

Abstract Table of Contents

Engineering and Physical Sciences.....2

Environmental and Biological Sciences.....8

ENGINEERING AND PHYSICAL SCIENCES

Gift of Lift

Since lift is crucial for airplanes in flight to work it would be helpful to maximize lift. The wing is what airplanes use to create lift. The wing angle will be a key factor in maximizing lift. What angle of the wing will create the most lift? If the wing angles of ten degrees, fifteen degrees, twenty degrees and forty-five degrees are tested, the ten degrees angle will create the most lift because it won't cause drag but will still catch enough air. For this project I bored a hole into two tissue boxes. I taped a wooden pole to an airfoil. Next I inserted the one end to one tissue box and the other end to the second tissue box. I centered the wing towards the middle of the fan and turned it on medium. I tested four different wing angles to find out which one had the most lift. The wing angles were 10, 15, 20 and 45 degrees. I placed one barometer above and one below the airfoil. I subtracted the pressure of the top of the airfoil from the bottom. I did this ten times for each wing angle and compared it to the control group. When comparing the 15, 20 and 45 degrees wing angles to the control group, the 45 degrees wing angle had the highest lift with .513. The 20 degrees wing and had .214 and the 15 degrees wing angle had .177. The lowest was the 10 degrees wing angle with .113 lift. Based on the data collected the 45 degrees wing angle had the most amount of lift with an average on .513. The variable that had the least amount of lift was the 10 degrees wing angle with an average of .113. Therefore, the hypothesis is rejected.

Flaming Pajamas

Many people send their children to bed thinking that they are safe. Under Federal law, manufacturers must make children's pajamas flame resistant. People must launder their children's pajamas. Many households use fabric softeners during this process. Does the flame retardant on children's pajamas still work as well after it has had 50 applications of fabric softener? If there are 50 applications of fabric softener to flame resistant fabric (such as that used in children's pajamas), then the flame retardant will be less effective than unwashed fabric because the chemicals in the fabric softener will have coated the fabric, reducing flame resistance. The procedure was conducted by having a control group that consisted of a piece of cloth that was washed and dried without fabric softener. The only other group had fabric softener applied in the wash and dry cycle. A lighter was applied onto the piece of fabric for three seconds. A digital caliper was then placed in the same area that the lighter was. The area burned from bottom to top was then measured in millimeters. This was done a total of 10 times for each variable. When comparing the different pieces of cloth (with fabric softener and without fabric softener) the ones with fabric softener did not burn as much as the other group. This was the control group. The pieces with fabric softener burned an average of only 43.266 millimeters. The ones without the softener burned 54.608 millimeters. Based on the data collected from this experiment, the use of liquid fabric softeners reduces the amount of the cloth burned. The softened fabric burned only 43.266 millimeters. The pieces of cloth without softener, on average, burned 54.608 millimeters. Therefore, the hypothesis was rejected.

Hot Wheelz

In the years that we live in scientists are trying to find a new way of fuel. Global Warming is effecting our environment. Will a wheel with rubber bands attached to it with heat on it make an engine powerful enough to be used or useful? If a wheel was put on a axle with rubber bands surrounding it and heat from different wattages from light bulbs then, the highest wattage would make the wheel turn quicker because the heat from the light bulb would make the rubber bands tighten faster so that the wheel could move and allow it to rotate. The procedure was tested by having three different light bulbs at different wattages, 60, 75, and 100 watts, see how long it took for a wheel with rubber bands on it to spin. It was measured by how long it took in seconds for the wheel to rotate all the way around with all three light bulbs. There were ten trials for each light bulb. The control was the smallest watt, the 60 watt. When comparing the 75 watt light bulb to the control group of the 60 watt light bulb the 75 watt light bulb had less of a time than the control with an average of 271.2 seconds. The control group had an average of 355 seconds. The reason this occurred may be because of the difference in heat from both light bulbs. The 100 watt light bulb had an average of 111.4 seconds. Theses results were better than the control group. The reason this occurred may be because of the amount of heat given off from the light bulb. Based on the data collection in this experiment the 100 watt light bulb did the best in the amount of time it needed to make the wheel spin at 111.4 seconds. The 60 watt and 75 watt light bulbs did the worst with the 60 watt having a 355 second average and the 75 watt having a 271.2 second average. Therefore the hypothesis is accepted because I thought that the highest wattage, being the 100 watt light bulb, would make the wheel turn more quickly.

Can Wasted Energy Be Harnessed?

The rotations of a turbine placed at the top of a flue stack were measured with increasing amounts of heat to find out if placing a turbine at the top of a flue stack of a coal plant could be harnessed to yield electricity. A simulated flue stack was fabricated out of household materials. Candles were placed at the bottom of the flue stack and the rotations of the turbine were measured, increasing by three candles after each minute. When the amount of heat placed under a turbine is 105° or less, the turbine will not rotate. When temperature was increased from 114° to 150°, rotations increased from 19 per minute to 49 per minute. The result of this experiment suggests that when the amount of heat under a turbine is increased, the number of revolutions will increase.

Temperature and Magnetic Fields

Magnets are commonly used in everyday life in fields such as transportation, medicine, and industry. The ability to control and maintain the proper strength of a magnet or magnetic field is essential to their use. One of the key factors that affect magnet performance is the temperature of the magnet. It is believed that lower temperatures cause the molecules in the magnet to align in one direction and strengthen the magnetic field. In this study, the effect of low temperatures and high temperature on the ability of a magnet to attract steel BB's will be investigated. To conduct the study, two magnets of different sizes will be either cooled (-45 deg C, -1,5 deg C) or heated (+93 deg C) and then their ability to attract steel BB's will be measured by counting the number of BB's that are gripped to the magnet when suspended 1" above the surface of a beaker of BB's. Each trial was repeated five times and the mean calculated. These results will then be compared to the control group at room temperature (25 deg C). It was hypothesized that the magnets at low temperature would attract a greater number of BB's than the control group and that the magnet at high temperature would attract fewer BB's than the control group. It was found that the mean number of BB's attracted at the lowest temperature (-45 deg C, Dry ice/IPA) was the highest compared to the control group (LM/SM=176/158.6 vs. 83.8/92.8). The mean number of BB's attracted at the next low temperature (-1.5 deg C/ ice water bath) was the second highest compared to the control group (LM/SM=131/120.4 vs. 83.8/92.8). The mean number of BB's attracted at the highest temperature (+93 deg C/ hot water bath) was also higher than the control group (LM/SM=127.6/120.8 vs. 83.8/92.8). The trends observed were that the mean number of BB's attracted increased as temperature was decreased at temperatures below the control group. However, at the one temperature tested above the control group, the mean number of BB's attracted was also higher. The results of this investigation showed that at temperatures below the control group, the number of BB's attracted increased. This finding was consistent and nearly linear at two lower temperatures for both the large and small magnets. The finding that the number of BB's attracted at a single temperature higher than the control temperature was also higher is not supported by the research or the hypothesis and either represents a rejection of the hypothesis or a problem with the experimental design. This result was true for both the large and small horseshoe magnets. The mixed results from this study either indicate that this assumption is not true over the range of temperatures investigated or that the experimental design was not correct at the higher temperature.

Free Power From The Sun

The sun gives off more energy in one hour than all of the energy consumed by humans each year. The sun gives off a lot of energy but humans don't use it. In 2006 only 1% of the sun's energy was used by humans. This experiment was conducted to see at what angle will a solar cell receive the most energy from the sun (0 degrees, 90 degrees, or 75 degrees) The procedure was carried out by having the solar cell placed two feet away from a lamp and set at 0 degrees. Then moving the lamp around the solar cell (as the sun moves) and recording the highest amount of power that it receives. Then repeating the steps and changing the angle of the solar panel to 90 degrees. Finally changing the angle to 75 degrees and repeating the steps. The mean output power of the angle of 0 degrees was 13.39 watts. The mean output power of the angle of 90 degrees was 13.04 watts. The mean output power of the angle of 75 degrees was 12.6 watts. The data indicated that the angle of 0 degrees on a solar cell will get the most total output power. The angle of 75 degrees had the least amount of total output power.

Newton's Roller Coaster

What effect does the angle of a slope in the first hill of a roller coaster have on the time it takes an object to travel a constant distance on the roller coaster track? If the angle on a slope of a model roller coaster track is increased, then the time it takes a marble to travel down the slope will increase proportionally. The independent variable is the angle of the marble track. The dependent variable will measure the change in the time it takes the marble to travel a certain distance. The constant variables include: size and shape of the marble; size and material of the track; height of the track where marble begins rolling down; stopwatch; length of the distance timed; and same room in the house that investigation is conducted. The problem was tested by rolling a marble down a model roller coaster track set at three different angles with the starting height of the marble being the same on the tracks for the three angles. The time it took the marble to travel down each angled track for a constant distance of 1 meter was recorded. After conducting a minimum of 10 tests for each angle of the track, a conclusion was made. This experiment showed that on average, a marble rolling on a model roller coaster track with a 30-degree angle and 51.5 centimeters high traveled 1 meter in 0.658 second. A marble rolling on the model roller coaster track with a 45-degree angle and 51.5 centimeters high traveled 1 meter in 0.604 second. A marble rolling on the model roller coaster track and 51.5 centimeters high with a 60-degree angle traveled 1 meter in 0.701 second. This was not the expected result of the experiment.

Solar Substitute

In sunlight, there are incandescent light waves and ultraviolet light waves. Incandescent can be seen by the human eye, whereas ultraviolet light cannot. Does a solar panel produce more energy from sunlight, ultraviolet light (black light), or light from a 60 watt bulb? If solar panels pick up UV light and incandescent light and the sun produces both types of light, then the solar light will create the most energy.

Keep It Cool

The topic of "Going Green" has most likely come across everyone's lives at least once or twice. One example of "Going Green" is to have natural insulation. This experiment was conducted to find out which of three natural insulators (straw, soil, leaves) would maintain the closest temperature to the beginning temperature. The procedure was carried out by having a control group composed of a small jar filled with water with no insulation surrounding it. Three other jars filled with water were surrounded with insulation. One jar was surrounded by straw, and one jar was surrounded by soil. The third jar was surrounded by leaves. Each of the jars' beginning temperatures was 5 degrees Celsius. They were left to sit for 2 hours and then measured again. This procedure was repeated 5 times. The average temperature of the straw insulation was 12.5 degrees Celsius. The jar surrounded by soil had an average of 10.5 degrees Celsius. The jar surrounded by leaves had an average of 11.7 degrees Celsius. The jar with no insulation had an average of 14.2 degrees Celsius. The data indicated that the three jars with insulation maintained the closest temperature to the beginning temperature. However, the soil maintained the closest temperature to the beginning temperature than the other insulations.

Breathing Easy

Some air filters don't work as well as others and that could mean some people's health could be at risk. Dust is one of the materials that can harm humans and it is very small and hard to catch. This experiment will determine whether a HEPA filter will work better than a charcoal filter at capturing and collecting house hold dust. This experiment was carried out by having the HEPA filter as the control group and the charcoal filter as the experimental group. Before testing, measure the mass of the filters and record it. The filters were tested by blowing a leaf blower through a pvc pipe and through the filter. After a minute record the mass of the filter and subtract the mass of the original mass from the new mass. The average amount of dust collected with the charcoal filter was 0.174grams of dust. The HEPA filter collected an average of 0.606grams of dust. The data indicated the control group (the HEPA filter) collected more household dust than the experimental group (the charcoal filter).

Highway Science

Humans always want to determine ways to live safer and healthier lives. That's one reason they developed the yellow barrels along the highway. These are intended to lessen the impact of a crash, preventing cars from striking concrete objects. In the experiment, a substitute for the sand barrels was tested, a yellow plastic barrel filled with bubble wrap instead of sand, a significantly lighter option. It was hoped that the bubble wrap would be able to disperse the collision as well or better than the heavier sand. It was theorized that the bubble wrap would burst, lessening the impact of the collision, stopping the car safely. If bubble wrap could be used in this way, transportation costs for barriers could be reduced. Additionally, management of the barriers would be significantly easier. The sand barrels in use range in weight from 700 pounds for the smallest to 2100 pounds for the largest. A model of the system was constructed. Sand and bubble wrap filled cups were substituted for the barrels. Weighing slightly less than a pound they simulated one of the 700 pound barrels. A four pound mallet set as a pendulum provided a consistent and repeatable impacting force. The cup was placed against a brick. The distance this brick travelled after the collision was measure to determine the relative energy transmitted, not dispersed in the collision. Unfortunately, the hypothesis proved false. After measurement, the sand proved to be a much better material to absorb the force of a collision.

Metals' heat conduction rate

There are two different types of heat conductors. There are good conductors, which conducts heat well, and there are insulators, which conducts heat very slowly. Metals are good conductors of heat. All metals conduct heat from one end to the other. Do all of metals conduct heat at the same rate? This experiment was conducted to find out so. The procedure was carried out by having an experimental group of three different types of metal wires, copper, aluminum, and steel dipped into the boiling water and freezing water. The control group was the same types of metals dipped in just the boiling water. Data and results were taken by measuring centimeters of each metal in each group, and recording how far the heat was conducted. Data, and centimeters of heat conducted, was recorded ten minutes interval each time. The results were that the copper wire conducted heat faster than all of the other two types of metals. So no, not all metals conduct heat at the same rate after exposure to varying temperatures. Therefore, the hypothesis can be accepted.

The Effect of Temperature Change On the Solubility Rate of Salt

Solubility is the ability of one substance, the solute, to dissolve fully into another substance, the solvent. Solubility can let you know if a substance can contaminate waste water, the concentration of the solution and much more. It is thus important to know what some of the properties of solubility are. What effect in the speed at which salt dissolves do different water temperatures have on salt when 35 grams of salt are tested in 100 grams of distilled water. If 100 grams of hot water, cold water, and water placed at room temperature are tested to see which is a faster solvent of 35 grams of sodium chloride, then the prediction is that there will be no noticeable difference in the time it takes to time it takes to dissolve the solute, table salt, in the three different temperatures of the solvent, water, because comparable experiments have shown that the effect of increasing temperature on the solubility of sodium chloride is nothing. The solubility of sodium chloride is said to be nothing due to it being strongly ionic and strongly ionic means it cannot be broken down by water easily. For the procedure 100 grams water would be heated or cooled to the desired temperature. Then, the maximum solubility of salt, 35 grams, would be placed in the water and stirred at a steady pace. The data was recorded. This was done for ten trials. The testing was to see if temperature effected the solubility rate of salt. The control was water placed at room temperature. When comparing the hot group to the control group of room temperature the hot group had a similar result with an average of 48.8 seconds. The control group an average of 48.07 seconds. The reason this occurred may be because salt has an equal solubility at room temperature as it does at a greater temperature. This could be why the solubility rate was the same when the hot group was compared to the control group. The cold group had an average of 48.02 seconds. These results were similar to the control group. The reason this occurred may be because salt has an equal solubility at room temperature as it does at a lesser temperature. Based on the data collected in this experiment, the hot group did the best a result of 48.8 seconds and the cold group did the worst with an average of 48.02 seconds therefore the hypothesis was accepted because the experimenter believed that there would be no noticeable difference between the averages of the three groups.

Humidity

The cost of natural gas is expected to rise 17% this winter season and in this troubled economic time people are cutting their budgets. They may try to spend less or not go on that vacation or they might turn down their thermostat. Turning down the temperature will also lower our house's humidity level causing you and your family to feel uncomfortable and making you more susceptible to illness. Instead of lowering the temperature you may reroute an electric clothes dryer to the inside of your home. Otherwise, it is sucking warm air in making it hot and humid and expelling it to the outside. What effect will rerouting an electric clothes dryer to the interior of a house have on that house's actual humidity level? It was hypothesized that if you are to reroute an electric clothes dryer to the interior of a house, then there will be a measurable increase in that houses actual humidity level. The procedure was done with a control group of 5 days of testing at 2 different locations within the house while the dryer was not operating. The experimental group was 5 days of testing at the same 2 locations while the dryer was operating. The temperature and relative humidity was recorded at both locations when the dryer started, when it finished, and 30 minutes after it had completed. Of the ten testing days at two locations, there was an average actual humidity increase of 1.82 g/m³ compared to the control group. Therefore the hypothesis was true.

ENVIRONMENTAL AND BIOLOGICAL SCIENCES

Reducing World Hunger by Controlling Insects Through Hermetically Stored Grain

In developing countries, a lot of the people's food gets eaten by insects, such as the larger grain borer. I'm trying to find a way to prevent insects from eating the food. One way is by hermetic storage. Hermetic storage is a form of storage where contact between the stored material and the external atmosphere is prevented. The respiration of grain, insects, and molds use up the oxygen, thus the insects suffocate if the permeability of the container is low. I used everyday materials, such as glass jars, trash bags, etc. Then I put corn and insects into each container keeping the ratio of corn to insects somewhat constant. Then I got as much air out of the containers as I could. After that, I waited for three weeks and then determined if the insects were alive and counted how many corn kernels were damaged by insects. The glass jars gave me the best insect control in grain, although the results for containers were not significantly different. The insects in the GrainPro bags, trash bags, and freezer bags were alive. The glass jars, the metal containers, and the plastic bottles would be best for hermetic storage. People in developing countries who do not want to lose their grain to insects should use metal containers, glass jars, or plastic containers that can be sealed. This would help reduce world hunger.

Through the Window Glass

The experiment "Through the Window Glass" was conducted to answer the question, "Does the type of glass affect the amount of heat passing through it? To test this problem, three types of glass were used. Clear glass was the control group. Tinted and teal stained glasses were the two experimental groups. It was hypothesized that the tinted glass would be the most efficient because it would reflect the light. A model house (test box) was set up with a heat lamp turned on (to act as the sun) in front of it for fifteen minutes. Temperature data was then collected, analyzed, and expressed in graphs and data tables. The three types of glass gained the following averages in degrees Celsius: clear-3.00°, tinted-1.88°, and teal stained glass-1.32°. The teal stained glass proved to be the most efficient, and therefore the hypothesis was rejected.

a-MAZE-ing Plants

Phototropism is the growth response of plants towards light. Will plants that are placed inside a simple maze with a light source shining on them from an angle other than above, grow through that maze and towards the light source? To create the simple mazes, get two boxes and cut holes in the side for the light source to shine through. Place 25 plants underneath the mazes for the experimental group and 25 plants outside the mazes for the control group. Don't forget to water every plant with 25 ml each day (let water sit out for at least a day to make sure no chemicals are present). Put the plants by a window for maximum sunlight. After about two weeks the plants will start growing. Collect the data by measuring their growth (in centimeters) towards the light. At the end of nine days, take a final measurement, and compare the plants' heights from the control group to the experimental, (those in the maze.) Results showed that the plants within the mazes did grow towards the light, and none of them grew at a 90 degree angle. Therefore my hypothesis was accepted.

Water Absorption

This experiment was conducted to find a way in which soil could absorb more water. This would help farmers grow crops. It would also help people grow flowers in their gardens. Most of all, it would save water. There were tests done to see if compacting soil would increase water absorption. Soil was put into cans with holes in them and half of them were compacted. Water was poured into the cans and was left to drain for ten minutes. After the data was collected, the conclusion was made that compacting soil does not increase water absorption. In fact, it even decreased the water absorption by about 8 %. Therefore, the hypothesis predicted cannot be accepted.

Soils and Stability

Stability of houses has been a big problem for a long time. When the soil isn't strong enough it could make a house topple over if it is severe. It can also cause problems with the house's foundation. The experiment was conducted to find out which soil is the most stable (topsoil, sad-based soil, or clay-based soil). The procedure was carried out by having a control group made of the water and the rectangular container. The independent variables consisted of three types of soil: topsoil, clay-based soil, and sand-based soil. Five containers were filled for each type of soil. Then 800mL water was thrown into the sand. The amount the box moved was found by measuring the distance it was from the original place. This procedure was done with all three types of soil. The average amount of movement from the trials with the topsoil was 0.3175 centimeters. The container with the clay soil moved an average of 0.3175 also. The average amount of movement for sand based soil was 1.524. Some of the data looks different than the actual outcome. This is because some of the buildings toppled over. The data shows that the clay based soil was the sturdiest and strongest soil even though it has the same mean of movement it never toppled over.

An Elephant Never Forgets

Memory and emotion are the intangible yet vital systems of our body. Memory allows for a person to learn from their mistakes and make decisions. Emotion allows a person to feel something they do and don't like, for instance if something is funny or not. The list of emotions and memories we create and experience in our lifetime are endless. This experiment that I conducted was to find out which of three important emotions (happy, sad, and neutral) would best be retained by those participants that took part in my experiment. The procedure was carried by first showing a neutral story I created by the use of a PowerPoint slideshow. The story in the slideshow was then changed slightly using happy and sad elements, then these stories were shown separately to each of these participants. After the three slideshows were shown to each participant, they were asked to take a questionnaire in which they answered questions pertaining to the story and what they remembered about the story. Then three days later, the participants took the same questionnaire once again, but without the use of any three of the slideshows. They had to take in account their memory of the story that was shown three days previously. The happy, sad and neutral questionnaires that each of the 10 participants had taken were then graded. The mean average was 71% for the participants that viewed the happy slideshow and immediately took the questionnaire, while the neutral mean score averaged 69% while the sad slideshow mean averaged 70%. The mean average for the neutral slideshow questionnaires taken three days after was 72%, the neutral slideshow mean average was 67%, and the sad slideshow mean averaged 55%. The data demonstrated that the neutral emotion questionnaire scored the lowest score immediately after the slideshow story was shown. Three days later, however, it proved different when the sad emotion score sank below the other two emotion scores. The results demonstrated that the happy emotion questionnaire scored the highest averages right after the slideshow was shown and then again three days later when the questionnaire involving the happy slideshow was given was again.

Diabetes: Agave Nectar Vs. Sugar

This study was created to determine the effect of agave nectar and raw sugar on blood glucose levels of persons with diabetes mellitus. This study compared the effect the different sweeteners on a diabetic subject and non-diabetic subject. Carbohydrates affect the rise in blood sugar. Some sweeteners cause a diabetics blood sugar to peek quickly, which makes it difficult maintain blood sugars in safe range. What affect will sweeteners with a low glycemic index have on blood sugars 1 and 2 hours after consumption verses those with a higher glycemic index? Agave nectar is advertised to have a low glycemic index therefore if agave nectar was compared with sugar when eaten by Type one diabetics, agave nectar will raise blood glucose slower than table sugar because of its lower glycemic index. Table sugar will raise the blood glucose faster in Type one diabetics because it has a higher glycemic index. The data indicated that after the experimental group's consumption of raw sugar, the experimental group's blood glucose levels decreased. After the control group's consumption of raw sugar, the control group's blood glucose levels decreased 2/3 of the time tested, and increased 1/3 of the times tested. The data also indicated that after the experimental group's consumption of the Agave nectar, the experimental group's blood glucose levels decreased 2/3 of the times tested and increased 1/3 of the times tested. After the control group's consumption of the Agave nectar, the control group's blood glucose levels decreased 1/3 times tested. The control group's blood glucose levels went up and down 2/3 times tested.

The effect of Melaleuca alternifolia oil on the growth of the mold Physarum polycephalum on various surfaces.

The purpose of this project was to determine if Melaleuca alternifolia oil, commonly known as tea tree oil, has an effect on the growth of the slime mold Physarum polycephalum on various surfaces. The idea being that if this oil is an effective antimicrobial then it will inhibit the growth of the mold. In order to test this hypothesis, samples of onyx, concrete, wood, filter paper, and agar were selected. Ten samples of each type of surface were selected and each one was placed inside a petri dish. A piece of Physarum polycephalum was placed on each sample with oat flakes for food, with water to keep it moist, and then left to grow for several days. After recording the growth area of each sample, Melaleuca alternifolia oil was then added to half of the samples in each group; the other half was kept as the control. It was observed that the mold on the onyx, wood, and paper samples in the control group (not treated with Melaleuca alternifolia oil) continued to grow healthily and the area covered increased significantly. The average areas of growth from day 7 to day 10 being 3.2cm² to 10.25cm² on the onyx tiles, 3.55cm² to 15.65cm² on the wood, and 3.75cm² to 11.6cm² on the paper samples. None of the concrete and agar samples showed any development. No further growth was observed on any of the samples in the experimental group (those treated with Melaleuca alternifolia oil). These results supported the hypothesis, and so it was concluded that Melaleuca alternifolia oil does inhibit the growth of Physarum polycephalum.

Don't Let the Rain Steal Your Land

Erosion is one of the greatest threats to agricultural productivity in the world. This experiment has been conducted to find out which of three grasses (rye, fescue, and bluegrass) would have less soil erosion. This was carried out by filling three containers with soil and growing three different types of grass (rye, fescue, and bluegrass) in each container. (Fescue is the control group because it's the most common in the local area.) After the grass had grown the containers were tilted at a 45 degree angle. Using a watering can held one foot over the grass, one gallon of water was poured on the top of the grass. The run off was collected in a large container. The water through a paper towel and the soil collected. After the soil had completely dried it was measured and the amount of soil lost was recorded. This was repeated seven times for each type of grass. The average amount of soil lost for the fescue grass was 47.9925 grams. The rye grass average loss was 6.2775 grams. The bluegrass lost the most with an average of 140.535 grams. The data indicated that the ryegrass helped prevent erosion the most. Therefore the hypothesis was supported.

It Doesn't Make Scents!

The purpose of this experiment was to test the effect of rosemary, lemon, and lavender essential oils on memory. It was hypothesized that rosemary oil would increase the amount of things remembered, lemon oil would have similar results to the control group, and lavender would decrease the amount of things remembered compared to the control group. This experiment used fifteen test subjects of the same gender and age, and had all of them do the control group test, which involved studying a list of thirty objects for five minutes, then writing down what they remembered from the list one hour later. Then, five test subjects were put into each the rosemary, lemon, and lavender group, and they repeated the test, but this time they smelled the scent that their group indicated for the first and last minute of the five minutes, then smelled the scent again an hour later before recording what they remembered. The average amount of things remembered for the control group was 14 out of thirty objects, or 46.7%. The group that smelled lavender during the study time remembered an average of 9.4 objects, or 31.4%, the lemon group remembered an average of 7.8 objects, or 26%, and the rosemary group remembered an average of 12 objects, 39.8%. The hypothesis for this experiment was not supported because the control group test had more objects remembered than any of the scents, although the lavender group results were below the control group results, as hypothesized.

What Gets You Moving?

Everyday Millions of Americans exercise. Often times because of this exercise they feel a sensation of pain, or discomfort. To take their minds off these feelings they listen to music, however there are different genres, or groups of music. The purpose of my experiment is to pinpoint the genre that has the largest effect on a persons ability to exercise.

Only as Good as You Believe

For the procedure, the first subject was given a glass of Kool-Aid and told that there is nothing in the Kool-Aid. They were then timed for a minute jumping as many times as possible onto a step aerobics step. After at least an hour, they were given another glass of plain Kool-Aid, nothing added. But this time, they were told that there was an energy enhancer which would give them a short burst of energy in it. They were tested again to see if their heightened belief in themselves would make the amount of jumps increase. This was then tested with the other eleven subjects. When comparing the results where the subjects thought they had an enhancer to the control group, where the subjects knew that it was plain Kool-Aid, the time where the subjects thought that there was an enhancer in the Kool-Aid had improved results with an average of 62.917 jumps. The control group had an average of 54.803 jumps. The reason this occurred is that when the subjects thought they would do better, they did. It was because their increased confidence made them expect to do better and therefore they did more jumps. Also, the subjects may have learned how to do the jumps better and more quickly. On another note, certain subjects only improved by one or two jumps. The reason that this may have occurred is that they were the more athletic of the subjects, so they were already operating at their peak amount of jumps. Also, it could be possible that those subjects would be considered less gullible than certain of the other subjects. Based on the data collected from this experiment, the experimental group where the subjects believed that there was an energy enhancer in the Kool-Aid did more jumps than the control group, where the subjects knew that there was nothing in the Kool-Aid. The group that thought there was an enhancer had an average of 62.917 jumps. When the subjects did not think that there was an enhancer they did an average of 8.114 jumps more than the subjects that knew there was nothing in the Kool-Aid, which had an average amount of jumps of 54.803. Therefore, the hypothesis is accepted because it was thought that the group that believed that they had consumed an enhancer would do more jumps in a minute because their belief that they would do better would cause them to actually do better.

Do You See What I See?

Normal eye vision is considered to be 20/20. Everyday there are children and adults told that they are going to have to wear something to correct their eye vision. When individuals find out that they have to do something to correct their eye vision they are a variety of options available. Two major types of correction are eyeglasses and contact lenses. It was hypothesized that individuals correcting their eye vision by wearing contact lenses would have better visual acuity than with their eyeglasses. The procedures included asking six individuals who wear glasses and contact lenses to participate in the study. Using the Snellen Chart, visual acuity measurements were obtained for the left eye, right eye, and both eyes with individuals wearing their glasses and then visual acuity measurements were obtained with the individuals wearing their contact lenses. The average of visual acuity measurements for glasses ranged from 20/24.17 to 20/26.67, while the average visual acuity measurement for contact lenses ranged from 20/20.83 to 20/23.33. Data results showed that the mean or average of visual acuity measurements for the group wearing contact lenses was closest to 20/20 (normal vision). Therefore, the hypothesis was supported.

Saved by The Chill

The problem is “Will freezing seeds affect the germination of those seeds in a controlled environment? It is hypothesized that if a seed is frozen, regardless of temperature, then the germination rate will stay within 5% of the control group. A brief procedure of the experiment is as follows. Three sets of seeds consisting of five varieties were placed in a freezing environment (-18°C, -80°C and -200°C). A fourth set of seeds was left at room temperature (22°C) as a control. After two weeks, each of the five varieties was placed in a germinating environment as defined in the Procedure. The data collected included: number of seeds that germinated for each variety, time and day of germination. Germination was defined as when the radicle emerged from the seed. The results do not support the hypothesis.

The Wandering River

River meanders are one of the most common forms of water erosion, occurring mainly in streams and rivers. They have been a growing problem since the early 1900s. Many things have been done to try to prevent them from occurring because they erode at property and can weaken bridge stability, making bridges more likely to collapse. This experiment was conducted to discover what effect slope has on river meandering. Different slopes were tested, using a test board to simulate an actual river. Different wood blocks are placed under the board to simulate different slopes. The blocks gave the board slopes of 20mm/m, 42mm/m and 61mm/m. Sand was then placed on the board and water was run down the board until the bucket that had the water was empty. The results showed that the more the slope increased, the smaller the channel length became. So, it could be said that slope has a negative effect on river meandering. The hypothesis stated that the more the slope increased, the channel decreased, so the hypothesis was supported.

Harbour Porpoises' Race Against CO2

Humans have released so much greenhouse gas that earth’s temperatures have increased. If temperatures rise, animals won’t have the ability to adapt as fast to the change in climate temperatures. People are pouring carbon dioxide faster than the ocean can absorb it. This could cause glaciers to melt resulting in rising sea levels. This experiment was performed to see how these drastic changes are really affecting marine animals by using harbour porpoises. In the procedure, harbour porpoises’ movements were tracked by satellite. Tracked porpoise from 1998 and 2007 were used to compare how their migration patterns differed in those past 10 years. Then the experimenter had to see where the CO2 levels have grown and how it has effected the porpoises’ movements. Looking for a difference in the number of miles or how far north or south the porpoises from 2007 differed from those of 1998. Those differences could have been effects of CO2. The increase in industrialization on the United States east coast has caused nitrogen emissions to increase by 10% to 70%. The nitrogen emissions have caused eutrophication, an increase in chemical nutrients made of nitrogen a phosphorous. Eutrophication has formed dead zones, these are areas where oxygen depletion has occurred in the ocean. Fishing industries have also risen along the east coast, threatening dolphins and small whales with their gill netting. These fishing industries also contribute to creating nitrogen emissions in our atmosphere and oceans. This has forced harbour porpoises to swim further south. They no longer are migrating into Canada’s northern waters. With oxygen deficiencies and the increase in industrialization, porpoises are unable to travel there. Tracking swim patterns of marine animals like harbour porpoises can help people learn how pollution is affecting our oceans’ creatures. They are the first to be effected by these drastic changes, and if people don’t try to help solve this problem we’ve created, like global warming and the rise in climate temperatures around the world, then we too will be feeling these effects.

Plants in Space!

NASA scientists think that if people are able to grow plants on the moon, they would be able to supplement meals. It is too expensive to send food out to astronauts every day, everywhere in space. This means that if people can figure out ways to grow food in space with their limited light, space missions could last longer. This experiment was conducted to figure out which of four light amounts (0 hours, 8 hours, 16 hours, 24 hours) would have the most plants growth after 7 days. The procedure was carried out by having a 42.18 x 25.4 x 24.13 centimeter box with holes so four 10.16 centimeter trays inside could get light separately from 40.64 centimeter long florescent light above them. Each tray was filled with potting soil and 6 seeds were put into each. They were put into the box and each cell in the box got different amounts of light each day for 7 days (0 hours, 8 hours, 16 hours, 24 hours.) Each day the height of each plant was measured. The average height of the seeds in the 0 hour cell was 1.27 centimeters. The average height of the seeds in the 8 hour cell was 6.98 centimeters. The average height of the seeds in the 16 hour cell was 6.14 centimeters. The average height of the seeds in the 24 hour cell was 11.04 centimeters. The data indicated that the seeds with the most light grew the tallest. The seeds with the least light grew the least. The 24 hour light cell grew the tallest, and the 0 hour light cell grew the least. This means giving plants 24 hours of light makes them grow the tallest.

Soil Compaction vs. Plant Growth

My experiment was conducted to see if soil compaction affected plant growth. There were three groups, 1 control and 2 experimental groups. My control group is my first group and it is the loose soil. My second group is my first experimental group, which is the slightly compacted soil. My third group is my second experimental group, which is the heavily compacted soil. There were 5 trails, with 15 plants total. The experiment was started on December 28, 2008 and finished January 25, 2009. Data and results were taken by measuring the height of the seed/plant in centimeters. The growth was recorded everyday. Only 1 plant grew above the surface, so measurements were also taken by digging up the seeds at the end of the experiment and measuring the plant growth under the soil. The loose soil had the most growth with an average growth of 4.9cm. The slightly compacted soil had an average growth of 1.6cm. The heavily compacted soil had an average growth of 1.12cm. Therefore my hypothesis was accepted.

Light Lovin' Beans

Lately florescent light bulbs have been getting more and more popular due to their energy efficiency. Incandescent bulbs are, of course, still very widely used. These are the two main common household light bulbs. The experiment was done to examine the two different bulbs' effect on the growth of plants. This experiment was done with a control group of twenty-five pinto bean plants that were exposed to direct incandescent bulb (60 watt) light. The experimental group in the experiment was a group of twenty-five pinto bean plants that were exposed to direct florescent bulb (15 watt) light. Results were taken by measuring the height of the bean plants after one week of growth under the lights. The average height of the bean plants grown under the incandescent light bulb was 9.468 cm. The average height of the bean plants under the florescent bulb was 4.884 cm. The data indicated that the incandescent grown plants were significantly taller after a week of growth.

Oh Deery Me!

The purpose of this experiment was to see what attracted the most deer to an area a salt lick or corn. I set up a game camera in my uncle's back yard. Then I set the salt lick down in front of it and spread the corn around in front of it too. I came back the next week and got the pictures from the camera. Throughout the whole week I counted fourteen deer but there was most likely more than that. Thirteen of the fourteen deer ate the corn and one deer licked the salt lick from what I saw from the pictures. So I was correct in saying that there would be more deer at the corn. In addition to there being deer there were also raccoons that enjoyed the corn. I saw that there were more raccoons than deer. There were also squirrels, birds, a cat, and a fox that ate the corn. So eventhough those animals weren't part of my experiment they still helped me know that animals will go for food instead of just the taste of salt. I believe that my experiment is important because it helps hunters know what works best for attracting deer to where they are hunting. It could save them money if they know what works best.