: My project was to determine whether eyewitnesses are reliable enough to be used as substantial evidence to a crime. I arranged a mock crime in front of witnesses and later questioned them on what they actually perceived. Theft was my crime. I found a thief, persons of authority, witnesses, and other suspects for line up. I established a place, date and time for the theft, questioning and photo line up. I created witness reports and photo line up forms. Completed forms of data showed 33% of the questions asked were accurately answered by 55% or more of the witnesses.

Project Number: MBS031

Grade: 8

Title: Exercise and Memory

Abstract: Memory is important for successful school experiences. The purpose of this project was to determine if your memory was in fact better after exercising. To collect data for this experiment two memory tests were made. Teens were asked to take one memory test before exercising. Teens exercised for ten minutes, and then were retested. Data were on the amount of numbers remembered by teens. In conclusion, the average amount of numbers remembered for males and females was seven. It appears that there is no difference in memory of teens tested in this study before and after exercising.

Project Number: MBS032

Grade: 7

Title: Brand Preference: Fact or Fict.

Abstract: The purpose was to determine whether people have an actual or psychological preference for cola brands. I examined whether individuals' perceived preferences for given brands of cola are consistent over a series of taste tests. Subjects were asked to rank their preferences for Coke, Generic Cola, and Pepsi. They then took a blind taste test, a taste test with colas correctly identified, and a taste test with colas misidentified. Subjects identified colas in the first taste test, and ranked colas in all three taste tests. The majority of individuals could not identify colas by taste, and had inconsistent taste preferences.

Project Number: MBS033

Grade: 8

Title: Classical Genius

Abstract: The purpose of this experiment was to find a correlation between classical music listening and memory. It was hypothesized that students who listen to classical music have better memory retention. After testing 35 subjects, it was found that students who listen to classical music scored slightly better in simple memory tests. This experiment would benefit educators and scientists who study the brain and its abilities.

Project Number: MBS034

Grade: 8

Title: Mnemonic Devices Through the Ages

Abstract: Students of all ages need good memorization. A common tool used to assist memory is a mnemonic device such as the Loci Method which involves picturing items in a familiar room. An experiment was conducted find the level in which mnemonics are most effective: elementary or

INTERMEDIATE DIVISION – BEHAVIORAL AND SOCIAL SCIENCE

middle school. Students of both levels were given a paper with twenty objects and asked to write down the objects they remembered. One week later, the same students were taught about mnemonic devices and given the same paper of objects to apply the Loci Method. They then wrote down as many objects as they as remembered.

Project Number: MBS035

Grade: 8

Title: Color Preference for Packaging

Abstract: My purpose is to determine if there is a color preference for packaging. I obtained my materials, randomly selected 80 students, and had them chose 9 colored boxes in any order they preferred. I recorded my data for 40 males and 40 females to find a color pattern. I concluded that they were chosen in this order: red, pink, orange, blue, violet, green, yellow, black, and white.

Project Number: MBS036

Grade: 8

Title: AMBIDOGTROUS

Abstract: My hypothesis was: I think if I test a variety of dogs for right or left-pawedness, then the majority will be right-pawed. The purpose of my project was to determine whether dogs were right or left-pawed. What I did was perform three tests, record the results, and come to a conclusion that the majority of the dogs were both! From this experiment, I learned that it is not easy to interact with dogs. I also learned that dogs are totally different when compared to handedness in humans.

Project Number: MBS037

Grade: 7

Title: The Effect of Competition on Performance

Abstract: The purpose was to prove the hypothesis that competition improves performance. Phase I determined competition's effect on hand-eye coordination; phase II studied competition's effect on following directions. Both phases involved 30-second trials to place different color beads on a pegboard. In both phases, students first completed the tests individually, then competed in groups of six, with exercises repeated six times for accuracy. Competition improved individual performance. Scores increased between individual and group tests in both phases. When analyzed by gender, the data showed girls outperformed boys. When testing for manual dexterity or following directions, applicants should be tested in groups. Knowledge gained in this study will aid companies in selecting the best method to test applicants for employment.

Project Number: MBS038

Grade: 8

Title: Remember This!

Abstract: Memory can be beneficial in school, so the reason for doing this experiment is to study the difference between the memory of male and female adults and teens. To accomplish this 15 items were used: 3 lists of numbers, 1 list of pictures, and 1 list of words. The subject was asked to study each the numbers for 15 seconds and each list of pictures and words for 30 seconds. Items that were successfully remembered by each subject were recorded. The data collected suggested that tee! n females had the best memory, and teen males had the worst.

INTERMEDIATE DIVISION – BEHAVIORAL AND SOCIAL SCIENCE

Project Number: MBS039

Grade: 8

Title: Reality Check - Radar

Abstract: In my project called Radar Reality Check, I used a radar gun to collect the speeds of vehicles in seven areas and categorized them into six categories. I had collected 975 records of vehicles total, and at each location I had set a timer for fifteen minutes. My results showed that 81% of drivers exceeded the speed limit and that motorcycles were the worst offenders. My only variable were the different roads I had tested on and the constants of my project were the same radar gun, time of the day, day of the week, and I only tested on-coming traffic.

Project Number: MBS040

Grade: 8

Title: Police Lineup Accuracy

Abstract: Many police departments use police lineups to investigate crimes and properly identify suspects. The purpose was to determine if the Original Lineup, The Department of Justice Lineup #1, or The Department of Justice Lineup #2 works the best to identify criminals. A crime scene video was shot, then the test subjects watched the video and answered questions from each of the different police lineups. The data suggested that the Department of Justice #1 worked the best as it correctly convicted the criminal fourteen out of twenty times.

Project Number: MBS041

Grade: 8

Title: Musical Tempo and Heart Rate

Abstract: The topic of this investigation is the effect of musical tempo on heartbeat. In this project 20 different subjects will be tested, all of them between the ages 12 and 14. There will be three different tempos; fast, medium and slow. According to the metronome, the fast tempo will be measured at 200 beats per minute. The medium tempo will be at 92 beats a minute, and the slow tempo will be 52 beats a minute. Heartbeat of the subjects will be monitored periodically during the tests and results will be recorded and analyzed.

Project Number: MBS042

Grade: 8

Title: You're Distracting Me!

Abstract: Please visit student's exhibit for abstract.

Project Number: MBS043

Grade: 8

Title: The Beat Goes On

Abstract: Please visit student's exhibit for abstract.

Project Number: MBS044

Grade: 8

Title: It Will All Come Out In The Wash

Abstract: Laundry utilizes more natural resources than almost any other American household activity. If we wish to conserve precious resources such as water, oil, and natural gas by doing less laundry, we must first determine which factors cause people to produce laundry. An accounting sheet was given to participants to collect the following data: Items of daily laundry, age, sex, employment, temperature, laundry responsibility, marital status, and daily number of activities. A strong correlation between number of activities per day and laundry was established.

INTERMEDIATE DIVISION – BEHAVIORAL AND SOCIAL SCIENCE

In addition, gender, marital status and sex roles, significantly influenced a persons laundry production.

Project Number: MBS045

Grade: 8

Title: Cool Beams!

Abstract: A gymnast's falls and wobbles occur most often on the dreaded balance beam. This experiment was conducted to discover if the height of the beam contributes to the frequency of falls and wobbling. Ten gymnasts were instructed to walk to the end of and back of a low, medium, and high beam. The number of falls and wobbles were recorded. It was determined that there was no pattern found in the number of wobbles each gymnast performed on each beam. Research suggests that balance is harder to maintain from higher levels. Future studies could involve more subjects at the same ability levels.

Project Number: MBS045

Grade: 8

Title: Aromatic Essence...Up in Smoke!

Abstract: Please visit student's exhibit for abstract.

INTERMEDIATE DIVISION – BIOLOGY

Project Number: MBI001 Grade: 7

Title: Does water temperature affect plant growth?

Abstract: The purpose of my experiment was to see if plants germinated faster when watered with cold or hot water. This experiment consisted of watering 30 seeds with either hot, cold, or room temperature water every other day for 17 days and recording the date the plant broke the surface. The cold plants germinated on average in 13.4 days, room temperature plants an average of 13.8 days and hot an average of 14.875 days. I found that plants germinate faster with cold water.

Project Number: MBI002 Grade: 7

Title: Fast and Healthy

Abstract: What is the effect on different fertilizers on the growth and health of Fenugreek Seeds? If I can find out, maybe I can give advice to farmers. The 3 fertilizers were Vigoro, Miracle Gro, and Osmocote. I planted seeds in three different pots and let them grow for 5 days. On day six, after measuring the growth of each plant, I added the fertilizers (one to each pot). After letting them grow for another 15 days, I measured again and compared the measurements to 5 days growth. My data was the plants' mean growth. My conclusion was that my hypothesis was correct - the Vigoro grew the fastest and healthiest.

Project Number: MBI003 Grade: 7

Title: Celery Seeds

Abstract: My hypothesis was wrong. The plants that grew the fastest were the ones I watered with seltzer water. The reason for this might be seltzer water is carbonated and tap water is not. The changes in height of the plants were recorded daily for two weeks. Then data tables were created containing the changes in height. The average height of the plants on the last day of measurement was 10.5 cm in the seltzer water, while it was 5 cm in mineral water and only 3.9 cm in tap water.

Project Number: MBI004 Grade: 8

Title: Effects of Electromagnets on Plants

Abstract: Please visit student's exhibit for abstract.

Project Number: MBI005 Grade: 8

Title: Does Alcohol Affect the Germination Rate of Bean Plants?

Abstract: The purpose of this investigation was to find out how alcohol affects the germination rate of bean plants. I watered 20 plants with tap water and 20 with vodka. After an extended growing period there was a significant difference in the percentage of tap water plants that grew versus the percentage of vodka plants that grew. The findings of this investigation show that water is more effective when germinating seeds.

Project Number: MBI006 Grade: 7

Title: How Much Is Enough?

Abstract: Will more fertilizer get better results? The investigator wondered how much the advertised "recommended rate" of fertilizer actually affects plant growth. This experiment intended to find the effects of recommended rate of fertilizer, no fertilizer, or two and four times

INTERMEDIATE DIVISION – BIOLOGY

greater than the recommended rate of fertilizer on the growth rate of 100 tomato and 100 marigold plants. Over a growing period of six weeks, 200 marigold and tomato plants were given 100 milliliters of varied amounts of fertilizer, or none at all, every three days. It was determined that both plant types exhibited a higher growth rate with the recommended rate of fertilizer. If this experiment were to be repeated, the experimenter would continue it over a longer period of time.

Project Number: MBI007

Grade: 7

Title: Aeration Investigation

Abstract: This experiment will determine how aeration affects the growth rate of a hydroponics plant. One plant will be grown connected to an air pump. The other will be grown without being aerated. After a growing season of eight weeks, the two plants will be compared to see how much taller the aerated plant is than the unaerated plant.

Project Number: MBI008

Grade: 8

Title: Raised vs In-ground Gardening

Abstract: Many people enjoy gardening. This experiment's purpose was to learn if raised bed or inground gardens will produce a higher vegetable yield. Onions, lettuce, beans, and radishes were planted in both beds, daily observations and watering occurred, and the height and yield at the end of the growing period was recorded. After harvesting, it was determined that onions and lettuce did noticeably better in the raised bed, radishes did better in the inground bed, and the beans did not produce a yield in either bed. The conclusion was that a raised bed, on average, will produce a higher yield.

Project Number: MBI009

Grade: 8

Title: Going Bananas!

Abstract: The purpose of this experiment was to determine the optimal temperature for isolating banana plant DNA. The procedure involved breaking open cells with bleach and then ethanol was conducted at five different Celsius temperatures. It was determined that at 60 degrees Celsius, the most amount of banana DNA could be extracted. This project continues the quest to isolate and decode the genetic material of life.

Project Number: MBI010

Grade: 8

Title: Transpiration and Light

Abstract: Please visit student's exhibit for abstract.

Project Number: MBI011

Grade: 8

Title: Bean Plants: What Can They Grow In?

Abstract: Bean plants can't grow in anything, but soil right? The purpose of my experiment was to find the answer to that question. I planted two bean seeds in six different materials, sand, gravel, tap water, potting soil, shredded tree bark, and mushroom manure, and let them grow for four weeks. I found out that bean do grow the best in potting soil, but can also grow in shredded tree bark. Those were the only two bean seeds that germinated. My experiment was successful and I proved my hypothesis correct. I also found the answer to my question.

INTERMEDIATE DIVISION – BIOLOGY

Project Number: MBI012

Grade: 8

Title: The Affect of Music on the Heart?

Abstract: The hypothesis of the investigation is ,if twenty people listen music to classical and rock music will raise their heart rate. Country and punk music will not. After the investigation was done all genres of music had raised the subjects heart rates. Punk music raised it the most, rock raised it the second most, classical music raised it the third most and country raised it the least. The hypothesis was supported because it stated that classical and rock music would raise the subjects' heart rate, and classical and rock music did raise the subjects heart rates.

Project Number: MBI013

Grade: 7

Title: Somewhere Over the Rainbow

Abstract: My original question was "What is more wasily remembered colored or black and white text?" I chose this experiment because I wanted to see which text you remembered easier black or white or in color. I hypothesized that you would remember colored text better, because it catches your attention. First I randomly selected 20 words. Then I put the words in a sheet of paper, half in color text and half in black and white text. I had six volunteers, which each got their own sheet of paper that had the colored and black and white text. I gave them 2 minutes to look at the sheet of paper and then waited a half an hour and gave them another sheet of paper. The second paper had 40 words on it some words were from the first list and the other words were added. The volunteers had 2 minutes again and on the second sheet of paper they circled the words they could remember from the first list. Then I recorded the results. I averaged the volunteer's results of what they remembered out of black and white text remembered and then compared my results. In conclusion, my hypothesis was proven correct according to my results. Color text remembered averaged out to be 61.6 and black and white text remembered averaged out to be 58.3. Both text averaged close to each other.

Project Number: MBI014

Grade: 8

Title: Smell Vs. Taste

Abstract: This experiment was conducted to learn if different smells affect the tastes of foods. Participants had to taste five different types of pudding and I timed how long it took for the person to identify the taste. Next, I blindfolded the subject and had them taste the same puddings but with a different type of scent by their nose. I determined that with the smells, all participants took more time to identify the type of pudding by at least one second. In conclusion, different smells can affect the tastes of foods.

Project Number: MBI015

Grade: 7

Title: Water and Plant Growth

Abstract: My project title is Water and Plant Growth. The purpose of this investigation was to determine if watering grass with different types of water will affect the grass's height. The hypothesis in this investigation is if grass is grown using different types of water, such as spring water, tap water, and rain water, then the grass watered with the spring water will grow the tallest. In this investigation grass seed was planted in three groups of of six cups per group. Each group using a different types of water: spring, rain, and tap water. Spring water ended up growing the tallest.

INTERMEDIATE DIVISION – BIOLOGY

Project Number: MBI016

Grade: 7

Title: Doggie See Doggie Don't

Abstract: The question I asked is as stated "Are dogs really colorblind?" I hypothesized that dogs are colorblind to a certain extent. The procedures I used are as followed: I took black and white photos of red, blue, yellow, green, and black construction paper to determine which colors are similar and dissimilar in degrees of brightness. I covered two jars with differently colored construction paper that share similar contrasts. Then I covered the third jar with a color that was distinctly different from the other two in contrasts. For the first part of the experiment I trained the dog to choose one of the similar colors from the different one. I switched the jars around frequently so that the dog wouldn't just pick the one that was in the spot. My dog was able to distinguish between the degrees of brightness and consistently picked the correct color. Another variable involved with this experiment that affected it was towards the end the dog started to get frustrated and uninterested.

Project Number: MBI017

Grade: 8

Title: Hydroponic Mediums on Plant Growth

Abstract: My purpose was to find out which medium produces the largest *Raphanus Sativus* (radish). I wanted to prove that hydroponics is more efficient than conventional farming. Twenty radish seeds were placed in cotton balls, clay pellets, packing peanuts, and the control, soil. A nutrient solution was added along with air from a pump. Soil averaged 24 cm, clay 19.75 cm, cotton 19.65 cm and peanuts 13.45 cm in height. Future work may include using the aeroponic method or trying new ways of exposing the plants to the nutrient solution.

Project Number: MBI018

Grade: 7

Title: Does *Drosophila* Gender Affect Response to Repellents?

Abstract: The purpose of this experiment was to determine what natural repellents were most effective in repelling fruit flies and to determine if the gender of the flies affects their response. Flightless *Drosophila Hydei* were chosen as test organisms. A test chamber was constructed, consisting of one large central chamber with four branching chambers connected by tubes. Four agents were tested: bay leaves, peppermint oil, cinnamon oil, and citronella. Fifty flies were placed into the central chamber. Dry sherry was used to attract the flies. Bay leaves were the most effective repellent, followed by citronella and peppermint. Cinnamon was not a repellent, attracting more flies than sherry alone. Females were more attracted than males to the agents. This experiment will benefit agriculture and commercial produce handlers in their search for safe methods to repel flies and reduce the economic impact of fruit spoilage caused by insects.

Project Number: MBI019

Grade: 8

Title: Oxygen Levels on Crickets

Abstract: This experiment tested whether or not the atmospheric oxygen percentage had a growth effect on insects. The test subjects were crickets, *Achetus domesticus*. The crickets were kept in two separate environments with one different factor; one had a higher oxygen level. After a forty-day period and through natural selection, the ones that could take the oxidative stress survived. In conclusion, the crickets in the environment with a higher oxygen level grew larger.

INTERMEDIATE DIVISION – BIOLOGY

Project Number: MBI020

Grade: 8

Title: How are Teeth Affected by Acids?

Abstract: I performed this experiment because the chemical reaction of acid on teeth caught my interest. I performed this experiment by taking a total of twelve spray painted metal fragments and saturating six of them in cherry coke and the other six in Tropicana Orange juice. I then observed. I found that the acid had no effect on the metal fragments. We should care because if we consume too much acid it can be detrimental to your teeth or even deadly. To improve my experiment I could have kept it going longer, and used something other than the metal fragments.

Project Number: MBI021

Grade: 8

Title: Keeping Pine From Falling

Abstract: Fresh pine trees provide decorations during the Christmas Holiday season .The pine needles frequently fall off while on display .The purpose of this investigation is to determine whether household items could keep the pine needles from falling off.Pine branches were cut from the same tree and placed in different solutions .A control group of water only was used . The solutions utilized were baking soda ,sprite aspirin,and sugar .Data was collected daily over a 30 - Day period.the process was repeated three times.The sugar solution kept the best with an average of 13 needles.Literature suggests that water is only item needed to keep pine needles from falling.

Project Number: MBI022

Grade: 8

Title: In which growing method do broad beans grow the tallest hydroponics or soil?

Abstract: Hydroponics is used to grow plants indoors. Rock wool is used in the place of soil. It is made of basalt or rhyolite. It is light and porous, so it can obtain the water and nutrients.The Clonex solution is mixed with to provide nutrients to the plants. It provides better seed germination and stronger roots. The Clonex solution protects the plants from fungi and disease. Growing plants in soil requires a longer germination period because the bacteria in the soil have to break down the nutrients for the plants.

Project Number: MBI023

Grade: 8

Title: Birds' Seed Preferences

Abstract: The purpose of this investigation is to determine which brand of bird seeds birds prefer to eat. The hypothesis stated that the birds would eat more of the safflower seed, and the data and results prove this true. Sunflower Hearts were eaten the most of the three selected bird seeds that were chosen for this project. Some procedures that were done in this investigation were obtaining materials, filling each bird feeder with 250mg of bird seed and letting them sit for nine hours for seven days a week.

Project Number: MBI024

Grade: 8

Title: Instant Coffee, Green Tea, or Water?

Abstract: The reason I picked this experiment was because of my fascination with caffeine, its effects on living organisms. I narrowed my experiment down to plants (turf grass). In a controlled environment, I ran an experiment that contained three trials. In each trial there were three of the same plants (turf grass) that I "watered" with different liquids: water, green tea, and instant coffee. I found that the levels of caffeine in the instant coffee caused the best plant growth. A possible extension is to see how caffeine also affects the human body.

INTERMEDIATE DIVISION – BIOLOGY

Project Number: MBI025

Grade: 7

Title: How does the amount of water affect seed germination?

Abstract: I chose this project because many indoor plants die because they aren't watered properly. In my experiment there were three sets of trays and each set received a different amount of water. I watered the plants everyday and kept track germination. The plants that received 20 ml of water didn't germinate, 15 ml germinated the fastest, and 10 ml the slowest. My hypothesis was partially supported because I believed the plants watered with 20 ml would germinate the fastest, 15 ml second fastest, and 10 ml the slowest, but 20 ml didn't germinate, 15 ml germinated the fastest, and 10 ml the slowest.

Project Number: MBI026

Grade: 8

Title: Caffeine Craze

Abstract: Caffeine can have an effect on the heartbeat of many different organism causing an increase or a decrease. This work is intended to see which source of caffeine has the greatest effect or increases the heartbeat of daphnia the most. Further research will confirm that Red Bull should have the greatest effect on the organisms.

Project Number: MBI027

Grade: 7

Title: Effects of Soil PH

Abstract: Many people plant plants in their yards. This experiment was intended to show if soil pH would alter the plant growth. The soil was tested to find the pH. Next, lime was added to some of the soil to raise the pH, and ammonium sulfate was added to lower it. Seeds were planted in three different soil samples and observed for four weeks. In conclusion, I found out that most plants thrive in an alkaline soil, but only a certain few can thrive in acid soil.

Project Number: MBI028

Grade: 8

Title: Will Plants Compete for Space?

Abstract: Every plant competes for the space around them. My purpose is to see what will happen when you put different plants, radish and lima bean, in the same container with limited resources. My project involved planting both seed types in an area for a period of 4 weeks, and observing whether they compete for the space around them. My observations indicated that plants do compete for the space and the resources they need. The radish plants died out as the lima beans started to dominate. This project helps explain what happens in plant life cycles and plant succession.

Project Number: MBI029

Grade: 7

Title: Vitamins Prevent Antioxidants

Abstract: My project is Vitamins Prevent Antioxidants. This experiment will test the antioxidant effects of Vitamin C, Vitamin E, and Beta-Carotene on seed germination. The source of free radicals is hydrogen peroxide mixed with distilled water. All of my seeds are Wisconsin Fast-Grow seeds. I had a 100-watt bulb on for eight hours per day. My collected data showed that Vitamin E has better antioxidant properties than Vitamin C and Beta-Carotene.

INTERMEDIATE DIVISION – BIOLOGY

Project Number: MBI030

Grade: 7

Title: Did You Remember To Wash Your Hands?

Abstract: What is the effect of soap in hand washing? What is the effect of water temperature in hand washing? What is the effect of duration in hand washing? I ask these questions because although I understand the importance of good hand washing, I wanted to investigate the most effective technique for hand washing to share with the class. My guess before beginning this project was that the soap used would be the most effective element in the hand washing process and that the water temperature and duration, although very important elements, do not matter as much. For the procedure, I purchased a solution called Glo Gel that after applied to hands would mimic the appearance of germs on your hands. After washing your hands using a specific technique on top of the solution, the hand washer then visualizes hands under a UV light and anywhere germs still exist is where the hand washer could see that they needed to do a better job washing ahnds, use a more effective soap, or wash for a longer period of time. I tested three different soaps: Lever 2000, a moisturizing antibacterial soap from Bath and Body Works, and Purell "waterless" hand sanitizer using hot and cold temperatures for five to ten seconds after applying Glo Gel.

Project Number: MBI031

Grade: 8

Title: Effect of Salt on Plant Growth

Abstract: Please visit student's exhibit for abstract.

Project Number: MBI032

Grade: 8

Title: How Many Seeds?

Abstract: The reason this experiment was done was to determine the favored feeding time of a Syrian hamster. The two times for feeding were in the morning, and in the evening for two weeks. The procedure was simply to feed the hamster every night and every day for two weeks, and to also take observations on how many sunflower seeds were eaten. The data shows that the hamster prefers being fed in the evening, over being fed in the morning. In conclusion, the hamster, being nocturnal prefers to be fed in the evening, when it doesn't have to enter the light

Project Number: MBI033

Grade: 8

Title: Organic and Bacteria – A Connection?

Abstract: Please visit student's exhibit for abstract.

Project Number: MBI034

Grade: 7

Title: Plant's Favorite Things

Abstract: Please visit student's exhibit for abstract.

Project Number: MBI035

Grade: 8

Title: Effect of Light Waves on Growing Lima Beans Plants

Abstract: Plants need the sun's light waves in order to make food and grow. The experiment was to see if different color light waves affect a plant's photosynthesis and growth. Four lima beans plants were covered either with clear, blue, red, or green cellophane and grown for one

INTERMEDIATE DIVISION – BIOLOGY

month. At the end of the month, the plant with the red cellophane grew the best, followed by the ones with the blue and green cellophane, and then last the one with the clear cellophane.

Project Number: MBI036

Grade: 7

Title: Does the color light affect mold?

Abstract: The purpose was to see if different colored lights affected the growth of mold. The hypothesis was if bread slice is placed under a white light, black light, and no light, then the piece that had no light would mold faster. To do so, set up three boxes and put a black light in one, a white light in one, and no light in the other with a bread slice in each. What was learned was that mold couldn't grow because the heat of the light bulb sucked out all the moisture, making it impossible for mold to grow.

Project Number: MBI037

Grade: 8

Title: Effects of Secondhand Smoking

Abstract: The purpose of this investigation, Effects of Secondhand Smoking, was to determine if exposure to secondhand smoking affected lung capacity. To complete this, fifteen children whose parents smoke, and fifteen children whose parents don't smoking were tested using a peak flow meter. The results did support the hypothesis, which stated that the children with the parents who smoke will have poorer lung capacity because secondhand smoking was proven more dangerous than directly inhaling the cigarette, therefore it will affect those who have exposure to it. After analyzing the data, it was concluded that secondhand smoking does affect lung capacity.

Project Number: MBI038

Grade: 8

Title: Ants No More

Abstract: I wanted to find a good organic ant repellent that wouldn't harm the environment. I conducted twenty trials per variable around an ant colony. The total number of ants attracted and repelled was counted. Cinnamon was the most effective, catnip was second, mint flakes was third, and red pepper flakes was last. My results will benefit anyone who has ant problems, and wants a safe alternative to dangerous pesticides. An expansion of my project could be to test more variables, and to test for a longer, more practical amount of time. This would eliminate repellents that don't last very long.

Project Number: MBI039

Grade: 8

Title: Kerosene's Effect on Elodea

Abstract: Kerosene's Effect on Elodea

This experiment was done to see how oil spills affect the growth of the plants they come in contact with. This will be done by taking 15 Elodea stems and placing three of them in each of five containers. Different concentrations of kerosene and water will then be added to the containers. After five days the Elodea will be taken out measured and recorded to see how much they grew.

INTERMEDIATE DIVISION – CHEMISTRY

Project Number: MCH001 Grade: 8

Title: Water Purification

Abstract: Please visit student's exhibit for abstract.

Project Number: MCH002 Grade: 7

Title: Which Antacid Is Best For Indigestion

Abstract: Antacids are commonly used for many cases of indigestion. This experiment is intended to test the different antacids available and determine which one or type works better. A combination of vinegar in distilled water was used as "stomach juice". Into each cup was mixed a dose of a different antacid with several drops of PH indicator. The change in PH was monitored over five minutes. It was first believed that a Calcium Carbonate such as Tums would be more effective; however Bicarbonate of Soda (Baking Soda) neutralized more acid than any other Brand or ingredient.

Project Number: MCH003 Grade: 7

Title: The Effect of Different Toothpastes Against Stain Removal

Abstract: The purpose of this experiment was to compare and contrast 5 types of toothpastes and analyze which one provides the greatest protection against stains. The eggs were immersed in coke for a day to produce stains and a similar reaction as eating foods. The stains were removed using different brands of toothpastes. The data was collected on a 5x5 grid; one square equaled 4% that was drawn on the egg. The average for three trials were calculated by counting how many squares were white. The results showed that Crest toothpaste performed best and Pepsodent was poorest against stain removal.

Project Number: MCH004 Grade: 7

Title: Splitting Gasses

Abstract: My question is whether or not Carbon Dioxide is released into the water and thereby the atmosphere in varying temperatures. I hypothesized that higher temperatures will decrease the amount of time it takes to release Carbon Dioxide into water and then the air. I will demonstrate this by using Calcium Carbonate tablets and water. In showing this, I hope to demonstrate that there may be a relationship between emitted gases and the turbulent storms and wicked weather.

Project Number: MCH005 Grade: 8

Title: The Effect of Gasoline Rating on Fuel Efficiency

Abstract: The purpose of this experiment was to determine how octane rating affected fuel efficiency. A gas generator was connected to a light bank and a clock. 100 mL samples of gasoline were placed in the gas tank and the generator was started. When the gas was used up, the lights went out and the clock stopped. The elapsed time was measured to determine how long the fuel sample powered the generator. 87,89, 94 and 115 octane gas was tested. 10 trials were conducted for each sample. 115 octane powered the generator for the longest time period. When the cost of the four types of gasoline was taken into consideration, 94 octane was found to be the most cost effective choice. This study will aid both industry and consumers in their selection of the most cost efficient fuels for their machinery and personal vehicles.

INTERMEDIATE DIVISION – CHEMISTRY

Project Number: MCH006

Grade: 7

Title: Rusting Metals

Abstract: You see rust every day, but have you ever wondered why it forms? In this science fair project, it was seen whether iron, steel, aluminum, tin, or zinc would rust the fastest and whether or not it rusted faster in salt water or in tap water. The metals were put in one of ten test tubes with either salt water or tap water, and the amount of rust was recorded each day for a week. The results were what they were because only iron rusts, and rust occurs faster in water with minerals in it.

Project Number: MCH007

Grade: 8

Title: Temperature and Enzyme Activity

Abstract: This project was chosen because of the interest in the human body and how it works. 5mLs of starch solution and 5mLs of enzyme solution were put in a test tube, then mixed and set in either a ice, room temperature, or body temperature bath for thirty minutes. Three drops of iodine was then added to see if the enzyme had broken down the starch. The results were inconclusive, and in all of the test tubes, hardly any starch had been broken down by the enzyme.

Project Number: MCH008

Grade: 7

Title: Corrosion Explosion

Abstract: My science fair project is "Which metal corrodes the least while submerged in a solution of vinegar and bleach in a set limit of time?" I chose this project because last year I worked with four out of five of these metals and wanted to know more about their properties. My hypothesis was correct. Out of the five metals I tested, stainless steel is least prone to rust. The procedure was: Gather all materials. Fill plastic containers with the set measurements of vinegar and bleach. Place three separate pieces of the same metal in the containers. Start the stopwatch. Stop the stopwatch in twenty minutes. Set the metals on a towel or rag to dry. When dry, weigh the metals on a metric scale. Record the new weight of the metals. Save each one as a different trial. Repeat steps 2-7 for each set of metals. My hypothesis was correct. My conclusion was that stainless steel corrodes least when submerged in a solution of vinegar and bleach in a set amount of time. If I were to repeat this experiment and change it, I would change the volume of the metals and the types of the metals themselves. Also, time could be altered to affect the result, as is the same with the solution the metals soaked in.

Project Number: MCH009

Grade: 8

Title: Hot Pajamas

Abstract: The purpose of my project is to find out if a child's pajamas will catch on fire due to the fabric softener their parents use. The reason I want to find this out is because I have a little sister, a niece and, a godbrother, and I would want to keep them all safe. For my procedure I will get some pajamas and put them in the washer, after that I will dry them with the fabric softener and after that I will set it on fire and see how long it'll take to burn.

Project Number: MCH010

Grade: 7

Title: Now You See It...Now You Don't

Abstract: Del Sol rings appear to "change color" in sunlight. This is because they are made of Spectrachrome Crystals which experience an energy shift (a molecular excitation transition) when exposed to ultraviolet light. The purpose of this investigation was to learn what items could serve

INTERMEDIATE DIVISION – CHEMISTRY

as shields to inhibit the molecular excitation transition of the Spectrachrome Crystals so the rings would not "change color" when exposed to ultraviolet light. Of 30 shields tested in a black view box constructed by the investigator to serve as a controlled environment, 15 did not allow the rings to "change color." Further research on these 15 shields, using a simple spectroscope constructed by the investigator, resulted in only 6 shields blocking all of the ultraviolet light. The shields were able to do so because of their density, color, composition, thickness, or weight. The other 9 shields allowed some light to pass through them, but it was not enough energy to cause a "color change" in the rings. It is important for research to continue in ways to block ultraviolet light because once damage from ultraviolet radiation has occurred, it can never be reversed!

Project Number: MCH011

Grade: 8

Title: The Quest for the Best Food

Abstract: This project will compare fruits and vegetables, depending on their amounts of Vitamin C and other antioxidants. The substances will first be tested for the amount of Vitamin C. After receiving a result, the same substances will be compared to existing data on antioxidants. The two sets of results will conclude in one substance with the best combination of the antioxidants.

Project Number: MCH012

Grade: 7

Title: Juicy Fruits

Abstract: My project theme is which fruit contains the most liquid? This interested me because I like fruit and wondered which fruit contains the most liquid. To begin the project fruits were selected based on drying times. The fruits were weighed and placed in the dehydrator. My hypothesis was that the watermelon would contain the most liquid. Other fruits used were apples, grapes, bananas, pears, and pineapples. My hypothesis proved correct in all trials completed.

Project Number: MCH013

Grade: 7

Title: Going Going Gone

Abstract: Please visit student's exhibit for abstract.

Project Number: MCH014

Grade: 8

Title: R U Confused By Color?

Abstract: This project intended to determine if we are confused by color. Ten subjects tasted twelve flavored waters that were tinted with red, blue, green and brown. Eight of the twelve beverages were flavored with extracts. It was determined that the subjects tested were confused by the color/flavor combination.

Project Number: MCH015

Grade: 8

Title: The Effects of Temperature on Guitar Strings

Abstract: I started playing guitar one year ago. I broke three guitar strings in a month so I wanted to find out what kind of temperature is best for playing guitar in. I placed 50 strings in five different temperatures for one hour. My data proved that strings are more likely to break in colder conditions, and less likely to break in warmer conditions. Future work will include different types of strings such as bronze-wound strings, nylon strings, electric steel strings, and acoustic steel strings.

INTERMEDIATE DIVISION – CHEMISTRY

Project Number: MCH016

Grade: 8

Title: pH Comparison of Antacids

Abstract: A healthy stomach's pH is between 2.5 and 4.0. Acid problems occur from several reasons which decrease the pH below 2.5. Antacids can increase the pH above 2.5 and maintain a healthy stomach. The purpose of my experiment was to determine the most cost efficient antacid. Several different antacids were added to the lemon juice (mimicking the acidic stomach fluid with pH ~ 2.5) and pH was measured from 0 to 30 minutes. The data from my experiment indicated name brand liquid antacid, Mylanta, worked the best, but local brand Equate tablet was the most cost efficient.

Project Number: MCH017

Grade: 8

Title: Do You See? Vitamin C!

Abstract: This investigator intended to find out which orange juice sample has the most Vitamin C. The orange juice sources were Bottled, Freshly Squeezed, and Frozen. A Vitamin C indicator was used to determine which had the most Vitamin C. The lower the drops it took to change the indicator to colorless had the most vitamin C. The more drops meant less Vitamin C.

Project Number: MCH018

Grade: 8

Title: SPF vs. Body Temperature

Abstract: This investigation was performed to determine if sunscreen and its various SPF's protect body temperature. The hypothesis stated that high SPF's would keep the body's temperature lower. I used five cups of water with sunscreens on the top and placed them under a heat lamp for an hour. Four different SPF's and a constant, cups with no sunscreen, were tested. I followed this procedure for each SPF. The SPF 30(Sweat-Proof, protected the most. Though, the SPF 15(Oil Free), protected the least. This means that the hypothesis was partially supported by the data of this investigation.

Project Number: MCH019

Grade: 7

Title: Organic vs. Conventional

Abstract: For this project the investigator is going to find out if organic fruit juices have more vitamin C than conventional fruit juices. The investigator first will set everything up for the experiment. The investigator will then count how many drops it will take the indicator to turn clear using vitamin C. The investigator will repeat this procedure for each type of juice, both organic and conventional. The results will be recorded and graphed.

Project Number: MCH020

Grade: 8

Title: Water Purification Methods

Abstract: Water is a necessary part of survival, thus water purification is essential. This project tested different methods of water purification. The purpose of this project was to see which method will purify the water better. The procedure consisted of 5 different tests to test water after purification. Each water sample was tested before purification and after purification by both methods. Data was recorded. Results suggest the different methods show different results.

INTERMEDIATE DIVISION – CHEMISTRY

Project Number: MCH021

Grade: 8

Title: Compounds on Vegetation

Abstract: Please visit student's exhibit for abstract.

Project Number: MCH022

Grade: 7

Title: Which Antacid Works Best?

Abstract: The purpose of this project is to find the best pain relief for an acidic stomach. To determine this, I added one dose of antacid in gastric solution. A pH meter was used to measure the pH at 0, 5, 15, and 30 minutes. I compared commercially available antacids and home remedies. In 5 trials, Roloids worked the best (causes the greatest increase in pH) while Tums followed. Pepto Bismol, crackers, and milk had no effect on pH. Roloids contain bicarbonate, so I then compared bicarbonate-containing antacids. Baking soda caused the greatest increase in pH. Roloids and Eckert brand antacid worked similarly.

Project Number: MCH023

Grade: 8

Title: Farther Than You Think

Abstract: My question was "What kind of octane gets better gas mileage; a higher or a lower octane. My hypothesis was that the higher octane was going to get a better gas mileage. To do this experiment I had to ride a dirt bike in the same gear with each different octane level gases. Then I had to record the mileage off of the odometer. I did three trials with each of the different gases. What I concluded after doing the project was that the higher octane got better gas mileage, then the gas with next highest octane level, and then the lowest octane level gas. So my hypothesis was proven correct and the better gas mileage was the gas with the highest octane.

Project Number: MCH024

Grade: 8

Title: Does pH Affect the Freezing Point of Water?

Abstract: The purpose of my experiment was to determine if different pH levels affects the freezing point of distilled water. I made two different solutions, one basic and one acidic, using pool chemicals and measuring pH level. Inserted three thermometers, one in each liquid, and record temperature. Placed all liquids in home freezer and record temperature and observations, until three samples were frozen. I concluded that pH does affect the freezing point of water.

Project Number: MCH025

Grade: 8

Title: Solutions and Boiling Point

Abstract: Distilled water boils at 100°C . This work intended to observe if the boiling points of various concentrations of salt water were different from the boiling point of distilled water. Boiling points were measured for distilled water. Boiling points were measured for distilled water and were recorded as the concentrations of a salt water solution were increased in five gram increments. This was continued until a saturation point was reached at 40 grams of salt per 100 ml of water. I determined that the boiling points did increase with an increase in solution until a plateau was reached due to saturation.

INTERMEDIATE DIVISION – CHEMISTRY

Project Number: MCH026

Grade: 8

Title: pH Problem

Abstract: In my experiment I used household acids to explain that various temperatures do not affect the pH of substances. I tested room temperature, 0 degrees Celsius, and 80 degrees Celsius of apple juice, lemonade, orange juice, soda pop, tomato sauce, and vinegar to find if their pH would change. My results could be used for the safety of common people, the environment, and chemists. After performing my experiment I found that the environment of a substance does not affect the pH.

Project Number: MCH027

Grade: 8

Title: Most Absorbent Cat Litter

Abstract: This experiment was conducted to learn which cat litter is the easiest to learn. Also, to see if the products work as well as are expected, because of the different products manufactured from them. The experimenter poured 100mL of water onto 100 g of cat litter and measured the remaining water that was not absorbed by the cat litter. The data collected showed that Fresh Step is the most absorbent cat litter from the three different companies tested. The conclusion gathered from the results shows that Fresh Step is the most absorbent, then Arm & Hammer, and finally Fresh Step.

Project Number: MCH028

Grade: 8

Title: Understanding Electrochemical Cells

Abstract: The purpose of this investigation is to improve electrochemical cells. The effects of different electrolyte concentrations and materials of the barrier in a Daniell Cell are examined. The procedures consist of constructing a Daniell Cell by gluing a divider inside a beaker; pouring appropriate concentrations of aqueous Cu and Zn salts into their divisions; and measuring the cell's current and voltage with an ammeter. As of this writing the collection of data is unfinished. It is hypothesized that the cell's voltage increases with the electrolyte concentration while the current is determined by the rate of ion flow through the barrier.

Project Number: MCH029

Grade: 7

Title: Storage of Basketballs

Abstract: The main purpose of the research was to learn how to prevent air loss in basketballs. The hypothesis was that the stability of the storage environment and the surface treatment will effect the pressure loss and bounciness. In the experiment, balls were subjected to different storage conditions and surface treatments and the pressure and bounciness were measured before and after storage. The ideal gas law was used to relate pressure decrease to air loss. It was seen that the biggest effect on air loss and bounciness was the stability of the storage environment. Surface treatments led to mixed results.

Project Number: MCH030

Grade: 7

Title: Antacids' Effect on Dissolving Aspirin

Abstract: When antacids are taken they increase the stomach's pH. Aspirin is a pill that is made to break down in a higher pH. Seven different antacids were placed into beakers of gastric juice; each beaker had an aspirin pill in it. The pH change over five minutes was recorded. It was determined that Brioschi raised the pH the most and dissolved more of the aspirin. The other

INTERMEDIATE DIVISION – CHEMISTRY

products were evenly spread out. Future work is planned to determine if less than the recommended amount of antacid would have the same results as the recommended amount.

Project Number: MCH031

Grade: 8

Title: Penny Project

Abstract: I did this project on finding a substance that would clean old and foreign coins (tested on pennies). First I cleaned the pennies with nine different acid based products, such as lemon juice, vinegar, and tomato sauce. Then I let five people pick which they thought were the cleanest. The tomato sauce was the most acidic of the substances. It had an average of 3.2 pennies picked per person. Water was the least acidic. If I did the experiment again I would try to have more people picking pennies to have a more exact result.

Project Number: MCH032

Grade: 8

Title: Burn Baby Burn

Abstract: The purpose of my experiment is to find out if the scent of a candle affects how long it burns. I did it because my mom always burns candles and I was curious if scent affects it. I put the candles in holders and burned them simultaneously until they went out. I also tested Party-Lite candles and the Party-Lite candles burned two hours longer than Candle-Lite candles. I found out that the company that made the candles, ingredients, and quality matter more than the scent. We should care about this so we get better, efficient candles.

Project Number: MCH033

Grade: 8

Title: Sunscreen: Price vs. Effect

Abstract: The experiment was conducted to determine which sunscreen is most effective and if price correlates to performance. This was done by pouring a chemical solution into petri dishes with sunscreen spread on the lid, exposing the dishes to a controlled UV light source, and weighing the dishes contents after exposure. Knowing that the lowest weight means the highest level of protection, the experimenter obtained the data. In conclusion, price and performance do not necessarily relate.

Project Number: MCH034

Grade: 8

Title: Salt Content on Electroplating

Abstract: In my experiment I wanted to prove that the differences in salt content change the quality of the electroplating process. I observed how well copper is plated with tin and how much electro-deposition occurred. The greater amount of salt did the best and the control of no salt did the worst. For further study I would also change the lemon juice content as well as the salt. I would also change the metals and use aluminum or zinc.

Project Number: MCH035

Grade: 8

Title: Counting Calories

Abstract: This investigation was conducted to determine the caloric content of various types of nuts by measuring the temperature change in a sample of water. It was hypothesized that the macadamia nut would have the highest number of calories. A apparatus was built and the nut was placed inside the apparatus. The name and mass of the nut were recorded in the data table. A flask containing water was placed on top of the apparatus. The nut was lit on fire and the

INTERMEDIATE DIVISION – CHEMISTRY

temperature of the water was recorded in the data table. The macadamia had the most amount of calories.

Project Number: MCH036

Grade: 8

Title: Apples to Apples

Abstract: The purpose of this experiment was to test the correlation between pH level and sugar level in apples. Using a refractometer, sugar content was measured and compared to pH level using litmus paper. Apples with a lower pH were shown to have a higher sugar content. Scientists creating apple cultivars could benefit from this project.

Project Number: MCH037

Grade: 8

Title: Effect of Salts on B.P. and F.P. of Water

Abstract: The more salt there is in a solution, the lower the freezing point drops, and the higher the boiling point becomes. In a solution of salt and water, the salt molecules are mixed with the water molecules. The presence of the salt molecules makes it harder for the water to form the crystal pattern they assume as ice. This experiment identified which salt solutions work best when trying to keep water from freezing or boiling. It was determined that Calcium Chloride is best when keeping water from freezing and Potassium Chloride is best when keeping water from boiling.

Project Number: MCH038

Grade: 8

Title: Candy Chromatography

Abstract: The goal of my project was to determine if the colors of dyes used in M&M's and Skittles are the same by identifying and comparing the chromatograms of M&M's and Skittles dyes with chromatograms of FD&C dyes. I proposed that dyes of the same color would have the same R_f (retardation factor). If these R_f values would match the R_f's of control FD&C dyes, then the dyes used in the two different candies would be identical to these FD&C dyes. Through my experiment, I found that my hypothesis was correct for the red, yellow, and orange candies.

Project Number: MCH039

Grade: 8

Title: What's In Water

Abstract: The purpose of my experiment is to determine the amount of hardness, alkalinity, pH, total chlorine and hydrogen sulfide in the following samples of water: spring, city, bottled, well, creek and stream. Samples of water were collected and tested. It was determined that spring, well and creek water were high in hardness and alkalinity. The pH levels varied from 6.2 to 7.8 indicating the waters to be slightly acidic and slightly basic. There was no considerable difference in the bottled water.

Project Number: MCH040

Grade: 8

Title: The Effect of Fire on Different Fabrics

Abstract: The workstation was assembled to ignite samples of cotton, acrylic, nylon, polyester, and rayon. Data and observations recorded included burn time, percentages of remaining fabric and destroyed fabric. Visit the exhibit floor to hear the details of the workstation. Major findings of experimentation are directly correlated to why the (FFA) Flammable Fabrics Act was adopted into law in the United States. Results confirmed my hypothesis 75% correct. The results also illustrated the physical changes of fabrics when exposed to intense heat, the purpose behind fire

INTERMEDIATE DIVISION – CHEMISTRY

resistant clothing and products, and its importance to consumers, firefighters, hazardous material handlers, and astronauts.

Project Number: MCH041

Grade: 7

Title: OILS

Abstract: If the Hypothesis is right, then out of the three oils: synthetic, blended and petroleum, synthetic would heat the slowest and be better for the motor. The reason I did the experiment was to see if I could save my parents some money. The procedures used were, first you set up the experiment, then light a heat source, and after five minutes, take the temperature. The data I got was from Quaker State and I found out the different oil names and which was the best. The best was the synthetic, then the blended and the worst was the petroleum.

Project Number: MCH042

Grade: 7

Title: Which Alt. Fuel is Best to Use?

Abstract: The purpose of my experiment was to see if alternate fuels could be used instead of gasoline. Three alternative fuels were tested in a lawn mower and compared against gasoline. Engine run time and maximum temperature were measured. I also compared thickness of the different fuels. My conclusions were that a 75% gasoline 25% ethanol mixture ran the longest but also ran the hottest in the engine. By 2025 there will be 1 billion cars and we probably won't have enough gasoline to run them. My experiment is important because it shows that there are alternative fuels that can work.

Project Number: MCH043

Grade: 7

Title: Studying the Rate of Rust on Steel

Abstract: The purpose of my experiment is to find out how do common chemicals accelerate the corrosion in steel. My procedure was I numbered each test tube so that you could tell them apart. I tested each liquid to find out the pH. I thought the lemon juice and vinegar would be more effective because they were more acidic. I took nails and placed them in the test tubes. Each day I observed the nails to see if there was any corrosion in the nails. I took pictures of the nails on days 1, 3, 6 and 9.

Project Number: MCH044

Grade: 8

Title: Fastest Pain Reliever

Abstract: The purpose of this experiment was to find out which brand and type of pain reliever dissolves fastest. I placed one generic ibuprofen caplet in 15 mLs of the HCl acid solution. Then I stirred for 10 seconds. I watched the pain reliever dissolve and recorded the time of complete dissolve. I repeated this procedure on 15 pain relievers of each brand and type. The average dissolve time for Advil caplets was 8.33 minutes, CVS generic was 28.05 minutes, and Motrin caplets was 21.22 minutes. Advil tablets dissolve time was 11.25 minutes, CVS generic was 12.32, and Motrin was 30.05 minutes. Advil caplets dissolved fastest and Motrin tablets was the longest.

Project Number: MCH045

Grade: 7

Title: Cleaning Pennies With Juice

Abstract: This experiment determined which juice cleaned pennies best. Pennies of same color were placed into cups of different juices. Weekly, pennies were analyzed to identify any changes

INTERMEDIATE DIVISION – CHEMISTRY

in color. Photos were taken and data was recorded. Final data stated lime, tomato, and lemon were juices that cleaned pennies best. My hypothesis stated lemon juice would clean pennies best because of the acid the juice contains. Data results determined lemon in third place. One could conclude the hypothesis was correct. The conclusion is lime juice cleaned pennies best. Comparing ingredients, juices with citric and ascorbic acids, sodium bisulfate or salt cleans pennies best.

Project Number: MCH046

Grade: 8

Title: Look Out Below!

Abstract: If 100, 200, 300, or 400 plastic pellets are added to each brick, then the brick with the 400 pellets will be the strongest. The purpose of my project was to see if a brick could be made stronger by adding plastic pellets. At first I thought of using steel pellets, but then thought that might be too easy because steel is stronger than plastic and would make a difference, so I decided to use plastic pellets instead. The data proved that when a certain number of pellets are added to a brick, it does in fact make a difference to the brick's strength.

Project Number: MCH047

Grade: 8

Title: Electrolysis of Water

Abstract: Please visit student's exhibit for abstract.

Project Number: MCH048

Grade: 8

Title: Does time affect Vitamin C amount?

Abstract: The purpose of this experiment was to see which juice maintained the most Vitamin C over a thirteen day time period. The experimenter made an indicator solution out of iodine, cornstarch, and distilled water. Then, using a pipette, a drop of juice was added. This process continued until the indicator solution was clear. The more drops added to the indicator solution, the less Vitamin C. Over the thirteen days, orange juice maintained the most Vitamin C rising only one drop throughout the whole experiment. Among the other juices tested, Apple Juice performed the worst.

Project Number: MCH049

Grade: 7

Title: Detecting Vitamin C in Fruits/Vegetables

Abstract: This project determined if tomato, grape, pineapple, orange juices or green pepper juice has more vitamin C. By adding drops of the juices into a reacting agent of known concentration until the solution changed color determined the amount of vitamin C in juices. The results showed that the green pepper juice had the most vitamin C. Grape juice came in second, tomato third, pineapple fourth, and orange juice fifth. People think that orange juice has the most vitamin C, but really it is a vegetable that does.

Project Number: MCH050

Grade: 8

Title: Preservation methods & Vit. C

Abstract: This experiment compared the Vitamin C content in fresh vegetables to that in processed vegetables. Fresh green bell peppers were compared to frozen green bell peppers, and fresh banana peppers were compared to canned banana peppers. The Vitamin C was extracted from one gram of pepper for each sample. The resulting solution was titrated with

INTERMEDIATE DIVISION – CHEMISTRY

0.11% N-Bromosuccinimide solution. The frozen green bell peppers contained only 67% of the Vitamin C found in the fresh green bell peppers. The canned banana peppers had only 17% of the Vitamin C that was found in the fresh banana peppers.

Project Number: MCH051

Grade: 8

Title: Which Container Preserves Vitamin C Best?

Abstract: Vitamin C is very sensitive to heat and light. Factors such as storage, handling, temperature, position on the tree, type of container, and type of orange may affect Vitamin C content. This experiment will help answer whether or not container type affects Vitamin C in orange juice over time. Ten different orange juices were tested over two weeks for a total of ninety trials. As predicted, individual fresh squeezed oranges purchased from the grocery store do contain the greatest amount of Vitamin C when the juice is stored in a plastic container.

Project Number: MCH052

Grade: 8

Title: Flammability of Wood and the Effect of a Cleaner

Abstract: The purpose of my experiment was to see if wood cleaning products increased fire hazard. My procedure was to first purchase the wood flooring. Next we labeled the wood. Then we tried to ignite each piece with timing how long it takes for it to catch on fire. My data is currently inconclusive. Oak wood took a long time to ignite. Cleaners used on this flooring caused various changes in time primarily minimal. I plan to investigate other wood flooring next time.

Project Number: MCH053

Grade: 7

Title: Exploration of the Eggshell

Abstract: The project explores the science behind the eggshell by using vinegar, white and brown chick eggs, and quail eggs. The study explains the mechanisms of "bouncing egg", chemical reaction of the eggshell, strength and thickness relationship of the eggshell, and the fascinating multilayer structures of the eggshell. It also discusses the pigment effect on the egg color.

Project Number: MCH054

Grade: 7

Title: The Rusting of Steel

Abstract: The purpose is to find out how salt affects oxidation of steel.

INTERMEDIATE DIVISION – COMPUTER SCIENCE/MATH

Project Number: MCM001 Grade: 8

Title: P2P Network Virus Infections

Abstract: Computers are potentially at risk of becoming infected by viruses and spyware when software files are downloaded from Internet-based Peer-to-Peer networks. The purpose of this project is to determine the risk of infection by downloading files from a popular, P2P network, LimeWire. A virtual machine was set up within a computer, and LimeWire was installed. Fifty software files were then downloaded. Each downloaded file was scanned for infections. The results showed that 52% of the downloaded files were infected. Although this rate of infection was less than the hypothesized rate of 75%, a majority of the files were infected

Project Number: MCM002 Grade: 8

Title: Which search engine is most effective in a search for song lyrics?

Abstract: The purpose of my project was to determine which search engine among Google, Yahoo, and MSN Search was most effective through observing the number of clicks needed to retrieve the page with the exact lyrics. I formulated a list of obscure songs from www.billboard.com, went to each engine, and searched my query using this template: "song name" "artist name" lyrics for one time various songs. My hypothesis, that all search engines would produce the same results because they operate on similar algorithms, wasn't supported. Yahoo had the least number of clicks, then Google, and finally MSN Search.

Project Number: MCM003 Grade: 8

Title: Using A Robot To Maximize Water Sampling Accuracy

Abstract: Water collection groups get inaccurate readings from their tests because they do not draw samples from the center of the lake/pond. From these tests, inaccurate readings could be given to the government. The government would then fine companies because it would be thought that they were polluting. I have made a robot that is teleoperated, or controlled by a remote. The robot can take water samples from throughout the pond or lake. First, it was planned in DeltaCAD, a computer-aided design program. Then by using woodshop materials, a robot was created from foam, Lexan, and spackling. Then the electronics were added to finish it. It is fast, efficient, small, and accurate. This robot will save companies and collection groups millions of dollars worth of fines because the water tested was not tested from the middle of the lake/pond.

Project Number: MCM004 Grade: 7

Title: Understanding The Number PHI

Abstract: My plan was to find out 1) mathematical meaning of phi, 2) known applications of phi, and 3) explore some yet unknown places to find phi. Besides finding out the mathematical meaning of phi and learning about how it was of practical use, I tested the relationship between phi and the Fibonacci numbers. My hypothesis was that the ratio of two consecutive Fibonacci numbers is phi, when the numbers are large.

INTERMEDIATE DIVISION – CONSUMER SCIENCE

Project Number: MCS001 Grade: 8

Title: Hair and Shampoo

Abstract: Different types of shampoo were used on hair samples to determine which shampoo lengthen and thicken hair the best. After completing this experiment I can choose the best shampoo to get the results I want. Hair samples were shampooed and rinsed with 5 different brands of shampoo: Head Game, Sleek Look, Clarifying, Volumizing, and Moisturizing. Data on the length and thickness were recorded before and after shampooing. After completing this experiment the results suggest that the Sleek Look brand lengthened hair the most by 5 centimeters and the Moisturizing shampoo thickened hair the most by 9 millimeters.

Project Number: MCS002 Grade: 7

Title: Are All Eggs Created Equal?

Abstract: The importance of this experiment was to see if consumers were being charged the right amount for each grade of egg. I tested three different types of eggs, brown, white, and organic, from two different producers, Giant Eagle and Egglands Best, 72 eggs in all. I determined that Giant Eagle was the best producer and brown eggs were measured the most accurately. If I were to repeat this experiment I would test eggs from different regions.

Project Number: MCS003 Grade: 8

Title: Effectiveness of Tooth Whitening Systems

Abstract: There are many different tooth whitening products on the market, making it difficult for consumers to choose which one is best. My experiment is to see which whitening products whiten the most effectively. I bleached twelve different teeth with six different bleaches to see which one whitened the best. The teeth were then compared to a dental stain guide. It was determined that the professional Nite White 22% whitened the best.

Project Number: MCS004 Grade: 7

Title: What Brand Cereal Has Most Raisins?

Abstract: My purpose for this project is to find what brand of cereal has the most raisins because raisins are healthy. Once I find that out, we can have a more nutritious breakfast from now on. All I have to do is count the raisins. For my data, I have graphs and history on raisins and their nutritious value. My hypothesis was correct. Raisin Brand has the most raisins.

Project Number: MCS005 Grade: 8

Title: Don't Get Burnt

Abstract: What brand of suntan products are the best? I selected this topic because I have fair skin. I went to a tanning salon, added the lotions to the Ultraviolet Beads and placed them on the tanning bed for 2 minutes, 5 minutes, 10 minutes, and 20 minutes. The CVS brand sunscreen protected the beads the best, second was Coppertone, then No-Ad, fourth was Banana Boat, fifth was Hawaiian Tropic and last was the control lacking lotion. In the future, I may test additional lotions designed specifically for tanning beds, or I may test other SPF levels.

INTERMEDIATE DIVISION – CONSUMER SCIENCE

Project Number: MCS006

Grade: 7

Title: Does the Brand Matter?

Abstract: I did my experiment on generic and national brands of stain removers. I wanted to see if generic stain remover products would take stains out better than a national brand. What I did was cut six pieces of cloth out at a time. Then I stained all six with steak, hot sauce, and soy sauce. Then I took three pieces of the cloth, one for each stain, and poured the national and generic brand of stain remover. I repeated this step. The generic brand removed the stain on all three trials.

Project Number: MCS007

Grade: 8

Title: Weathering on Exterior Paints

Abstract: Paint is a pigmented liquid that protects and beautifies substrates. The research I've conducted is to see which paint is the most durable on pine wood. Two different brands of paint were used, True Value and Devco, and in each brand I used a latex flat, a latex gloss, an oil-based, and a basic primer paint. I tested the paints by using a heat lamp for the sun conditions, acid rain for a rain conditions, and the freezer for the cold conditions. It was determined in my experiment that True Value oil did the best but Devco's flat and gloss did better than True Value's flat and gloss. If I were to repeat this experiment I would not prime the board and I would use different brands and different types of paint.

Project Number: MCS008

Grade: 8

Title: The Biggest Burger

Abstract: Meat usually shrinks when you cook it. This is because fat runs off the meat. First, the meat was made into patty form at 113 g. Next, the four meats were cooked to 170 degrees. In conclusion, ground turkey stayed the largest, and ground beef shrank the most.

Project Number: MCS009

Grade: 8

Title: Let's Talk Turkey

Abstract: Different brands of sliced turkey have fillers processed into them. This is because companies are trying to lower the cost of processing the turkey. To prove which brands have fillers, the procedure is as follows, in a brief summary. Place slice of turkey on waxed paper, drop 3 drops of iodine in the center of the turkey. Measure the veins of fillers in millimeters. The veins of filler will turn black or dark blue from the iodine indicating presence of carbohydrates. The results from this experiment will be recorded and graphed.

Project Number: MCS010

Grade: 7

Title: What Type of Insulation Works Best?

Abstract: Building insulation has many uses, one of which is to keep a house warm or cool depending on the time of year. This investigation was conducted to determine if one type of insulation works better than the others. Four different types of insulation were placed around jars containing boiling water in four identical boxes. Then the temperature of the water was recorded for each box over time during two trials. It was found that foam board insulation had the highest average final temperature of the trials and therefore performed better than all of the other types.

INTERMEDIATE DIVISION – CONSUMER SCIENCE

Project Number: MCS011

Grade: 7

Title: In Control?

Abstract: The purpose of my experiment was to find what affects an infrared remote's operation. I believed an opaque substance would block the signal, while a transparent substance would not. The experiment used a remote in a shoebox to minimize stray signals and pointed at the receiver, changing distance and angle to see what effect there was. I tested the effect of different objects on the operation, recorded the data and analyzed the results. I concluded that opaque objects always blocked the signal, translucent objects blocked the signal somewhat and transparent objects had no effect. This data supported my hypothesis.

Project Number: MCS012

Grade: 7

Title: Stretched to the Limit

Abstract: Swimmers rely on swim caps every day to remain durable and not split or tear before a race. Unfortunately, many swim caps break every day. In this experiment, the experimenter will test the durability of four different brands of latex swim caps and one silicone swim cap. The caps will be tested after soaking in highly chlorinated water for up to 24 days. This experiment will show how certain types of swim caps are affected by chlorinated water and simulated use, and which brands are most durable

Project Number: MCS013

Grade: 7

Title: Cheaper Might Be Better

Abstract: My question is, which dollar store brand battery works best to power the electromagnet? Xtra Heavy Duty? Super Maxcell? Eveready? I wanted to do this project because I want to see if the off brand batteries work as well as the regular ones. My hypothesis is the Super Maxcell battery will work best. The materials I used were two of each type of battery, coated wire, battery holder, ball bearings(bbs), magnetic nail, wooden tray, plywood, and a switch. First I connected the nail to the battery holder. Next, I turned on the switch. Then, I put the nail into the bbs for 5 seconds. Then, I let the bbs fall into the tray. Then, I counted the bbs, and found the average. I did 3 trials with each type of battery. My hypothesis was correct, the Super Maxcell battery had an average of 41 ball bearings. Eveready had 35, and Xtra Heavy Duty, at only 30. If I were to do this project again, I would change the type of batteries to different dollar store brand batteries. I have learned that some dollar store brand batteries work better than the regular ones, but some do not.

Project Number: MCS014

Grade: 7

Title: Which Is The Best 8 lbs Line?

Abstract: Any fisher men would know that there is many lines to choose from. My purpose for doing this project is to test the top three know 8lb fishing lines which are Trilene, Stren and Power Pro. This test will show the strength, the drag and the rod bend of these three fishing lines. The procedure I use in my project are first gater materials and second test the strength of the three fishing lines. The third thing i did was test the drag of the three fishing lines and forth test the rod bend of the three fishing lines. Last step was to compare all three lines for strength, drag and rod bend to find the superior fishing line out of these three. In my conclusion Pro Pro fishing line did the best out of all three test. Trilene was the second best out of my three test and Stren did the worst out of my three test.

INTERMEDIATE DIVISION – CONSUMER SCIENCE

Project Number: MCS015

Grade: 8

Title: Which Brand of Guitar Strings Last Longest?

Abstract: I made a device with a dowel rod, guitar pick, and hobby motor to continuously pluck GHS Dynamite Alloy Boomer, D'Addario, Elixir Polyweb and Elixir Nanoweb strings until the strings broke or the string was plucked equivalent to that of a professional's use. The motor spins at 6750 rpm, so the motor needed to run for 11 minutes and 12 seconds simulating a professional's use. The purpose of this experiment was to determine which of the four leading brands of guitar strings would last the longest. My hypothesis was completely incorrect. The Elixir Polyweb strings did not last the longest.

Project Number: MCS016

Grade: 8

Title: Picture Quality: Disposable vs. 35mm

Abstract: Disposable cameras are becoming more and more popular in the United States. Two of the main reasons are that disposable cameras are less expensive and less complicated. I was curious as to which camera really does produce a better picture quality. Therefore, the problem to be studied is will a standard 35mm camera produce a better picture quality than a disposable camera? It was the experimenter's hypothesis that this investigation would yield the following results. A standard 35mm camera will produce a better picture quality than a disposable camera. I support this hypothesis because I believe that a camera with more options will allow the photographer to have a better picture outcome.

Project Number: MCS017

Grade: 8

Title: Water With Different Tastes

Abstract: Water is needed in order for everything on this planet to exist. My purpose was to find out whether you could really tell the difference between the brands of bottled waters. Five different waters were tested: tap, Brita, Aquafina, Dasani, and Evian. Volunteers were asked to identify the type of water they normally drink and then ask to choose the preferred water after tasting each sample. It was determined that the subjects tested can taste the difference between bottled and tap water. Because the temperature of the water affected some of the responses, future studies would ensure that all waters were refrigerated for the same period of time.

Project Number: MCS018

Grade: 8

Title: Which Window Works?

Abstract: The purpose of my project was to try to figure out, using four different window samples, which one would hold the most heat, and would be the most energy efficient in the average American home. The four different window samples I used were a single paneled window with untreated glass. The second window sample I used was a double paneled window with untreated glass. The third one I used was a double paneled window with argon gas in the middle. The final sample was a triple paneled window with krypton gas in between the pieces of glass. I used a heat lamp as the heat source and a thermometer to find the temperature. I used room temperature with the temperature behind the window to find how much heat it was letting through. I found out that the window with the krypton gas had the best results.

INTERMEDIATE DIVISION – CONSUMER SCIENCE

Project Number: MCS019

Grade: 8

Title: Golf Balls : Is Distance Expensive?

Abstract: My experiment was to determine if the price and designs of different golf balls corresponded to the distance that each one flies when struck with a golf club at a constant force. I believed that if the ball was more expensive, with a more intricate design that it will go further if all other conditions were constant. I constructed a machine that struck the ball with an identical force each time. It was determined that the Srixon balls flew the farthest, 437 cm. The most consistent ball was the Nike Mojo, ranging from 330 to 391 cm.

Project Number: MCS020

Grade: 7

Title: Stains, Stains Go Away

Abstract: The purpose of this experiment was to determine which detergent works best on common household stains. The detergents I chose were All, Tide, Xtra, and Purex. I stained 4 clothes made of 100% cotton, let the stains set for 24 hours and washed them in the detergents. I rated each cloth with a number according to how much of the stain remained. This brought me to the conclusion that Tide is the best overall.

Project Number: MCS022

Grade: 8

Title: Varying Storage Temp. of Batteries

Abstract: Batteries are an important part of everyday life and are used for many different purposes. My experiment was intended to see if batteries that were stored in the refrigerator and freezer performed better or worse than batteries stored at room temperature. My hypothesis was that batteries would perform better when stored at room temperature. However, that was not the case; the batteries all performed equally. In the future I would store batteries at different humidity levels before testing to see if performance would be affected.

Project Number: MCS023

Grade: 7

Title: Watt's Up?

Abstract: Please visit student's exhibit for abstract.

Project Number: MCS024

Grade: 8

Title: Does Wattage Really Matter?

Abstract: If one wattage can provide enough illumination for each light source in a house, then one wattage can be bought instead of several because wattage provides only atmosphere and not illumination restrictions. A light box was constructed. The partner wrote and placed a message under the box and placed a bulb in the lamp. After looking into the hole the lamp was turned on and moved towards the box. The measurement was noted when the light first illuminated inside the box so the message could be read. This was repeated for each wattage, and results were compared.

INTERMEDIATE DIVISION – CONSUMER SCIENCE

Project Number: MCS025

Grade: 7

Title: Oh My Gosh It's Gone

Abstract: Please visit student's exhibit for abstract.

Project Number: MCS026

Grade: 8

Title: The Accuracy Of Paintballs

Abstract: The investigation was to determine which brand of paintballs produced the straightest line of fire using different brands of paintballs each varying in cost. The same marker was used for firing. Ten paintballs from each brand was fired from the marker at the same location and distance from the target. The distance from the stiring to where the paintball hit was measured and recorded. The findings in this investigation included the accuracy of the paintballs to the target was not relate to the cost and the most expensive brand was the least accurate.

Project Number: MCS027

Grade: 8

Title: Which Detergent Works Best?

Abstract: Over time many ingredients have been added to detergent. This study intended to determine which of the four detergents, Tide, All, Ultra, and Era, tested worked best in brightening, and cleaning T- shirts. Four T- shirts were stained with the four stains including chocolate syrup, ketchup, coffee, and grape juice. It was determined that Tide removed most of the stains from all shirts. Future study could include testing of other stains or other detergent brands.

Project Number: MCS028

Grade: 8

Title: Should You Shout It Out or Bleach It?

Abstract: Everyone gets stains on clothes and other objects and wants them removed. The purpose of my experiment was to see which stain remover was more effective on the stain. I used two different stain removers, Shout and Clorox, and applied them on a sauce stain on several pieces of cloth. The cloth was soaked, stirred, and rinsed and the data was recorded. It was established that the Shout worked better than the Clorox with a slight difference in the size and shade of the stain.

Project Number: MCS029

Grade: 8

Title: Carpet Stain Resistance Compared to Cost

Abstract: Consumers have many choices when selecting floorcoverings for their homes. When a consumer chooses carpet for its warmth and softness instead of a hard surface, stain resistance is also an issue to be considered. This project tested what type of carpet fibers resist stains the best and are least expensive. Tea and oil stains were applied to eight different carpet fibers. Forty-eight hours later, the samples were cleaned utilizing a professional method. The results were then compared to cost. It was found that Olefin fibers performed the best for cost and price. Future experimentation would include more fibers and stains.

INTERMEDIATE DIVISION – CONSUMER SCIENCE

Project Number: MCS030

Grade: 8

Title: Weed Killer vs Weeds

Abstract: Which weed killer works the best and fastest? I selected it because we had tried many weed killers that haven't worked. I used 3 name brands and my homemade mixture in varying amounts on weeds. This showed how much weed killer was needed to kill weeds in a given amount of time. In order the best and the fastest were Spectracide, Bayer, Ortho, and the control. Results varied because of weather and the placement of weed killer. Future work would include testing more brands of weed killer and increasing the amounts added by one milliliter each time.

Project Number: MCS031

Grade: 7

Title: Does Expensive Mean Better?

Abstract: On my Science project, I will test three laundry detergents, and see which one really works the best. The three I have decided on are Tide (most expensive), Cheer (moderately priced), and Ultra (least expensive). My hypothesis is that Tide, the most expensive product, will work best because it is more expensive. Tide seems to be more popular than Cheer and Ultra, so that is also why I think Tide will work better. Usually, the more expensive something is, the more value it has, and since Tide is the most expensive, I think it will work better. My materials for the experiment are three white t-shirts, with marker, mud, and grass stains, and the three detergents. The procedure is to get three of the same white t-shirts, and put mud, grass, and marker stains on all of them. Then, I will wash each shirt, according to the directions on the product to test which detergent works the best. I will present my findings by showing an example of each of the shirts. At the conclusion of the project, I will be able to show if more expensive detergents work better than the lower priced brands.

Project Number: MCS032

Grade: 7

Title: Biodiesel - Fuel from the Kitchen

Abstract: Our country is dependent on fossil fuels; alternate sources are needed, possibly converting waste-oils/fats into biodiesel (100lbs of oils = 100lbs of biodiesel). I wanted to find out how much waste-oils/fats are generated by family households and local restaurants to see if their collection for the purpose of biodiesel production would be worthwhile. Family households (N=10) generated an average of .95 lbs (.14 to 2.9 lbs) and restaurants (N=7) 1550 lbs (79.4 to 865.6 lbs) per month. For biodiesel production, it is reasonable to pursue the collection of waste-oils/fats generated by restaurants but not by family households.

Project Number: MCS033

Grade: 8

Title: What Glove Insulates the Hand the Best?

Abstract: The purpose of my project is to find what glove insulates the hand the best. I thought it would be very beneficial to many people. A hand warmer was placed inside the glove I was testing, and placed into a bucket of ice. I recorded the temperature every two minutes for ten minutes. The results from best to worst are Gore-tex, leather, wool, cotton, and fleece. Future work may include testing different types of glove materials and possibly socks or even outerwear.

Project Number: MCS034

Grade: 8

Title: Toilet Tissue Tests

Abstract: This project involves dissolving different brands of toilet paper to see which one loses the most mass. First, three different brands of toilet paper will be placed in water. The

INTERMEDIATE DIVISION – CONSUMER SCIENCE

experimenter will stir the water for ten seconds. The toilet paper will be left to soak for 7 days. Observations will then be made. The toilet paper will dry and be weighed. The results will be recorded. Then the experiment will be conducted two more times. Finally graphs will be made of the data.

Project Number: MCS035

Grade: 8

Title: White Bright Smile

Abstract: The purpose of this experiment was to evaluate the effectiveness of different store brand teeth whiteners. Egg shells, used to simulate teeth, were stained with coffee. Four different teeth whiteners were applied on four test groups. One control group of stained shells had no whitener applied. After 30 minutes, the shells were evaluated for stains based on a stain scale. Crest Whitestrips were the most effective at removing stains. This project would benefit all consumers of these products.

Project Number: MCS036

Grade: 8

Title: Soak Up The Sun

Abstract: My project investigated how effective various sunglasses are in protecting your eyes from ultraviolet radiation. My hypothesis was that the more expensive, brand name, sunglasses provide the greatest protection. I placed different sunglasses between an ultraviolet light and a solar panel that was connected to a motor. The energy from the light drove the motor which turned a counter. Readings were compared to determine the effectiveness of the sunglasses. My results showed that all the sunglasses tested protect your eyes from ultraviolet light. In addition, my results showed that the darker the lenses, the greater the protection against light intensity.

Project Number: MCS037

Grade: 8

Title: Drum Heads & Rebound Height

Abstract: Which material of a drum head works the best for a snare drum? I have been playing for 2 years and I thought it could help myself and other drummers with there drumming. I built device that could drop a drumstick and I then measured the rebound height. Twenty trials were conducted. I found that the Renaissance head was the highest, second was Ebony, third was Calfskyn, fourth was Clear, and last was White Coated. Future work will include testing different thicknesses, sizes

Project Number: MCS038

Grade: 8

Title: Deterioration Of Surfaces

Abstract: The purpose of this investigation, Deterioration of Surfaces, was to determine what surface cleaner deteriorates wooden countertop surfaces the least. Samples of wooden countertop were soaked in different cleaning products (Generic: Orange and Commercial: Clorox). After over 200 hours, the samples were removed, dried, and massed. Data was then recorded and displayed on a bar graph. After analyzing the data, it was concluded that the reason the generic brand surface cleaner displayed the least effect on the wooden countertop surfaces because the Commercial Brand Clorox contained more harmful chemicals that caused deterioration and decay.

INTERMEDIATE DIVISION – CONSUMER SCIENCE

Project Number: MCS039

Grade: 8

Title: Crystal Clear & Cold!

Abstract: Warm water for lunch is what brought the idea of my experiment to find which material keeps water the coldest. My hypothesis stated, if water is wrapped in aluminum foil it will stay the coldest when tested with other materials. I refrigerated bottled water, wrapped it in various materials, and measured the temperature every forty-five minutes for six hours. My results proved my hypothesis wrong, stating that the black plastic kept the water the coldest, while the foil came in second. The purpose of this project was to find a way to keep drinks cold using basic household materials.

Project Number: MCS040

Grade: 8

Title: I'm Melting!

Abstract: Ice Melt is a commonly used product during the winter season. This experiment was designed to determine which ice melt product works fastest and at what cost. Six different products were used and applied to identical ice cubes at room temperature, freezing, and below freezing. Sodium chloride (rock salt) performed best overall in all five trials and cost the least. Though not the fastest in completely melting the ice, magnesium chloride started working the quickest. If I were to repeat this experiment, I would try to use more ice melt products, a bowl for melting instead of a plate and smaller size ice cubes.

Project Number: MCS041

Grade: 8

Title: The 411 on Hair Conditioner

Abstract: The hair treated with the most expensive conditioner will be strongest, have least friction, and change greatly in appearance. The experiment's purpose was to study what effects conditioner has on hair in strength, friction, and appearance. The most expensive conditioner tested left hair with reasonable strength and reduced friction. Less expensive conditioners left hair with either added strength or reduced friction. Microscope images showed as the price of conditioner increased thickness of the coating left on the hair also increased. Overall, conditioner adds strength, reduce friction and adds texture when looking at appearance. Paying more for conditioner will enhance effects.

Project Number: MCS042

Grade: 8

Title: Can Carpeting Reduce Noise Levels

Abstract: The purpose of this project was to determine if carpeting can be used to reduce noise levels. Polyester, nylon, olefin and acrylic samples were tested. Each carpeting sample was placed in a simulated room. A 70dB recording was played and a decibel meter was used to record the sound level after it had bounced off the carpeting sample. Ten trials were done for each sample. It was found that carpeting can reduce sound levels by a maximum of 3%. Homes, schools, offices and public areas would benefit by using carpeting to lower noise levels.

Project Number: MCS043

Grade: 7

Title: Adhesive Bandages

Abstract: I wanted to do this project because I was interested in what bandage was more adhesive to the skin.

INTERMEDIATE DIVISION – EARTH/SPACE/ENVIRONMENT

Project Number: MES001 Grade: 8

Title: Organic and Synthetic Materials on Oil Absorption

Abstract: During a research of the Exxon Valdez spill in 1989, I was interested in finding improved environmentally friendly ways to clean up oil spills. By constructing a sluice, I used as a barrier and tested two synthetic variables, polyester and spandex and two organic variables, cotton and hemp. Using 190 cc of water and 5 cc of oil mixture the results of my testing proved cotton absorbed the most followed by spandex, hemp, and polyester. My next experiment I will need to find an exact measurement of how much oil was retained within the variables tested.

Project Number: MES002 Grade: 8

Title: Making Waves

Abstract: My problem is: does the slope of the ocean floor to the coastline affect the size of the ocean's waves? My hypothesis is: I think if there is a greater degree slope, then the waves will be larger. A device was used to replicate ocean waves. An adjustable piece of plastic was used to simulate the slope. Water was directed over the slope, and then the distance traveled was measured from the peak of the slope to the base. In my experiment I proved that my hypothesis was correct, a greater angled slope means larger waves.

Project Number: MES003 Grade: 8

Title: Best Environment for Strawberries

Abstract: Many people have been wondering what environment would be best for the growth of strawberry plants. This project was done to figure this problem out. To do this project different five different environments were set up. They are the Ocean, Desert, Arctic, Spring outdoor, and Rainforest environments. Data collected suggests that a desert is not a good place for strawberries followed by an arctic, ocean and spring outdoor environment. This experiment shows that the best environment for strawberries is a rainforest environment.

Project Number: MES004 Grade: 8

Title: Subsidence from Longwall Mining

Abstract: The purpose of my experiment is to study the effects of longwall mining on ground subsidence. I think the larger the width of coal removed from underground, the more the surface will cave-in due to subsidence. For the experiment, I used two wood boards of different widths, two plastic containers, and colored gravel. I cut a hole, the width of the boards, on each side of the containers. I inserted the boards and filled the containers with gravel. Then, I pulled the board out and observed the effects. The more coal that was removed, the more the surface caved in.

Project Number: MES005 Grade: 8

Title: Whose temperature forecast is best?

Abstract: Weather gives people the ability to plan their lives in great detail. A comparison was conducted between the three local news channels to determine which predicted the most accurate five day forecast. The five day forecast for every day during a nine month period was recorded and entered into a spreadsheet. The total variance of each channel was added. Channel 11 predicted days 1 and 2 the most accurate, Channel 4 predicted day 3 the most accurate, and Channel 2 predicted days 4 and 5 the most accurate. Overall, Channel 2 predicted the entire five day forecast the most accurate.

INTERMEDIATE DIVISION – EARTH/SPACE/ENVIRONMENT

Project Number: MES006

Grade: 8

Title: Which Rock Absorbs The Most Heat

Abstract: With the cost of home heating sources sky rocketing today the purpose of my experiment was to discover which type of rock brick, slate, sandstone, granite, coal, and limestone absorbs, retains, and conserves the most energy. My procedure included three phases, Phase I was the heat lamp phase. Phase II was the convection oven phase and Phase III was to average the overall heat. Please visit floor exhibition for the Phase I, II, and III details. I concluded that sandstone absorbs the most heat through conduction, slate through radiation and slate overall absorbed the most heat.

Project Number: MES007

Grade: 7

Title: Oil Absorption: Dark Hair vs Light

Abstract: I wanted to find out which type of hair would absorb oil better, dark hair or light hair. I wanted to conduct this experiment because of the environmental issues of oil spills polluting our oceans and waterways.

Project Number: MES008

Grade: 7

Title: Rockin' with RIPRAP

Abstract: Please visit student's exhibit for abstract.

Project Number: MES009

Grade: 8

Title: How Dirt Ate Water

Abstract: Soil is found all over the world. Even in your backyard. This work was intended to determine the water holding capacity and the capillary movement of different soils. There were two parts to this experiment. The first part consists of seeing how fast water flows through different types of soil. The second part consists of testing the capillary movement of the soils. It was determined that the gravel let the most water through fastest and the sand held the most water.

Project Number: MES010

Grade: 7

Title: Does Grain Size Matter?

Abstract: The investigator will be trying to find out how grain size affects water absorption. For this project the investigator will need three 250-mL beakers, 250-mL measuring cup, a package of dried split peas, medium size gravel, marbles, and water. The investigator will fill a beaker with peas and pour 250-mL of water into the measuring cup and then into the beaker until the water just covers the peas. The investigator will then observe the measuring cup and subtract the amount of water remaining from 250-mL. The same steps will be repeated 2 more times for the peas and 3 times for the gravel and marbles. The marbles should have had the least amount of water left in the measuring cup due to small grain size.

Project Number: MES011

Grade: 7

Title: Rust and Corrosion

Abstract: The purpose of this experiment is to discover if different acidic levels taken from a variety of water samples will affect the rate and amount of corrosion. Five unsealed jars were

INTERMEDIATE DIVISION – EARTH/SPACE/ENVIRONMENT

each filled with different water samples. The pH levels were tested and a nail was placed inside them. They were set aside for six days, checking everyday for the amount and rate of rust formation. It was determined that rain water caused the most rust, at a faster rate. The experiment was repeated, this time sealing the jars. Same results occurred with a slight change of rust formation on the nails.

Project Number: MES012

Grade: 7

Title: Effect of Light on Growth of Pea Plants

Abstract: The purpose of this experiment was to see if pea plants (*Pisum sativum*) would grow faster under artificial white light, artificial red light, or sunlight. My hypothesis states that if pea plant growth is related to a type of light, then the plant will grow faster in natural sunlight, as compared to white or red artificial light. The data collected proved that artificial white light plants grew fastest, followed by artificial red light plants, and slowest growing were the natural sunlight plants. I learned that additional factors such as water and temperature affected the performance of the pea plants.

Project Number: MES013

Grade: 8

Title: The Study of Snow: Temperature vs Humidity

Abstract: Please visit student's exhibit for abstract.

Project Number: MES014

Grade: 8

Title: Ultra Violent Light and Algae

Abstract: This experiment explored the effects of ultra violent light on algae. The purpose of this experiment is to see if algae responded to different amounts of U.V. light because it changed in health. The procedure in gathering all materials is to add water to algae and put the algae in four bins. Continue five trials of five, ten, fifteen, minutes using different amounts of U.V. light. The data was what color the algae was, the temperature of the algae, and the mass of the water and algae. In conclusion, the U.V. light did change the health of algae over time.

Project Number: MES015

Grade: 8

Title: Hot House

Abstract: I wanted to use solar energy to cool a model house, built of bricks and roofing shingles. I shined the light on the house for 5 hours for the following tests.

- 1) All windows and doors shut
- 2) Open all windows
- 3) Open all windows while running a solar fan

Results, the fan and open windows making a 50% difference.

Project Number: MES016

Grade: 8

Title: Antifreeze Comparison

Abstract: I hope to prove that the less toxic antifreeze can be a substitute for the conventional, more toxic antifreeze. The antifreeze was tested in glass, plastic, tin and Pyrex. I put the same amount of three different kinds of antifreeze in each container and the same amount of water as my control. Using a thermometer, I measured the temperature of each container at ten minute intervals for 30 minutes. I concluded that the less toxic antifreeze was an effective as

INTERMEDIATE DIVISION – EARTH/SPACE/ENVIRONMENT

the conventional antifreeze. Future work will include testing other brands of antifreeze and varying the amount of water.

Project Number: MES017

Grade: 8

Title: Which piece of metal will heat water the most?

Abstract: I hypothesize that if six different solar panels are tested, then the piece of black copper will heat the water the most. The purpose of my project is to find out which piece of metal will conduct energy to heat water. In my data, I found that my hypothesis was correct. I also found that the metals that were painted black conducted a large amount of heat more than the others that were not painted. I learned that some of the metals are a good way to heat water, but others only reflect the sun.

Project Number: MES018

Grade: 7

Title: Can a System Be Developed to Control Erosion?

Abstract: The purpose of this experiment was to find the best method to reduce soil erosion. The procedure followed was to add topsoil to containers, select methods to prevent erosion such as window screening, rocks, newspaper and perforated underground tubing. Containers were placed on an angle and equal amounts of water were added to simulate rainfall. Run-off was collected; the water was evaporated and the mass of soil eroded was recorded. The experiment was repeated 4 times. Newspaper was found to be the most effective method to reduce erosion. Window screening was second followed by rocks. The least effective method was the underground tubing system. Knowledge gained in this study will aid in our search for ways to reduce the economic and environmental impact of soil erosion.

Project Number: MES019

Grade: 7

Title: Methods to Reduce Highway Noise Pollution

Abstract: The purpose of this study was to determine the best method to reduce noise pollution for homeowners living near major highways. A test box was constructed with the barrier at one end and the sound source at the other. Two different noise sources were tested: a horn and a person alarm device. Five materials were tested: wood, rubber, concrete, earth and metal. A decibel meter was used to measure the sound level before and after the barrier was inserted. 10 trials were conducted for each barrier and the data was recorded and averaged to determine the most effective barrier. This study will help engineers to construct barriers along highways that lower the noise levels in surrounding residential communities.

Project Number: MES020

Grade: 8

Title: O-Rings Unsealed

Abstract: The purpose of my experiment was to determine if the o-rings in a solid rocket booster (SRB) on a space shuttle would crack if they were exposed to below freezing temperatures or cold water. My hypothesis was that these conditions would cause the o-rings to crack. I used three SRB's made of aluminum, metal, putty, and six rubber o-rings 3.5mm in diameter each. I put two o-rings on each SRB. I stored one SRB in 28F, one in cold water, and the other in room temperature. I used the one in room temperature to compare my other 2 SRB's to. I stored them in these conditions 12 hours each. I did this a total of 13 times for each SRB. I found that the o-rings in 28F unsealed 1 out of 13 times and the o-rings in cold water unsealed 12 out of 13 times. My hypothesis was correct because the o-rings did unseal.

INTERMEDIATE DIVISION – EARTH/SPACE/ENVIRONMENT

Project Number: MES021

Grade: 8

Title: Pollutants on Crystal Absorbency

Abstract: The purpose of my experiment was to see if Super Absorbent Crystals can absorb the pollutants in soil. I recorded the mass of the crystals, soil and the contaminants. Crystals were added and removed after ten minutes. The mass was recorded again. Best absorbed was the oil, then ammonia, water and antifreeze tied, and last was the gasoline. Future work will include giving more time to the crystals so they can possibly absorb more of the pollutants. I would test more pollutants like grease, different types of gasoline, and different types of oil.

Project Number: MES022

Grade: 7

Title: Acid Rain/Rain H₂O Effect on Plants

Abstract: The purpose of my experiment was to see how acid rain, diluted sulfuric acid, and rainwater affects plants. My hypothesis was that if I watered one plant with diluted sulfuric acid, another with rainwater, and another with distilled water, the plant watered with diluted sulfuric acid would die first. My experiment involved watering three plants with 50 milliliters of the substance every three days. Then I recorded their heights and appearances every five days. I learned that acid rain destroys plants. It can weaken their root systems and eventually kill the plant.

Project Number: MES023

Grade: 8

Title: World Temperatures - Global Warming

Abstract: Not available. Please visit student's exhibit for abstract.

INTERMEDIATE DIVISION – ENGINEERING/ROBOTICS

Project Number: MER001 Grade: 7

Title: Electricity from Waves

Abstract: I wanted to see if, increasing the water flow onto a turbine would increase the amount of electricity produced. I made a waterwheel, attached it to a dynamo, and connected it to a galvanometer. I constructed a ramp, to collect water from waves. Waves were simulated in a bathtub. Water was collected in a reservoir. The reservoir was drained using 1, 2, 3, or 4 straws. The force of water coming out of these straws was used to turn the waterwheel. I concluded that the amount of electricity produced is proportional to the amount of water flowing onto the waterwheel.

Project Number: MER002 Grade: 8

Title: Wing Shape on Airplanes

Abstract: Airplanes are a major mode of transportation in the world today. The various shapes were explained by my father stimulating my interest in this project. The purpose of this project is to discover the shape that will make an airplane fly the most level. I carved airplane shapes Curved wing, Flat wing, Delta wing, Straight wing out of balsa wood and constructed a launcher to test the flight of the planes. My hypothesis was correct and the plane number one with more lift flew the best.

Project Number: MER003 Grade: 8

Title: Shingle Color vs Temperature

Abstract: How can you save money on your heating bills? I wanted to see how shingle color affects your home temperature. I built five mini houses and added Owens Corning Asphalt Shingles in red, black, green, brown, red and the control lacking shingles. I placed the houses outside for one hour. During each of 20 trials, I measured the change in temperature. My results proved that the color black caused the most increase in temperature, then green, brown, red and last the control. Future work may include testing shingles made of clay, wood, metal, fiberglass or composition brand shingles.

Project Number: MER004 Grade: 8

Title: SKY HIGH

Abstract: Hovercrafts are fun to ride outside. This work was intended to see how the different sizes of materials affect the performance of the hovercraft. I built two hovercrafts out of simple materials and tested them to see which one could hold more weight. One was two feet and the other one was four feet. It was determined that the four foot ACV held two-hundred and ninety five pounds and the two foot one held eighty pounds. The four foot one was by far the stronger hovercraft. Some people think that hovercrafts are the vehicles of the future. Later on in time, engineers will improve the ACV to meet the specifications of today's vehicles and more.

Project Number: MER005 Grade: 8

Title: Pier Pressure

Abstract: My project was about bridges and how its support column affects its strength. I thought a rectangular prism would hold the most weight because it had more sides than a triangular prism and cylinder. To test my hypothesis, I built the bridges; one with cylindrical columns, rectangular prisms, and a triangular prism. I added weight to the bridges until they collapsed. I did three

INTERMEDIATE DIVISION – ENGINEERING/ROBOTICS

trials. My hypothesis was incorrect. The cylinder held the most weight. I realized that a cylinder has so many sides that they're too minute to count, giving it more surfaces to distribute weight.

Project Number: MER006

Grade: 8

Title: Is Faster Really Better?

Abstract: The Goal of my project was to create a device allowing me to load railcars at optimal efficiency. The previous project I performed revealed that loading into all holes of a hopper car improved efficiency thus inspiring me to simultaneously load through all holes hoping to cause interaction thus forcing product into railcars. Since the 19th century when railroads fueled the growth the country, we have continued to ship products across the US via rail. Now shipping 16 % of all freight that moves within our country, railroads have become congested. This project was chosen to minimize this traffic.

Project Number: MER007

Grade: 8

Title: Flood Prevention

Abstract: Flood prevention is a big concern in the United States, especially since Hurricane Katrina. A model river was built and tested to determine the best method for preventing floods. The model river was tested with no restriction and with the following restrictions: levee, dam, rock check dam. The data recorded were on the time to break the restriction and the amount of water the restriction held in this time period. In conclusion to this experiment the best way to prevent flood damage is by using a levee.

Project Number: MER008

Grade: 8

Title: Electrifying Attractions

Abstract: The purpose of my experiment was to find out which variable from the wire length, metal rod length, metal rod thickness, and the number of coils would increase the magnetic field of an electromagnet so that it could pick up more paper clips. I had believed that if the wire length was decreased, then the current of electrons would take a longer time to travel and fewer clips would be picked up. Three different amounts were used for each variable with twelve variable changes tested seventy-five times each. This was done over a period of twelve days, a change everyday, with constants of the same type of batteries, material the wire and metal rod were made of, and also the metal paper clips. I found that when the metal rod was thicker, then more clips would be picked up due to the magnetic field increasing with the metal rod in the solenoid.

Project Number: MER009

Grade: 8

Title: Exciting Bridges

Abstract: Which bridge deck has a higher resonance frequency, an arch or a suspension bridge?

Project Number: MER010

Grade: 8

Title: Canine Spring Action!

Abstract: My engineering goal was to improve the everyday dog leash by decreasing the force required by the human, controlling the dog. The purpose was not only to decrease the force, but also to let the dog walker have better control over the dog. I added a spring to a regular leash, and I tested this mechanism on my two dogs a black lab mix, Molly, and a terrier mix, Pennie. Molly used sixteen fewer Newtons of force with the invention than with a normal dog leash, while

INTERMEDIATE DIVISION – ENGINEERING/ROBOTICS

Pennie used nineteen less Newtons with the invention. I decided to call my improved leash, "Spring-loaded Dog Restrictor."

Project Number: MER011

Grade: 8

Title: There's No Place Like Home

Abstract: My problem is, "Which house structure is most affected by wind force; an a-frame, a quadratic shape, or a dome?" My hypothesis is the quadratic shape will be most affected by wind force. I believe this to be true because of the aerodynamics, wind load, and percentage of surface area directly perpendicular to the wind force of each structure. To begin my project, an a-frame, a quadratic shape, and a dome(nonagon) were constructed out of balsa wood. All three structures were the same height and covered the same ground area. A table was placed against a wall and covered with a plain colored tablecloth. A floor fan was placed at the edge of the table and tape on the floor marked its position. The distance from the center of the fan's blades to the wall was measured. The same distance was measured from the wall to the tabletop and marked with a piece of masking tape as a starting point. Each house was centered one at a time on the starting point. The a-frame was centered slanted side facing the fan first, then the triangular side, then a corner. The quadratic shape was centered with the longer side facing the fan first, then the shorter side, then a corner. The dome(nonagon) was centered with a vertex facing the fan first then a flat base side. After each house was centered on the starting point and the base of the fan was checked for position, the fan was turned on to the highest setting for one minute. The tablecloth was marked at the furthest point of the house. A measurement was taken from the starting point to the mark and recorded. The data collected was the a-frame was moved by wind force on an average of 41.56cm, the quadratic shape 103cm, and the dome(nonagon) 15.83cm. In conclusion, the quadratic shape was most affected by wind force.

Project Number: MER012

Grade: 8

Title: Shakin' Shapes

Abstract: The purpose of this project was to determine which building shape would withstand an earthquake of the greatest strength. Since triangular shapes are typically used in construction, a pyramid shaped building should withstand an earthquake simulation of the greatest magnitude. Several different building shapes were evaluated during this experiment, and the best designs (best to worst) were: pyramid, dome, rectangle, and square. The effect of additional support bracing was also evaluated for each shape. The results indicate that the best building shape is not always one constructed with the most materials, and the addition of bracing strengthens each building design.

Project Number: MER013

Grade: 8

Title: Hydrocity

Abstract: The purpose of this experiment was to see if a small scale water powered electric generator could be created. A small hydroelectric motor was created with magnets that was powered by falling water. Only .1 volts of electricity was produced. However, the experiment was a small scale simulation of what could be a large hydroelectric dam. This project provides an alternative energy solution for the United States.

Project Number: MER014

Grade: 8

Title: Battle Of The Welders

Abstract: Please visit student's exhibit for abstract.

INTERMEDIATE DIVISION – ENGINEERING/ROBOTICS

Project Number: MER015

Grade: 7

Title: REDUCTION OF APPLIANCE EMF

Abstract: My project involved cinnamaldehyde, a natural oil extracted from the bark of cinnamon trees. I hypothesized that cinnamaldehyde would prohibit rust as well as a store-bought anti-rust product. I tested three sets of nails in a humid environment to see which ones rusted. The first set of nails was coated with cinnamaldehyde, the second with Rust-oleum anti-rust paint, and the third was my control group of plain steel nails. While observing the nails each day, I concluded from the results that the cinnamaldehyde did prevent rust, but because the cinnamaldehyde did not adhere as well to the metal, the Rust-oleum worked better.

Project Number: MER016

Grade: 7

Title: Flight Plan

Abstract: For my science project, I wanted to know what makes an airplane fly. I think the engine turbines make the airplane fly. I wanted to see if I could prove that there were other factors involved. For my experiment, I tested two ways that a homemade airplane could fly. I used a hair dryer and I used human force, my arm, to make the plane glide. I did one trial with the hair dryer. This trial was not successful at all so I decided to stop after the first try. I did three trials using my throwing arm. This method worked much better. The results were that throwing the airplane with the smaller wingspan caused the plane to glide farther. In conclusion, the pointed nose plane with the small wingspan went the greatest distance of the planes that I tested. I learned that the engine is not the only factor in keeping an airplane in the sky.

Project Number: MER017

Grade: 8

Title: Insulators vs Heat Retention

Abstract: The purpose of this science fair project was to determine what type of insulation works the best in terms of heat retention. The different types of insulation used were: sand, newspaper, fiberglass insulation, and cellulose insulation. The student built a model house with room to place insulation. In the center of the house she placed hot water in a beaker and recorded how quickly the water cooled using different insulations. The student found that the cellulose insulation worked much better than the other types of insulation tested.

Project Number: MER018

Grade: 8

Title: Are We Ready For Solar?

Abstract: Solar energy was believed by many to be the future power source for mankind. This may still be true, but has enough technological advances been made yet to make solar affordable? My hypothesis, after some research, is that although many advances have been made, solar energy is not yet affordable when compared to existing power resources such as coal, oil and natural gas. From my testing, I concluded that my hypothesis is correct. Furthermore, testing of a standard efficiency solar cell used today, surprised me with how little power was produced. The dream of solar energy may have to wait.

Project Number: MER019

Grade: 8

Title: Spaghetti's Breaking Point

Abstract: Structures are important in modern life. This project was intended to find the strength of different structures made out of spaghetti and marshmallows. Bowls and pennies were used to test five different structure shapes three times. It was found that the hexagon did the best at

INTERMEDIATE DIVISION – ENGINEERING/ROBOTICS

holding the weight of the pennies. None of the other structures held as much weight as the hexagon. I was very surprised that the square didn't hold much weight. Future research could involve the testing of other geometric shapes for structural strength.

Project Number: MER020

Grade: 8

Title: Wood Sealant and Water Absorption

Abstract: In my investigation, I determined if different types of chemically coated woods would absorb different amounts of water. I used three types of wood, wolmanized pine, uncoated pine, and pine coated with Thompson brand water sealant. I cut the wood into five blocks each, soaked the blocks in water for one week, massing them each day. The results I recorded were, The coated pine gained the least water, while it started out with the most mass. The wolmanized pine gained the most water, while it started out with the least mass. The uncoated pine was inbetween, With an average mass.

Project Number: MER021

Grade: 7

Title: Recycled Tires on Cement Strength

Abstract: Does adding recycled tires affect the strength of cement? There were four groups of cement bars with five samples in each group. Three groups had different amounts of tires in each group and the controls group no tires. To test the strength, increasing amounts of sand were attached to the middle of each bar. Once it broke, the weight it took to break the bar was recorded. This experiment yielded the following results: the control group did the best with no tires. However, as the amount of tires increased the strength went up.

Project Number: MER022

Grade: 7

Title: Swelled Payload vs Conical Ogee Nosecone

Abstract: To test the effect of drag and stability which affects altitude, I tested a swelled payload and a conical ogee nosecone of the same weight. To control the experiment I used the same medium size rocket body and fired them with the same type engine, and launched them in the same weather conditions. Experiments were also conducted on the ground to help detect drag effects and stability of the different nose cones. The conical cone increased height and also proved to be more stable.

Project Number: MER023

Grade: 8

Title: Aerodynamics

Abstract: The purpose of this experiment was to test the aerodynamic properties of different shapes for automobile engineers. Four different foam shapes were created and tested for their ability to withstand wind from a fan. The amount of movement that the shapes endured by the wind was measured. A boxy "NASCAR" design was pushed most by the fan indicating that it lacks good aerodynamic qualities. While a streamlined design race car design moved the least, indicating it was the most aerodynamic. This project would be useful for all transportation engineers.

Project Number: MER024

Grade: 7

Title: 5, 4, 3, 2, 1, Lift Up

Abstract: Hovercrafts are remarkable phenomenons. It was intended to learn from this experiment how long different hovercrafts could hover. All that was done was the making of the

INTERMEDIATE DIVISION – ENGINEERING/ROBOTICS

hovercrafts and the testing of the hover times. It turned out that the hovercraft of the middle-sized bottom hovered the longest, followed by the largest, and then the smallest. The intentional learning of which hovercraft would hover longer was the only thing that was learned.

Project Number: MER025

Grade: 8

Title: How to Make a Solar-Powered Fan

Abstract: The purpose of my experiment was to see if you can get enough solar-power energy in the winter. I made a wooden box and built a circuit to find out if it would work in the sun. The data is inconclusive. I found out that the fan will work if there is enough sun and light. We should care about this experiment because we can spend less money on electricity. You can see if you can connect solar energy to other houses. I can do the experiment in the summer so there can be more sunny days.

Project Number: MER026

Grade: 7

Title: The Strongest Mortar

Abstract: The name of my project is "The Strongest Mortar". I tested to see which mortar could hold the most mass. Barbells were laid on brick "walls" and continually applied until the joint broke. The different types of mortar were used to bond the bricks. The control held the most mass. Type M held the second most mass, type S held the third most, and type N held the least.

Project Number: MER027

Grade: 7

Title: Aluminum alloys and heat

Abstract: The Purpose of this investigation is to determine if heat affects strength of aluminum alloys. If different aluminum alloys are heated at various temperatures, then the alloys would be strongest at the highest temperature because heating aluminum alloys increases strength. One piece of each alloy, 5083, 6022, 6061, was heated at 93C for 30 minutes, then another at 149C, 204C and 260C. Specimens were transported to laboratory, broken in 810 tensile tester and the force required to break and maximum elongations were recorded. Aluminum alloy 5083 had highest peak force and lowest elongation at break. Aluminum alloy 6062 had lowest peak force and highest elongation at break. Aluminum 6061 was average.

Project Number: MER028

Grade: 8

Title: Novel Product for Determining Vitamin C Intake of a Guinea Pig

Abstract: Please visit student's exhibit for abstract.

Project Number: MER029

Grade: 8

Title: Is it possible to measure foot movement?

Abstract: Please visit student's exhibit for abstract.

INTERMEDIATE DIVISION – MEDICINE/HEALTH/MICROBIOLOGY

Project Number: MMH001 Grade: 8

Title: What's in our creek water?

Abstract: Please visit student's exhibit for abstract.

Project Number: MMH002 Grade: 8

Title: Bacterial Transformation

Abstract: The purpose of this experiment was to determine what type of salt works best when attempting to perform bacterial transformation. The different salts used were: calcium chloride, sodium chloride, baron chloride, and aluminum chloride. The student performed bacterial transformation using each of the four salts. She then grew bacterial colonies to determine which salt worked more efficiently. The student determined that calcium chloride was the best salt to use for bacterial transformation.

Project Number: MMH003 Grade: 7

Title: The Effect of Capsaicin on Bacterial Growth

Abstract: The purpose of this study was to investigate whether capsaicin in peppers inhibits bacterial growth and offers explanation for the prevalence of spicy hot foods in warm climates. Using the Kirby-Bauer and broth culture methods, samples of pepper extract were tested against *Staphylococcus epidermidis* and *Escherichia coli*. The result was compared to the known effects of penicillin and tetracycline. The pepper extract produced no clear zones of inhibition on any of the plate cultures, and broth cultures containing the extracts demonstrated no change in bacterial growth. *E. coli* may have actually consumed the dried pepper extract. None of the bacteria tested showed growth inhibition with pepper extracts. Other explanations for regional use of spicy foods must be sought.

Project Number: MMH004 Grade: 8

Title: Vitamins

Abstract: Vitamins are important to everyone on an everyday basis. This experiment explores the time it takes for different vitamins to dissolve in stomach acid. The purpose of this experiment is to see which vitamin dissolves the fastest for individuals who need a fast dissolving vitamin. Different types of vitamins were placed in separate beakers, with 30 milliliters of simulated stomach acid. The amount of time for the vitamin to dissolve and other observations were recorded. Vitamin D dissolved the fastest, and vitamin C dissolved the slowest. In conclusion, if you want fast results, vitamin D dissolves very fast.

Project Number: MMH005 Grade: 8

Title: What are the Effects of Drugs on the Heart rate of a Daphnia

Abstract: The experiment's purpose was to discover what effects occur on the heart when a certain drug is ingested. The procedure stated that grease was applied on a nylon washer, and then placed on a microscope slide. The liquid drug was placed inside of the washer along with a daphnia. Two sets of ten seconds passed for each the adjustment and experimental periods. In conclusion, the ideal heart rate was about 41 beats, and both caffeine and adrenaline increased it with 48 and 42 beats. Ethyl alcohol with 36, lactic acid with 36, nicotine with 35, and aspirin with 34 beats all decreased the heart rate.

INTERMEDIATE DIVISION – MEDICINE/HEALTH/MICROBIOLOGY

Project Number: MMH006

Grade: 8

Title: Effect of Cleaners on E. Coli

Abstract: The purpose of my experiment was to determine the effect of various household cleaners on bacteria growth. Hypotheses tested were: (1) cleaners with harsh chemicals such as chlorine bleach would be most effective; (2) natural cleaners using organic ingredients would be less effective; and (3) organic ingredients may actually encourage bacterial growth. Solutions of E. coli, four cleaners, and a control were plated and incubated. Cleaner-soaked paper circles were added to E. coli-smear plates and incubated. Bacteria colonies were counted and inhibition zones surrounding the paper circles were measured. The data supported hypothesis (1) and (3), but not hypothesis (2).

Project Number: MMH007

Grade: 7

Title: Stenotic Valves

Abstract: This experiment was performed to investigate at what point the left ventricle, of the heart, would be affected due to aortic valvular stenosis. A model representing the left ventricle, with the aorta and aortic valve was created. Following the completion of a control test, a constrictor affecting the aortic valve opening was added. Two tests: A/B with 5 trials each was completed/recorded. The data indicated the left ventricle being seriously affected at 40% narrowing/constricting of the aortic valve. In conclusion, the hypothesis was disproved, however, it provided valuable information to doctors and patients suffering with aortic valvular stenosis.

Project Number: MMH008

Grade: 8

Title: Are You Chicken of Bacteria?

Abstract: Many cooks are concerned with bacteria in their kitchen when they use chicken. This experiment was done to test if five different natural cooking ingredients would decrease bacteria on raw chicken. By decreasing bacteria, the cook can assure safer meals for their family. The procedure consisted of soaking or covering the pieces of chicken in the cooking ingredient for five minutes and then swabbing six samples. The results of the experiment suggest that all cooking ingredients used decreased bacteria on the raw chicken with lemon juice decreasing the most bacteria.

Project Number: MMH009

Grade: 8

Title: Your Toothpaste and Gingivitis

Abstract: Colgate®, Colgate Total®, and Crest Peroxide and Baking Soda® toothpastes were tested to determine which of these toothpastes would prevent gingivitis the best. I used three subjects to test the three toothpastes. Each subject swabbed their gums before brushing (control), one hour after brushing (one hour test), and the following morning, eight hours after brushing (eight hour test). Cultures were plated and colony counts were made for each test. Colgate Total® proved to be the superior toothpaste to reduce the bacteria that causes gingivitis.

Project Number: MMH010

Grade: 8

Title: Effect of Meditation on Blood Press.

Abstract: Please visit student's exhibit for abstract.

INTERMEDIATE DIVISION – MEDICINE/HEALTH/MICROBIOLOGY

Project Number: MMH011

Grade: 8

Title: Which Mouthwash Best Inhibits Bacterial Growth?

Abstract: Mouthwash didn't become formally used until the early 1900's with the introduction of Listerine. It was so effective and popular that in 1914 it became the first prescription made available over the counter and created the mouthwash category. Most of the bacteria living in your mouth cannot harm you, but some can cause bad breath, cavities, gum disease, and sickness. Using mouthwash is way of ridding your mouth of these harmful bacteria, but which type is best?

Project Number: MMH012

Grade: 8

Title: The Beat of your Heart

Abstract: My hypothesis was, that if a person drinks 240 mL of Mountain Dew® Code Red before running on a treadmill, then his or her heart rate will increase. The purpose of my experiment was to discover if drinking different fluids has an effect on heart rate. My data agreed with my hypothesis. My results concluded that the lowest increase of heart rate was with Sunny Delight® orange juice with an average of 36.5 beats per minute. The largest increase of heart rate was with Tropicana Twister™ orange soda with an average of 43 beats per minute.

Project Number: MMH013

Grade: 8

Title: Water Woes

Abstract: The purpose of this experiment was to test the quality of different bottled waters for bacterial levels. Four bottle waters were tested by inoculating agar plates with a small amount of water. Over a two week span, the amount of bacterial colonies were measured and monitored. Most bottled waters showed little to no bacterial presence. However, one brand did have more bacterial growth than would be expected. This project would benefit the average consumer of bottled waters.

Project Number: MMH014

Grade: 8

Title: Natural vs. Synthetic Antibiotics

Abstract: Which antibiotic, natural or synthetic, will best inhibit the growth of the bacterial strains *Streptococcus mutans* and *Lactobacillus casei*? Eight different antibiotics were used in this experiment (natural and synthetic): Colloidal Silver, Grapefruit Seed Extract, Honey, Garlic, Ciprofloxacin, Penicillin, Ampicillin, and Bacitracin. Each antibiotic was tested in two different trials on the two different bacterial strains. It was hypothesized that natural antibiotics would best inhibit the growth. However, results showed that synthetic antibiotics are better at inhibiting the bacterial strains used in this experiment. Of the natural antibiotics, Grapefruit Seed Extract and Colloidal Silver performed the best.

Project Number: MMH015

Grade: 8

Title: Solar Water Disinfection

Abstract: Please visit student's exhibit for abstract.

INTERMEDIATE DIVISION – MEDICINE/HEALTH/MICROBIOLOGY

Project Number: MMH016

Grade: 8

Title: Exercise Affects Blood Sugar

Abstract: The purpose of this experiment was to determine if exercise affects blood sugar. The student tested his brother, who is a diabetic. He had his test subject record his blood sugar before exercising, and in 10 minute intervals over 4 hours during exercise. The types of exercise the student tested were: walking, swimming, bouncing on a trampoline, and using an elliptical machine. After completing all tests, the student discovered that exercise did raise the blood sugar, and that swimming raised the blood sugar the most.

Project Number: MMH017

Grade: 8

Title: Cell Phone: Friend or Foe?

Abstract: The purpose of this experiment was to see if cell phones give off more radiation than normal. A hand held geiger counter was used to check radiation in bequerels emitted by common cell phones. A very slight increase in radiation was detected during incoming or outgoing calls on 2 phones of the the 15 cell phones tested. The results of this project are important for cell phone manufacturers and their clients.

Project Number: MMH018

Grade: 8

Title: Are We Truly Clean? The Tru...

Abstract: Please visit student's exhibit for abstract.

Project Number: MMH019

Grade: 8

Title: Disinfecting Wipe Project

Abstract: I chose this experiment to determine which type of disinfecting wipe inhibits the most bacteria. I put bacteria on three agar plates and soaked sterile disks in the disinfecting wipe's liquid. I left a fourth agar plate empty as a control. The next step was to incubate bacteria at 37°C for a twenty-four period and then to repeat the experiment for forty-eight hours. I then measured the zone of inhibition for each disk. Scotch Brite brand had the largest zone at .459 cm., Clorox brand was next at .413 cm, and the Lysol brand was the lowest at .393 cm.

Project Number: MMH020

Grade: 8

Title: Fastest Pain Reliever

Abstract: Pain relievers are used in everyday life to help many people cope with arthritis, headaches, and muscle pains. The gastric juice in the stomach breaks down all food and medications into small particles, which enables them to be absorbed into the blood stream. Eight different types of pain relievers were placed into gastric juice in two trials and tested to see which pain reliever dissolved the fastest. The pain reliever that dissolved the fastest was presumed to reach the blood stream quicker. Future testing would be done to see if coated tablets or uncoated tablets work better.

Project Number: MMH021

Grade: 7

Title: Which toothpaste kills the most bacteria?

INTERMEDIATE DIVISION – MEDICINE/HEALTH/MICROBIOLOGY

Abstract: The purpose of this experiment was to find the toothpaste that best rids the mouth of bacteria. I tested fifteen people using three different kinds of toothpaste. I counted the bacteria in the Petri dishes before and after the subjects brushed their teeth to see how much bacteria was killed by the toothpastes. The control was the most effective killing 34% of the bacteria. When using Crest the bacteria increased by 34%. When using Colgate the bacteria increased by 128%. When using Tom's of Maine the bacteria increased by 238%. My hypothesis was partly supported by this investigation.

Project Number: MMH022

Grade: 7

Title: Do people contaminate hands?

Abstract: My hypothesis was: "If I swab the inside door handles in the bathroom at my school, I will find bacteria because people do not wash their hands properly after using the bathroom." I swabbed bathroom door handles with a moisten sterile swabs and then agar plates. The plates were placed in an incubator and observed for growth for 2 days. My study data supported my hypothesis. The bacteria were most likely transmitted from people who had just used the bathroom.

Project Number: MMH023

Grade: 7

Title: Face Mask Effectiveness

Abstract: The purpose of this experiment was to determine which type of mask was most effective at preventing the spread of bacteria. I tested ear loop masks, face masks and molded face masks. To perform this experiment, I stood 30 cm away from a Petri dish, coughed on it wearing all types of masks and with no mask. I also tested the inside of each face mask. My data suggested that the molded face mask was the best at preventing the spread of bacteria and the other two were about the same

Project Number: MMH024

Grade: 8

Title: How much metal do you eat?

Abstract: For my science fair project I measured how much iron was in breakfast cereals. My hypothesis stated that if I added hot water to crushed cereal and stirred with a magnet then Total would have the most iron filings. My hypothesis was correct. Total had 0.99 grams of iron filings, Cheerios had 0.89 grams, and Shredded Wheats had 0.88 grams. I learned that some of the iron in our breakfast cereals is in the form of "raw" elemental iron.

Project Number: MMH025

Grade: 8

Title: Inhibiting Bacterial Growth: Spices vs. Antibiotics

Abstract: I tested five spices: ginger, cloves, cayenne pepper, oregano, cinnamon, and 5 antibiotics: listerine, alcohol, iodine, polysporin, neosporin on four different types of bacteria to see which product inhibited the most bacteria. My control was sterile water tested on the same bacteria. I incubated the bacteria with each of the products and measured the zone of inhibition after each incubation period. I learned that spices inhibited the most bacteria growth with an average zone of inhibition of 1.98 mm compared to 3.5 for the antibiotics tested. Cinnamon inhibited the most bacteria of all the products tested.

Project Number: MMH026

Grade: 8

Title: Kitchen and Cafeteria: How Much Bacteria?

INTERMEDIATE DIVISION – MEDICINE/HEALTH/MICROBIOLOGY

Abstract: Please visit student's exhibit for abstract.

Project Number: MMH027

Grade: 7

Title: What Are Sleep Disorders?

Abstract: The purpose of this project is that I wanted to know why my dad could not get to sleep. I looked up what sleep disorders are and I asked my dad if he had something on his mind and he said yes. I might find a way to stop people from having sleep disorders.

Project Number: MMH028

Grade: 8

Title: The Effect of Surfaces on Germs

Abstract: I wanted to do this because I was curious as to what would be the dirtiest surface in my house. I swabbed an area one night, then waited and swabbed it again. I went to the lab to plate the swabs, placed them into an incubator and waited 48 hours. After 48 hours, I returned to analyze the plate. The most to least amount of growth order is the dishrag, toothbrush, bathroom counter, TV remote, and the cutting board. Future work would include changing the surfaces and the amount of time the plates were left in the incubator.

Project Number: MMH029

Grade: 8

Title: How much bacteria does coin money contain?

Abstract: The purpose of this experiment was to become more aware of the amount of bacteria that is passed around on our coin money. The first step was to make a control agar plate. Next take a sterile swab and swipe each coin with sterile water and then use that swab to swipe the agar plate. After incubating each plate for 24 and 48 hours, record the data. Repeat this process twice. In conclusion, the penny with a total of 6.08 bacterial growths, was hypothesized to contain the most bacteria. Overall, the dime contained the most bacterial colonies with 60.8125.

Project Number: MMH030

Grade: 7

Title: Can Antioxidants Reduce UV Radiation Damage in Yeast Cells?

Abstract: This experiment was conducted to determine if antioxidants can reduce UV radiation damage in yeast cells. A water displacement technique was used to measure carbon dioxide production over 120 minutes. Phase 1 control group tested yeast cultures alone and averaged 152 cc's of carbon dioxide. Phase 2 yeast cultures with vitamin c averaged 154 cc's. Phase 3 yeast cultures exposed to 20 minutes of UV radiation averaged 73 cc's. Phase 4 yeast cultures with Vitamin C and exposed to UV radiation averaged 107 cc's. Vitamin C was responsible for a 22% reduction in damage caused by UV radiation. Knowledge gained from experimentation with antioxidants, such as Vitamin C, will help us learn how to reduce or reverse damage caused by exposure to ultraviolet radiation.

Project Number: MMH031

Grade: 8

Title: Which energy drink has the most impact?

Abstract: The purpose of the experiment was to see which energy drink, when tested in the subjects, increased their heart rates after exercise. When conducting this experiment, give the six subjects 20 minutes for proper digestion. When allowed this time, have them get onto a treadmill and run for 10 minutes to see if they enter their heart rate zone. Then make your observations. For this experiment three different energy drinks were used. I concluded that between Redbull, AMP, and Monster Assault, the Monster Assault and AMP worked the best.

INTERMEDIATE DIVISION – MEDICINE/HEALTH/MICROBIOLOGY

Project Number: MMH032

Grade: 8

Title: Bleach Concentration on Bacteria

Abstract: This experiment will determine if bleach solutions are effective when used to clean.

1. Make solutions of 100%, 75%, 50%, 25%, 10%, 1%, and .1% bleach.
2. Sterilize tweezers by dipping in ethyl alcohol and flaming in a Bunsen burner.
3. Using tweezers, dip sensitivity disk in solution.
4. Place on agar.
5. Place agar plates in incubator, measure zone of inhibition in mm.

The hypothesis was accepted. Trial one: no bacterial growth on 100% agar plate. Trial 2: 75% solution inhibited more bacteria than 100%. Trial 3: 100% plate had a zone of inhibition of 11.18713mm, Otherwise, the zone increased as the amount of bleach increased.

Project Number: MMH033

Grade: 8

Title: Elimination of Iron Bacteria

Abstract: The purpose of this investigation is to determine what chemicals are necessary to eliminate iron-related bacteria from water. Samples of water containing iron bacteria were obtained. The samples were treated with sodium hypochlorite, a phosphate bases surfactant and a combination of both surfactant and sodium hypochlorite. These samples were then tested using IRB-BART tests. The water samples treated with just the sodium hypochlorite and just the surfactant still had iron-related bacteria present after the observation period. The sample treated with both the surfactant and the sodium hypochlorite did not contain any iron-related bacteria. The combination treatment eliminated the iron bacteria.

INTERMEDIATE DIVISION – PHYSICS

Project Number: MPH001 Grade: 7

Title: A Look Into Foods As Batteries

Abstract: Please visit student's exhibit for abstract.

Project Number: MPH002 Grade: 7

Title: Will An Egg Fit Into A Bottle?

Abstract: The purpose of this experiment was to find out if an egg could fit into a bottle and to find out if pressure could be created by heat and oxygen. First, I heated the water and boiled the egg. Next I filled the Snapple jar with the hot water, waited two minutes and poured it out quickly. I then put the egg on top and watched it slip in. My data was that the egg lasted 10 minutes before splitting apart, making my hypothesis correct. My conclusion was that the egg did not fit into the bottle. Half did and half did not.

Project Number: MPH003 Grade: 7

Title: Hole In One

Abstract: It's a bird, it's a plane, it's a solenoid? What is a solenoid anyway? Well, a solenoid is a spring-like figure that reacts to certain things that go through it, shooting them out as far as it can. In this experiment, however, the investigator will try to see what kind of solenoid and weight of a ball will make the ball shoot out the farthest. The reason this project being done, is so that when a solenoid is needed for a certain project or invention, the perfect solenoid will be chosen. So in conclusion, if a solenoid is ever needed, it will not take long to be picked because it will already be known which one works best for different purposes.

Project Number: MPH004 Grade: 7

Title: What Is The Strongest Wood?

Abstract: Wood is a common material in home construction projects. My work intended to determine the strongest type of wood. Seven common types of wood were selected to be tested. The wood was cut into 37 cm by 3cm by 6 mm pieces, the wood was placed in a vise, and weight was applied. The breaking strength of each type of wood was recorded. After testing, my results showed that white oak wood is the strongest. From my project, I concluded that white oak wood would be best for projects.

Project Number: MPH005 Grade: 7

Title: Environmental Effects on Film

Abstract: To find out which photographic medium better tolerates extreme environmental conditions, I subjected canister film and digital smartcards to heat, water, cold, and radiation, and then measured the pixels in photographs from this exposed media. Based on the data collected, I concluded that pixels distort if canister film is subjected to extreme heat, cold, water, and radiation. Pixels do not distort significantly when digital smart cards are placed in the same conditions. Therefore, digital smartcards perform much better than canister film rolls perform when exposed to extreme environmental conditions, and are the best choice for consumers who travel.

INTERMEDIATE DIVISION – PHYSICS

Project Number: MPH006

Grade: 8

Title: Oilology

Abstract: Oil stops an engine from overheating and breaking down. This work intends to see if different oils at different temperatures will affect how much friction is generated. A 900gram weight is dragged across a metal surface with different oils at different temperatures and the amount of newtons will be recorded. Research says different oils will do better at different temperatures.

Project Number: MPH007

Grade: 7

Title: What type of bottle keeps water coldest longest?

Abstract: The purpose of this experiment was to see which type of beer bottle kept their contents the coldest. My procedures included refrigerating the bottles and then exposing them to different treatments. I then calculated how much heat was gained. My data shows the average temperature for all three bottles in two locations. For those left on the counter the results from coldest to warmest were aluminum, glass then plastic. For the cooler testing the order was aluminum, plastic, and then glass. I concluded that aluminum bottles were the best choice for retaining cold temperatures.

Project Number: MPH008

Grade: 7

Title: Which Wood Burns the Fastest?

Abstract: The purpose of this experiment is to determine which type of wood burns the fastest. I took five different types of hard and soft wood found in Pennsylvania and burned them for five minutes each. Upon completion, I weighted each using a scale and recorded the results. It was determined that the soft woods burn faster than the hard woods.

Project Number: MPH009

Grade: 7

Title: Solar Power: The Energy of Our Future

Abstract: The purpose was to determine if the angle of the Sun's rays shining on a solar cell affect the produced power. I hooked a solar panel to a voltage meter and I illuminated the solar panel with the light source; then recorded the readings on the meter. I started rotating the solar panel to different angles and recorded the different readings at the following angles (75 °, 60 °, 45 °, 30 °, 15 ° and 0 °). I repeated the test six (6) times to verify the results. In the end, I did verify that the angle of the Sun's rays affected the output of the solar cell.

Project Number: MPH010

Grade: 8

Title: What materials make the best insulation?

Abstract: The purpose of this experiment was to find out which material made the best insulator. I choose this topic because I think it's good to know what keeps you and your house the warmest in the winter. Twelve different materials were used in this experiment in a time and temperature controlled environment. The results were that fiberglass and thinsulate materials were the best insulators. The conclusion proved that fiberglass insulation and thinsulate are two great choices to keep you warm. Future experimentation on my topic is planned by using different materials and increased control times.

INTERMEDIATE DIVISION – PHYSICS

Project Number: MPH011

Grade: 8

Title: Gas Mileage Mania

Abstract: Gas prices are extremely high this time of year with heating your home and just driving to work. I tested to see if increasing your vehicle's gas mileage could save money. The mileage my dad travels to work and back everyday in a 1991 Chevy pick up was recorded and the miles per gallon calculated. Changes including: removing a chip box, increasing tires pressure and an overall tune up was made. It was determined that removing the excess weight was most effective in improving the miles per gallon.

Project Number: MPH012

Grade: 8

Title: Temperature and Target Practice

Abstract: Since its introduction in the 1980s, paintball has become an extremely popular sport. I decided to test how storing paintballs in different temperatures affects their accuracy. I placed 50 paintballs in different temperatures including: freezer 23F, oven set at 100F, refrigerator 37F, oven set at 85F and room temperature 72F. Ten shots were fired at the target. Observations were recorded to determine how far the paintball landed from the center of the target. It was determined that paintballs stored at 85 degrees Fahrenheit were the most accurate. Future research is planned to see if different levels of air pressure affect accuracy.

Project Number: MPH013

Grade: 7

Title: Movement of Objects in Liquid

Abstract: My purpose was to find the viscosity of liquids and to determine which objects move freely in a magnetic field. I thought that medium weight objects would move the most freely, and water would allow the most movement. First, I filled a container with 860 mL of a liquid and placed an object inside 40mm from the edge of the container. I would move a magnet closer to the object until it moved and would record the distance it was away from the object. I found that my hypothesis was correct in both aspects.

Project Number: MPH014

Grade: 8

Title: Drying Laundry Efficiently

Abstract: Since conserving energy is very important, the purpose of my project was to determine what size laundry load is most efficient in conserving natural gas. I tested various size laundry loads, recording the weight before washing, after washing, and after drying. I also recorded the time it took to dry each load. My main hypothesis was that medium-size loads would be more efficient than larger or smaller loads. The results indicated that larger loads were the most efficient when evaluating drying time per kilogram of laundry. Also, medium loads were more efficient than smaller loads.

Project Number: MPH015

Grade: 7

Title: The Bending of Light through Water

Abstract: My hypothesis is that when the light beam hits the water it will change its angle between 50 and 100 for each angle, depending on the angle of the light approaching the water (the incidence angle). The smaller the incidence angle, the greater the bending of the light beam (or greater the refraction).

INTERMEDIATE DIVISION – PHYSICS

This project investigated how light is effected by traveling through water. By running this experiment, I have concluded that my hypothesis was proven correct. By measuring the angle of the laser entering the water and the angle the light was refracted, I demonstrated that the smaller the incident angle the larger the refracted angle.

Project Number: MPH016

Grade: 7

Title: Run Your MP3 Player For Less!

Abstract: Millions of people own portable MP3 Players. This work intended to compare different battery types, and find the most cost-effective battery. Six types were tested including single and multiple use batteries. A computer recorded the playing time. The energy cost was determined by the purchase price and the kWh used to recharge the batteries. It was determined that single use batteries were more cost-effective at first. After 100 runs, multiple use batteries would be less expensive. A break-even analysis determined when multiple use batteries were better. Future work could test other battery types and devices, e.g. flashlights.

Project Number: MPH017

Grade: 8

Title: How to make electricity flow through a town

Abstract: Electricity is a power source that is used throughout the world. This work intended to show how electricity reaches our homes. A model was built to represent the distribution of electricity from the power plant to an individual residence. The model was then wired to conduct electricity through a series of model streetlights and into a model home. It was determined that electricity is generated from the power plant, goes to a step-up transformer and distributed over long distances before reaching sub-stations that contain step-down transformers and finally to another step-down transformer before entering our homes.

Project Number: MPH018

Grade: 8

Title: The Big Bang

Abstract: I tested how velocity affects the penetration of an object by a bullet. I fired shots into phone books and recorded the number of pages that the bullet penetrated. The results showed that the .50 caliber 370 grain bullet with 100 grains of powder penetrated the phone directories the most. I checked my observation by testing the weights of the bullets fired into the phone books compared to the unfired bullets. The bullets traveling at higher velocities lost more weight due to the disintegration on impact.

Project Number: MPH019

Grade: 7

Title: Does Thickness Affect Sound?

Abstract: Please visit student's exhibit for abstract.

Project Number: MPH020

Grade: 7

Title: Am I Attractive?

Abstract: Can a liquid media affect magnetism? My hypothesis was that it cannot. When I did my research I learned that temperature can affect magnetism, but I wasn't sure if a liquid media did. My project contained a round magnet, two identical containers, one holding 16 fluid ounces of water and the other holding 16 fluid ounces vegetable oil. Another identical container contained nothing to demonstrate my control group. Next I placed 350 zinc plated steel bbs in each of the containers. The magnet suspended from a string connected to a tripod, attracted bbs

INTERMEDIATE DIVISION – PHYSICS

3 cm from magnet to table top. The magnet picked up an average of 282 bbs out of five trials in my control group. In water, the magnet picked up an average of 261 bbs. In oil the magnet picked up an average of 162 bbs. The reason the oil picked up only an average of 162 bbs is due to the fact that oil is a denser liquid. The same argument can be made for water. Water is thicker than air so the magnet picked up less bbs when in water than in air. My hypothesis was proven incorrect.

Project Number: MPH021

Grade: 7

Title: Rock A Bye Pendulum

Abstract: The purpose of my experiment was I wanted to find out if the length of the string effects the swing of the pendulum. My procedure consisted of calculating the swings by timing them for 15 seconds each. My data showed that each inch of string you add, one less swing occurs. I then calculated my information to compare it to my experimental information. My conclusion was that the length of the string did effect the swing of the pendulum.

Project Number: MPH022

Grade: 8

Title: The Effects of Magnetic Fields

Abstract: Please visit student's exhibit for abstract.

Project Number: MPH023

Grade: 7

Title: Bowling Balls and Mass

Abstract: Bowling balls of different masses were tolled down a ramp to determine if the mass of a bowling ball affects how many pins it knocks down. The bowling ball with the least mass, 3.6 kilograms, consistently knocked down the most pins, from 9-10 pins. The bowling ball with the most mass, 7.2 kilograms, consistently knocked down from 8-9 pins. The bowling ball with the middle amount of mass, 5.4 kilograms, was the most inconsistent at knocking down pins, from 7-10 pins. It lacked the mass of the 7.2 kilogram ball and also lacked the pin action of the 3.6 kilogram ball.

Project Number: MPH024

Grade: 8

Title: Colors and Heat Absorption

Abstract: The purpose of my project was to test my hypothesis that darker colors absorb more light and retain more heat than lighter colors. Using two halogen lamps, a box with a side cutout and specific colored cloths, I ran two successive tests measuring air temperature via two probes placed inside the box. The color vs. temperature plots did not follow the order of the source light spectrum. Based on the source spectrum analysis and controlled perimeters, I concluded that spectrum does not indicate energy levels in each wavelength.

Project Number: MPH025

Grade: 8

Title: How Air Pressure Affects A Basketball's Bounce

Abstract: Does air pressure really affect a basketball's bounce? This study intended to determine if air pressure affects the bounce of a basketball. A basketball was filled with two pounds, four pounds, six pounds, eight pounds and ten pounds of air and then dropped from a distance of six feet. The height that the ball bounced was recorded and the average height calculated for the trials conducted. It was determined that the greater the air pressure, the higher

INTERMEDIATE DIVISION – PHYSICS

the ball bounced. Future study may involve how the surface the ball is bounced on affects the height of the ball.

Project Number: MPH026

Grade: 8

Title: Bouncing Tennis Balls

Abstract: Tennis balls bounce at different heights. This project will determine if the tennis ball will bounce higher or lower in hot, warm, or cold temperatures. The tennis balls will be in a heating pad at 68 degrees C, at room temperature (19 degrees C.) and in a freezer at -10 degrees Celsius. After an hour, take the tennis balls out of their storage areas and drop them from shoulder height. Observe the height of each bounce and record in centimeters. Do the experiment three times to get an accurate result. Analyze and graph data.

Project Number: MPH027

Grade: 8

Title: Correlation of Sound and Force

Abstract: The purpose of this work was to determine if the graph of sound with increased power is straight or curved. The first experimentation idea involved a robot; however, stress on the motor made the robot inaccurate and this idea could not be used. A device was then built to drop multiple objects on a drum from varying heights. Sound levels were collected from the drum and then averaged. Graphs were created from these averages. It was concluded that the graph is a curve. Future research is planned to test using varying objects or dropping objects on different drums or cymbals.

Project Number: MPH028

Grade: 7

Title: Best fuel for a potato gun

Abstract: Please visit student's exhibit for abstract.

Project Number: MPH029

Grade: 8

Title: Temperature Effects

Abstract: My purpose of the experiment was to see if temperature can affect the bounce of a basketball. In my experiment I ran three times. I use the same ball for all of the experiments. I heated, refrigerated and froze the ball. I found that if a ball gets too hot it won't bounce very high, and if you freeze it too cold it could shatter in pieces. The warm ball bounced higher than the cold ball.

Project Number: MPH030

Grade: 7

Title: How well a Bouncy Ball Bounces

Abstract: The purpose of my project was to determine how high a bouncy ball would bounce if I dropped a frozen bouncy ball, a heated bouncy ball, and a room temperature bouncy ball. My hypothesis was, 'If I dropped a heated bouncy ball it will bounce higher than if I dropped a frozen bouncy ball or an at-room temperature bouncy ball.' The data stated that a small ball bounces higher than any ball. I learned that the heated balls bounce pretty high, but not high enough to beat the small ball.

INTERMEDIATE DIVISION – PHYSICS

Project Number: MPH031

Grade: 7

Title: Eggsactly How Much Force Can An Egg w/hold?

Abstract: The purpose of this project was to determine whether a vertical egg could withstand a larger force of water than a horizontal egg. My hypothesis is that if I have an egg in a vertical position and apply force, then it will withstand more force than an egg in a horizontal position. I did this project by measuring the amount water force that an egg could withhold from different positions. My hypothesis proved correct. I learned that the arch of a vertical egg helps it withstand applied force, therefore withholding more water than the horizontal egg.

Project Number: MPH032

Grade: 7

Title: Physics of Cheating in Baseball

Abstract: Four hollow wooden baseball bats, one filled with rolled cork, one with Styrofoam peanuts and one with rubber balls, and one solid wooden bat will be attached to a batting device in turn. Each bat will spring from the batting device and hit the baseball, which will be set on a tee. The distance, which the ball travels in the air, is measured and recorded. This investigation will determine if the material in the core of the bat does have an effect on the distance the struck ball travels.

Project Number: MPH033

Grade: 8

Title: Temp. & Instrument Note Quality

Abstract: Does an instrument's temperature affect its playing quality? A flute, clarinet, trumpet, and recorder were placed in five different temperatures and tested twenty times each. Using an electronic tuner and a metronome while playing steady notes, I concluded that most instruments play better when warmed prior to playing. Future tests may include testing more different and complex instruments that have different parts to be affected and finding a different way to heat them that would keep the temperatures steadier for longer periods of time.

Project Number: MPH034

Grade: 7

Title: Metals and Magnetism

Abstract: The Earth is a giant magnet. Compasses use this fact to find direction. This experiment investigates how different metals react to the magnetic field of a permanent magnet and how strong a magnetic field they produce when used to make an electromagnet. Attraction was measured between different metals and a permanent magnet. Between a steel washer and electromagnets constructed using the different metals and a strong correlation was found. Some metals were found to have very weak attraction, while other metals had much stronger attraction. Of the metals investigated, high iron-content steels would make the best compass needles.

Project Number: MPH035

Grade: 7

Title: Wood Absorption

Abstract: To make a sturdy, long-lasting, water tight shelter for my dog. It was important to choose a wood that absorbed very little water. This experiment tested the water absorption property of four types of wood. Five samples each of cedar, oak, pine, and poplar were placed in distilled water and weighed at 24 and 48 hours. It was determined that cedar absorbs the least amount of water, and therefore is the best choice for a doghouse.

INTERMEDIATE DIVISION – PHYSICS

Project Number: MPH036

Grade: 8

Title: Paintball Flight Consistency

Abstract: This investigation was conducted to discover how the shape of a paintball affects the consistency of its flight pattern. It was hypothesized that paintballs with spherical shells would strike their target most consistently. A total of sixty paintballs with spherical, oblong, and dimpled shells were fired from a paintball marker at a large wooden board ten meters away. The consistency of each paintball shape was determined by averaging the distance between the marks left by that paintball type. The spherical paintballs displayed the greatest consistency. The oblong paintballs displayed the second greatest, and the dimpled paintballs displayed the least.

Project Number: MPH037

Grade: 7

Title: Strength vs a String's Length

Abstract: The question that my project answered was if the length of a string affected its strength. My hypothesis was that shorter strings would hold more mass than longer strings. Things that are taller or longer are usually less stable than short things. The red yarn held the most when it was 76.2 cm long. The green sewing thread held the least when 50.8 cm long.

Project Number: MPH038

Grade: 8

Title: Does Temperature have an Effect on Electric Resistance in Metals

Abstract: The purpose of this experiment was to see if temperature had an effect on the electric resistance in metals. I had 4 temperatures and 4 metals. I conducted 5 trials for each metal in each temperature and recorded the amount of amperes with an amp meter. After I have gathered my data, I need to convert my data into ohms. After all of the calculating was completed, Aluminum ended up with the least resistance and iron ended up with the least. All of the metals also performed best in 21°C and worst is 100°C. I conclude that temperature does have a pretty significant effect on electric resistance in metals.

Project Number: MPH039

Grade: 7

Title: Just For Kicks

Abstract: When kicking a soccer ball, does the air pressure affect how far it travels? A kicking contraption was constructed to "kick" the ball with the same force each time. The experiment tested three brands of balls at 12 different air pressures. The "leg" kicked the ball ten times at each air pressure and distances were recorded. This was repeated for all brands of soccer balls. Data was collected and made into graphs.

Project Number: MPH040

Grade: 8

Title: Bricks vs Blocks

Abstract: The purpose of this project is to see which brick or block is stronger. 1. Place two pieces of angle iron under a basketball hoop. 2. Place a testing object on the angle iron. 3. Climb up a ladder. Have someone hand you a weight. 4. Drop the weight through the basketball hoop then onto testing object. 5. Drop the weight until the testing object breaks. The clay bricks were not as strong as the concrete bricks and blocks. The grid block was the strongest.

INTERMEDIATE DIVISION – PHYSICS

Project Number: MPH041

Grade: 8

Title: Conservation of Heat

Abstract: This project involves heat energy. The experiment was conducted to see if heating energy could be saved by the reduction of space temperature. The data was collected per minute by data loggers. Microsoft Excel was used to analyze the data of the temperature of the water flowing into the house from the wood burning boiler. The data was then calculated to see how much energy was used for the 28 days of testing. In conclusion, heating energy was saved overall during the unoccupied periods.

Project Number: MPH042

Grade: 8

Title: Effect of Therm. Insulators on H₂O

Abstract: In Pittsburgh, winters can be harsh. This investigation was intended to discover whether or not the properties of the thermal insulators Wigwam wool, Waverly polyester, Egremount cotton and Davos Nylon could confine heat in a container of water thereby proving the effect thermal insulators have on water temperature. My experiment was designed to catch or hold heat within a container of water using different insulators as the means preventing heat loss. Wigwam wool proved to be the best insulator as shown in my testing and research.

Project Number: MPH043

Grade: 7

Title: The Bounce of Balls

Abstract: In many sports, we use a ball, but have you ever wondered which sport's ball bounced the highest? For my project, I wanted to know which ball bounces the highest. I constructed a two-meter tall block of wood and dropped each of my five balls off of it. Each ball was bounced on two surfaces, a gym floor and my backyard. The golf ball bounced the highest in the gym, but the lowest in my backyard.

Project Number: MPH044

Grade: 8

Title: The effect of age on how far a baseball travels

Abstract: Baseball is America's pastime. I was interested in seeing how the age of a baseball contributes to the distance a baseball will travel. The experiment was prepared to mimic the striking of a baseball with a baseball bat. The machine would pitch a baseball striking a metal sheet five meters away. The distance of rebound would be recorded. The results proved the newer the baseball is the farther the distance it travels. Now I wonder if schools without funding available at a disadvantage during practice and thereby preventing their players to become as successful as other schools with funding?

Project Number: MPH045

Grade: 8

Title: Photographic Image Distortion

Abstract: The purpose of my experiment was to test if focal length and f-stop affect image distortion. I photographed a grid, using eight different focal lengths and four different f-stops at each focal length. On each photograph, I measured the distortion. There were small changes in distortion when changing f-stop but no pattern. Changing focal length yielded a clear pattern of distortion. As the focal length changed from 18mm to 200mm the distortion progressed from 3.25% barrel distortion to 0.5% pincushion distortion. From my data, I concluded that f-stop didn't affect image distortion but focal length did.

INTERMEDIATE DIVISION – PHYSICS

Project Number: MPH046

Grade: 7

Title: Strength of Electromagnets

Abstract: Magnets created by using electricity are called electromagnets. My project intended to learn whether or not the number of wire coils and the strength of the magnet had an effect on the strength of the electromagnet. From 5 to 35 coils, in integrals of 5, were wrapped around the nail used as the magnet. With each addition of 5 coils, staples were picked up. The number of staples was recorded. This was repeated with two different strengths of batteries. It was determined that both the number of coils and the strength of the battery affect the strength of the electromagnet.

Project Number: MPH047

Grade: 8

Title: Flexible Concrete

Abstract: The project is called flexible concrete. The project consists of dropping weights onto two types of concrete and setting weights on two kinds of concrete by dropping weight increments of 11.3. The end of the weight will be 100kg. First pour the concrete into the square after mixing it well. Then wait the 28 days for the flexible concrete, 24 hours for the regular concrete to set. After the 28 days and 24 hours then start the project by dropping weights by 11.3kg until you do the four trials which was done all at once. They both broke at 11.3kg.

Project Number: MPH048

Grade: 7

Title: Temperature and Roof Color

Abstract: The title of my investigation is Temperature and Roof Color. I wanted to see if the color of shingles affect the amount of heat absorbed. I shined a heat lamp on one roof shingle for fifteen minutes, three times. I repeated this procedure for all nineteen different colored roof shingles. Then I took the temperature of the underside of each shingle with an infrared thermometer, a pyrometer. The results were that the lightest colored roof shingles had the lowest temperature, and the darkest colored roof shingles had the highest temperature, as was predicted in the hypothesis.

Project Number: MPH049

Grade: 7

Title: A flashpoint under your sink?

Abstract: Please visit student's exhibit for abstract.

Project Number: MPH050

Grade: 8

Title: Motion

Abstract: The purpose I chose this experiment was to determine if changes in weight, amplitude or length effect that period of motion of a pendulum. For the procedure I will assemble a pendulum frame, then I will attach a screw hook to the center of the upper wood frame, attach a protractor to the hook. Weight a random number of fishing weights, put them in to a small bottle and tie it to the hook. Now the pendulum is ready to set into motion. Bring the bottle to an amplitude of (A) degrees from the vertical and release the pendulum.

INTERMEDIATE DIVISION – PHYSICS

Project Number: MPH051

Grade: 8

Title: Solutions Affecting Conductivity

Abstract: My experiment is to determine which solutions conducts voltage better; acid, base, or neutral (distilled water).

Project Number: MPH052

Grade: 7

Title: Insulators: Which Fabric Is Best?

Abstract: Consumers have many choices of fabrics to keep them warm in cold weather. This experiment was performed to find out which of eight selected fabrics is the best. Eight types of insulators were tested. Cotton, wool, ramie, sheepskin, nylon, rayon, polyester, and thinsulate were each wrapped around a baby food jar and secured with hot glue. The temperature was recorded after 7 minutes in the freezer, 5 minutes out of the freezer, and then after 13 minutes out of the freezer. It was shown that sheepskin and thinsulate were the best insulators. Future work could be done to find out which is the best insulator with the least cost.

Project Number: MPH053

Grade: 8

Title: Mass and Momentum

Abstract: My football coach suggested that I gain weight. The purpose of my experiment was to determine if a big, slow player hits harder than a small, fast player. My hypothesis is that the big, slow player hits harder. I suspended two weights, a control and experimental, from ropes. I raised and released the experimental weight. After collision, I measured how high the control traveled. Two experimental weights, 1.8kg and 0.9kg, were released ten times. The control traveled an average of 23.49cm with the 1.8kg weight and 20.68cm for the 0.9kg weight. I concluded that big, slow players hit harder.

Project Number: MPH054

Grade: 8

Title: How does storage temperature affect the bounce of a golf ball?

Abstract: The purpose of this experiment was to find out how the storage temperature affects the bounce of golf balls. I stored some golf balls in the refrigerator, some in a warm oven, some in the freezer, and some at room temperature. I dropped each from one meter and counted the number of bounces in 15 second. On average the balls stored in the oven bounced 11.7 times. Those stored at room temperature bounced 10.2 times. Those stored in the refrigerator bounced 8.4 times, and those stored in the freezer bounced 5.3 times. My hypothesis was fully supported by this experiment.

Project Number: MPH055

Grade: 7

Title: Swing and a Miss

Abstract: Not available. Please visit student's exhibit for abstract.