



66th PITTSBURGH REGIONAL SCIENCE & ENGINEERING FAIR

SENIOR DIVISION ABSTRACTS

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

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SENIOR DIVISION – BEHAVIORAL/SOCIAL SCIENCE

Project Number: SBS001

Grade: 11

Title: Memory Recall: How True Are Affidavits?

Abstract: The purpose was to determine if witnesses' affidavits are good, veritable sources of information. A simulation of a traumatic event was conducted by showing students the autopsy from Alien Autopsy. Then, questions were administered concerning the content after biases were determined. It was found that biases and time factor greatly into distortion of memories, so affidavits may not be the accurate source of information as perceived before.

Project Number: SBS002

Grade: 11

Title: Gender and the Stroop Test

Abstract: The purpose of this project was to see if gender will have an effect on the Stroop test. I gave the 25 males and 25 females the black and white list and recorded the time. Repeat with the right color test and with the wrong color test. Compare the male times with the female times. Create data tables with the results of the tests. The results were that males had faster times than the females in the black and white test. Females had faster times in the right color test, males had faster times in the wrong color test.

Project Number: SBS003

Grade: 12

Title: Is The PSSA The Best Way?

Abstract: I propose that there is a direct correlation between a specific learning style and the type of question they perform best on. The question types are multiple choice, true and false, completion, matching, and constructed-response. Visual learners will perform best on multiple choice questions, and kinesthetic learners will perform poorly. Fifth grade students took a learning styles inventory, read three passages, and took three tests after each passage with the five different types of questions. I grouped the tests into kinesthetic, visual, auditory, and mixed preference. Then I determined the correlation. The ANOVA statistical analysis test disproved the hypothesis.

Project Number: SBS004

Grade: 12

Title: How much do you really know?

Abstract: The purpose of my project was to determine how student's grade level affects their knowledge about A.I.D.S and H.I.V as well as their attitudes and behavior. The comparison will be done based on the student's grade level, using 9th and 12th graders. I found that 12th graders know more about H.I.V and A.I.D.S than 9th graders, but have poor attitudes and behavior towards them than 9th graders. My conclusion is that student knowledge doesn't correspond to their attitude and behavior. In my further research I talk to different students in different schools, which contain three high schools and one middle school. I did all of my research and testing on the three high schools that I went to. I presented my project to them gather information that I received by asking questions and then gave them a test.

Project Number: SBS005

Grade: 11

Title: Brain size and emotional intelligence

Abstract: The size of the general intelligence and emotional intelligence for each subject was calculated and analyzed in an attempt to draw a correlation between the two. The results were then used to confirm that the hypothesis that one does not need to have to have a large brain to have emotional intelligence or "get a joke" is true. Measurements from the ICV (Intracranial

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Volume) scans in 53 human brains using Brains2 software were compared to the results from the MSCEIT © Emotional Intelligence Test. The results were compared using the Pearson Correlation Coefficients. The data from these 53 brains showed no correlation between emotional intelligence and brain size. Therefore, I concluded that the two were not linked.

Project Number: SBS006

Grade: 12

Title: Visual vs. Auditory in Autistic and Typical Children

Abstract: Abstract was not submitted electronically. The purpose of my research was to see if autistic and typical children learned better by visual or auditory cues. I hypothesized that autistic children would learn better by visual cues than by auditory cues. I also hypothesized that typical children learned better by auditory cues than by visual cues. I visited a local elementary school and daycare. I tested the autistic and typical children with visual and auditory items. I found that autistic children understood visual cues better than auditory cues; typical children understood auditory cues better than visual cues. For further research I will use a wider age range.

Project Number: SBS007

Grade: 9

Title: Forged!

Abstract: Forensic handwriting analysis is a very controversial topic among the scientific community, mostly due to its validity as criminal evidence. In my project, I set out to see if a person could forge another person's handwriting if given a sample to forge. I compiled a survey that directed a subject to give a sample of their own handwriting and to attempt to forge three handwriting samples. Then I analyzed the data for vowel width, consistency to the sample, and consistency between handwriting samples. In conclusion, although forgery is possible, the forger's handwriting is always present in the forged samples.

Project Number: SBS008

Grade: 12

Title: Does Color Affect Memory?

Abstract: To investigate the effect of color background on memorization, I showed males and females words on various colored boards. I found that the boys did better with the colored boards than the control (white) board. The girls did better with the control board than the colored boards. Overall the boys did better than the girls. The results proved my hypothesis to be correct: The colored background helped memory. My continuation of my experiment is to use eleventh graders, shorten the time, use only a white and yellow poster board, and finally use thirty words on each poster boards.

Project Number: SBS009

Grade: 11

Title: Are You Tired, Burned Out and Feeling Down?

Abstract: The purpose of the project is to compare the different levels of stress between males and females.

Project Number: SBS010

Grade: 12

Title: Is Caffeine Beneficial?

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

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Project Number: SBS011

Grade: 11

Title: What You See is What you Get... Right?

Abstract: What You See Is What You Get...Right? My project is a project studying optical illusions. I wanted to test whether or not adults viewed optical illusions differently from teenagers. I hypothesized that the average findings for the adults would be different from the average of the teenagers. To test this I had a printout of eight different optical illusions and I individually sat down with each teen and each adult. I showed them each picture once at a time for one second. They then wrote down their response and I analyzed the data I found that my hypothesis was correct.

Project Number: SBS012

Grade: 10

Title: Postive vs. Negative

Abstract: The purpose is to determine the physical reactions of high school students when asked a question with a positive spin as opposed to a negative spin. Physical reactions that will be measured include heart rate, brain activity, body language, and delay of response time. Heart rate will be taken before any questions are asked and during questioning. Brain activity, using a simple EKG device, will be monitored throughout the questioning.

Project Number: SBS013

Grade: 9

Title: How Subliminal Messages Effect Your Brain

Abstract: Abstract was not submitted electronically.

Project Number: SBS014

Grade: 9

Title: Is Physical Activity Protecting Against Video-Computer &TV Use?

Abstract: The objectives of the study are to describe patterns of physical activity (PA), playing computer/video games and watching TV shows; and to determine their relationships across 9th grade boys and girls. Hypotheses include: 1) there will be differences in patterns of PA, playing computer/video games and watching TV between boys and girls; and 2) there will be negative relationships between PA with computer/video games and TV viewing. A survey was developed to test hypotheses and administered to fifty-five 9th graders (27 boys and 28 girls) after the IRB approval and consent form signed. Results showed that: 1) boys who actively participated in PA spent less time on video games; 2) girls who actively participated in PA spent less time on computer for non-academic purposes; and 3) girls who actively participated in PA spent less time on TV.

Project Number: SBS015

Grade: 9

Title: Does Exercise Enhance Test Scores?

Abstract: The purpose of my project was to determine how exercise affects test scores. Two groups of fourth grade students were asked to take a math test. One group spent 40 minutes exercising in physical education class after taking the test. The other group had a regular class, there was no specific exercise involved. After the 40 minute perios, the students were retested. My findings were the control group, that had no exercise between classes, out performed the group that spent 40 minutes in physical education class on the retest. Therefore according to my project, exercise did not enhance test scores.

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Project Number: SBS016

Grade: 9

Title: Effects of Environment on Short-Term Memory

Abstract: This investigation studied if lighting of the room, the time of day, and gender influenced short-term memory performance. Five separate classes of 9th grade honors biology students were given memory tests under light and dark conditions. The data showed that students did better in the light versus the dark. In the light females did better than males. Finally morning classes did better than afternoon classes in the dark. It is clear that darkness interferes with short-term memory under all conditions except gender. The observation that females have more working memory was verified in the light.

Project Number: SBS017

Grade: 9

Title: What Side are You?

Abstract: The purpose of this experiment was to find out if having a more dominant left brain hemisphere or right brain hemisphere will affect how someone memorizes vocabulary words.

Project Number: SBS018

Grade: 11

Title: I'm Smarter Than You! Ha-Ha

Abstract: My project addresses the question of: what effect does students of different racial, geographical and gender backgrounds have on the SAT 1 in the United States? I hypothesized that the females of the white race who live in Florida will have the highest SAT 1 scores in both math and verbal. My procedure consisted of prioritizing all of the data and analyzing the data using a Chi-Squared statistical analysis.

Project Number: SBS019

Grade: 10

Title: Guiding Scents

Abstract: Based on human sperm's attraction to eggs' lily of the valley scent, this experiment's purpose was to determine whether this attraction relates to people's preference of lily rather than other common flowers. About sixty students were asked to rank by preference five unlabeled flower scents. The data was compiled according to sex; approximately forty percent of both males and females preferred lily of the valley over the others. This data does not prove a correlation between sperm's attraction to the egg's scent and people's attraction to the scent, but it serves well as a preliminary survey for a future study.

Project Number: SBS020

Grade: 9

Title: The Effect of Flavonoids on Memory

Abstract: There is some research that suggests that flavonoids in blueberries help the memory. This project was done to show if this is true, and if so, which kind of berry would help the memory the most. I tested strawberries, raspberries, blackberries and blueberries. I propose that blackberries will be the most beneficial because of their dark pigmentation. Subjects were given memory tests before and after eating and digesting various berries. It was concluded that blackberries were the most effective in improving memory.

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Project Number: SBS021

Grade: 11

Title: Creating the Designer Pabulum

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SBS022

Grade: 11

Title: Can Psychiatrists Recognize Mental Illness in Visual Art?

Abstract: Paintings by mentally ill artists are said to have unique features. To determine if this was true, I interviewed 12 psychiatrists and 12 lay people (with no background in psychology). Psychiatrists, but not lay people, were able to identify the time period of creation of individual paintings randomly selected from before and after the date of onset of Bipolar Disorder in four artists. However, lay people were just as accurate as psychiatrists when viewing sets from before and after onset of illness. I conclude that psychiatrists possess unique skills that allow them to accurately identify mental illness from visual art.

Project Number: SBS023

Grade: 9

Title: "I'm watching you!"

Abstract: My project was done to determine how many drivers will stop at a stop sign under observation in different times of the day. I did this to find out how many people stop under observation, and if a person watching them would affect them in stopping. I observed 10 cars during 3 periods of the day. My results were that most of the people did stop while they were being watched.

Project Number: SBS024

Grade: 9

Title: Stroop Effect: A Closer Look

Abstract: Determine whether the effect of conflicting word stimuli is decreased if only part of each word contains conflicting color. Participants took six timed tests, naming ink color of twenty-five words. Three tests contain congruous word and ink color (blue printed in blue ink) and three incongruous (blue printed in red ink). Lists contain whole words, last two letters of each word, or first two letters of each word in colored ink. When incongruous word stimuli is located at the end of each word rather than the beginning, the response time to conflicting word stimuli is decreased.

Project Number: SBS025

Grade: 12

Title: Stress on the Immune System

Abstract: I purpose that stress does have an effect on the immune system of the Spirostomum. The stressed cells will have a higher death rate and lower contraction rate than the non-stressed cells when exposed to the bacteria. To test this, I exposed the non-stressed Spirostomum and those which were stressed by the hydrogen peroxide, to the Bacillus Subtilis. I recorded the contraction rates over one minute and the death rates. The stressed cells did end up having a lower contraction rate and higher death rate than the non-stressed Spirostomum after being exposed to the Bacillus Subtilis.

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Project Number: SBI001

Grade: 11

Title: Muscle Feedback After Stimulation

Abstract: The purpose of this experiment is to determine if resulting muscle force and displacement after electrical stimulation can be graded through varying voltages and pulse durations to help facilitate the creation of a future device that will restore the eye blink. Sprague-Dawley rats were used for accurate testing of muscles because they were similar to humans.

Project Number: SBI002

Grade: 11

Title: Hepatitis A in Green Onions

Abstract: The largest Hepatitis A outbreak in the USA occurred in November 2003. As a result of this outbreak 4 people died and 660 were infected. The source of that outbreak was traced to green onions from a farm in Mexico. I used two biomarkers [fluorescent microspheres and Hepatitis A attenuated virus vaccine] to determine how the Hepatitis A virus might have contaminated green onions. Onions were grown hydroponically. Quantitative fluorescent luminosity and reverse transcription-polymerase chain reaction assessments using both biomarkers support the conclusion that the virus can be taken up by the roots to contaminate the plant intracellularly.

Project Number: SBI003

Grade: 11

Title: Fecal Coliform Bacteria Levels Left by a Manure-Sand Separator

Abstract: Dairy farmers often use sand as bedding for their cows. To dispose of the soiled sand, farmer spread the mixture on their fields. Environmental regulations limit the amount of sand a farmer can spread on their fields; therefore some farmers have invested in a manure-sand separator machine. I wondered how effective these machines would be at limiting harmful bacteria. I tested several samples of sand before, during, and after use. I concluded from my data that the manure-sand separator machine efficiently removed harmful bacteria.

Project Number: SBI004

Grade: 9

Title: Identifying opsins in *Inia geoffrensis* tissue

Abstract: My hypothesis *Inia geoffrensis* can see color. I will determine if two classes of cone visual pigments are present, using PCR, for cloning and characterizing dolphin visual pigments. My goal is: to identify opsin genes in *Inia*, first learning the molecular biological techniques by identifying equivalent opsin genes in the fruit fly. I designed primers, extracted DNA from fruit fly (pilot study), river and bottlenose dolphin tissue, ran PCR's, gels and sequenced the product. The sequenced PCR reactions need further identification and comparison of short-wave sensitive cone opsins to determine if color vision is possible.

Project Number: SBI005

Grade: 10

Title: Slime Mold Interaction in Simple Mazes

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

SENIOR DIVISION – BIOLOGY

Project Number: SBI006

Grade: 10

Title: Correlation Between Behaviors and Genders of Budgerigars

Abstract: Budgerigars, known as parakeets, are popular pets. The study is intended to acknowledge different behaviors of male and female budgies to help people distinguish between the two genders. Budgies are sexed using PCR to obtain results of two males and two females. Knowing genders, six behaviors were observed in a five-hour period. Applying Chi-square test to the behavior data yielded that the behaviors of gnawing and territorial aggression are typical in females while behaviors of chirping, bobbing head and bowing, and feeding others are dominant in males; the behavior of burbling and warbling alone is not significantly influenced by genders

Project Number: SBI007

Grade: 12

Title: The speed of androstenedione on planarian regeneration

Abstract: The problem is “ Does Androstenedione increase the rate of planarian regeneration?” The procedure was to first make the concentrations of Androstenedione, then put each concentration into Petri dishes. Next, cut the planarians in half to separate them wait a say to observe if anything happened or changed. Repeat until you see something has grown. Do the same thing for trial two. The results show how many days it took for the planarians to regenerate. For the continuation of my project was I’m going to use a higher concentration.

Project Number: SBI008

Grade: 10

Title: Effectiveness Homemade Pesticide against Crickets

Abstract: The purpose of my experiment was to determine the most effective homemade pesticide. The Procedures are to divide 50 crickets into 5 groups of 10. Apply the garlic and pepper solution to group 1, rosemary to group 2, salt solution to group 3, and vinegar/soy sauce solution to group 4. Group 5 served as the control group. Spray the pesticide upon the food. Repeat the experiment 2 more times. In conclusion the most effective is the vinegar and soy Sauce solution. The trends show that both the garlic/pepper and the vinegar/soy sauce reduced the amount of food consumed by crickets.

Project Number: SBI009

Grade: 9

Title: Limits of Lichen

Abstract: Lichens, composed of fungi and algae, were used in ancient Greece and today are found in antibiotics for treatment of tuberculosis and skin diseases. My project studies the effect of acid rain on the chlorophyll of lichens. Lichens were separated into five groups, watered with different amounts of vinegar, and then ground into a liquid to be measured for absorbency in a Spectrometer. My research shows that the sulfur content from acid rain can eventually break down the chlorophyll molecules, the site of photosynthesis in algae, causing lichen death. Although my hypothesis of higher vinegar concentration to absorbency was not supported; I did find acetic acid in vinegar turns lichens orange.

Project Number: SBI010

Grade: 10

Title: Minimum Effective Concentrations of DEET

Abstract: I determined a low effective concentration of DEET. I Built an apparatus to test the concentrations of the DEET it had three compartments. I first determined that the flies had no side preference in the apparatus. I also determined that apple serves as an attractant for the flies.

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I found that the 100% concentration of DEET was statistically the same as the 50% concentration and the same was true of the 25% and 10%.

Project Number: SBI011

Grade: 12

Title: Fermentation of Yeast

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SBI012

Grade: 9

Title: How Long Is Bottled Water Safe?

Abstract: This project investigates the correlation between brand, time, temperature and bacteria growth in bottled water. What is a safe time period to carry a bottle of water with you without refrigerating it or throwing it out? Four subjects will drink from bottled water brands. The bottles will be allowed to set out for eight hours, with temperatures and swabs being taken every two hours. The petri dishes will be incubated at room temperature and bacterial colonies will be counted over a period of days. I propose that six hours will be the safe time period to drink from room temperature bottled water.

Project Number: SBI013

Grade: 9

Title: Observing Earthworm Behavior

Abstract: The purpose of my experiment was to observe and see what environments worms prefer to live in. In my project, I observed earthworm behavior in different environments. I placed ten different worms in each environment. The environments were, dark, light, moist, and dry. All worms seemed to adapt to moist, dark environments well. I also drew and labeled parts of a worm. Each environments temperature was recorded. All observations were recorded during the process of the experiment.

Project Number: SBI014

Grade: 12

Title: UV Light Mutagenesis of *Aspergillus nidulans*

Abstract: I wanted to determine if the color of fungal spores is changeable by treating the spores with ultraviolet light. I exposed the spores to ultraviolet light for 20 seconds and then looked for colony color changes. I found that the color of fungal spores is changeable by treating them spores with ultraviolet light, as I found several different colored colonies.

Project Number: SBI015

Grade: 12

Title: Preservation and Bacteria Growth

Abstract: The purpose of this experiment is to see what preservation technique slowed meat spoilage the best. I hypothesize that is meat preservation techniques are tested, irradiation will hinder bacteria growth more than antibiotic and herbal methods. Beef was treated with irradiation, turmeric and salt, and penicillin. The meat was then left to sit for five hours, and the bacteria was then cultures on Coilsan Easygel. The experiment concluded that irradiation worked the best, followed by the herbal method, and lastly penicillin.

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Project Number: SBI016

Grade: 11

Title: The Hydrogen-Producing Benefits of *Chlamydomonas reinhardtii*

Abstract: To determine if *C. reinhardtii* can produce a sustainable supply of H₂ under ecopoietic conditions to assist in interplanetary engineering, prepare two cultures of *C. reinhardtii*-one which produces hydrogen in a sulfur-deprived medium, and one which will produce oxygen in a complete medium. Keep the cultures anaerobically in a mechanism which will collect the gas in a meteorological-quality balloon. The experiment runs for six days, each day measuring the gas volume via water displacement. Repeat the experiment. The significant volume of hydrogen produced proves that the algae will meet the projected requirements of planetary engineering.

Project Number: SBI017

Grade: 11

Title: Do Water Impurities Effect Plant Growth?

Abstract: The purpose of my project was to find out if different types of water with different water impurities would effect how a certain type of plant grew. I tested four different waters, pond water, Pymatuning Lake water, Lake Emilie water, and Monongahela River water, for five different impurities, hardness, nitrite, nitrate, alkalinity, and pH. I thought that the water sample that had the most impurities would cause the plants to grow the least. Before testing began I thought pond water would be the best because it seemed to be the purest because of the pre-treatment it would have had. After I tested the water I thought that the Lake Emilie sample would have the least growth because it tested the highest for all impurities. Pymatuning Lake and pond water had the same overall level of impurities but the pond water's were lower in some categories, so as stated before, I believed that the plant's watered with pond water would grow the best. I tested each water sample with Jungle Quick Dip 5-N-1 Test Strips and then, after recording results, I planted the plants and grew each one with a different type of water.

Project Number: SBI018

Grade: 11

Title: Do Cats Eyes Glow in the Dark

Abstract: Abstract was not submitted electronically.

Project Number: SBI019

Grade: 12

Title: Healthy Hearts

Abstract: I hypothesized that there would be a direct correlation between cardiovascular fitness and different paces of exercises. I proposed that the vital signs will increase more when testing athletes rather than the dancers. I tested the vital signs before and after female athletes, dancers, and non athletes did ten minute workouts. These consisted of exercises specific to each workout regime. I then tested their vital signs after all the females took a break and exercised again. I concluded that there is a direct correlation between the increase of pulse and respiratory rate with the different exercise methods.

Project Number: SBI020

Grade: 11

Title: Stem Cell Induction by Scaffold Immobilized FGF Beta

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

SENIOR DIVISION – BIOLOGY

Project Number: SBI021

Grade: 11

Title: Do light filters affect plant growth?

Abstract: This project will investigate the ideal wavelengths of photosynthesis. Conditions except the color of the light will be constant for all plants. Filters will be made from cellophane that will cover the entire set of plants. A full spectrum light bulb will be used. At the end of the investigation the plant' height and health will be recorded. Final mass will be compared to original mass.

Project Number: SBI022

Grade: 12

Title: Adolescent Obesity & High BP

Abstract: Obesity is an epidemic. Just how accurate are the current assessments of obesity-related illnesses in teens? I proposed that there would be a direct correlation between adolescent obesity and hypertension. I planned to measure obesity using the BMI scale and hypertension using systolic and diastolic measurements. I predicted that as the BMI number increased, the blood pressures would rise. Using medical surveys, I collected medical histories of my 32 test subjects. After calculating BMIs and blood pressures, I observed a general trend that supported my hypothesis. I also noticed problems areas with the BMI scale and suggested modifications that would give a more complete risk assessment.

Project Number: SBI025

Grade: 11

Title: Gender Bender

Abstract: The purpose of my project was to see the effects of estrogen on male guppy sex organs. I had two tanks with 16 guppies in each. One tank had estrogen the other did not. I am predicting that the fish exposed to estrogen will take on female characteristics. For further research I could use female guppies and testosterone or I could use a different type of fish.

Project Number: SBI026

Grade: 9

Title: Transpiratin in Broad Leaf Plants

Abstract: How environmental conditions affect transpiration rates in plants will be investigated. The effect of light, wind and humidity on transpiration will be examined. Red kidney beans will be the plants used. A de-rooted plant will be attached to a pipette filled with water. As the plant transpires water out of the leaves, readings will be taken from the pipette. Petroleum jelly will be used to seal the connection between the plant stem and the pipette.

Project Number: SBI027

Grade: 12

Title: Stress on Blood Sugar Levels

Abstract: The effect that stress has on blood sugar in non-diabetics has not been fully tested. Teenagers are a great group to test for any type of stress. For diabetics it is shown that there is a correlation between stress and blood sugar. By using a glucometer, glucose test strips, a lancet, and penlet, I would be able to test my subjects' blood sugar. Also by verbally asking there stres level on a scale of one through ten I would be able to discover their stress level. I concluded that there is no correlation between stress levels of teenagers and their blood sugars for non-diabetics.

SENIOR DIVISION – BIOLOGY

Project Number: SBI030

Grade: 9

Title: The effect of different temperature caffeine solutions on Daphnia heart rate.

Abstract: The purpose of this investigation is to see if different temperatures of the caffeine solution will effect the heart rate of Daphnia.

Project Number: SBI031

Grade: 9

Title: The Relationship Between Body Mass Index

Abstract: My experiment shows one way that obesity affects the heart. Heart disease is prevalent in obese people. I used analysis of field data to evaluate the length of time it takes for an obese person's heart to slow down after activity; the longer it takes to slow down, the more strain is placed on the heart. The data shows that there is a greater period of time for the heart to relax in an obese person, than in an average person. In conclusion, being over weight puts an unhealthy strain on the heart, therefore putting undo stress on the heart.

Project Number: SBI032

Grade: 9

Title: Dehumidifier Water & Plant Growth

Abstract: This investigation was to performed to determine if dehumidifier water and cigarette smoke-exposed dehumidifier water affects plant growth, as measured in height and root mass. It was determined that the plants watered with the smoke-exposed dehumidifier water would grow less tall and less dense than the other plants because of the chemicals it contains. After watering thirty grass plants divided into three groups, the control, plain dehumidifier water, and smoke-exposed dehumidifier water, the plants watered with the smoke-exposed dehumidifier water grew less tall and less dense than the other plants, as was predicted.

Project Number: SBI033

Grade: 9

Title: The Short Term Effects of Meditation on HRV and Blood Pressure

Abstract: To see if short-term meditation affects Blood Pressure and Heart Rate Variability 30 adults, 50-60 years of age, 15 male and 15 female were accepted. The baseline BP and heart rate variability was taken. The WildDivine Game, which has breathing exercises, was used to determine if subjects were doing meditation. Electronic sensors were put on the fingers of each subject, and their readings linked directly to the movement in the computer game. After 20 min., the BP and heart rate variability was taken again. The change in BP before and after the game was not significant, in males or females, but it did decrease a little. The change in the heart rate variability was significant in males and females. Although a significant change did not occur in blood pressure before and after the game, it did show a positive decrease, which shows that maybe more meditation would produce better outcomes. The change in the heart rate variability was significant, but it was shown that short-term meditation does not affect males more than females.

Project Number: SBI034

Grade: 11

Title: Starch in Deciduous Leaves

Abstract: The purpose of this project is to determine whether starch levels are higher in green leaves or in already changed color leaves? Starch levels should be higher in green leaves since they are still alive and are still photosynthesizing, where as in already changed color leaves are dead and are not photosynthesizing.

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Project Number: SBI035

Grade: 12

Title: The Effect of Ethylene on Pea Seedlings

Abstract: Last year, the purpose of my project was to study the effect of ethylene gas via cigarette smoke on the growth patterns of pea seedlings. As I continued my research this year, I found that cigars had 20% more ethylene gas per cigarette than Newport 100's. For this years' project, I will use cigar smoke in addition to cigarette, and compare my results. I hypothesize that the width of the plant stems will be even larger, and the height will be about the same in the experimental group this year compared to last year.

Project Number: SBI036

Grade: 9

Title: Bees and Colors

Abstract: Abstract was not submitted electronically.

Project Number: SBI037

Grade: 11

Title: The Affect of Rennin on Milk

Abstract: The purpose of this experiment was to find the optimum temperature and pH for rennin to catalyze milk. This was accomplished by mixing the rennin solution with the milk and timing the reaction. For pH, I mixed the milk and rennin with NaOH and HCl and timed the reactions. I found that milk catalyzes best at 35 C under a pH of 1. This was because of the HCl in the stomach which shows the low pH. The average body temperature is 37 C and 35 C was the closest temperature tested. Rennin is secreted into the stomach at body temperature.

Project Number: SBI038

Grade: 11

Title: Fertilizer Effects on Seeds

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SBI039

Grade: 11

Title: Oxidative Stress Induces HUVEC Senescence

Abstract: Many prominent diseases such as heart disease, Alzheimer's, multiple sclerosis, and spinal cord injury cause cells in the body to stop dividing, or senesce; this may be why victims of these diseases suffer more than usual. However, could there be a lurking factor that causes these cells to senesce? Oxidative stress is the imbalance between reactive oxygen species (which attack chemical bonds in the body) and damage-preventing antioxidants. In the present study, oxidative stress was found to be that lurking factor. This study may be the spark to ameliorate millions of sufferers of hundreds of diseases in the world.

Project Number: SBI040

Grade: 11

Title: Grafting Cacti

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

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Project Number: SBI041

Grade: 11

Title: Lethal Habit: Smoking Kills

Abstract: The experiment establishes the damaging effects of cigarette smoking on the human respiratory system. Prepare epithelial cells for experiment. Set up the apparatus to emulate human inhalation. Add 30% smoking fume medium into original medium. Incubate the cells for certain periods of time. Count cell deaths. The equation $P = 97.14 * 0.91^t$ (P is percent of cells alive; t is time in hours) models the rate at which the number of epithelial cells alive decreases.

Project Number: SBI042

Grade: 10

Title: Forensic Flies

Abstract: This project intends to explore the rate at which maggots decompose different types of animal tissue. This information would aid in determining the time of death in forensic investigations. Chicken muscle, skin, cartilage, and human hair were exposed to maggots and measured every two hours to calculate a rate of decomposition for each. It was concluded that maggots decompose skin the fastest, and human hair decomposes most slowly.

Project Number: SBI043

Grade: 10

Title: A Study of Differentiation in N27 Cells

Abstract: Dibutryadenosine cyclic monophosphate (db-cAMP) induces cellular differentiation as well as apoptosis by altering gene expression. The 1RB3AN27 (N27) cell is an immortalized clone of fetal rat mesencephalon Dopamine neurons, which undergoes differentiation when treated with db-cAMP. This experiment determines the ideal condition in which the greatest number of N27 cells can undergo differentiation. The experiment involves five experimental groups, where cells were treated with 0.5mM, 1mM, 2mM, 3mM, or 4mM of db-cAMP, and a 0mM control. 2mM of db-cAMP yielded the most differentiated cells and proves to be the optimum balance between cellular differentiation and cell death caused by apoptosis.

Project Number: SBI044

Grade: 12

Title: Cardiac Hypertrophy Prevention

Abstract: Cardiac hypertrophy is a risk factor for cardiovascular disease and increases its mortality by twofold. The causes of hypertrophy are examined to aid in its future prevention. Fibronectin and phenylephrine induced cardiac hypertrophy, a risk factor for cardiovascular disease, in cultured neonatal rat ventricular myocytes as analyzed by Luciferase Assays, Western Blots, and Protein/DNA Assays. Cardiac hypertrophy increased transcription of several proteins in the HMG-CoA Reductase pathway, indicating that hypertrophy increases cholesterol synthesis. These novel mechanisms can be used to more effectively diagnose, treat, and prevent cardiovascular disease.

SENIOR DIVISION – CHEMISTRY

Project Number: SCH001

Grade: 9

Title: Soil Amendment Chemistry

Abstract: Recycled wallboard (drywall) and hardwood bark were evaluated for reuse as soil amendments. When mixed with soil to 50/50 volume %, these materials increased water retention and percolation rates while also reducing soil density and increasing the ability of soil to neutralize pH 4.5 water. In addition, these waste based amendments contributed Ca^{2+} , NO_3^- , NH_4^+ and Cl^- as dissolved nutrients to the soil. The reuse of low value construction and manufacturing wastes as soil amendments improves the sustainability life-cycle of these products by reducing landfill waste and providing a productive carbon sequestration alternative to the burning of hardwood bark.

Project Number: SCH002

Grade: 9

Title: Conductivity in Sports Drinks

Abstract: As a basketball player, I was interested in finding out which sports drink would provide the best replacement of lost salts in the body. I researched my topic and found that the conductivity of the sports drink should increase with an increase in concentration and temperature. I measured the conductivity of the drinks with a milli-ampere meter and varied the temperatures and concentrations while doing so. I found that an increase in concentration and temperature does increase the conductivity of sports drinks. Also the effect of supersaturating, I believe, had an effect on my project.

Project Number: SCH003

Grade: 11

Title: Crystallization vs. Molec. Wt. of Polypropylene

Abstract: Plastics are used everywhere in today's world. These plastics are made of polymers, which are extremely long molecular chains. In this experiment, the molecular weight of a polymer, polypropylene, was compared to its rate of crystallization with the expectation that a high molecular weight will correspond to slower crystallization, and vice versa. Melt flow and microscopy were used to measure the molecular weights and crystallization rates, respectively, of polypropylene samples. After data analysis, it was determined that there exists an inverse relationship between the two properties, supporting the hypothesis. In future experimentation, more trials would be repeated, and additional polymers would be considered.

Project Number: SCH004

Grade: 9

Title: Determination of the Cooking Efficiency of the Microwave Oven

Abstract: A microwave oven emits energy, but the foods in the microwave oven only take in some of the energy. The purpose of this experiment is to determine the cooking efficiency of the microwave for different foods using the materials: distilled water, sucrose solution, sodium chloride solution, olive oil, and butter. In this experiment, it can be concluded that sucrose solution has the greatest cooking efficiency percentage, but it is unusual to conclude that sucrose solution had a higher cooking efficiency percentage than water, since water is a pure material. In this project, this phenomenon is also researched upon in great depth.

Project Number: SCH005

Grade: 10

Title: biodiesel Extracted from Different Oils

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

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Project Number: SCH006

Grade: 11

Title: Acid Mine Remediation - Year II

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SCH007

Grade: 9

Title: Temperature Effect on Fuel Cell Efficiency

Abstract: Fuel cells are currently being considered as a future means of powering cars. An important consideration is how the efficiency of the fuel cell varies with temperature. For this project, a PEM (proton exchange membrane) fuel cell obtained from the Thames and Kosmos fuel cell car kit was used. The hypothesis was that the efficiency of the fuel cell would increase as the temperature increased. Three temperatures were studied: 10 oC, 23 oC, and 45 oC. Based on the experimental results, the hypothesis was shown to be incorrect. The lowest fuel cell efficiency was measured at the highest temperature studied.

Project Number: SCH008

Grade: 9

Title: The Effect of Self-Cleaning Glass on the Degradation of Organic Compounds

Abstract: The project investigated was: The Effect of Self-Cleaning Glass on the Degradation of Organic Compounds. The purpose of the experiment was to determine the difference of hydrophilic and hydrophobic properties of self-cleaning and regular glass. The glass samples were coated with stearic acid and put under a UV light. Water droplets were then dropped onto glass and measured. The results of the experiment showed a noticeable difference between the hydrophilic and hydrophobic properties of the two types of glasses (the self-cleaning glass was more hydrophobic, but this didn't effect the rate of degradation).

Project Number: SCH009

Grade: 11

Title: Amylase Activity in Barley

Abstract: This project is to determine the Amylase activity in barley by measuring the enzyme's ability to break down sugar into glucose. I will also measure the Amylase activity at different temperatures.

Project Number: SCH010

Grade: 9

Title: Effects of Corrosion on Steel

Abstract: The purpose of this experiment was to determine whether carbon or stainless steel alloys corroded faster under various conditions (air only, burned, water, or sulfuric acid.) Iron and oxygen need to be present for corrosion to occur, so both were present in the set up. The effects of corrosion that the environment provided were monitored. The mass of the coupons was taken before and after six weeks. It was determined that the carbon steel coupon in sulfuric acid lost the most weight due to corrosion. All other coupons lost a generally insignificant amount of weight.

Project Number: SCH011

Grade: 10

Title: Caffeine in Coffee Beans

Abstract: My experiment tests three different types of coffee beans and determines which has the highest caffeine content. My procedure involved using vacuum filtration, working with

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chloroform, and extracting caffeine. I determined the caffeine in each coffee bean type by massing the solid I obtained at the end of my experiment. I performed my procedure three times for each type of coffee bean. I hypothesized that Indonesia coffee beans would have the greatest caffeine content because of their low roasting time. After completing my experiment, I discovered that my hypothesis was not supported. Columbia coffee had a higher caffeine content than Indonesia.

Project Number: SCH012

Grade: 10

Title: Let There Be Light!

Abstract: Chemiluminescence, the production of light via a chemical reaction, occurs in both natural and synthetic processes. I investigated the variability of the intensity and color of light emitted during the luminol reaction, by changing the oxidant, its concentration and dye sensitizers. I monitored the emitted light using a UV/visible spectrophotometer. As expected, the intensity of the emission increased with increasing oxidant concentration, and the addition of dye sensitizers altered the color of light which reflected changes in the recorded UV/visible spectrum. Future work is planned to study the time-dependence of the intensity of the light emitted during these reactions.

Project Number: SCH013

Grade: 11

Title: Which Soap Is The Mildest?

Abstract: Many chemicals in body soap are released into the environment every time soap water goes down the drain. Which brand of soap, when dissolved in distilled water, has the least concentrate? The procedures used in this investigation were testing pH, ammonia, nitrite, and chlorine levels in each sample of soluted soap water. Each soap water sample was tested 4 times on each level, with the use of Red Sea Fresh Water Deluxe Test Kit. The scores were then averaged, and compared to distilled water (the control). Distilled water had a pH of 7, Ammonia of 0, Nitrite of 0, And Chlorine of 0. For pH, Caress and Lever came closest to 7, with 6.6, and 7.4. For Ammonia, Each Caress, Dove, and Olay had an amount of .1 For Nitrite, Olay came closest to 0 by scoring a .01. Lastly, for Chlorine, Caress, Dove, and Olay each had a score of 0. The Soaps with the best overall scores were Caress and Olay, however, each in different fields of water testing. The conclusion to this experiment, is Caress and Olay must be the most mildest soaps to the water environment.

Project Number: SCH014

Grade: 10

Title: Extraction of Lead from Vitamins

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SCH015

Grade: 10

Title: Caffeine Contents in Teas

Abstract: Abstract was not submitted electronically.

Project Number: SCH016

Grade: 9

Title: Temperature and Crystal Growth

Abstract: Several factors affect the amount, size, and shape of crystal growth. The aim of this experiment was to determine if temperature of a solute affects the amount of crystallization that occurs, A solution of 30 mg salt and 70 ml water was place in the different temperature rooms

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(n= 30 and 15) and is left to evaporate for two weeks. Data was collected on the mass of crystals that grew for two weeks. This data indicates that a higher temperature solute allows for an increase in crystallization, further experiments will be performed to see if different minerals change crystallization or crystal type.

Project Number: SCH017

Grade: 12

Title: A Qualitative Analysis of Bio-Diesel

Abstract: With the ceasing search for alternative fuel sources an interesting new advancement is quickly becoming a viable fuel option; bio-diesel is a variation of diesel fuel produced from vegetable oil. I intend to use various chemical and physical test in order to compare a commercial version of diesel fuel to a commercial brand of biodiesel. Finally I intend on creating my own version of biodiesel from various natural oils the same chemical/physical tests in order make an informed decision as to whether bio diesel is viable alternative fuel. Data and conclusions impending.

Project Number: SCH018

Grade: 12

Title: Fire Retardant Paint

Abstract: The purpose of the experiment was to examine how well different paints retard flames. Flame tests were conducted on a variety of household paints. The goal of the experiment was to provide paint manufacturers and fire fighters with important information about the ability of paints to resist or retard fire.

Project Number: SCH019

Grade: 11

Title: The Synthesis of Carbon Dioxide by Magnesium Oxide Gum

Abstract: Abstract:

Carbon dioxide is problematic when in confined areas like the Space Station, and in the summer, being the signature attractant for disease-carrying mosquitoes to humans. The purpose of this experiment was to add Magnesium oxide to chewing gum and synthesize CO₂ to form MgCO₃. ((MgO(s) + CO₂(g)» MgCO₃(s))) I prepared control gum without MgO, and gum with MgO. I measured the CO₂ of air, my breath, and my breath after chewing the gums utilizing a Vernier CO₂ Gas Sensor Probe. Currently, repeats of the CO₂ measuring experiments are being conducted to verify the validity of my initial tests.

Project Number: SCH020

Grade: 11

Title: Discovering A New Pesticide

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SCH021

Grade: 11

Title: Cotton Oil Transesterification

Abstract: Biodiesel is a clean and environmentally friendly fuel made from vegetable oils, both virgin and recycled, and rendered animal fats through transesterification process. This work evaluates the effectiveness of catalyst type, reaction temperature, and alcohol for making biodiesel from cotton seed oil. The different variables will be tested using a stirred reactor system. The samples will determine the level of biodiesel conversion using a gas chromatograph. The data will help to determine how best to make biodiesel in Africa and India

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Project Number: SCH022

Grade: 10

Title: The effect of microwave cooking on the stability of vitamin C

Abstract: Does vitamin C in foods survive cooking in microwave ovens?

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Project Number: SCM001

Grade: 12

Title: The eXtensible Document Scripting Language

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SCM002

Grade: 11

Title: Fractals

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SCM003

Grade: 10

Title: To Infinity (Maybe) and Beyond: An Explanation of Fractals

Abstract: Various fractals were explored and formulas were derived by observing the change in characteristics of the fractal.

Project Number: SCM004

Grade: 9

Title: Object-Oriented 3-D Engine

Abstract: Create a simulation engine that serves as a rapid application development interface, using the C++ programming language. Incorporate real-time 3-D visualizations and Newtonian physics calculations. An engine provides interactivity to 3-D artwork, allowing the creation of a virtual reality or real-world simulation. The engine will use an object-oriented hierarchical scene graph to incorporate data sets with properties and behaviors. These objects will hide the algorithms from the developer. Features of the engine include object display and animation, environments such as indoor and outdoor areas, rigid body dynamics and collision detection. Special effects include lighting, perspective, shadows, reflections, and particle systems.

Project Number: SCM005

Grade: 10

Title: Exploring Warfarin Pharmacokinetics with Python

Abstract: Methods for dosing Warfarin, an anticoagulant, are inconsistent and at times dangerously inaccurate. This experiment further refined a previously developed model that used historical Warfarin records to predict future anticoagulation levels (INR).

Project Number: SCM006

Grade: 9

Title: How Do Weather Conditions and Averaging Time Affect the Accuracy of GPS Measurements

Abstract: In this project, weather conditions and averaging time were investigated. The focus of the experiment were the factors that affect GPS accuracy. Two laps were taken around a specific area on various days. 30 second waypoints and 2 minute waypoints were taken to determine the affect the factors had on GPS accuracy.

Project Number: SCM007

Grade: 11

Title: Nice Pair! Hold'em Probabilities

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

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Project Number: SCM008

Grade: 12

Title: Graph-Traversal Factorization

Abstract: Factoring n -bit numbers presently is a hard problem, and a very important one in the field of public-key cryptography; being able to factor numbers quickly means the encryption standard RSA is insecure and vulnerable to attack. In developing a new algorithm to factor an n -bit number, integers were represented by value $p+q+r$. Values p , q , and r were stored in a binary array, and an implicit graph was traversed, letting adjacent nodes be integers whose bit representation differed by one. The algorithm yielded a complexity of $O(2^n)$, although the results were not consistent due randomness.

Project Number: SCM009

Grade: 10

Title: The Mystery of the Number Phi

Abstract: There are many claims that the irrational number phi is prolific in nature, supposedly found in leaf placement, pinecones and celery, as well as in manmade items in the areas of art and architecture. The goal of the research was to determine whether these claims are true and if so whether they can be scientifically explained. After learning about various mathematical properties of phi it can be explained scientifically why this number is found throughout nature. However, phi's role in art and architecture was due to its intentional use.

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Project Number: SES001

Grade: 10

Title: Therapeutic Effects On Protist

Abstract: Various levels of two common medications present in the water environment were tested for protist colony effects. Amoeba and paramecium colonies were exposed to Prednisone or Amoxicillin individually (in solutions of 1, 10 and 100% concentrations) and in combination. Absorbance readings at 600nm revealed that the 100uM solution of prednisone enhanced population size of the protist colonies. The 10 and 1uM prednisone solutions had little or no effect on population size. The amoxicillin solutions had a negligible or slightly depressed effect on population growth. It is inconclusive whether very low concentrations would affect these species over the long-term.

Project Number: SES002

Grade: 9

Title: Study of a Niche Environment

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SES003

Grade: 11

Title: Oil-Degrading Microbes

Abstract: The purpose of this experiment was to discover if the oil-degrading microbe *Pseudomonas Fluorescens* is more efficient in higher or lower temperatures. To complete the experiment, I filled twelve test tubes with 15mL of distilled water, 5mL of motor oil, and .1g of nutrient broth. To six of the twelve test tubes I added 1mL of *Pseudomonas Fluorescens*. Three control and three microbe test tubes were placed in a 25 degree Celsius environment and the same procedure was followed for a 35 degree Celsius environment. I then calculated the area of oil in each test tube each day thereafter. My results showed that oil significantly degraded more in the 35 degree Celsius environment with the *Pseudomonas Fluorescens* as opposed to the 25 degree Celsius environment.

Project Number: SES004

Grade: 11

Title: Polymer Plastic Biodegradation

Abstract: The purpose of this experiment is to determine which type of soil will decompose low-density polyethylene plastic the fastest. I placed plastic pieces, equal in mass and area in containers filled with humus, top soil, sand and clay. I measured the pieces after each week for eight weeks. My data showed that the humus degraded the most plastic, followed by top soil, then sand, then clay. I believe that the humus and top soil degraded the plastic the fastest due to the high number of aerobic organisms in these soils, and low number in the sand and clay.

Project Number: SES005

Grade: 9

Title: Eco-Friendly Insulation

Abstract: The purpose of this experiment is to determine if biodegradable insulation types perform as well or better than traditional non-biodegradable types. In the experiment cellulose, straw, clay, Styrofoam, and fiberglass will be compared in terms of efficiency, ease-of-use, and environmental friendliness. The goal is to develop better insulation products with less environmental and health impacts.

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Project Number: SES006

Grade: 12

Title: Simulating the Remediation of Mine Drainage

Abstract: The treatment of AMD has been of intense interest particularly in Western PA due to the large number of abandoned coal mines. Using bench top simulations of passive wetland treatment systems can provide a model for development of future types of treatment systems. This project simulated a static treatment pond and a reverse vertical flow wetland. Both simulations showed effectiveness in the treatment of local AMD as pH increased and iron decreased as a function of time.

Project Number: SES007

Grade: 9

Title: Biomediation

Abstract: My project was done to determine the growth of oil eating bacteria in different types and amounts of oils. Different amounts of oils and types of oils were added to the growth media of oil eating bacteria. And was tested for the amount of growth in each solution over 120 minutes. The olive oil group was shown to have the most bacterial growth out of any of the oils. This project can help our environment by cleaning up major oil spills and killing less wildlife and plants and animals.

Project Number: SES008

Grade: 10

Title: Analysis Of Soy Food Products

Abstract: I wanted to see if soy food products labeled as organic or no genetically engineered ingredients contained genetically modified soy products or not. I extracted the DNA from the products, PCR'd the DNA to amplify the genes I was looking for indicating the presence of genetic modification and finally agarose gel electrophoresis to visualize the gene.

Project Number: SES009

Grade: 11

Title: Daphnia and Cigarette Solution

Abstract: Abstract was not submitted electronically.

Project Number: SES010

Grade: 12

Title: Sorbent Use on Oil Spills

Abstract: The use of conventional sorbents, e.g. straw, volcanic ash, and shavings of polyester-derived plastic, has had some success with cleaning up major oil spills. The impetus behind this project is to test the sorbency of a sponge sorbent selected because of the relative ease of extracting the sponge from an oil spill, which is a challenge with the use of other sorbents. The results were analyzed to determine whether a positive linear correlation is observed between oil removed and sponge insertion.

Project Number: SES011

Grade: 12

Title: Algae and A.M.D.

Abstract: Green algae is often found growing in abandoned coal mine discharges. A previous study by an Indiana HS student attempted to grow Euglenid in AMD without success. It appears that this green AMD algae has adapted to survival in low pH and high metal contaminated water. Will this same algae grow in "normal" surface water or does it require the conditions of AMD?

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Project Number: SES012

Grade: 10

Title: The Environmental Impact of Class A Foam

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SES013

Grade: 12

Title: The Perfect Pond

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SES014

Grade: 10

Title: Tsunamis Dominate, but for How Long?

Abstract: The intention of this project is to determine if putting in barriers into the path of an oncoming wave will lessen its power. The experiment that was undertaken included a tank 3metersx.29metersx.6meters with a paddleboard, bricks, and an incline at a 15 angle as a few of the materials. There were ten tests taken, all were different cases and came out with different power readings. The conclusions of this experiment were that the use of barriers in the path of an oncoming wave would lessen the power of the wave.

Project Number: SES015

Grade: 9

Title: The Effect of Malathion Solution Age as Measured by Brine Shrimp Mortality

Abstract: The purpose of this experiment was to determine what effect malathion solution age has on brine shrimp mortality. The problem formulated was:what effect does malathion solution age have as measured by brine shrimp mortality? The procedure used was:Hatch brine shrimp.In a sturdy container, add 1ml of malathion to 1liter of tap water. Add 6 brine shrimp to beaker. Add 10 ml of the malathion solution to the beaker. Record the time to when 50% of the brine shrimp are dead. Repeat steps 4-6 each day for days 2, 5, 6, and 7. The older the solution, the longer it took to 50% mortality.

Project Number: SES016

Grade: 11

Title: What's In Our Creeks

Abstract: This experiment combined my two loves; science and the outdoors. During this experiment I took ampliform four creeks near my house and performed test on the water to determine the health of the creeks. I performed tests for: Iron, Chlorine, Copper, Alkalinity, hardness, Ph, Pesticides, and bacteria. My results showed that two of the creeks are in peak health while the other two are in danger. One tested high in bacteria and the other one had a high positive test for pesticides. I plan on continuing and expanding this project in the future.

Project Number: SES017

Grade: 11

Title: The Effects of AMD on Daphnia Magna

Abstract: Daphnia, which are an important food for trout and other fish, were placed in different concentrations of acid mine drainage from a local stream. The Daphnia samples were placed in a 100% solution, 75% solution, 50% solution, 25% solution of acid mine drainage, and a control group containing no acid mine drainage. Three trials were tested from each sample on a different dates to observe any changes in the heart rate of the Daphnia. Initially, a change in heart rate

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was noted, but later results suggested that the Daphnia might be able to adapt to the acid mine drainage conditions.

Project Number: SES018

Grade: 11

Title: Acidrain and Plant Growth

Abstract: The purpose of this experiment was to determine if acid rain effected the growth of plants. The procedure used was: -Gather all materials -Cut 12 parts of 3 plants, 6 stems and 6 leaves. -submerge cuttings in acid mixture and neutral mixture -leave cuttings in mixture and record growth every 2 days for 2 weeks. The Data showed that the cuttings placed in the neutral mixture grew more then the cuttings in the acid mixture.

Project Number: SES019

Grade: 9

Title: Vitaplant

Abstract: Because vitamins are essential for healthy growth and development, I wanted to find out if vitamins would promote a greater amount of healthy development in spider plants? I filled plastic cups 3/4 of the way full and placed one plant in each one. 4 plants were dedicated to each vitamin and 2 plants for the control. For the water soluble vitamins (B12 and C) I took two plants, grounded up the recommended amount of the 1 vitamin pill and added it to the water. For the other two I added an overdose of 2 pills. The water was changed twice a week and new vitamins were added each time. For the fat soluble vitamins (E) the same procedure was followed, but because it was a liquid it was also applied to the plants leaves. The plants growth and development was observed for three weeks, and then and of the results were taken. In conclusion I ended up with mixed data, In some cases the vitamin caused the plant to grow larger and faster than the control and in other cases the plant's root system and foliage was destroyed.

Project Number: SES020

Grade: 9

Title: Lakes, Rivers, and Streams

Abstract: The title of this experiment is Lakes, Rivers, and Streams. The purpose of this investigation was to determine if the pollutants in lake, river, and stream water adversely affect the growth of plants. Grass plants were watered with Creek water, River water, and Lake water. Water samples were obtained from Long Run Creek, Peters Creek, Monongahela River, Youghiogheny River, Lake Emilie, and Old Hickory Lake. The Creek water was thought to have the greatest amount of growth because stream water moves faster and collects fewer pollutants than lake or river water.

Project Number: SES021

Grade: 9

Title: Species and Bow

Abstract: I tested different types of woods for the amount of bow with different amounts of weight added. I placed wood on 2 pieces of wood and added weight to the wood then i measured the amount of bow. The one with the most bow would not be good to be used for building purposes.

Project Number: SES022

Grade: 12

Title: Remnants of a Coalmine

Abstract: Do mines cause springs in close proximity to them to have high levels of iron? On October 10, 2004 I picked four separate testing sites where springs were visible on the surface of the land. I made sure that these were close to proximity to coal mines. I took two separate

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samples of water from each spring using plastic water bottles. I tested each sample four times for its alkalinity, pH, iron, copper, nitrates, and Phosphorus. The test sites range from site 1 (farthest away) to site 4 (closest to the mine). For test site 1 there was pH of 5.9, an alkalinity of 28ppm, a Phosphate of 2.21ppm, a Nitrate presence of 3.8ppm, 0.04ppm of Copper, and 0.05ppm of Iron. For test site 2 there was pH of 7.2, an alkalinity of 104ppm, a Phosphate of 0.41ppm, a Nitrate presence of 0.41ppm, 0.06ppm of Copper, and 0.05ppm of Iron. For test site 3 there was pH of 5.9, an alkalinity of 36ppm, a Phosphate of 0.45ppm, a Nitrate presence of 2.30ppm, 0.02ppm of Copper, and 0.02ppm of Iron. For test site 4 there was pH of 6.9, an alkalinity of 40ppm, a Phosphate of 0.21ppm, a Nitrate presence of 1.00ppm, 0.0ppm of Copper, and 0.77ppm of Iron. Site 4 did have very high levels of iron. The normal reading for Iron is 0.3ppm. Mines do cause drainage of iron in springs in close proximity to them

Project Number: SES023

Grade: 12

Title: Simulation of an Anoxic Limestone Drain

Abstract: Anoxic Limestone Drains (ALDs) are utilized in the treatment of Acid Mine Drainage in situations where the effluent from the mine is highly acidic but not high in metal content. A benchtop simulation of an ALD can serve as both a teaching tool and a means to test system designs before actual construction.

Project Number: SES024

Grade: 9

Title: Titration of Vitamin C in Juice

Abstract: The question to be addressed is how much vitamin C is there in fresh orange juice compared to concentrated juice. Titration will be used to determine the vitamin C concentration in fresh and concentrated orange juice.

Project Number: SES025

Grade: 10

Title: Environmental AsSALT

Abstract: Although 'road salt,' (or NaCl) provides safe travel in dangerous weather, it also serves as a pollution source for aquatic and terrestrial life. This experiment is intended to show the extent of harm that traditional road salt plays on wheat. Four plant chambers were grown, one was the control, another received doses of NaCl, one received doses of CMA (calcium magnesium acetate), a road salt alternative, and the last received a mix of CMA and NaCl. This experiment plans to show that CMA is not only safer for the environment, but when applied prior to NaCl, also provides safer travel.

Project Number: SES026

Grade: 12

Title: Pollution on Plant Growth

Abstract: I believe that the amount of fecal matter in a water source will be indirectly proportional to the growth rate of plants that are watered by the contaminated source. To test this, I took samples from six different water sources and used them to water six different groups of radish plants. I used a fecal coliform bacteria test to determine how contaminated each water source was. I then compared the amount of contamination to the growth rate of each corresponding plant group. I concluded that the amounts of fecal matter in each water source were directly proportional to the growth rate of plants.

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Project Number: SES027

Grade: 9

Title: Eliminating Pollutants in Water Through Wetlands

Abstract: I wanted to discover which layer of a wetland is the most effective filter of pollutants in water. I tested peat moss, dead sphagnum moss, living sphagnum moss, and soil as the layers and sulfuric acid and potassium nitrate as the pollutants. To accomplish this, I put the layers in a PVC pipe individually and poured the pollutants through the layers. I then tested the resulting solution to see the new concentration of the pollutant. I also tested various combinations of these layers and tested each trial three times for accuracy. According to my results, both sphagnum mosses were the most effective in reducing potassium nitrate content. The soil was the most effective in filtering the sulfuric acid solution. Through my results, I determined the layers that are the best filters of polluted water. These results could be valuable in rebuilding a wetland.

Project Number: SES028

Grade: 12

Title: How Healthy Are Our Streams?

Abstract: This physical stream survey was conducted to determine the potential quality of water considering the stream flow rate and the composition of the stream beds, banks and surrounding environment of the streams in the Pucketa-Chartiers Watershed. The flow rates of the streams' water were measured with a flow meter and observations were conducted of the surrounding environment and the ripple affects from the streambed structure. These factors contribute to the aeration affect to provide dissolved oxygen, an important factor to support aquatic life and overall stream health. The physical survey of the watershed streams, provided evidence that Chartiers Creek and Little Pucketa Creeks had better potential of providing healthier environment than Big Pucketa Creek.P

Project Number: SES029

Grade: 11

Title: Cigarette Smoke and Lima Beans

Abstract: The purpose of this project was to find out if cigarette smoke had a negative affect on lima beans. I had two trials, one for germination and one for growth. My data showed that my hypothesis was tantively suppoetd; however I could have used a larger number of seeds to see if a significant difference between the smoke and non-smoke lima beans.

Project Number: SES030

Grade: 9

Title: Neutralizing Acid Mine Drainage

Abstract: The purpose of this experiment was to find the rate at which limestone decreases in its ability to neutralize AMD in a diversion well. A well was constructed and an acid solution was run through it and titrated. I found that the stone's total change in normality was as follows: 0.084, 0.076, 0.054, 0.080, 0.059, 0.059, 0.074, 0.066, 0.054, and 0.035. The rate was not constant perhaps due to layers of sediment which formed around the rock and then wore off periodically releasing a 'fresh' layer of stone. Based on these results, I concluded that limestone must frequently be replaced to stay effective.

Project Number: SES031

Grade: 10

Title: Effect of Prozac on the Development of *H. trivolvus*

Abstract: In order to understand the changes that will occur in the environment as pharmaceutical waste escalates, the effects the drugs will have on the fauna should be taken into account. By utilizing serial dilutions, a representative environment, in respect to actual

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concentration levels of Fluoxetine in the wild, was created. The invertebrate *Helisoma trivolvis* acted as a test species and the rate and degree of reproduction was measured. These results were tabulated over a period of eight weeks and indicated that the effects of the highest levels of fluoxetine found in the wild had little effect on this particular species.

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Project Number: SER001

Grade: 10

Title: London Bridge is Falling Down

Abstract: The Purpose of my experiment is to see which type of truss bridge will be able to withstand the most mass. 1.Determine what types of bridges are to be built. 2.Cut out all the bases, tops, side parts, and cross beams. Make sure that they are equal in size to the other parts that are of the same type. 3.Connect two side parts to the top and base. This will form the side (frame) of a bridge, which is an isosceles trapezoid. 4.Make four pairs of frames for each of the four designs, to have a total of 16 bridges. 5.Glue the different struts into the frames according to the design. 6.Glue cross beams to two frames to connect them. 7.Wait for the bridges to dry. 8.Place a bridge on top of two level platforms. This will simulate a bridge across a river, canyon, etc. 9.Tie one end of the rope to the pencil, and the other end to the bucket. Make sure that it is attached to the center of each. 10.Then place the pencil at the top center of the bridge, allowing the bucket to hang down. Make sure that the bucket does not touch the floor. 11.Slowly add water to the bucket to add mass. 12.Stop when the bridge collapses. 13.Weigh the container and gather the data. 14.Repeat with all sixteen bridges. In conclusion, my hypothesis was partially proven to be correct. The Pratt and Howe Truss bridges were able to withstand more mass than the Warren Truss bridge. However, the Pratt and Howe Bridge withstood different amounts of mass even though they contained the same amount of triangular supports. This could be explained by the different shape of the two bridges. The Howe Bridge was able to spread out more mass because its beams pointed outwards

Project Number: SER002

Grade: 11

Title: HARP Phase 2: Implementation of Object Oriented Programming on Helicopter-based Autonomous Robotic Pilot

Abstract: The primary goal of my project is to build an autonomous robot capable of taking-off, hovering and landing a model helicopter. In the second phase of my project I will correct several electrical and mechanical problems. To accomplish this, the robot will be restructured and reprogrammed to use a Javelin Stamp microcontroller that implements Object Oriented Programming which is better suited for robotics. The programming will be based on data collected from non-autonomous flights so the robot can replicate a human pilot. The robot will be tested on a homemade "helicopter simulation" before being mounted on the actual helicopter.

Project Number: SER003

Grade: 9

Title: Motor Drivers: Motion to the Max

Abstract: My project is called "Motor Drivers: Motion to the Max". The project is about testing the performance of electronic motor driver circuits to see if the same device can be used in different applications while meeting the manufacturer's specifications. I built different circuits to demonstrate the motor driver's performance. Then, I tested them with three different types of motors to ensure data collection accuracy. Next, I graphed the data and developed my solution. I concluded that my hypothesis was valid. This experiment shows that simple devices can be used in many ways while still meeting the manufacturer's specifications.

Project Number: SER004

Grade: 12

Title: Load-Down on Dome, Pratt, Howe

Abstract: Growing up in a geodesic dome, I've heard arguments purporting domes' superior design. This work intended to determine whether geodesic domes can support a heavier load than conventional truss-based roofing systems. Pratt and Howe trusses were constructed, along with 5/8 and 3/8 geodesic domes, using a Zome construction kit. Increasing amounts of weights

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were placed on the roofs until structural damage occurred. The experiment proved that domes can carry a heavier load, with a load of 200.04N for the 33cm 3/8 dome compared to a maximum load of 168.92N for the Pratt system, and 120.02N for the Howe trusses.

Project Number: SER005

Grade: 12

Title: The Effects of Powder Type of Rifle Accuracy

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SER006

Grade: 10

Title: Beam Stress & Disp Analysis

Abstract: Beams were modeled using finite element analysis software to study the stress distribution and deformation of various geometries when force was applied. Beams of straight, parabolic, and semicircular geometries were tested under uniform conditions. Loads were applied at either a point or along the span. Beam properties were varied to simulate flexible and brittle materials. The straight beam tests were used to assess and calibrate the testing system. The semicircular beam produced the least deformation and the fewest concentrations of stress; thus a semicircle was most efficient in its geometry. As a beam flattened into a parabola it became weaker.

Project Number: SER007

Grade: 10

Title: Molten Salt Generators

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SER008

Grade: 12

Title: Hold Back The Flood

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SER009

Grade: 10

Title: Design and construction of a portable game console

Abstract: The purpose of this project was to create the first fully portable Gamecube (GCp) video game console that could be played independently of TV and AC connections. The Gamecube motherboard, disc drive, controllers and power supply were modified to fit in 10.5"x6"x1.5" vacuum-molded case, with incorporated controls and video screen. A Sony PS1 screen was modified with 4 ultrabright LEDs. Using $R = (V_s - V_f)/I$ required voltages were adjusted. With 2200 mAh lithium polymer batteries, playtime was > 60 minutes. All design goals were accomplished through re-engineering, resulting in the most advanced fully functional portable video game console available.

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Project Number: SMH001

Grade: 11

Title: LSA5 Activity in Biological System

Abstract: Based on the broad antibacterial activity of LSA5 and its negligible host toxicity in artificial media, it is hypothesized that LSA-5 will demonstrate high activity against *P. aeruginosa* in human serum with no toxic effects to human cells. Furthermore, *P. aeruginosa* will not develop resistance to LSA-5.

Project Number: SMH003

Grade: 12

Title: The Causes and Cures of Acne

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SMH004

Grade: 12

Title: Taxol Immunofluorescent Protocol

Abstract: This experiment involved a widely used chemotherapy drug, Taxol. Taxol works by inhibiting contraction of microtubules during anaphase of mitosis. When the cells are arrested, they are forced to undergo apoptosis. As most cancers are known to undergo mitosis quickly relative to other cells, Taxol has a greater effect on these cells because it prevents mitosis. The purpose of this experiment was to create a protocol for studying Taxol in vitro. This involved creating and adapting protocols for future experimentation, as well as studying concentration of Taxol and percent of cell death, as well as study by immunofluorescence.

Project Number: SMH005

Grade: 10

Title: Comparison of Doppler with Angiography

Abstract: Hypertension, a morbid disease in America, can be caused by renal artery stenosis. This can be detected by Doppler ultrasonography (US) or magnetic resonance angiography (MRA). During the experiment, the dependability of US was compared with MRA. Twenty-five hypertensive cases had both modalities. After analyzing the results, the statistical analysis of US was tabulated, and compared to the documented statistical analysis of MRA. MRA proved a more reliable test, with a significantly greater sensitivity, specificity, and overall accuracy. Future experimentation will focus on validating the statistical analysis of MRA by comparing it to a gold standard catheter angiography.

Project Number: SMH006

Grade: 12

Title: Cooldown Methods on Lactic Acid

Abstract: Lactic Acid is a common problem that faces many runners. It causes pain and fatigue in the legs. I tested different cooldown techniques on lactic acid. Drains will do the best, then a cooldown run, then stretching, and finally nothing. To test this, fifteen participants ran two miles around Highland School and did a different cooldown technique afterwards. They ran the course four times so they completed all the cooldown techniques. In the end, my hypothesis was correct with drains being the best and doing nothing being the worst. The cooldown run and stretching were second and third.

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Project Number: SMH007

Grade: 9

Title: The effect of Anabaena and Daphnia on The Growth of Selenastrum cells.

Abstract: The project will focus on the survival rate of Selenastrum cells while in the presence of Daphnia and Anabaena. Cell counts will be taken at two intervals of seven days.

Project Number: SMH008

Grade: 11

Title: Effects of Green Tea vs. Decaffeinated Green Tea on A. tumefaciens

Abstract: Cancer is the second leading cause of death in the United States. It is said that green tea prevents the growth of cancer. Through my experiment I am trying to determine whether or not the presence of caffeine makes a difference on the growth. Through my results it was seen that the decaffeinated green tea stunted the growth of the cancer cells more than the caffeinated.

Project Number: SMH009

Grade: 12

Title: Seeking Sugars from Cellulose

Abstract: The purpose was to try to find a type of bacteria that could break down cellulose into glucose, and leave excess glucose in the environment. There was a control group (cellulose and nutrient broth) and an experimental group (cellulose and water). Samples were taken from a wooded area of both rotting logs and rotting leaves (five of each). There was minimal growth observed in the control groups, and no growth observed in the experimental groups, so there was no evidence found that this type of bacteria exists. If this bacteria could be found, it could help produce ethanol for fuel.

Project Number: SMH010

Grade: 10

Title: Remediation of Cell Damage with Natural Tea

Abstract: This investigation examined whether green tea helps yeast recover after being exposed to UV radiation. An experiment was designed in which 4 concentrations of sterile green tea were made to model the amount that people normally drink. After the yeast was spread on the agar plates with the green tea, the plates were exposed to a controlled amount of UV radiation. It appeared that increasing exposure to UV radiation caused a decrease in average survivorship, supporting the hypothesis. Additionally, increasing concentrations of green tea appeared to cause increasing yeast survivorship after UV exposure, also supporting the hypothesis.

Project Number: SMH011

Grade: 10

Title: The mold growth on different brands of bread

Abstract: The purpose of this lab is to test which brand of bread has the lowest and highest possibility of mold growth on them. The mold growth better on certain breads depending on the preparations, such as moisture, different kind of sugar, acidity, added ingredients and preservatives. The basic procedures are cut each slice of the different brands of bread into 8x8 cm squares. Then, pour the 50% sugar solution on each slice of bread and put each of them into a zippered bag. Then, prick holes on the zippered bag and put all of them into a black trash bag to keep away from the lights. My hypothesis was proven to be incorrect. Kuhn's white bread has 87.5% mold growth, and Schwebel's wheat bread has 62.5% mold growth, and Lij oven white bread has 50.0% mold growth, finally, oven fresh wheat bread has 31.3% mold growth.

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Project Number: SMH012

Grade: 10

Title: Bacterial Levels in Lunchmeat

Abstract: The purpose of this project is to determine how long various lunchmeats can remain in a refrigerated environment before becoming contaminated. The first step was to purchase fresh lunchmeat from grocery store. Swab the lunchmeat immediately by rubbing the surface with a sterile Q-tip, put it on sheep blood agar, and place in incubator at 37 degrees Celsius. Place meat in separate sterile freezer bags. Place in refrigerator at 3 degrees Celsius. Every 24 for 144 hours remove all meat from refrigerator, swab surface, put on agar, and place in incubator. Incubate each plate for 24 hours, count, and record then number of bacterial colonies.

Project Number: SMH013

Grade: 9

Title: Showdown: Cleaners vs. E. coli

Abstract: The purpose of this experiment was to see which disinfecting wipe, of the given, is most effective against E. coli. It was hypothesized that Lysol wipes would work best. A standard procedure was followed for inoculating agar plates and growing bacteria. The hypothesis was supported. The largest inhibition area (area around wipe without bacterial growth) was 6.5 millimeters; the smallest was .5 mm. Lysol wipes proved most effective against E. coli, with ValuTime next, then Clorox, and Wet Ones last. All of the wipes proved satisfactory, although Lysol did a 50% better job than any of the others.

Project Number: SMH014

Grade: 12

Title: Are Trigger Points Effective?

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SMH015

Grade: 12

Title: Quantifying the Powers of the Sun

Abstract: Ultraviolet radiation is a growing problem in many areas. In order to survey and protect afflicted areas, an inexpensive way of measuring UV light is necessary. Through previous work, it was determined that yeast could be used to measure UV radiation, but no exact numbers were gathered. For example, if forty yeast colonies are produced after being exposed, how many joules of UV energy can we assume are in that light? In order to test this, the yeast and ferrioxalate were exposed simultaneously to light. The results were compared to obtain numerical ratios for the yeast and the UV light.

Project Number: SMH016

Grade: 11

Title: Herbs; Inhibiting Bacteria

Abstract: The purpose of this project was to determine which type of herb, peppermint, chamomile, aloe, or garlic, would inhibit the most bacterial growth. I first gathered my materials and prepared the incubator. I made ten tryptic soy agar plates, and labeled them each appropriately. I rehydrated the cultures of e-coli and staphylococcus bacteria then inoculated 5 plates with each. I then placed a thin layer of each herb onto the 2 cm diameter circle in the agar on the appropriate plates and also the control. I incubated the plates for 48 hours, recorded the results and drew conclusions.

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Project Number: SMH017

Grade: 12

Title: The effect of concentration of nicotine on the growth of beta-galactosidase E.coli

Abstract: My project investigated whether the ack mutation rate of beta-galactosidase deficient E. coli will increase or decrease when it's exposed to nicotine serial dilution. My hypothesis was: the number of E. coli colonies will increase due to the exposure of nicotine. I used the Ames test to test my hypothesis. I found that the rate increased with the use of nicotine.

Project Number: SMH018

Grade: 9

Title: Perusals With Pepsin And Pal

Abstract: This project was designed to test which mixture of hydrochloric acid and pepsin would break down protein the best. Hydrochloric acid, pepsin, and hydrochloric acid and pepsin were added to a protein sample of peanut butter and placed in an incubator. Observations and temperature readings were recorded. It was determined that protein is only broken down in an environment of hydrochloric acid and pepsin. Possibilities for future work include investigating the digestion of other substances like carbohydrates, fats, etc. Also, work with the digestion of protein/carbohydrates may influence research in recent fad diets.

Project Number: SMH019

Grade: 10

Title: The Effects of Natural and Commercial Cleaners on E. Coli

Abstract: In order to determine what the effects of natural and commercial cleaners would have on E. coli the following steps were taken E coli was grown on an agar dish. Disks dipped in solutions of natural and commercial cleaners were placed in the E. coli the periods of inhibition were measured the following day.

Project Number: SMH020

Grade: 11

Title: Ca All The Way

Abstract: This study involved identifying chemical substances which increase the solubility of calcium compounds. Magnesium, iron and vitamin C were used as deterrents in the production of calcium oxalate. It was found that overall the best combination of deterrents was the daily recommendation of magnesium and the daily recommendation of vitamin C, although iron stopped the formation of calcium when it was an isolated deterrent. As a source of calcium, calcium citrate was the most soluble.

Project Number: SMH021

Grade: 11

Title: Lysogens vs. Lytic Phages

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SMH022

Grade: 12

Title: Temperatures, antibiotics, and how they effect E. coli.

Abstract: The purpose of my experiment is to see what effect temperature has on the growth of bacteria when exposed to antibiotics. The steps I followed to get my results were to first grow E. coli in selected temperatures, then record the growth differences for the separate temperatures. After the first trial of my experiment I grew more plates of E. coli with antibiotic disks placed in the centre. After growing and incubating plates both with and without antibiotics, I compared the

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growth rates between the two groups. I found that temperature has a great effect on the growth of E. coli, but the antibiotics didn't have much of an effect.

Project Number: SMH023

Grade: 11

Title: The Effect on Cell Apoptosis from a Vitamin-K Compound

Abstract: The purpose of this experiment was to determine if the human liver cancer cells killed by the Vitamin-K Compound (Compound 5) died due to an increase of apoptosis. The cells were first cultured in order to increase their numbers. Then, the Vitamin-K was added. After a few days, the cells were prepared for staining in order to see if they underwent apoptosis. According to the research data, as the Vitamin-K amount was increased, the number of cells undergoing apoptosis also increased. The significance in this is that Vitamin-K can be used as a safe way to prevent the spread of cancer.

Project Number: SMH024

Grade: 12

Title: Soapy Science

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SMH025

Grade: 12

Title: Electricity and Cellular processes

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SMH026

Grade: 11

Title: An Alternate Strategy for Anti-HIV

Abstract: Anti-HIV drug development has lagged for the public's demand due to limited accessibility to hazardous HIV facilities or lack of novel antiviral approaches. A genetically generated HIV model was used in the study to assess HIV TAT TAR RNA binding site as a feasible target for the antiviral research and to explore TAT TAR RNA binding domain as a potential source for anti-HIV treatment.

Project Number: SMH027

Grade: 9

Title: Magnetism's Effect on Bacteria

Abstract: The purpose of my experiment was to determine if magnetism had an effect on bacteria. I subjected three test tubes containing one milliliter of bacteria, with two magnets on either side to create the magnetic fields, and one control test tube with no magnets. Variable 1 had two north sides facing the test tube, Variable 2 had both south sides, and Variable 3 had one south and one north side. I placed the bacteria onto 20 plates and counted the number of one millimeter squared blocks the bacteria covered.

The result was that magnetism did have an effect on bacteria.

Project Number: SMH028

Grade: 9

Title: Triclosan Resistance

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

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Project Number: SMH029

Grade: 9

Title: There's Bacteria On That Sponge!

Abstract: This project explores the problem: "Is the dishwasher or microwave better at killing bacteria on a kitchen sponge?" The results of this experiment will assist housekeepers in choosing the most effective method to sanitize kitchen sponges.

Project Number: SMH030

Grade: 9

Title: The Development of Antibiotic Resistance in E. coli

Abstract: The purpose is to determine the amount of bacteria resistance to the antibiotic Kanamycin. The resistance will be determined by the amount of antibiotic utilized on and the amount of time the antibiotic has been used.

Project Number: SMH031

Grade: 12

Title: Water Filtration

Abstract: Water is a necessity for all humankind. In this experiment I tested the quality of several bottled waters and home water filters and I compared them to regular tap water. I did this because more and more people are turning to bottled water instead of tap water. I used water test kits to examine the water. I found that bottled water and filtered water is the same quality as tap water. Some future implications are to test the water at the treatment plants.

Project Number: SMH032

Grade: 12

Title: Inhibitory effects of Honey on Bacteria

Abstract: Few studies investigated the usefulness of honey in human infections. In this study, we investigated the inhibitory effect of honey on different types of bacteria. We included cultures of Staphylococcus simulans, Staphylococcus epidermidis, and E. coli B. Ampicillin and glycerol were used as positive and negative controls; respectively. Two different dilutions of honey were tested: 33% and 50%. Honey (33%) demonstrated inhibitory effects on St. simulans and St. epidermidis superior to Ampicillin. In E. coli B, only Ampicillin had more inhibition. In conclusion, honey seems not only be bacteristatic but also bactericidal on Staphylococcus species. Since Staphylococcus is a skin bacteria, this shows that honey can be used in the treatment of wound infections.

Project Number: SMH033

Grade: 10

Title: UV Light - How it Affects the Effectiveness of Various Antibiotics

Abstract: This experiment's goal was to analyze how well antibiotics work under UV light. I used two antibiotics, Cefoxitin and Ampicillin; they were added to E. coli-streaked agar plates via antibiotic disks. Agar plates containing each antibiotic were placed under weak a UV light and a standard visible light source. One control plate for each antibiotic was put in a darkroom. Results were determined by measuring the antibiotic disks' zones of inhibition; it was found that zones of inhibition were larger in UV light than in the darkroom. Therefore, both antibiotics were more effective under UV light than in the darkroom.

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Project Number: SMH034 Grade: 9

Title: Herbs as Adjuvants: Fact or Fiction

Abstract: Garlic and Echinacea are said to have antibacterial properties but their role as adjuvants to antibiotics is unknown. This study delineated the antibacterial and adjuvant effects of garlic and Echinacea. Commercially available garlic or Echinacea tablets were placed on agar plates inoculated with Methicillin-Resistant Staphylococcus Aureus, E. Coli, and P. Aeruginosa. Bacterial growth inhibition was measured. Garlic was effective against MRSA and E. Coli (5.1 mm squared). Echinacea was ineffective. The adjuvant effect of garlic was tested by juxtapositioning the antibiotic and garlic tablets. Growth inhibition was not increased. In conclusion, garlic is bacteriostatic but fails to enhance antibiotic effectiveness.

Project Number: SMH035 Grade: 12

Title: Do Vacuum's Emit Bacteria?

Abstract: Do vacuum cleaners emit bacteria into the air when they run. I grew bacteria from inside of the bags in each of the 6 vacuums, and did a control plate for each of the 6 rooms. I tested each vacuum from .6 m away and 1.524 m away. I found that there were significantly more bacteria on the plates that were .6 m and 1.524 m than the controls, so bacteria was emitted into the air. There was, however, not a significant difference between the amount of bacteria from .6 m away and 1.524 m away.

Project Number: SMH036 Grade: 11

Title: A Clean Sweep on the Mats

Abstract: My project "A Clean Sweep on the Mats" was designed to test what cleansers would disinfect the athletic mats of any contagious agents in a high school setting. Multiple bacterial survival tests were conducted over specific areas of the athletic mats using different disinfectants. Comparing my experimentation controls to other cleansers used by other individuals I also tested to see if there was a more effective cleanser than what is presently being used to clean the mats. The results of this experimentation will determine which type of cleanser would disinfect the athletic mats of any contagious agent.

Project Number: SMH037 Grade: 11

Title: Liposome Vectors for Gene Therapy

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SMH038 Grade: 11

Title: Loci Accuracy in DNA Fingerprints

Abstract: Abstract was not submitted electronically.

Project Number: SMH039 Grade: 9

Title: The Drinks That Your Heart Beats To

Abstract: Everyday you have a drink before your start on your day filled with walking and running. Have you ever wondered which one would be best for your heart rate? I had fifteen people drink one out of the four drinks, which were orange juice, water, diet coke, and 2% milk. Then I had them run 400 meters on a treadmill. Afterwards I measured their heart rate. Diet Coke averaged

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the highest heart rate and milk the lowest. Future work on this project would be to test more types of drinks such as carbonated water, Sprite, apple juice or skim milk.

Project Number: SMH040

Grade: 12

Title: Ankle Taping Effects

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SMH041

Grade: 9

Title: Effects of Temperature on Prodigiosin Production in *S. Marcescens*

Abstract: *Serratia marcescens* is a commonly found bacterium in soil and water. It is often used by scientists because of its bright red color unlike other bacterial cells. This work intended to find which temperature it expresses the most pigment, Prodigiosin, which gives it its bright red color. It was determined that this bacterium expresses the most pigment at 25° C or Room Temperature. Very little or none of the pigment was expressed at the other temperatures. Future work is planned to determine whether the pigment, Prodigiosin, can be used as an antibiotic on other bacteria.

Project Number: SMH042

Grade: 9

Title: Destruction of Bones by Osteoclasts

Abstract: I did this experiment to see how the number of osteoclasts affect the destruction of bones, and how this rate relates to osteoporosis. I first prepared different amounts of osteoclasts and put them on dentine slices. I then cultured these cells for nine days and then counted the number of absorption pits on each dentine. I found that more osteoclasts absorb more bones. Thus, as I predicted, fewer osteoclasts destroy fewer bones and more osteoclasts destroy more bones.

Project Number: SMH043

Grade: 12

Title: *Agrobacterium tumefaciens* bacteriophage effectiveness in treating Plant Gall Disease

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SMH044

Grade: 9

Title: Synergistic Effect of Natural and Prescribed Antibiotics on *E.coli* and *B. cereus*

Abstract: The goal of this experiment is to look for synergism between Natural Products and Man Made Antibiotics. Accepted lab techniques were used with bacterial cultures to prove the effectiveness of Natural Products. Antibiotics were tested to establish needed concentrations. Baseline effectiveness was found by testing products individually. Multiple tests were used to determine which combinations show synergism. No true synergism was found, however there was a great enhancement in the products effectiveness

Project Number: SMH045

Grade: 10

Title: The effect of vitamin B-12 on the survival of *Candida kefyr*

Abstract: It is hypothesized that the presence of vitamin B12 will inhibit the growth of *Candida kefyr*.

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Project Number: SPH001

Grade: 11

Title: Dehumidifying Swamp Cooler

Abstract: The purpose of this project is to determine if a swamp cooler can use the humidity in the air to efficiently cool a room. A swamp cooler will be build from an air proof box. It will be connected to a water source through a hose. The cool water will be run through the pipe to cool the grate forming condensation while the fan will pull condensation through the air to cool it. The testing will be done for specific temperatures and humidity. The data will be analyzed and conclusions drawn.

Project Number: SPH002

Grade: 10

Title: Paintball Impact Pressures

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SPH004

Grade: 11

Title: The Effect of Temperature on Viscosity

Abstract: The purpose of my project is to discover which motor oil has the best viscosity through various temperatures. I filled the tubes up with motor oil and left an air bubble at the top. Viscosity was measured by how long it took for the air bubble to reach the top. I placed the tubes in cold water and averaged the time of three trials. I did the same thing for the hot water. I found that 10w-30 has the best viscosity.

Project Number: SPH005

Grade: 11

Title: Sound Absorption of Building Materials

Abstract: The purpose of this experiment is to determine the effectiveness of building materials in absorbing sound. By passing a constant sound source through a constructed wall of each material, the amount of sound absorbed could be obtained. The materials that were used in this experiment include, concrete blocks, common building brick, and cedar blocks. It is important to note that all materials are not only common building materials used in construction, but also their densities vary significantly from each other. The material with the highest density was the most effective in sound reduction. These results were supported by statistical analysis.

Project Number: SPH006

Grade: 9

Title: Which Type of Caulk is Best?

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SPH007

Grade: 12

Title: Quantitative Determination of Four Latex Paints

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

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Project Number: SPH008

Grade: 11

Title: Acceleration is a Drag: Rocket Fin Design

Abstract: I have been involved in the Junior Air Force ROTC program at my school for the past three years and I am interested in aviation. My science experiment, dealing with aerodynamics, is designed to explore and measure how the wing sweep angle effects drag on the leading edge of a wing. For my experiment, I am using model rockets and varying the wing sweep angle of the fins, with all other aerodynamic factors constant. Measuring and comparing the altitude of the rocket flights with the various wing sweep angled fins will determine the effect of drag on the different angles.

Project Number: SPH009

Grade: 11

Title: Concrete Strength

Abstract: The purpose of my experiment was to test the effects of curing temperature on the strength of concrete. The procedure I used was: 1) Mix one bag of ready-mix concrete. 2. Make 15 cylinders. 3. Place three cylinders in each of the following curing temperature areas - 120 degrees C, 77 degrees C, 22 degrees C, 4 degrees C, -20 degrees C. 4. After one day, three days and seven days break a cylinder from each curing area in a concrete cylinder compressive strength-testing machine. The results were: the cylinder at 22 degrees had the highest strength at seven days. Conclusion: high and low temperatures adversely affect the strength of concrete.

Project Number: SPH010

Grade: 11

Title: Coefficient of Restitution in Various Golf Balls

Abstract: The purpose of my experiment was to test which golf ball has the greatest coefficient of restitution. In order to test this I measured the rebound of various golf balls on different surfaces. As I predicted the Titleist ProV1 ball showed the greatest coefficient of restitution. This ball is the ball used most by professionals. The reason the ProV1 shows the best results is because of the technology used to make the ball. It contains a 3-layer Urethane Elastomer which is the latest technology in golf balls and is the best product on the market for performance.

Project Number: SPH011

Grade: 11

Title: Aerodynamics: The Effects of Airfoil Design

Abstract: The wing is an extremely important aspect of an aircraft. This investigation was intended to determine the wing design which would produce the greatest lift force. Six different wing designs were tested in a wind tunnel, then a theoretical analysis was done on each design using a computer program. The results showed that the best wing was that with the greatest camber (curvature). These results were found to be consistent with the accepted information on the subject.

Project Number: SPH013

Grade: 11

Title: Wave Collision

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

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Project Number: SPH014

Grade: 10

Title: Vogel and Viscosity

Abstract: Abstract was not submitted electronically. Please visit exhibit floor for abstract.

Project Number: SPH015

Grade: 10

Title: Chuting For the Best.

Abstract: This is an experiment about parachute canopies. In this experiment, I plan to concoct three to five canopy shapes (all with the same surface area) and find out which one of them has the best loft. I will do this by directing air upwards under the canopy which will be trapped in a cage. By using a scale, I will determine the performance of the canopies by the amount of weight taken off the scale. I believe that I can find a shape that will give better loft than conventional designs.

Project Number: SPH016

Grade: 11

Title: Stent Versatility

Abstract: The purpose of my experiment is to determine which stent, stainless steel, cobalt chromium, or nitenol, is more flexible and stronger in arteries of a human heart. For radial strength, add mass to the stent in 50-gram increments and record diameter. For flexibility, bend top of the stent in 5-degree increments and measure net distance. Nitenol reached 50% loss at 150 grams; cobalt chromium reached 50% loss at 400 grams and stainless steel reached 50% loss at 450 grams. Nitenol movement was 5 degrees, cobalt chromium was 15 degrees and stainless steel was 40 degrees. Cobalt chromium was most versatile.

Project Number: SPH017

Grade: 10

Title: The Effect of E on EMR

Abstract: To better understand the nature of light, I performed an experiment testing how the amount of energy light possesses affects how much it is bent. To answer this question, I passed various forms of visible light through an equilateral prism. I then measured and compared the different refractions. I found as the lights' energy increased, so did its refraction. This could be caused by the greater concentration of photons in light of greater energy. The greater photon density in light with more energy gives it more mass, and therefore greater angular momentum, which would cause the light to refract more.

Project Number: SPH018

Grade: 11

Title: Viscosity of Motor Oil vs Temp

Abstract: The purpose of this experiment is to see if motor oil becomes less viscous as the temperature increases. A size 4 Ford Cup Viscometer was used to measure the viscosity of the motor oils at each temperature setting which included: initial temperature, 85 C, 95 C, and 105 C; a hot plate was used to heat the motor oil. The data recorded shows that as temperature increased the viscosity decreased. The SAE 10W-40 motor oils were less viscous than the SAE 20W-50 because the SAE 20W-50's are designed to be used under high temperature conditions; whereas the SAE 10W-40's can be used at varying temperatures.

SENIOR DIVISION – PHYSICS

Project Number: SPH019

Grade: 9

Title: Solutions to Lean On

Abstract: The Leaning Tower of Pisa in Italy has a lean to it. This investigation is finding the most stable and strongest substrate. Three different substrates were tested. A cylindrical cement model was used. The force to cause the tilt was the mass added. A pulley system was erected so that at one end was the mass suspended and the other connected to the top of the model. The sand with gravel substrate was the best substrate because the layers of gravel and sand form a close structure by filling the gaps. Future investigations would involve computerized modeling software.

Project Number: SPH020

Grade: 10

Title: Wood Type vs Heat Output

Abstract: The purpose of my project is to determine which wood when burned will release the most energy. I began my experiment by building a calorimeter. I cut each one of my four specimens of wood into 5 1cm by 1cm cubes. I then placed one of the 1cm by 1cm cubes into the calorimeter underneath a pop can, filled with water, suspended on a ring and lit the wood. I measured the amount of energy released by the burning wood. I repeated these steps 19 more times with each of the 1cm by 1cm cubes.