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The Effects of Varying Ratios of Bio-diesel Mixtures on Emissions During Combustion

Student Research By: Amanda Askew, Daryl Desrosiers, Sarah McCauley, and Adam Suddon

The purpose of the experiment was to test fumes given off by varying bio-diesel mixtures for harmful toxins that are released into the atmosphere. The motive behind this experiment is the environmental crisis that is affecting all areas of the world. A bio-fuel that eliminates toxic emissions is vital if this crisis is to be avoided. . The results of the experiment were found to be inconclusive. This was due to the method of collection and analyzation. One possible way to improve the experiment would be to change the method of data collection and analyzing tools. to one that is more specific to fumes.

The Effect of Over Clocking a Computer on Its Stability and Data Transfer Rate

Student Research By: Bruce Chang, Devin Kutchuk, Justin Roland, and Beau Sigfreid

The average number of computers within every household in America is one computer per household. There are many different costly ways to make each of these computers faster, but there is another alternative. Overclocking is an easy and affordable way to improve the performance of a computer system. Overclocking is defined as the process used to make a computer to run at a faster speed than originally intended. This experiment was created to test the ways that overclocking affects a computer's performance. In order to do this, an Emachines W3052 PC equipped with an AMD Athlon MP Barton Processor (1.19 GHz) and 512 MB of Samsung PC3200 RAM had three programs installed to assist in testing; CPU-Z, PassMark Performance v6.1, and Maple 9.5. The changes in its performance would be later analyzed after changing FSB Settings, AGP Aperture Size, and the Memory Frequency within the BIOS settings of the computer to find which setting would have the best performance. All testing was conducted at the Macomb Academy of Arts and Sciences in Armada, Michigan in the break room. It was found that changing the FSB Settings had the most significant affect on the time to calculate Pi. But, it seems that having more of a balance to the three settings results in better performance overall.

The Effect of Incubation Temperature on the Cleaving Capabilities of Hind III and Eco RI Restriction Enzymes

Student Research By: Trisha Blake, Levi Ekanger, and Ian McDonald

An experiment was conducted at the Macomb Academy of Arts and Sciences in Armada, Michigan to determine the effect of incubation temperature on the cleaving capability of *Escherichia coli* (EcoRI) and *Haemophilus influenzae* (HindIII). The research began in October 2007 and was performed once every week for ten weeks. Research of this nature has helped to achieve significant medical breakthroughs throughout history. Now, as technology advances, this type of research helps expand medicinal possibilities. The two restriction enzymes, HindIII and EcoRI, were added to an aliquoted DNA solution before being incubated at the temperatures 20° Celsius, 37° Celsius (Control), 60° Celsius, and 80° Celsius. The effect of the incubation temperature was analyzed by examining banding patterns of the DNA cut by the restriction enzymes. The data showed that altering the incubation temperature for the forty-five minute period had no effect on the banding pattern. The results showed that there was no relationship between the incubation temperature and the cleaving ability of the restriction enzymes. The results did indicate, however, that the cleaving process took place before the incubation temperature could have an effect.

The Effects of Energy Upon Impact of an Ink Drop on the Resulting Fractal Dimension

Student Research By: Corey Green, and Aimee Thueme

The purpose of this experiment was to successfully find a correlation between fractal dimensionality and energy upon impact by dripping calligraphy ink from 5 different heights: 10cm, 25cm, 50cm, 75cm, and 100cm. Tests were conducted at the Macomb Academy of Arts and Sciences in Armada, Michigan in the senior research room. In order to test and recreate fractals an apparatus was built to mechanically drip a single drop of calligraphy ink onto 100% Cotton HP Matte paper as to reduce human error as much as possible. There were five different heights and each height was tested 30 times a piece. Gravitational acceleration was found using Peak Motis, a motion analysis software. The gravitational acceleration was used to find potential energy at a given height, because the ink drop was not moving before being released from the mechanism kinetic energy was zero. Because there is a conservation of energy at all times; the potential energy for each height can be assumed to be the kinetic energy upon impact. For each trial two pictures were taken, one immediately after impacts while the ink was still wet and one taken when the ink dried. All photographs were then run through a fractal analysis software call Beniot 1.3. Beniot 1.3 rated the dimension of each photograph, if the dimension demonstrated was between one and two; the image is considered a fractal. A number closer to two would be a more complex fractal; where as a number closer to one would be a less complex fractal. The independent variable was the energy of each impact or the height; the dependent variable was the dimension of the fractal created. Confounding variables included the type of ink; the mechanism used to drop the vessel, and allotted drying time. Also, the same software programs, Benoit 1.3, and method for analyzing dimension remained constant for all trials. After testing was complete the results displayed a lack of statistical dissimilarity amongst all test subjects.

The Effect of Landslide Angle on the Amplitude and Velocity of a Wave

Student Research By: Shannon Kline, Mike Grix, Kurt Nieman, and Alex Pikunas

Tsunamis are deadly waves that can occur at any coastal area in the world. This makes it important to study the movement, velocity, amplitude, and other factors that could contribute to a tsunami's destructive qualities. This experiment focused specifically on analyzing tsunamis made by landslides. The purpose of this experiment was to determine if the angle at which the landslide entered the water affected the resulting wave's amplitude and velocity. A wave tank and the wave displacer were constructed and four different angles were tested. Angle 22.5° had the highest amplitude while angle 45° had the lowest amplitude. The velocities were almost the same for all angles. It was believed that angle of 22.5° had the maximum amplitude because the wave displacer had the greatest horizontal velocity. As the angle increased the displacer lost velocity in the horizontal and gained velocity in the vertical, therefore reducing the amplitude of the wave it created. Moreover, it was believed that the velocity did not change because the displacer was dropped from the same height every time. Therefore, the water received the same amount of energy from the displacer which created a constant velocity.

The Effect of Pollutants on the Volts Generated by a Solar Panel

Student Research By: Karl Cross, David King, Julie Miller, and Nick Weldon

The purpose of this experiment was to determine how a pollutant affected the light intensity and the output of a solar panel. This experiment was conducted because of the dwindling supply of fossil fuels. While light is a renewable resource, there may be some environmental factors that inhibit the amount of light that reaches a solar panel. From October 2007 to December 2007, an experiment was conducted where a light was positioned facing a fish tank with a solar panel and a light intensity meter on the other side. There were five levels of fog, soot, and baking soda. These independent variables resembled airborne pollutants. The data collected showed that the independent variables produced fewer volts from the solar panel. However, this was not the case for all of the light intensity trials. The soot trials produced a higher mean light intensity than the control trial. With the exception of this trial, the data showed that as the pollutants increased in amount, the volts generated and the light intensity decreased. The fog trials displayed the highest probability of blocking the most light.

The Effect of Ethanol as an Additive on the Combustion of Unleaded Gasoline

Student Research By: Jordan Krause, Robert Siewert, and Dave Wolf

In recent years, the emission produced from the combustion of fossil fuels has increased the need for an alternative fuel. An experiment was conducted in order to determine the optimal ethanol to gasoline fuel mixture that would yield the least problematic emissions. This experiment was performed at the Macomb Academy of Arts and Sciences between October and December of 2007. The gases produced by different mixtures of ethanol and unleaded gasoline were analyzed using an infrared spectrophotometer, commonly known as an I.R. It was found that the more ethanol rich mixtures produced cleaner emissions, while the gasoline rich mixtures produced a thick black smoke. However, these findings could be more thoroughly investigated by adjusting the technique in which the data was analyzed.

The Effect of Various Amounts of Antacids on the Dissolution Rate of Painkillers

Student Research By: Katie Baert, Mallory Diehl, and Shukria Shawqi

The purpose of this study was to determine if various amounts of antacid tablets would have an effect on the time it took for aspirin to dissolve in a simulated stomach. After setting up an apparatus for the simulation of a human stomach, antacid was added in increments of one tablet. An aspirin was then lowered into the Hydrochloric Acid by way of a platform and a stopwatch was started to record the time until the painkiller had completely dissolved. This resulted in discovering the particular way that the antacids affected the rate of dissolution for aspirin. The more antacids that were added, the slower the aspirin dissolved. The 0 through 3 tablet tests showed that the rate of dissolution decreased exponentially as the amount of antacid went up. However, 3 through 4 showed a less pronounced decrease in dissolution rate, thus suggesting that the slowing of the rate would plateau at some point.

The Effect of Varying Percentages of Fats and Sugars on the Amount of Calories Burned

Student Research By: Bethany Clark, Sarah Gutierrez, and Shannon Lynch

Obesity is a growing epidemic among Americans due to the over consumption of fats and sugars. The purpose of this experiment was to determine what percentage of fats and sugars should be incorporated into the Americans' diets so that fewer calories can be produced while eating the largest amount of food. Using a constructed bomb calorimeter, five diet groups were burned to determine the amount of calories produced. The five diets were 10%, 25%, 50%, 75%, and 90% fats and sugars, with each trial weighing ten grams. As a result, the data followed a quadratic regression with 50% diet producing the least amount of calories. In conclusion, the optimal diet consisting of 50% fats and sugars would produce the least amount of calories when digested.

The Effect of Rotations per Minute (RPM) on the Fuel Economy of an Internal Combustion Engine

Student Research By: Jason Deneweth

The purpose of this experiment was to determine the optimal RPM range to maximize fuel economy. The experiment took place in a local facility in Macomb, Michigan, from October 10, 2007 to December 15, 2007. Five different RPMs were tested that ranged from 3,000 to 7,000 RPM in 1,000 RPM increments. Each trial consisted of 50 milliliters of 87-octane fuel detonated through the 50 cubic centimeter engine. The operation time for each trial was recorded to determine which RPM increment would cause the engine to function the longest. The findings concluded that the optimal RPM increment was 3,000 RPM. This was believed to be the optimal RPM increment because of the mechanics of an engine. For every four RPMs the engine injects fuel into the cylinder for detonation, thus there is a direct correlation between RPMs and fuel injection.

The Effect of Various pH Levels of Hydrochloric Acid on Bacterial Growth

Student Research By: Stephen Peltier, Stacey Simon, Melissa Wesolowski, and Eric Young

The purpose of this experiment was to determine whether or not common food bacteria would survive in acid. The experiment was conducted by testing two common lunch meats, sliced turkey and ham in five different pH level hydrochloric acids (HCL). Two slices of each meat was placed into a 100 mL beaker at each of the 5 pH levels. The pieces of sliced meats sat in the HCL filled beakers for one hour. Once removed from the beakers, the meat slices were swabbed with sterile swabs. The swab was then whipped across a premade agar Petri dish. The dish was placed in an incubator for one week. After this, the dishes were removed and the visible bacteria colonies were counted. Mean number of colonies were then determined for each of the five pH levels, as well as the control, which was water.

The Amount of Methyl Paraben Left on Cotton Cloth

Student Research By: Allyssia Ashman, Ellery Henley, Megan Rawlins, and Brittany Watling

The experiment was conducted at the Macomb Academy of Arts and Sciences in Armada, Michigan. Methyl paraben is found in many household products and is typically used as a preservative. It was suspected to be a link to breast cancer, as well as various other health problems. The purpose of this experiment was to determine if, after the rinsing process of shampoos were complete methyl paraben was still present. Two different types of shampoo that contained no methyl paraben, one organic and the other a popular commercial brand, were mixed with various concentrations of methyl paraben. Another shampoo that had already contained methyl paraben was used in reference to the experiment. The shampoo mixtures were used to saturate a cloth and then went through two rinsing cycles. The water from the second rinsing process was run through an infrared spectrometer to determine if any methyl paraben was present. Most of the commercial brand samples exhibited peaks of oils, fragrances, and other substances. More of the organic samples displayed peaks that could represent paraben. The differences in results were believed to be due to the different chemical compositions.

The Effect of Landslides on the Formation of a Mega Tsunami

Student Research By: Sean Gillis, R.J. Perry, Ryan Phillips, and Andrew Rusek

The purpose of this experiment was to test the effects of different types of landslides on tsunamis created. The landslide types were changed by adding weight to the landslide and changing the height of the fall. There were five different heights and five different masses. The five heights were in increments of five inches from five inches to twenty-five inches. For the mass of the landslide, there were also five different masses that varied in increments of 200 grams from 0 grams to 1000 grams excluding 800 grams due to time restrictions. The data was collected by recording each wave and analyzed using computer software called Peak MotusTM Analysis. The results for velocity were measured in centimeters per second, and the amplitude was measured in centimeters. The procedure to measure the amplitude was completed by comparing it to the equilibrium line, which was where the initial water level was at. The wave was the highest was at 20 inches with 600 grams of mass. The lowest wave was at 5 inches with the control which was with no weight added. The fastest velocity was at 10 inches with 1000 grams of mass and the slowest wave occurred at 5 inches with 200 grams.

The Effect of the Number of Magnets and Various Wire Gauges on Voltage Values

Student Research By: Jamison Dullea, Kathleen Fitzsimons, Kristen Patchel, and Kathryn Van Ham

The purpose of this experiment was to determine which magnet combination and wire gauge pair would produce the greatest voltage values. Five different magnet combinations (1-magnet, 2-magnets, 3-magnets, 4-magnets, and 5-magnets) were placed on a dull jig saw blade that passed through three wire gauge coils (22-gauge, 26-gauge, and 30-gauge). Thirty trials of each magnet and wire gauge pair were conducted, and minimum and maximum voltage values were recorded. The 22-gauge wire when paired with 5-magnets was expected to produce the highest voltage values. However, in all trials, the 30-gauge wire produced the greatest change in voltage, both in the positive and negative direction. The 26-gauge and 22-gauge wire followed. The 2-magnet combination created the highest voltages when combined with all wire gauges. The changes in voltage value, when all wire gauges or magnet combinations were compared, were all statistically different when p-values were observed. This meant that the varied voltages were caused by the changes in the independent variable, not by chance. The 30-gauge wire combined with 2-magnets was the most productive in generating voltage.

The Effect of Acetone and Time on Percent Change in Mass of a Nail

Student Research By: Callan Banach, Danielle Beste, Holly Jurzysta and Jill Szydloski

The purpose of the experiment was to determine if various water to acetone concentrations and times would have an affect on the amount of mass lost per nail. This experiment took place at the Macomb Academy of Arts and Sciences for ten weeks during 2007 and 2008. The acetone concentrations tested were in increments of ten from zero to 100 percent. Each concentration was tested at 5, 10, 15, 20, and 25 seconds. Nails were painted and massed, set in the concentration, and massed again at the end. It was concluded after analyzing the results that the hypothesis was not supported. The acetone concentrations had no affect on the percent mass lost, and time played a small factor. However, the condition and age of the nail did have an affect on the mass lost.

The Effects of Reflective and Insulating Substances on Temperature Change and Light Intensity

Student Research By: Matt Karl, Bret Kirchner, Chris Tobey, and Cody Tousignant

The purpose of this experiment was to assess a radical proposal to postponing the negative effects of global warming upon the earth. Global warming itself is a growing problem that is a common mystery among the scientific class of citizens. One of the proposed solutions to the effects of global warming is the theory called solar shading. In order to test the proposed solar shading theory, tin and rubber shavings were placed in a plastic pie tin cover filled with 250mL of water emulating the shavings residing within the atmosphere. A heat lamp was then used to replicate the sun and its harmful waves of light and heat passing through the atmosphere. The different volumes of the tin and rubber shavings used were 2, 4, 6, 8 and 10mL, with 0mL being the control. As the light and heat waves passed through the water and samples, the amount of light and the temperature change produced by the lamps were recorded by light and heat probes. It was concluded that as the amount of each material, tin and rubber, increased, the light intensity that reached the probes decreased. This is due to the materials blocking the light waves and stopping them before they were able to reach the light intensity meter. As for the resulting change in temperatures, it was concluded that as the amount of rubber increased, the change in temperature decreased due to the rubber absorbing the heat that would have been transferred to the probes; it was also concluded that as the volumes of tin changed, the change in temperature stayed constant as a result of the tin heating up and warming the surrounding water, resulting in the heating of the probes. All experimentation was conducted between October 10, 2007 and December 12, 2007 within the old preschool wing of the Macomb Academy of Arts and Sciences in Armada, Michigan.

The Effect of Different Treatments on the Tensile Strength of Hair

Student Research By: Abby Czachorowski, Kyrene Teipel, and Katie Wylín

The objective of this experiment was to determine the effect of dyeing, bleaching, and straightening on the strength of hair. Testing began on October 11th and ended on December 12th of 2007. Untreated hair was purchased from a hair salon and separated into three groups. One group was left untreated, one dyed, and one bleached. The three groups were then separated into six smaller groups, all containing the same amount of hair. Five groups were straightened and one of the groups was left unstraightened. The five temperatures used when straightening were 200°F, 250°F, 300°F, 350°F, and 400° Fahrenheit. After this was completed, five hair strands were taken from each hair group and stretched by placing clamps at both ends of the strand. A plastic cup was then fastened to one of the clamps and sand was poured into the cup until the hair reached its breaking point. The amount of sand was measured, and this process gave the strength of the hair. The broken hairs were then observed under a microscope to determine how breaking patterns were affected by treatment.

The data was analyzed and several conclusions were made. The hypothesis stated that dying or bleaching hair would reduce the strength of the hair, while leaving the hair untreated would not affect the strength. Also, the higher the temperature the hair was straightened at, the weaker the hair became. However, the dyeing and bleaching treatments did not have much effect on the strength of the hair. The three sets all held similar amounts of weight. Straightening did seem to weaken the hair, since the straightened hair held much less weight than that which was unstraightened. However, it was also observed that the higher the temperature the hair was straightened at, the more mass it could hold. This may have been because the cells of the cuticle fused together when the heat was applied, requiring more force to break the hair.

The Effects of Mass and Angle Measure on the Flight Distance of a Hockey Puck

Student Research By: Chris Haller, Matt Martin, and Cole Waterstraat

The purpose of this experiment was to find the most effective way to launch a discus to achieve the greatest flight distance. The discus was too heavy therefore a hockey puck was used as a lighter substitute. The hockey puck was launched from skeet thrower with a pull cord latch that allowed the puck to be released at any given time. Five different masses were taken away from the hockey puck (176.5 g, 180.0 g, 183.0 g, 185.5 g, and 190.0 g) with the 190 gram puck being the control. The pucks were launched at 5 different angle measures (25, 30, 35, 40, and 45) to see which one of the combinations between the two would project the hockey pucks the farthest. With the 190.0 gram puck having no statistical significance, the 45 degree angle at which the pucks were launched at was then used as the control. It was concluded from the data that as the mass was taken away from the weight of the hockey puck the farther the puck traveled. It was also concluded that as the angle measure that the hockey puck was launched at increased towards 45 degrees, then the hockey puck would travel farther as well.

The Effects of Time Contacts are Worn on the Growth of Bacteria Colonies per 100mL of Water

Student Research By: Zach Nawrot, Brittany Ryan, and Katie Schlump

Many people, all throughout the day, in different environments, wear contacts lenses. This study was done to determine if the number of hours a contact was worn would have any effect on the amount of bacteria colonies per 100mL of water. The number of hours that were tested during this experiment was eight, nine, ten, eleven, and twelve hours. Nine hours is the recommended amount of time to wear daily disposables by doctors, so the hypothesis was built around this information. For each hour, ten trials were completed using the dilution method to calculate how many bacteria colonies per 100mL of water were grown for every hour, at each trial. It was observed that the amount of bacteria colonies per 100mL of water gradually increased from eight to twelve hours. Thus meaning, that the eight hour trials had the least amount of bacteria colonies and the twelve hour trials created the greatest bacteria colonies. It was concluded that the bacteria colonies grew and reproduced more as time increased. This experiment was conducted at the Macomb Academy of Arts and Sciences in Armada, MI. The testing took place between the times of October 10, 2007 and December 12, 2007

The Effect of Temperature on the Leaching of Chemicals into Absopure Bottled Water

Student Research By: Shana Knake, Crystal Knust, and Shelby Motoligin

The purpose of this experiment was to determine whether chemical leaching occurred in Absopure bottled water at two temperatures, 60°C and 90°C, by analyzing heated water using an infrared spectrophotometer. Absopure water is bottled with recycled plastic, which is made from a virgin composite and previously used plastic. Recycling plastic creates a weaker plastic, which may allow for plasticizers from the plastic to leach into the drinking water it contains. Between November 6 and December 12, 2007, cut up Absopure bottles were placed into Absopure water and were heated in a microwave at the Macomb Academy of Arts and Sciences. One drop of the water was placed on a salt tab and into the infrared spectrophotometer to identify the contents of the substance. No difference was found between the different temperature groups, but an unidentified, white substance appeared. This substance may have been due to the wrapper left on the plastic, but was never confirmed.

The Effect of Rosin Type on the Tone and Frequency of a Violin

Student Research By: Adam Kozlowski and James Schneider

The purpose of this experiment was to determine the effect of the rosin used on a violin bow on the actual frequency produced by the instrument. Several different rosin types were used, these including a professional grade composite rosin, dark rosin, and a light rosin, with no rosin being used as a control. Each of these rosins were put on separate bows. After the rosins were put on the specified bows, an A 440 Hz pitch was recorded in Spectrogram and analyzed for maximum points and minimum points. These sessions were recorded at the Macomb Academy of Arts and Sciences through the dates of October 17th and December 12th. The results from the recording sessions were found by comparing the ranges of each rosin types. The rosin type with the highest range was considered to be the best.

It was found that the dark rosin produced the greatest frequency range. The worst average range was found with the professional range. These results contradicted the quality of the rosin, for the professional grade rosin was of the best quality, also having the highest price, while the darker rosin was one of the cheaper grades of rosin.

The Effect of Garlic Oil and Tea Tree Oil Amounts on the Inhibition of Bacteria Growth

*Student Research By: Torrin McDonald, Sean Steinberg, Preston Treend,
and Melissa Wawrzyniak*

Both garlic oil and tea tree oils have been shown to have both antifungal and antibacterial properties. These oils are even used by certain companies to add effectiveness to their product. Tea tree oil is not associated with tea. In fact, tea tree oil is sap extracted from the leaves of the melaleuca alternifolia tree, native to Australia. Garlic oil is extracted from the cloves of garlic. The purpose of the experiment was to test to see if one to five sprays of garlic oil or tea tree oil prevented bacteria growth, when compared to a control with no oils. It was predicted that both of the oils would prevent bacteria, but the number of sprays would not matter. To perform the testing, agar was poured into the Petri dishes prior to sterilization. After the Petri dishes were sterilized using a pressure cooker, the dishes cooled overnight. The agar was then swabbed with saliva from one of the researchers. Next, the swabbed agar was sprayed with the pre-determined oil for the pre-determined number of sprays; both were chosen using a random number generator.

When tested, the two sprays of tea tree oil had the least amount of bacterial growth and one spray of garlic oil had the greatest amount of bacterial growth. Overall, tea tree oil had a lower average amount of bacteria than garlic oil. The results could have been caused because of the chemical types in each of the oils. Also, the antibacterial compound in garlic oil breaks down too quickly to be effective in preventing the bacteria growth. To improve the experiment, another way could be found to spread a more constant amount of bacteria on each dish. Also, a more constant source of bacteria than a human's saliva could be put on the dishes.

The Effect of Heat on the Decomposition of Polytetrafluoroethylene

Student Research By: Chelsea Antilla, Kelly Copely, Jamie Green, and Jacob Payne

The experiment was conducted at the Macomb Academy of Arts and Sciences in Armada, Michigan. The purpose of the experiment was to discover if polytetrafluoroethylene-coated cookware pans were safe for routine, everyday use by consumers. During the experiment, 60 ml of Pure Wesson Canola oil was decanted into one of two different pan sizes, 1.9 l and 1.4 l. The pan was then placed under a Black and Decker PowerBoost hand mixer and agitated for 1 minute. The pan was then placed on a hot plate heating device, and heated at a constant temperature of 176.6°C for a randomly selected length of time ranging between one minute and ten minutes in one minute intervals. From the data that was generated, it was concluded that while polytetrafluoroethylene was present in the oil, i.e. it did flake off of the pans into the oil, but only on a macroscale. The polytetrafluoroethylene in the oil was still bonded to other substances such as paint on the bottom of the pan, or other polytetrafluoroethylene molecules. Thus, it was concluded that while polytetrafluoroethylene did come off of the pans into the food that was being cooked in the pans, it was not harmful to human health because the polytetrafluoroethylene had not decomposed into its individual elements or molecules, which are the primary cause substances which negatively affect humans. It was therefore determined that as long as the temperature to which the pans were being brought to was not in excess of 176.6°C, the pans which were used during this experiment, and other similarly treated & manufactured cookware, may be used for common household food preparation without a sizable fear of adverse health effects.

The Effect of Various Substances on the Neutralization of Hydrochloric Acid

Student Research By: Braden Hayes, Josh Kanke, Raymond Van Ham, and Tom Zinger

The experiment was conducted at the Macomb Academy of Arts and Sciences on Wednesdays occurring between or on the dates of 10/10/07 and 12/12/07. The purpose was to determine the effect of various substances at various masses on the neutralization of hydrochloric acid. Seven different substances: baking soda, mint leaves, purified drinking water, Tums calcium carbonate tablets, Kroger calcium carbonate tablets, Pepsi, and peppermint oil, were tested at masses between 0.1 grams and 0.5 grams, in 0.1 gram increments. For all of the substances the increase in pH was very slight and the differences between the substances were minimal.

The Effect of Various Times and Concentrations on the Rate of Tooth Deterioration When Soaked in a Energy Drink and Water Solution

Student Research By: Jack Calderone, Michael Copley, Chris Graham, and Jake Serilla

This experiment was conducted in order to discover the truth about the effects of different lengths of time and concentration that teeth were exposed to a solution of Monster Energy and water. The experiment took place between October 10, 2007 and December 12, 2007, at the Macomb Academy of Arts and Sciences. There were three different solutions of Monster and water that the teeth were subjected to. These concentrates were 100% Monster and 0% water, 50% Monster and 50% water, and finally, 0% Monster and 100% water. Once the teeth were placed into the solutions, they were left in the beakers for various lengths of time. The times were as follows: 2 minutes, 20 minutes, 40 minutes, 60 minutes, and 120 minutes. There were thirty trials for each time and solution combination, and masses were collected before and after the tests. The experiment revealed that when the teeth were soaked in the 100% water solution for 20 minutes, had the greatest amount of mass loss occurred.

The Effect of Time and Grill Location on the Amount of Carcinogens Found on Chicken

Student Research By: Ann Marie Ede, Hannah Miller, Erica Pregano, and Amanda Shields

Any substance that can cause Cancer is called a carcinogen. Grilled foods carry a higher risk of containing carcinogens. It was predicted that the amount of time the chicken was grilled would have no effect on the amount of carcinogens on the chicken. Each week five pieces of chicken were grilled, each on one of five different locations on a charcoal grill. The chicken would grill for a set amount of time. After the chicken finished cooking, the char was scraped off of each piece of chicken and analyzed using the M500 Quick-Scan Infrared Spectrophotometer. The only carcinogen that was found on the chicken was benzene, an IARC Group One Classified Carcinogen. The amount of benzene found was almost the same for all tests. This meant that the grilling time had no effect on the amount of carcinogens found on the chicken. A future experiment that could be done would be testing other meats to see if different carcinogens are formed.

The Effect of Colored Filters on Light Intensity Produced by a Camera Flash

Student Research By: Joe Kilpatrick, Tyler Kinch, Jeff Medley, and Matt Soulliere

An experiment was conducted to compare wavelength of a flash of light versus the light intensity. The purpose of the experiment was to use colored filters to reduce the light intensity of a flash passed through them in order to help individuals with photosensitive epilepsy. The filters were the colors blue, cyan, green, yellow, magenta and red along with the control which was no filter. The hypothesis was that the red filter would produce the most intense light and blue would produce the least. A flash of light was produced by a camera flash and passed into the light sensor (Vernier Software Light Sensor, Beaverton, OR). A calculator (Texas Instruments TI-84 Plus, Dallas, TX) along with a CBL (Texas Instruments TI-84 Plus, Dallas, TX) produced a graph which allowed light intensities to be collected in lux. The experiment supported the hypothesis that the blue filter would reduce the light intensity the most. The data did not support the other part of the hypothesis that thought the red filter would reduce light intensity the least. In fact the yellow filter, which was in the middle in order of wavelength, did the worst in decreasing light intensity. The reason results occurred like this is because the properties of light, color, and the filters. By using the color wheel someone can see blue and orange-red are across from each other. With blue one of the lowest colors in wavelength and orange-red being the highest blue filters cancel out all orange-red light thus giving the light that passes through the blue filter the properties of blue light. This is why blue has low wavelength and light intensity. This theory can be applied to colors such as yellow and violet, green and magenta, and red and cyan. The main error that occurred was that the switch on the light intensity meter was broken and the fact that it could not read the flashes of light fast enough.

The Effects of Projectile Speed on Force Endured by the Human Body

Student Research By: Emily Fleming, Sarah Jurzysta, Emily Markey, and Sidonie Shuler

This experiment was conducted to observe the protection provided by a softball chest protector and to see if the condition Commotio Cordis could be prevented. Commotio Cordis is a condition in which the heart is thrown off its natural pattern when struck in the chest with a projectile during a precise point of its beating cycle [4] It was hypothesized that as the speed of the ball being pitched increased, the amount of force going into and coming out of the gear would increase also. A chest protector was set up on a wall to be hit with a dimple ball, pitched from a pitching machine at varying speeds. Thirty trials were conducted at 30, 35, 40, 45, 50, 55 and 60 miles per hour. 45 miles per hour was the control for the experiment because that is the average speed of a fastball for pitchers ages 10-14 years old. A video camera was set up to record the path of the ball as it impacted the gear. After using the program Peak Motus to analyze the data the hypothesis was supported. During the experiment, the dimple balls speed increased the force coming out of the gear increased gradually, essentially causing more damage to an athlete's body.

The Effect of Salt on the Electrical Properties of Water

Student Research By: Callan Bobcean, Gary Ezzo, Joshua Lewis, and David Sheridan

The purpose of this experiment was to determine if fish die when the ocean is struck by lightning. Twenty percent, 40%, 60%, 80%, and 100% saturation of salt in water were the independent variables during testing. Conductivity, resistance, current, temperature difference, and voltage was tested fifteen times for each percent saturation. Testing was conducted by first randomly selecting a percent saturation. Then the amount of salt needed for that percent saturation was measured out in grams using an electric balance. The salt was then poured into 1000mL of water. The salt water was stirred using a stirring rod until the salt was fully dissolved. Finally, testing was done for conductivity, resistance, current, temperature difference, and voltage. It was hypothesized that 100% saturation would produce the lowest resistance reading, and that 20% saturation would produce the highest. It was also hypothesized that 100% saturation would produce the highest conductivity reading, and 20% saturation would produce the lowest. This was hypothesized because salt helps conduct electricity through water by acting as an impurity. So, more salt in the solution should have produced lower resistance and higher conductivity. The percent saturation that produced the highest resistance was 80%, while the lowest was 20% saturation. This did not support the resistance portion of the hypothesis. Though, when looking at the conductivity data, it can be concluded that as the percent saturation of salt increased, so did the conductivity of the salt water solution. This supported the conductivity portion of the hypothesis.

The Effect of Ethanol on Gasoline and Diesel Burn Times and Temperature

Student Research By: Alex Blake, Fred Flaim, Mitch Kallek, and Jake Moegle

The purpose of this experiment was to find which combination of ethanol/gas and ethanol/diesel would burn the longest and the hottest. Ethanol was mixed with gas and diesel separately in increments of 20% from 0% ethanol to 100%. Once the mixtures were prepared, 1 ml of a randomly selected mixture was placed in a copper cap which was later placed in the flame hood. Each mixture was lit with a Bunsen burner. Both radiant heat (given off from the top) and conductive heat (given off from all sides) were measured, as well as the total burn time. It was observed that as more ethanol was added to the mixture, the total burn time decreased. When using 80% diesel and 100% gas the mixtures burned the longest. It was also found that 20% gas burned the hottest out of all of the mixtures.

The Effect of Permanent and Temporary Hair Dye on the Strength of Hair

Student Research By: Nicollette Brown and Alyssa Goike

The purpose of this experiment was to discover if the strength of hair would decrease when dyed; this was tested using both permanent and temporary hair color. The hypothesis for the study was: as the number of dyes increased, then the strength of the hair would decrease; it was also thought that permanent hair dye would cause more damage than temporary hair dye. This experiment took place at the Macomb Academy of Arts and Science during the fall and winter of 2007/2008. Each week, the hair was dyed with permanent hair dye and the strength was tested by performing thirty trials for both tensile strength and twist tests. This process was repeated using hair dyed twice, thrice, four times, and five times with both permanent and temporary dye; non-dyed hair was tested as a control for this experiment.

The Effect of Bullet Holes on Lift and Drag Forces Experienced on an Airplane Wing

Student Research By: Rebecca Durbin, Kevin Kline, and Sean Mulvey

An experiment was conducted to determine the effect of bullet holes on airplane wing's lift and drag forces. The research was conducted at the Macomb Academy of Arts and Sciences, Armada, Michigan, from October 10, 2007 through December 19, 2007. Five balsa wood wings were tested in a wind tunnel, constructed to simulate the flight of a plane and the lift and drag forces experienced. Zero holes were tested to provide a control to base the data off of when analyzing the results. Ten tests were conducted on each wing with each set of holes. Five sets of holes were tested; three holes through fifteen holes in increments of three holes. Lift is the force that keeps a plane in the air and drag is the force that opposes the forward movement of the plane in the air. Once all the data was collected it was analyzed and showed no measurable trend in the data recorded. The lift forces did not produce a constant trend to relate the number of holes to the force created. There was an average lift of 1.234 N when there were three holes in the wings. This was the greatest average recorded lift. The smallest average lift was recorded at six holes with a lift of 0.908 N. Drag partially supported the hypothesis in the way that none of the drag measurements were lower than the control test. The lack of trends in the experiment made it impossible to state what kind of affect bullet holes have on the lift and drag forces on a wing.

The Effect of Polyethylene Terephthalate on the Compressive Strength of Concrete

Student Research By: Stephanie Herbert and Casey Murray

The purpose of this study was to determine if water bottle pieces could be used as additives to strengthen concrete and to potentially slow down the rapid pace that water bottles have been filling up the landfills all across America. The study took place October 10, 2007 through December 19, 2007 at the Macomb Academy of Arts and Sciences in Armada, Michigan, the testing was done at Professional Service Industries (P.S.I.) in Plymouth, Michigan. All items were donated by P.S.I and Theut Products in Romeo, Michigan. Before the study began, the brand of water bottle and what shapes of the water bottles were going to be used was determined. The water bottle brands that were chosen were Nestle and Ice Mountain; this was completed using an Infrared Spectrometer (IR). The IR told the researchers that polyethylene terephthalate was the main component that the water bottles were made up of. It was also decided that the shapes of the water bottle pieces that were to be used in the study were squares, triangles, and shavings. The shapes were just chosen by the researchers. Two other additive variables in this experiment were fiber mesh and the control, which did not have any additives in it. Batches of concrete were made by hand with one additive in each batch. To insure that the concrete had a good consistency, a "slump test" was done, using a slump cone, for each batch of concrete. Each week, the batches were brought to Professional Service Industries to be tested for a compression test in which a machine was used to apply large amounts of pressure onto the concrete cylinders. Tests were crushed seven days and twenty-eight days after each concrete batch was made. For this study, the determination of results was based on the amount of pressure it took to break the concrete in a compression test. The results were based on how much additional strength each additive created for the concrete. The results for this study did not support the hypothesis made. The results showed that the additives made the concrete weaker. However the square water bottle pieces caused the concrete to have the highest strength and that the triangle water bottle pieces batch had the lowest strength.

The Effect of Height of a Clay Pigeon Shooter Off of the Floor and the Length of the Clay Pigeon Shooter from the Wall on the Distance of Ricochet of a Hockey Puck

Student Research By: Evan Baumann, Caitlin Bouchey, Amanda Douglas, and Tyler Nichols

Hockey players have lost possession of hockey pucks because of the effect of ricochet. Knowing ricochet's effect could be helpful in regaining the puck. This paper describes the research of ricocheting hockey pucks. Two different heights, of the clay pigeon shooter off of the floor, and four different lengths, of the clay pigeon shooter away from the wall, were tested to research the movement of ricochet. Four researchers tested these variables with hockey pucks, a clay pigeon shooter, and a mat – all representing the puck being shot and ricocheting taking into consideration some of the aspects of hockey. The pucks' ricochet was rather consistent: not changing much even with the varying alterations. There could have been many errors and considering that hockey is played on ice and the experiment tested was on a gym floor could also have affected the data.

The Effect of the Angle and Position of a Softball Bat on the Direction and Distance the Ball Travels

Student Research By: Darcie Ball, Caylyn Boadway, Kristie Harms, and Kate Shellenbarger

The purpose of this experiment was to find out if changing the angle of a softball bat would affect the outcome of where the ball would go when bunting. Also the researchers wanted to see if changing the position of where the ball would hit would affect the distance or the angle the ball would go. Six angles were tested; the angles were 55°, 65°, 75°, 90°, 100°, and 130°. The control was 90°. Three positions were tested; the positions were top, bottom, and middle of the bat. To start the researchers pitched a ball to the bat using a pitching machine. A digital camera was used to capture the trials. After all of the trials were finished they were transferred to Peak Motus motion analysis software where the total distance and height were found. After analyzing the data it was found that the position affected the outcome drastically. The best position was middle. It was also found that the angle did affect the outcome but it had no pattern to the results. Overall, the best way to bunt is at a 75° in the middle position.

The Effect of Catapult Arm Length on Projectile Flight Distance

Student Research By: Nathan Antilla, Dannie Fountain, Kourtnie Kurtz, and Raschelle Scheinost

In medieval times, the weapons of choice were catapults. They seemed to have a standard size to the catapults and the arms used. Was this standard arm length a perfect size, could they have used longer ones and still be effective? This was the question asked to start the research. This theory was tested by setting up a catapult with six different arm lengths. A 24-inch arm was used as the control. The projectile used was a 4-gram golf ball sized wiffle ball. The wiffle ball was launched and the distance traveled was measured in a 90° relation to the line of fire. The distance was measured using a trundle wheel. The independent variable was the arm length. The dependent variable was the distance that the projectile flew. The control arm was the median arm length (24-inch). The result from the experiment did not support the hypothesis, that the longer the arm length, the farther the wiffle ball will be thrown. The results did support that the arm with the plastic spoon would throw the wiffle ball farther, than the same arm with the metal spoon.

The Effect of Temperature on the Performance of Ball Bearings

Student Research By: Allan Husketh, David Schornak, Derek Schornak, and Matthew Van Ham

The purpose of the research was to find if different temperatures had an effect on bearings. At the Macomb Academy of Arts and Sciences, a box was used to house a bearing and light bulbs that would give the different temperatures. A string with a mass connected to the end was wrapped around a bearing. When the mass was dropped, the time for the mass to fall to the ground was measured. The greater the time, the more friction there was within the bearing. The project was hypothesized that the higher the temperature of the bearing, the less time that the mass would take to hit the ground. The result of the experiment was that heat increases the speed of bearings until it reaches a certain degree.

The Effect of Various Percent Combinations of Corn Kernels and Wood Pellets on the Energy Released in Combustion

Student Research By: Sherwood Baker, Cole McCloskey, Michael Pollari, and Sean Woods

The purpose of this experiment was to determine which combination of wood pellets and corn kernels would give off the most radiant heat. The experiment took place between the dates of October 17 and December 19, 2008 at the Macomb Academy of Arts and Science in Armada, Michigan in the chemistry lab. There were seven different combinations of gradients that were tested: 100% wood pellets and 0% corn kernels, 90% wood pellets and 10% corn kernels, 70% wood pellets and 30% corn kernels, 50% wood pellets and 50% corn kernels, 30% wood pellets and 70% corn kernels, 10% wood pellets and 90% corn kernels, and 0% wood pellets and 100% corn kernels. Each trial lasted five minutes and there were twelve trials for each combination reaching a total of 84 different trials. The researchers determined that the 70% wood pellets and 30% corn kernels gave off the most radiant heat. The corn seemed to pop from the heat that the wood pellets were giving off. The inside of the corn kernels seemed to give off an adequate amount of heat, which would make the kilojoules much higher than the rest of the combinations, since the other combinations did not seem to pop the corn and burn the insides. First thought, was that the 100% wood pellets would burn the hottest because the corn had moisture, which would cause the heat produced from the corn to be depleted. The heat created from the corn would have to vaporize the water in the corn first before all the heat truly would be produced and be focused on radiating the bomb calorimeter above.

The Effect of Hand Position on the Rotation of a Dancer Performing a Pirouette

Student Research By: Michael Frost, Shannon Klee, and Kelsey Noteboom

The purpose of this research project was to find out if there is a better distance between the fingertips to perform the most pirouettes. The research group hypothesized that the closer the fingertips were to each other, the higher the amount of spins that would be completed. This experimentation was conducted to help an individual in the group who dances on a regular basis. All the research was done in the gymnasium, at Macomb Academy of Arts and Sciences. 18 trials were completed with six different lengths of space between their fingers. The dissimilar string length was the independent variables. The dependant variable was the degree quantity that which the dancer spun. This could be changed with a more efficient dancer; someone who has more experience. Overall group had found that 24 Inches was the best length between the fingertips.

The Effect of the Change in the Counterweight Mass on the Projectile Range of a Trebuchet

Student Research By: Theodore Binkowski, Jacob Caporuscio, and Kevin Jutila

During the medieval times, the trebuchet was considered as a siege machine or instrument used to destroy enemy fortifications. The way a trebuchet works is that a counterweight is attached to one end of the throwing arm while a sling attached to a string is attached to the other side. When released, the downward force of the counterweight would send the projectile flying. This experiment was performed to see how changing the mass of the counterweight would affect the projectile distance. So a small trebuchet was constructed and had different counterweights tested. The different masses used for the counterweights were 4 kg, 5.134 kg, 6.25 kg, 6.5 kg, 7.6 kg, and 8.7 kg. To the surprise of the researchers, the outcome from the launches resulted in the farthest distances coming from the 6.25 counterweight mass. The greater and smaller masses were resulting in much lower distances. This is because the higher and lower masses would cause the machine to release early or late. An experiment to research the effect of the pin angle on the projectile distance would have revealed if the change could have rectified the problem.

The Effect of the Horizontal and Vertical Angles a Ball is Thrown on It's Distance Traveled and Time in the Air

Student Researched By: Eli Becht and Singen Chang

The purpose of the study was to determine which angle a ball would have to be thrown in order to give the ball the most distance and also give the ball a high amount of time in the air. To test which two angle combinations would work best for farther distance and having the most time in the air, researchers conducted an experiment to find out whether an angle like a 40° horizontal and 45° vertical angle would be better than a 0° horizontal and vertical throw. The experiment was tested with six different horizontal angles and 3 different vertical angles. The best angle was determined to be 45° vertical and 40° horizontal. The 40° horizontal overall, did not stay in the air as long as the 50° horizontal but did gain more distance because the ball had a better forward velocity than the 50° horizontal angle.

The Effect of Varying Combinations of Bleach and Hydrogen Peroxide on Human Hair's Tensile Strength

Student Research By: Lauren Fitzsimons and April Wesolowski

Many people use hydrogen peroxide and bleach to lighten their hair. The problem is that it is said to weaken the hair. The purpose of this experiment was to see what combination of bleach and hydrogen peroxide would weaken hair the least. To test this, each 0.1 gram section of the hair was soaked in one of the six different combinations of bleach and hydrogen peroxide for fifteen minutes. The different combinations were 70% bleach and 30% hydrogen peroxide, 60% bleach and 40% hydrogen peroxide, 50% bleach and 50% hydrogen peroxide, 40% bleach and 60% hydrogen peroxide, 30% bleach and 70% hydrogen peroxide, and 100% water (control). After the hair was soaked, the tensile strength was tested by hanging a cup filled with sand from the hair. The amount of mass that was hanging at the time the hair broke was recorded and put into a Minitab spreadsheet. The ANOVA tests showed that each gradient did not have a large enough change on the effect of the tensile strength of the hair to make the results reproducible. After analyzing the data, it was found that there were no significant trends.

The Effect of Paper Size on the Flight Distance of Paper Airplanes

Student Research By: Ashley Brodacki, Kaitlyn Clough, Rachel Goubert, and Taylor Krause

Aerodynamics has an effect on everything that travels through air. This experiment was conducted to identify the size of a paper airplane that would travel the greatest distance. In order to find this, thirty-five planes were folded for each of the six different sizes; the controls were the largest, the others were scaled down by increments of 1.3 cm. These planes were then fired from a launching device (which resembled a crossbow), that was positioned parallel to the floor (with 10 Newtons of force). The data suggested that all tested plane sizes flew approximately the same distances, no plane size flew farther than the rest. This led to the conclusion that the size of a paper airplane had no effect on the distance it flew. Since the planes were all the same shape, the aerodynamics acted similarly on each plane size and caused them to fly the same distance. The air flow around the planes was the same no matter what size, so flight patterns were similar on all planes in the experiment.

The Effect of Hydrogen Peroxide on Hair Strength

Student Research By: Nicole Ewert, Grace Gregory, Haley Waterstraat, and Alyssa Williams

The purpose of this experiment was to determine the effect of twenty volume hydrogen peroxide on the strength of a hair strand. Six time intervals were tested. Hair was soaked in hydrogen peroxide for ten, twenty, forty, sixty and eighty minutes. The project's control was hair strands that were not soaked in hydrogen peroxide. The control's strength was also tested and then used for comparison. Statistical analysis of the experimental data showed that there was no effect of hydrogen peroxide on hair strength. This result did not match practical experience. The researchers theorized that in order for the hair's strength to be affected, the twenty volume hydrogen peroxide must penetrate the outer layer of the hair called the cuticle. As the strength tests were conducted, it began to appear as though the twenty volume hydrogen peroxide was not reaching the inner layer called the cortex or if it was it was not affecting it enough to show a measurable impact on the hair's strength.

The Effect of Soap/Water Concentrations on the Size of Bubble Formed

*Student Research By: Kaitlyn Bushbaker, Christine Chorney, Elizabeth Crawford,
and Ashten Lindeman*

The purpose of this study was to determine the mixture of soap and water that would create the largest bubble. This study was conducted at the Macomb Academy of Arts and Sciences (MA²S). Ten different mixtures were tested. Each mixture contained a different percentage of soap and water. The bubble mixtures were tested thirty times each and recorded on a video camera. The recorded bubbles were analyzed on a computer using PEAK Motus motion analysis software. The lengths of the bubbles were measured as the film was analyzed frame by frame. It was found that the best mixtures for creating large bubbles were those with a large percent difference between soap and water.

The Effect of Weight Dropped on Various Radii of Sheet Metal

Student Research By: David Duncan, Austin Penzien, Vince Seefried, and Chris Sledz

The purpose of this project was to find out which one radius of sheet metal would dent the least and which would dent the most. This project resembled a car fender being hit by an object. The researchers bent a piece of sheet metal and then dropped a weight on it. There were two different types of sheet metal used in this project, aluminum and steel. There were six different radii used, a control (flat), ten centimeter, fifteen centimeter, twenty centimeter, twenty five centimeter and thirty centimeter radii. The sheet metal was screwed onto a wooden frame and then a weight was dropped onto it. For the aluminum, a two and a half pound weight was used and for the steel, a five pound weight was used. This was done because the steel sheets were thicker and was not affected by the two and a half pound weight. The dent was filled with a piece of clay. It was pulled out, cut in half, and its thickness measured with a ruler. For each different radius there were fifteen trials done with aluminum followed by three trials with the steel sheet metal. There was a total of eighteen trials for each radius. This project was performed at the Macomb Academy of Arts (Armada, Michigan), and Sciences from October 2007 through December 2007.

The Effect of Corking an Aluminum Baseball Bat on the Distance Traveled by a Struck Ball

Student Research By: Dan Binder, Don Goulette, Eric Kosek, and Aaron Solomon

The purpose of this study was to determine if an advantage is gained by corking an aluminum baseball bat with tennis or foam balls. This experiment was conducted in the gymnasium of the Macomb Academy of Arts and Sciences in Armada, Michigan. A maximum of four tennis balls or three foam balls were placed in the bat for each trial. After analyzing the data set it was concluded that no predictions can be made at this time because of overlap found in the data due to experimental error.

The Effect of Pressure and Launch Angle on the Distance Traveled by a Projectile Fired from a Pneumatic Cannon

Student Research By: Matt Goike, Roxythe Harding, Jesse Hyatt, Robert Okray

The purpose of this study was to test the effect air pressure has on a pneumatic cannon. Tennis balls were fired out of a pneumatic cannon at different pressures and angles to determine if these variables had an effect on the distance the ball traveled. Six different angles and six different pressures were used in the experiment. The angles studied were zero, five, ten, fifteen, twenty, and twenty five degrees. The pressures studied were fifteen, twenty, twenty five, thirty, thirty five and forty pounds per square inch (psi). The distance the tennis ball traveled was measured to where the ball first hit the ground. It was concluded that maximum distance was achieved using a pressure of 40 psi and an angle of 25 degrees.

The Effect of Masses and Angles on Ping Pong Ball Flight Distance

Student Research By: Sarah Doering, Katrina Prohaszka, Desirae Tibaud, and Elizabeth Ulinski

The purpose of this experiment was to determine how masses and angles effect the distance ping pong balls can travel through the air. Ping pong balls are categorized in different stars, which represent the different mass. The stars selected for this experiment were one star, two star, and three star balls, which had masses of 2.51, 2.65, and 2.78 grams. To test the effects of the angles on the balls travel distance, a pre-made slingshot was used. The selected angles were as follows: twenty-five, thirty-five, forty-five, fifty-five, and sixty-five degrees. When playing ping pong, a person can angle the ball in different directions. The angle of the ball determines how high the ball will travel and where it will bounce. Using the slingshot, these angles could be tested to see just how much they affect the travel distance of the ping pong balls. It turned out that the ping pong ball with a mass of 2.65 grams (two star) shot at the forty-five degree angle traveled the farthest at an average distance of 4.98 meters.

The Effect of Meteorites on Earth

Student Research By: Alex Asbury, Daniel Finn, and Cecelia Goulette

Meteorites hit the Earth daily; usually they are so small that people do not even see them. Many meteorites burn up in the atmosphere, causing them to reduce in size. Meteors also hit the Earth when they are larger, because when they entered the atmosphere they do not completely burn up. The purpose of this experiment was to replicate a meteor hitting the Earth in different kinds of land masses. A lead fishing sinker was dropped to created craters, and the drop height was changed, to see if it affected the crater size. The fishing sinker was removed from the crater, that was then measured (width and depth). Gravity is the reason why every thing falls back to earth, because it has a constant pull. Researchers found that the drop height did not affect the data of craters as expected, because of the constant gravity on Earth. It was also found that the ground like masses did not change the result of the data in the drastic way that the researchers had expected it too.