CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

John H. Bell, III

Project Number

J1501

Project Title

Does the Surface Material that a Blood Spatter Lands on Affect Its Shape and Size?

Abstract

Objectives/Goals

I investigated if the surface material a blood spatter lands on affects its width. I used five different materials, glass (control), dry wall, wood, leather, and cloth (cotton). I hypothesized that the widest spatter would be on the dry wall and the narrowest would be on the glass. I cut out five squares of each material. I dropped 0.1cc of mock blood from a syringe from a height of 130cm above the surface. I repeated this for all 50 squares of material. After drying, I measured the width of each spatter with calipers. My results proved my hypothesis wrong. The widest spatter was on the cloth with a width of 9.8mm, the dry wall was 9.7mm. the leather was 9.0mm, the wood was 8.8mm, and the glass was 8.6mm. I concluded that the more absorbent and textured the material the wider the blood would spatter.

Summary Statement

My project demonstrates how the surface material that a blood spatter lands on affect its shape and size.

Help Received

I received help from my parents on the construction of my launch platform. Also, I corresponded with Ronald J. Raquel, a

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Paulomi Bhattacharya

Project Number
J1502

Project Title
The Effect of Biotite Content and Ventilation on Radioactive Emissions from Granite

Abstract

Objectives/Goals
Because radioactive exposure leads to birth defects and other health hazards, this project determined whether biotite content and ventilation have an effect on radiation and radon emissions from various samples of granite.

Methods/Materials
As a scale model for a room in my home, wooden boxes and granite samples were chosen so that the ratio of their volumes was 100:1. The high ventilation box had many large holes to provide sufficient airflow, while the low ventilation box was sealed with sealant and modeling clay. Samples of the commonly installed granite types Costa Esmeralda, Kashmir White, Baltic Brown, and Crema Bordeaux (in order of lowest to highest biotite concentrations) were obtained from granite stores and fabricated to the required size. A Geiger Counter and radon detector were used to measure radioactive and radon emissions respectively. The Geiger Counter sensor was securely taped to each granite sample, which was then placed in the low ventilation box for 6 hours and a measurement was taken every hour. This procedure was repeated with the high ventilation box. The radon detector was placed with each granite sample inside the low ventilation box for 48 hours and then a measurement was taken to obtain a long-term measurement. The same was done in the high ventilation box.

Results
This experiment proved that under low ventilation, high biotite granites emitted more radiation and radon ($p>0.001$) than low biotite granites. However, under high ventilation, the radiation and radon counts of high biotite granites decreased significantly ($p>0.001$). Ventilation had no significant effect on low biotite granites. In fact, high biotite granites under high ventilation radiated the same amount as low biotite granites under low ventilation. Using statistical hypothesis testing methods, the results were found to be significant at levels 0.05 or below.

Conclusions/Discussion
These results show that granites with low biotite are safer to use in a home. If granites with high biotite levels are installed, homeowners should provide sufficient ventilation in order to reduce the radiation concentration. The data obtained in this experiment has a statistical significance at levels 0.05 or below, explaining the accuracy and importance of these findings.

Summary Statement
Using a scale model of a home, this project demonstrates that high biotite granites emit significantly more radiation and radon than low biotite granites, and ventilation reduces the radiation concentrations of the surrounding area.

Help Received
Ms. Lorna Claerbout provided general guidance. Geiger Counter borrowed from The Harker School. Parents bought Radon Detector. Carpenter helped build and seal boxes according to my directions. Granite fabricator helped to cut the granites to the required size.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Andre Bourret

Project Number

J1503

Project Title

How the Temperature of a Magnet Affects Its Strength to Make "7 Inch Nails"

Abstract

Objectives/Goals

The objective of this experiment is to determine whether the temperature of a magnet affects its strength. My hypothesis is that the dry ice is going to make the magnets decrease in strength and the boiling water will make the magnets stronger.

Methods/Materials

When the temperature of a material is increased or decreased, the temperature of a magnet may decrease or increase in strength. For this experiment I used about 500 one inch nails, all the same type; 8 magnets of the same size and strength; a small amount of dry ice to get the magnets to a temperature of -75 degrees Celsius; about a cup of ice water to cool the magnets to 0 degrees Celsius; about two cups of boiling water to heat the magnets to 100 degrees Celsius; and the fourth temperature was room temperature at 20 degrees Celsius.

Results

My graphs show the number of nails the magnets attracted and held after five trials for each of the four temperatures. When the magnets were in dry ice they were stronger and increased in strength after each trial, attracting the nails quickly and holding a larger number of nails. When the magnets were placed in ice water the number of nails it held showed a slight increase and decrease in the number of nails it could hold. The magnets heated in the boiling water as well as the room temperature magnets, proved to be the weakest and decreased in strength after each trial.

Conclusions/Discussion

My conclusion is that my hypothesis was incorrect. The change in temperature made a significant change in the strength of the magnets. The magnets on dry ice were stronger, and magnets in boiling water were weaker. The boiling water made the magnets weaker because the magnets soaked up all of the heat from the boiling water; the magnets also made the temperature in the boiling water decrease. There was no significant changes in the room temperature magnets. Based on the results of my experiment I would like to see how much weight magnets could hold at various temperatures. Also, can a magnet decrease or increase in strength after using it at extreme temperatures multiple times? It would also be interesting to see if the sizes of the objects matter in what a magnet can attract and hold.

Summary Statement

I conducted this experiment to find out how many small nails a magnet can hold after the magnet is exposed to four varying degrees of temperatures.

Help Received

Parents helped gather and purchase materials needed for the experiment; brothers helped count nails.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Alexis D. Camanga

Project Number

J1504

Project Title

Which Filling Materials in Sandbags Block Floodwaters the Best?

Abstract

Objectives/Goals

The objective was to find out if coarse gravel, fine gravel, or soil has the same effect as sand in sandbags for preventing floodwaters. I believe the denser the material, the more effective it will be at blocking floodwaters.

Methods/Materials

I used burlap cloth, sand, soil, fine gravel, coarse gravel, notebook, sewing machine, bucket, 3 empty 2 liter soda bottles, water, stopwatch, and a flood table. First, I made a flood table and 50 bags. I filled half a cup of the first material in some of the bags and stacked them on the flood table so they are as tight as they can be. Three bags on the bottom and 2 on top. I ran a flood by slowly pouring 2.84 liters of water at the start of the flood table and started the stopwatch as soon as the water touched the bags and stopped it as soon as water leaked through the bag into the bucket. I recorded the seepage time. Test was done 3 times with the same materials then repeated using the other 3 materials.

Results

This experiment showed that sand turned out to be the best material to use in sandbags for blocking floodwater. The overall average seepage time of sand compared to coarse gravel was 6.75 sec vs. 1.20 sec. The next best material was soil, then fine gravel, and lastly coarse gravel.

Conclusions/Discussion

In the end, my hypothesis was right. The two materials that stopped the most water were the densest. Those materials were sand and soil. The information gathered from this experiment will help people know the best materials used in sandbags to block floodwaters and to save there homes and lives.

Summary Statement

My project is to determine whether coarse gravel, fine gravel, or soil has the same effect as sand in sandbags to block floodwaters.

Help Received

My dad helped me build a flood table and my sister was the person recording the data in my notebook. My brother also helped control the stopwatch and my mom helped me fill the sandbags.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Andrea M. Cerda

Project Number

J1505

Project Title

Does the Amount of Insulation Affect Inside Temperature?

Abstract

Objectives/Goals

My project was to determine if the amount of insulation you put into a house affects temperature.

Methods/Materials

Two houses with identical size and shape were constructed. One of the houses was built with no insulation inside. The other was built with one layer of insulation. Each time I was finished with one layer of insulation I added another. I did this three times so that there was a total amount of three layers. In my experiment I put ice inside both houses and a heating pad underneath them both. I put ice inside to represent a cooling system. I also put a heating pad inside both houses and both the houses were around a tray of ice. The heating pad was put inside the houses to represent a heater. Each time I had tested I added a layer of insulation. Then I tested thirty trials for each layer.

Results

The insulated house had the lowest temperature with a Celsius of 11.11. The highest temperature was with third layered insulated house with a Celsius of 32.6.

Conclusions/Discussion

In conclusion houses with more insulation, are better for people who like to be cooler in the summer and warmer in the winter. I know this because in my experiment, the more insulation I put inside the houses the cooler or warmer the temperatures got. The more insulation you put the harder it is for the air to escape. Adding more insulation is also useful because it can lower the cost of using the cooler or the heater. Having more insulation will keep a constant temperature, Therefore you do not have to use the cooler of heater for a long period of time.

Summary Statement

My project is about the insulation of a house and if the amount of insulation affects inside temperature.

Help Received

Dad helped make sure the process of building my houses was safe.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Anakaren Chable

Project Number

J1506

Project Title

It's the Cement's Fault!

Abstract

Objectives/Goals

My objective was to determine whether different proportions of cement and sand in different cement mixtures affect the strength of the cement.

Methods/Materials

With parent supervision cut the carton roles into 20 pieces, each measuring 18 cm.Classify into four mixtures:A= 20 % of cement, 80% of sand, 50% of gravel;B= 30% of cement, 70% of sand, 50% of gravel;C= 40 % of cement, 60% of sand, 50% of gravel;D= 50 % of cement, 50% of sand, 50% of gravel. Put a label on each piece of the 20 pieces of carton tubes, then with the permanent marker label them.Place a piece of duct tape at the bottom of all the carton tubes.Prepare cement mixture A in a bucket by mixing cement, sand,gravel, and water.Pour cement mixture A into carton tubes labeled A1, A2, A3, A4.Remove excess from bucket and repeat steps 5-6 using the other mixtures and carton tubes. Place all carton tubes in bucket and let them rest for 48 hours. Remove duct tape from bottom of carton tubes and then peal the carton off from the cement tubes, as you are pealing off the carton rewrite the label of the carton tube on the cement tube. Place jack on top of the scale and inside the wooden frame.Insert the cement tube into the holes of the wooden frame.Discount the weight of the jack until the scale reads 0.Pull the handle on the jack until the concrete tube is fractured. Record pressure.Repeat steps 11-14 for the rest of the concrete tubes. Find average of 5 trials per category of cement mixture.

Results

It took an average force of 641.41 N to break the columns in mixture A; mixture B took an average force of 1078.49 N to break the columns; mixture C took an average force of 1302.52 N to break the columns; mixture D took an average force of 82859 N to break the columns.

Conclusions/Discussion

The amount of cement and sand in a cement mixture does affect its strength. Mixture D, which had an impractical amount of cement then the cement columns in mixtures B and C, should not even be considered because it is not cost effective.In conclusion, the cement mixture of cement mixture C was the best and most resistance out of all the mixtures.

Summary Statement

My project is about determining whether different proportions of cement and sand in a cement mixture affect its strentgh.

Help Received

My dad helped me make the cement mixtures and testing apparatus, My mom helped me glue things to the board, and Mr.Post gave me advice and helped me write in proper format.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Jeffrey D. Chen

Project Number

J1507

Project Title

Using Rubbing Alcohol to Cool Down a Car

Abstract

Objectives/Goals

The objective of this project is to see if spraying rubbing alcohol mixed with water can cool down a car and if so, to determine how effective different concentrations of alcohol would be compared to more conventional ways.

Methods/Materials

Different concentrations of alcohol were individually tested in each experiment by spraying them onto the interior of a car. The time it took to cool the car from 29 degress C to 21 degress C was recorded. These results were compared to cooling a car by more conventional methods such as using air conditioning.

Results

It took 4 min and 30 sec to cool the car from 29 to 21 degrees C using 70% rubbing alcohol, 8 min and 28 sec with a mixture of water and 70% rubbing alcohol, and 10 min and 24 sec with just water. These were significant results due to the fact that the temperature did not change for 9 min when nothing was sprayed. It took 3 min and 49 sec when air conditioning was used.

Conclusions/Discussion

Based on the results of these experiments, rubbing alcohol significantly cools down the car compared to when nothing is sprayed. This was shown by testing the solution with just water, since it took much longer for the car to cool down. Furthermore, the temperature of the car did not change for nine minutes when nothing was sprayed. Although using air conditioning is faster, rubbing alchol does cool down a car significantly on a hot day and saves energy.

Summary Statement

Spraying rubbing alcohol on the interior of a car can effectively cool down the car compared to more conventional methods.

Help Received

Father and sister helped proof read report

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)	Project Number
Matthew P. Denton	J1508

Project Title

Efficiency of a Carbon Filter

Abstract

Objectives/Goals

Adsorption is the process by which activated carbon removes substances from water. Activated carbon is carbon processed to be extremely porous to increase its surface area. The purpose of this experiment is to determine if the amount of total chlorine present in water affects the adsorption efficiency of a carbon filter.

Methods/Materials

Four different tests were run through previously unused carbon filters. A measured amount of simple household bleach containing sodium hypochlorite was added to tap water to achieve inlet total chlorine concentrations of 5 mg/L, 20 mg/L, 50 mg/L, and 80 mg/l. During the tests, the temperature and flow rate were kept constant. 60 liters of water were run through the filter in each test. The last 250 ml of each two liters filtered was tested with Total Chlorine Test Strips to find the outlet total chlorine concentration. Occasionally, samples were only taken after every 4 liters when the data did not change very quickly.

Results

The data showed that about the same percentage of total chlorine was removed at the beginning of all of the tests, but as the tests when on, there was a much lower percentage of total chlorine removed in the higher chlorine concentrations, especially at 80 mg/L. In other words, total chlorine concentrations were much higher in the tests with higher inlet concentrations as more and more liters of water were filtered. Adsorption isotherms are relations that can be used to predict how much material can be adsorbed by activated carbon. The two constants in the Freundlich isotherm were calculated using the experimental data from the 80 mg/L test. This isotherm curve, using the experimentally derived constants, confirmed the measured data and can now be used to predict the total chlorine removal of other inlet concentrations.

Conclusions/Discussion

The activated carbon filters fails much more quickly as total chlorine concentration increases. This was likely due to quicker saturation of the activated carbon, in which case total chlorine was getting through the filter because less total chlorine could be adsorbed.

Summary Statement

The adsorption efficiency of a carbon filter decreases as the total inlet chlorine concentration increases.

Help Received

My parents helped me lift the large water jug during the experiment, and they proofread my report and helped me with the math of the isotherm.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Laelia Z. Fitzgerald

Project Number

J1509

Project Title

Does Fire Retardant Work and Does Its Effectiveness Vary on Redwood, Pine, and Cedar?

Abstract

Objectives/Goals

The problem that the experiment was going to solve was "Does fire retardant work and does it#s effectiveness vary on redwood, pine, and cedar?"

Methods/Materials

For each of the woods, coated with fire retardant and not coated with fire retardant, 50 trials, 300 trials in total, were conducted to see what the average time until combustion was. Each piece of wood was burned on a campfire stove at medium heat. After the piece of wood could sustain combustion for at least 3 seconds after being taken off of the fire, the time until the wood sustained combustion was recorded.

Results

The average time until combustion for the uncoated redwood was 21 seconds, average of cedar was 18 seconds, and average of southern yellow pine was 16 seconds. So, out of the uncoated woods, the redwood burned slowest, cedar burned at a medium rate, and pine burned at the slowest rate.
The other 150 pieces of wood were coated with CeaseFire fire retardant, let dry, and burned. The average time of redwood was 328 seconds, the average combustion time of cedar was 307 seconds, and the average combustion time of pine was 306 seconds. Therefore, redwood had the highest combustion average, the cedar second highest combustion average, and pine the lowest combustion average.

Conclusions/Discussion

The conclusions that could be drawn from this experiment are that redwood is the least flammable of the three most commonly used woods for outdoor purposes. Fireproofing redwood exponentially increases the time until combustion, and if used for an outdoor structure, it could take over 15 minutes to catch fire, long enough perhaps for firemen to put out the impending fire. Fireproofed Cedar and fireproofed Pine are the next best choices, because though they take less time to combust than redwood, they also do take several minutes to combust. Of course, the use of wood for outdoor structures depends also on the mindset of the user. Redwood treated with fire retardant may be the best choice in terms of flammability, and it looks nice and and very good working qualities, it is also expensive and is not so good for the environment, as it takes decades for a single tree to grow. However, if there is going to be an outdoor structure in a fire-prone area, redwood, treated preferably, is the most appropriate wood to use.

Summary Statement

The purpose of my project was to find out if fire retardant worked, which commonly used wood for outdoor purposes it worked best on and to apply that to find out what wood would be most ideal in fire-prone areas.

Help Received

Father, Gerald Fitzgerald, assistance with set up and graphs; Brother, Michael Fitzgerald, assistance recording data; Grandfather, Randy Faulk, cutting wood.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

R. McKay Giller

Project Number

J1510

Project Title

Frugal Firefighting

Abstract

Objectives/Goals

The objective is to find a soap that can be combined with water to create an inexpensive substance that can easily be applied to a home that retards the advance of a wildfire as effectively as other much more expensive products on the market.

Methods/Materials

One half of fifteen different six inch pieces of balsa wood were treated with three different types of soapy substances in the same manner. An open flame was applied to test the retarding capabilities of the various substances and how long it took to burn, if at all. Once that data was collected, it was determined that the car wash soap retarded the fire more effectively. Then the car wash soap was tested against other samples that were either untreated or treated only with water. Several different delivery systems were also tried. The materials used to conduct the experiment included balsa wood, water, Dawn# liquid soap, Zep Car Wash Soap#, Foaming Hand Soap#, an air compressor, Flo Master Sprayer#, Miracle Gro Garden Feeder#, candle, metal rods, alligator clips, metal brackets and a lighter.

Results

Zep Car Wash Soap# mixed with water was the most effective fire retardant of the three soaps tested. The car wash soap was effective for longer than six hours. The Dawn# liquid soap and Foaming Whipped Hand Soap# did not retard the fire longer than two hours. The car wash soap completely stopped the advancement of fire for longer than six hours which is the same as the more expensive commercial products. At twenty hours, it still slowed down and eventually extinguished the fire. The Miracle Gro Garden Feeder# proved to be an easy, inexpensive, and effective application method that anyone could use.

Conclusions/Discussion

My conclusion is that Zep Car Wash Soap# mixed with water through the use of the Miracle Gro Garden Feeder# is an inexpensive and effective method of retarding the advancement of an approaching wildfire and easy to apply to a house.

Summary Statement

My project was to develop a low cost easy to use effective fire retardant .

Help Received

My mom, step dad and brother helped supervise when I was using the open flame to test the effectiveness of the various substances. They also provided financial support and transportaiton to home improvement stores.

Name(s)
Grant M. Harmon

Project Number
J1511

Project Title
Predicting the R50 of High Energy Electrons

Abstract

Objectives/Goals
The goal of this experiment is to see if I can accurately predict the R50 of high energy electron beams produced by a medical linear accelerator. The R50 is the thickness of water or tissue that an electron beam must travel through in order to reduce the dose of radiation to 50% of the maximum dose. The R50 is used to determine how far an electron beam will travel inside a cancer patient being treated with a linear accelerator. This information is used to make sure that an adequate dose of radiation will be delivered to a tumor and that only a safe dose will be given to the normal tissues. My hypothesis is that after I measure the R50 for three different energies of electron beams I will be able to predict the R50 for other electron beams.

Methods/Materials
I used a Varian linear accelerator to produce five energies of electrons. A parallel plate ion chamber was used to calculate the dose of radiation that had traveled through different thicknesses of solid water. Solid water is a material with the same density as water and tissue. Every reading was repeated three times and averaged. After ion chamber readings were obtained for 6 MeV, 9 MeV, and 12 MeV, I created depth-dose curves for each energy of electrons. These curves allowed me to find the maximum dose of radiation for each electron beam (Dmax). From these curves I then determined the thickness of solid water that was needed to cut the dose of radiation in half. This is the R50 and it is measured in cm. I then plotted the energy of electrons in units of MeV vs. the measured R50s in units of cm. I extrapolated a linear best-fit-line and predicted the R50s for 16 MeV and 20 MeV. I repeated the experiment and found the actual R50s for 16 MeV and 20 MeV.

Results
From my data I predicted the R50s for 16 MeV and 20 MeV to be 6.4 cm and 8.2 cm. After I repeated the experiment, I determined the measured R50s to be 6.5 cm and 8.0 cm for 16 MeV and 20 MeV respectively. These results show that I can accurately predict the depth of tissue where the dose of radiation is reduced to 50% of the maximum dose.

Conclusions/Discussion
The data supports my hypothesis. The predicted and measured R50s are very close. This experiment has real world applications. Being able to predict the range of high energy electrons through tissue will allow for safer and more effective use of ionizing radiation in the treatment of cancer.

Summary Statement
I studied high energy electron beams produced by a medical linear accelerator and was able to accurately predict the dose of radiation in a tissue equivalent material.

Help Received
Jason Durant operated the equipment for my experiment and my dad helped me do research and answered many of my questions.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Eric A. Hauser

Project Number

J1512

Project Title

Clothing Material Matters

Abstract

Objectives/Goals

My objective was to determine the insulating properties of different fabrics under different environmental conditions. I wanted to verify or refute some sayings like, "Cotton kills"," Wool is warmer" and "A space blanket can save your life".

Methods/Materials

My experimental model was a hot water filled container that lost a constant amount of heat to the environment through different fabrics as its temperature decreased by 5° C. By measuring the time for the heat to be lost, the relative insulation performance of each fabric could be determined. Four different environmental conditions: Dry, Wind, Wet (simulating falling into a lake and getting out) and Wet Wind were used. 5 materials: Cotton, Thin Wool, Thick Wool, Windzone (a synthetic polyester fleece) and Space Blanket plus a control with no fabric were tested in each of the 4 conditions. A ThermaData Logger thermometer with two probes stored the water temperature for two simultaneous experiments at six second intervals and could be downloaded into my computer. The weights of the same sized material pieces were also measured to compare the fabrics with compensation for weight differences.

Results

Cotton was the worst performer in all conditions. Cotton in wet conditions allowed very rapid heat loss and was worse than control! Windzone was a top performer in all conditions, well above control. Space Blanket also did very well in all conditions and when weight was considered it blew away the competition by a factor of 10-20. Wool did not do very well in Wet for this model of heat loss right after an immersion in water. Thin wool was only a little better than cotton in the wet and was worse than control. The results for thick wool were mixed with below control results in the wet though it did outdo control in wet wind. It was noted that wool dried very fast compared to cotton so not long after the test period it began to insulate like dry wool again.

Conclusions/Discussion

If I fall into a river out in the cold and wind, my experimental data suggests that the best plan is to get out of my cotton and wool clothing (Windzone could be left on), and wrap up in my space blanket in a nice wind sheltered area while the woolen clothing is drying. Cotton can kill, wool is not warmer than a good synthetic fleece and I am always going to include a superlight and compact space blanket in any emergency kit.

Summary Statement

In my project I compared the thermal insulation of different clothing materials in a variety of environmental conditions.

Help Received

Mother helped organize board; Father bought ThermaData Logger thermometer; Patagonia gave clothing material samples.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Will J. Hettel

Project Number
J1513

Project Title
Playing with Fire: Fabrics in Flames

Abstract

Objectives/Goals
I did this project to see which fabrics are safe or unsafe and why by measuring how fast they burned in relation to their physical properties.

Methods/Materials
Materials:
1. Different types of fabrics; 2. Burner; 3. Thermometer; 4. Micrometer; 5. Balance scale; 6. Stopwatch; 7. Graduaded cylinder; 8. Goggles; 9. Gloves; 10. Kiln shelf.
Procedure:
1. Take all flammables out of the burning area; 2. Check temperature (55˚F-60˚F); 3. Fill the burner with fluid until it is full; 4. Test burner; 5. Place the fabric sample on the burning stand; 6. Set the burner so it releases the right amount of gas to make a controlled flame; 7. Ignite the fire and start the timer; 8. Once the fabric catches on fire, stop the timer and throw the fabric into a bucket of water; 9. Record data; 10. Repeat steps 5-9 eleven more times; 11. Take average of 12 data points (or less if something goes wrong with some measurements # 10 is typical); 12. Repeat steps 3-10 burning each type of fabric.

Results
Bleached Harem Cloth burned the fastest, silk didn#t burn. Thickness, volume, and mass determined the ignition times. Weave density and fiber density didn't determine ignition time.

Conclusions/Discussion
My hypothesis was correct. If I were to do this again, I would use more samples and pay more attention to the possibility of fire retardants.

Summary Statement
I did this project to see which fabrics are safe or unsafe and why.

Help Received
My dad helped me graph the data; My mom helped me measure ignition times and buy equipment; My science teacher let me use his balance scale

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Tyler Jones; Samuel Recchio

Project Number

J1514

Project Title

Weak vs. Strong

Abstract

Objectives/Goals

To test the strength of wood by using a battering ram.

Methods/Materials

Materials: Battering ram materials 1) wood 2)nails 3) saws 4)sheet metal 5)rope 6)drill 7) file for sanding

Wood: 1) Douglas Fir 2) Redwood 3) White Oak

Method: 1) Battering ram was designed and created using the above matierals. 2) Adult was used to operate the saw 3) All other tools were used by student.
4. The three types of wood were purchased and kept in a room for two weeks prior to the experiment to guarantee as much as possible that they contained the same amount of moisture. 5) The pieces of wood were put into the battering ram one at a time. 6) The same person pulled the battering ram back and forward in an attempt to make sure the same amount of force was being used when the wood was tested. 7)The experiement was video taped and photographed. 8) The wood was used to break cinder block 9) Observations were made by several people who were asked to rate the amount of damage done to each piece of wood 10) Experiment was done three times to verify results.

Results

Redwood was the strongest. White Oak was the weakest. The Douglas Fir was weaker than the Redwood but stronger than the White Oak.

Conclusions/Discussion

All woods do not have the same strength. Strength of wood should be a factor when building or using wood.

Summary Statement

Our project is testing the strength of different woods

Help Received

My dad used the electric saw. He taught me how to use the screwdrivers, drills and handsaw. My mom helped get the photographs developed and took us shopping for the supplies for the board.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Lucas R. Kirby

Project Number
J1515

Project Title
Turf vs. Grass: The Ultimate Comparison

Abstract

Objectives/Goals
The objective of this experiment was to determine whether a ball's roll length varied on artificial Turf versus natural grass.

Methods/Materials
The experiment used a soccer ball, tape measure, a regular grass field, a Turf field, and a controlled kicking device. The experiment also used two saw-horses, a metal bar, a sledge hammer, a mason's level, a soccer cleat, and connecting materials, in an invented kicking device that strikes the soccer ball with controlled amounts of force. The distance that the ball traveled was measured with the tape measure. There were two different kicks: a lower impact kick, and a higher impact kick. This procedure was repeated on both surfaces multiple times in four directions, to control for slope. The experiment was conducted under common weather conditions to control for dampness, heat, and other factors.

Results
The kicking device successfully propelled the ball on a consistent rolling pathway, sustaining contact with the surface and thus testing the friction. This experiment showed that on average, the ball traveled 81% farther on the Turf field on the higher impact kick, and 88% farther o the lower impact kick. On Turf, the overall big kick average was 40'3" and on the small kick it was 20'3". On the natural grass surface, the overall big kick average was 22'3" and on the small kick it was 10'9".

Conclusions/Discussion
These results showed that when struck with the same force, a soccer ball rolls almost twice as far on Turf than it does on grass. Therefore, a soccer ball can be kicked softer on Turf tan on grass and still travel the same distance. Soccer players should adjust their play accordingly.

Summary Statement
This experiment tests and proves that a soccer ball will roll farther on artificial turf versus natural grass.

Help Received
Mother helped type application; father helped carry kicking device to fields and took photographs during testing.

Name(s)
Julie M. Korsmeyer

Project Number
J1516

Project Title
Best Fake Blood

Abstract

Objectives/Goals
My purpose was to find out which of the 3 fake bloods I chose was the closest to real blood.

Methods/Materials
My first step was to make all the different types of fake blood recipes I had chosen. I did the splatter test first. 0.25 ml of samples were dropped from a 3 ft height. I had to go through and make a splatter 3 times for each blood and then measure the diameters of all of them. My second part was the flow. I set up a tilted board at 21 degree angle, each drop 0.25 ml of blood flowed down the paper for 15 seconds, measured the distance and repeated it 3 times for each blood. Then my mom (an adult had to do this part) did the splatter and flow for the real blood from chicken liver. I measured the real blood, made graphs and wrote my conclusion.

Results
When we tested the splatter, the average of B1 was 1.4361 in while Real Blood had an average of 1.121 in. In the flow test, B1 had an average of 28.5 cm of distance traveled while Real blood had a 27.3 cm average distance. Comparing all 3 fake bloods to real blood, B1 was closest.

Conclusions/Discussion
My hypothesis, that B1 would be closest to the real blood, was correct. For both splatter and flow, B1 mimicked Real Blood the best. The most important factor of this whole project had to do with the consistency of the fake bloods. Other tests might have different results than this one. I recommend other tests such as the way blood looks after it dries, how long it takes to dry, the dragging marks, the spraying pattern and how it stains.

Summary Statement
This project was to find out which of the 3 fake bloods was the closest to real blood.

Help Received
My Mom for putting up with me, giving me all the supplies, helping me keep on track and helping me on my experiment if it was needed. Mr. Espinoza for being an awesome teacher, answering my questions, and helping me understand the Scientific Method. SCCBEP for loaning me the Caliper and Tube Racks.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Joel L. Kosmatka

Project Number

J1517

Project Title

Planes, Panes, and Automobiles: Quantifying the Transmission of Ultraviolet Light

Abstract

Objectives/Goals

It is well known that cumulative doses of ultraviolet light can lead to deadly skin cancer and cataracts. In my project, I wanted to test the variation of UV light throughout sunny and rainy days followed by testing different products that were able to block dangerous ultraviolet light. I decided to test sunscreens, eyeglasses, home window films, car windows, and aircraft windows.

Methods/Materials

I quantified nearly 20,000 readings in my experiment. I tested ordinary glass and four other window films; ultraviolet treated acrylic used in aircraft windows, various car windshields and two SPF 30 and three SPF 50 sunscreens to see how well they blocked ultraviolet light. I tested the substances by using a Styrofoam box to block out any other ambient ultraviolet light and using Vernier software and equipment. I took 180 sample readings for each substance I tested.

Results

I compared home window films. The bronze window film blocked the most ultraviolet light. Ultraviolet treated acrylic material used in aircraft windows blocked more ultraviolet light than any of the coated glass home windows. Automobile windows also blocked much of the ultraviolet light. Windshields blocked much more UV light than the side windows. The eyeglasses I tested showed that ultraviolet protective eyeglasses offered much better protection from UV rays than untreated eyeglasses. I tested five different sunscreens. The most expensive sunscreen (SPF 50) contained titanium particles. This sunscreen blocked the most UVA light although my least expensive SPF 50 sunscreen blocked the most UVB light.

Conclusions/Discussion

Products such as aircraft windows, automobile windshields, UV protective eyeglasses and home window UV films all effectively lowered transmittance of ultraviolet light. All of the sunscreens tested (SPF 30-50) blocked at least 90% of the ultraviolet light that was present.

Summary Statement

In my project I tested the amount of ultraviolet light present over the course of a day and a variety of materials used to reduce UV light transmission, including tinted home windows, automobile windows, aircraft windows, eyeglasses and sun

Help Received

Vernier Software and Technology supplied equipment, my parents gave guidance and support, my science teacher helped explain some of the research.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Alexander R. Lay

Project Number

J1518

Project Title

The Effect of Insulation Type on Temperature Drop inside Identical Boxes Placed in a Refrigerator

Abstract

Objectives/Goals

The objective of this investigation was to learn if textile scraps could be used as a successful insulation. The experiment compared shredded fabric to fiberglass insulation and no insulation.

Methods/Materials

Three 12" and three 4" square cardboard boxes were made. The small box was placed inside the large box and the 4" of surrounding space filled with either shredded fabric, fiberglass insulation or no insulation. A digital thermometer probe was placed in the small box, then the lid was sealed and the box was placed in the refrigerator for 2 hours. Temperature readings were recorded every ten minutes.

Results

The results of the data collected through observations showed that the temperature dropped the slowest in the box insulated with shredded fabric.

Conclusions/Discussion

The results supported the hypothesis that if the temperature drop is measured inside a box that is insulated with either fiberglass or shredded fabric and placed in a refrigerator for two hours then there will be less of a temperature drop inside the box insulated with shredded fabric.

Summary Statement

This projext compares the insulation properties of recycled shredded fabric and commercial fiberglass insulation.

Help Received

Mother supervised using boxcutter to make cardboard boxes and cut the fiberglass insulation.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Claryce N. Lazerson

Project Number

J1519

Project Title

Rosin vs. No Rosin: The Big Showdown

Abstract

Objectives/Goals

Horsehair with rosin will be the best materials to use on the bow to produce the clearest and most solid sound on the violin.

Methods/Materials

Using an inexpensive bow, play the violin without rosin on the bow. Record by describing the type or level of sound the violin makes. Rosin the same bow 100 times. Play and record the sound. Take the bow apart and replace the horsehair with surgical thread, gold thread, fishing line and dental floss and repeat the same procedure, first without rosin and then by applying rosin to each material and recording the sound it makes.

Results

Horsehair without rosin produced little sound and a hint of scratchiness. The bow slid across the string and there was no friction. With rosin, the sound was clear and there was much friction between the bow and the string. Surgical thread without rosin produced a scratchy and hollow sound and there was no friction between the bow and string. With rosin, the sound was wavering and hollow. There was little friction. Gold thread without rosin, produced a light, feathery sound, but there was still little to no friction. As the thread was being rosined, it squeaked. With rosin, the sound was much louder and clearer, but not quite as clear as the horsehair with rosin. Dental floss without rosin produced little friction. The coating on the dental floss rubbed off on the string. As the bow was being rosined, the dental floss gradually deteriorated and started to fall apart. The sound was no different. It was just a little, wavering sound, though not as hollow as some of the other materials.

Conclusions/Discussion

Horsehair proved to be the best material out of all the materials that I used. Rosin clearly was needed to produce sound. Without rosin, all materials made little if any sound and slid across the string, producing a minimal amount of friction and therefore, a scratchy or hollow sound was made. With rosin, the sound was better on most of the materials I used, but the best example of a distinction between using rosin and not using rosin occurred with the horsehair.

Summary Statement

I wanted to determine whether rosin was needed to produce a solid, clear tone on the violin using various materials including horsehair.

Help Received

My mom helped with research, disassembly/assembly of the bow; Mrs. Wilson gave me suggestions; my friend's mom supplied the surgical thread; California Keyboard for advice on disassembling the bow.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Justin G. Lee

Project Number

J1520

Project Title

Water, Lawn, and Astroturf: How Do Ground Materials Transfer Solar Heat?

Abstract

Objectives/Goals

The purpose of this project is to find out how solar heat is being absorbed, conducted, and radiated by different ground materials. What ground material is the friendliest to its surrounding by having the least increase in its surface and surrounding temperature when heated and retaining heat the best when cooled.

Methods/Materials

Six ground materials (lagoon water, lawn, Astroturf, sand, soil, and asphalt) were placed under a 250 watt heat lamp to check the change in temperature of each material with the heat lamp on and then off for 30 minutes respectively. Temperature measurements were taken on the material surface, 1 inch below the surface and on the ambient air to examine how the materials absorb, conduct and radiate heat.

Results

The experimental results showed that Astroturf transfers heat mainly through absorption and radiation with very little conduction. Water absorbed and emitted heat much slower than solid ground. The temperature data supported my hypothesis that water has the lowest temperature gain when heated and the lowest heat loss when cooled.

Conclusions/Discussion

Water is the friendliest ground material to the surrounding. Lawn is the second friendliest with a low sub-surface temperature and moderate surface and air temperature. The most unfriendly ground material is Astroturf with the highest surface and air temperature.

Summary Statement

My project was about examining how different ground materials transfer solar heat to its surrounding.

Help Received

Mom helped with purchasing materials and editing my report. Dad suggested hanging the heat lamp on a tripod and provided advise on the layout of the display board.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Rachael M. Metzger

Project Number

J1521

Project Title

Metal Corrosion

Abstract

Objectives/Goals

The objective of this project was to determine which metal resists corrosion the slowest, aluminum, brass, copper, iron, or lead, when placed in bottled water, tap water, and salt water. Upon research, the majority of websites indicated that brass would rust the slowest. The project also investigated whether the type of water had an impact on the rate of corrosion.

Methods/Materials

Two-inch strips of aluminum, brass, copper, iron, and lead were cut and submerged into three types of water: tap water, bottled water (Chrystal Gysier) and salt water; made by dissolving 8 grams of sea salt with bottled water. Each clear plastic container held one cup of liquid and maintained a median temperature of 70°. Observations and measurements were logged every two days for sixteen days. In order to not disturb the metal strips, corrosion was measured by visually estimating impact to surface cover.

Results

At the end of the sixteen-day experiment, lead and then aluminum showed the most resistance to corrosion in any water type, while iron rusted the most. Bottled water impacted only 1 of the 5 metals (iron) tested, but salt water impacted 4 of the 5. The rate of corrosion on iron submerged in tap and salt water was 2-½ times quicker than the rate of corrosion in bottled water.

Conclusions/Discussion

During the experiment, brass turned out to rust in tap water, disproving the hypothesis. The conclusion is that lead has the most resistance to corrosion. Bottled water proved to slow the rate of corrosion on all metal types. Future experiments should include extending the length of the experiment; use distilled water instead of bottled water; include an acidic solution; and develop a better method of measuring the impact to the metal surface, either by creating a line grid on the metal strips or by having multiple strips submerged so you can take each one out of the water for testing.

Summary Statement

What metal, aluminum, brass, copper, iron, or lead, corrodes or rusts the slowest when placed in salt water, tap water, or bottled water and what impact, if any, does water type have on the rate of corrosion?

Help Received

Mother helped with Excel spreadsheets and graphs, and provided input on the display board.

Name(s)

Erin M. Miller

Project Number

J1522

Project Title

Measuring Fruit/Veggie Batteries' Efficiency

Abstract

Objectives/Goals

I read that lemons and potatoes can act as batteries and drive a small clock. I wondered what fruit or vegetable would make the best "veggie" battery? I hypothesized that the fruit/vegetable with the lowest pH level (most acidic) would perform best.

Methods/Materials

I did 5 tests on 16 fruits and vegetables:
1) Measured pH.
2) Did the fruit/vegetable run a small clock? 5 didn't!
3) Measured the volts generated by the fruit/vegetable when not running the clock (no work).
4) Measured the volts generated when running the clock (clock volts). I compared the "no work" voltage to the "clock volts."
5) Counted the number of people holding hands (completing the circuit) before the clock no longer ran.

Results

Of the 16 fruits/vegetables tested, the RED CHILI PEPPER won the battery contest and the BRUSSEL SPROUT lost.

Strangely, some batteries like the lime, couldn't run the clock but otherwise were similar to "good" batteries. I retested the lime using a different lime. It did run the clock but it was still one of the poorer performing fruits or vegetables.

Conclusions/Discussion

Surprisingly, pH does not predict the best fruit/vegetable battery. The best veggie batteries generate more volts when they are working (running the clock), usually 0.55 volts or higher. They have less fall off in voltage when they are running the clock versus when they aren't running the clock, often declining only 0.10 - 0.15 volts. They drive more volts through a bigger "circuit", usually 13 people or longer.

Summary Statement

My project seeks to identify the "best" fruit or vegetable battery by running a series of experiments to measure efficiency.

Help Received

Mother typed part of my report and bought the produce; Father demonstrated how to use a Voltmeter; neighbor Jim Martin showed me how to make Excel charts and graphs.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Elexis S. Padron

Project Number

J1523

Project Title

Investigating the Heat Resistance Level of Different Types of Countertop Materials

Abstract

Objectives/Goals

My objective was to determine which countertops are best at taking extreme heat

Methods/Materials

Obtained 12 X 12 inch slabs of common counter top materials: granite, wood, laminate, and ceramic. Exposed one section of material to heat from a blowtorch for time intervals of 30 seconds, 60 seconds, 90 seconds, and 120 seconds. I then took the temperature in degrees Celsius of the side of the material NOT directly exposed to heat. Recorded and compared the data along with any other observations of damage to material.

Results

Hardwood counter tops have the least amount of heat transfer, but the most visible damage. Granite came in a close second for heat transfer, but had very little visible damage. Ceramic was the worst; it completely shattered at about 75 seconds.

Conclusions/Discussion

My conclusion is that granite and hardwood counter tops are the best materials to use in new homes; they take heat very well.

Summary Statement

My project's purpose is to see which countertops are most appropriate for certain housing conditions and to examine how well they take extreme heat.

Help Received

Father helped with blowtorch; Mother helped put the board together (cutting and glueing straight)

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Sumana Rallapalli

Project Number

J1524

Project Title

Tribo-Light AM: Continuous Triboluminescence and Radio Emission from a Safe, Portable, Low-Cost Generator

Abstract

Objectives/Goals

Develop a low-cost, safe, portable, classroom-friendly continuous triboluminescence generator to study the physical properties of this phenomenon.

Methods/Materials

Sucrose and Wint-O-Green Lifesavers both emit brief flashes when struck/ground, but only peeling adhesive tape emits continuous triboluminescence visible in a dark room. Three tape-based generator versions # manual hand-crank, electric eggbeater, and Lego-based # were constructed. A super low-lux CCD camera was used for live viewing/recording. Sound and radio signals were recorded using a portable microphone and radio connected to a laptop computer to determine whether the tape produced radio emission. Linear filters were used to detect polarization. The spectrum of the light was captured using a quantitative spectroscope and compared with the published spectrum of nitrogen.

Results

Continuous triboluminescence is emitted with partial polarization at the unwinding end and, surprisingly, flashes were emitted at the rewinding end also. Color photos and video of the light were captured. Fairly strong radio emission was detected. The spectrum was similar to nitrogen.

Conclusions/Discussion

Peeling tape is the safest, cheapest, and most portable method for generating and studying the properties of triboluminescence. The hand-crank version is cheapest and best for photography and recording sound and radio emissions but requires a dark room and manual effort. The eggbeater version is inexpensive and effortless but too fast. The Lego version has programmable speed control and is a portable and safe way to generate triboluminescence in classrooms, but is more expensive. Visible light was recorded continuously at the unwinding end and appears to be partially polarized. Light flashes were recorded at the rewinding end and all over the tape. Spectral analysis proves that emission is due to fluorescence of nitrogen. Fairly strong radio emissions were recorded at normal atmospheric pressure between 1100 and 1500 KHz. Sound, light and radio emissions are time-correlated.

Summary Statement

Developed safe, low-cost, portable continuous triboluminescence generators using adhesive tape and analyzed properties of the energy emitted.

Help Received

Dr. Carlos Camara (UCLA) showed tape based x-ray emission that inspired me to use tape. My family and advisor helped me understand concepts, plan board, edit report, and purchase materials.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Janel S. Self

Project Number

J1525

Project Title

Stop the Noise

Abstract

Objectives/Goals

Which material dirt, foliage, wood, or cement will do the best job at blocking out traffic noise?

Methods/Materials

Four barriers were built (wood fence, cinder block, stack of leaves, and stack of dirt) each 120 cm by 120 cm and I recorded 10 minutes of traffic noise. I placed the tape recorder 120 cm from each barrier. For each type barrier, I recorded the decibel level from behind the barrier. Also, I recorded the decibel level without any barrier. I repeated the experiment twice.

Results

Dirt did the best job at blocking traffic noise. Without a barrier, the decibel level was 65.2. Dirt reduced the decibel level by 24.2, but it had the most variance between the two tests. Cinder blocks were neck and neck with dirt. Cinder blocks reduced the decibel level by 22.1. Wood did not do as well as dirt or cinder blocks, but it was not that bad. Wood reduced the decibel level by 18. Leaves were slightly better than no barrier and reduced the decibel level by 4.

Conclusions/Discussion

My hypothesis was wrong. Dirt was the best at blocking noise. However, I would recommend a cinder block wall because it was very close to dirt, but much easier to build.

Summary Statement

Which material dirt, foliage, wood, or cement will do the best job at blocking out traffic noise?

Help Received

My mother helped me build the wood fence and worked the stop watch during the experiment. She also showed me how to make charts and graphs. My dad helped me gather leaves.

Name(s)

Julia R. Solazzo

Project Number

J1526

Project Title

Should Your Basketball Be Green?

Abstract

Objectives/Goals

My objective was to learn if extreme climatic temperature changes would affect the bounce height and pressure of basketballs and if a recycled ball would perform as well as a synthetic or rubber basketball.

Methods/Materials

Materials and Equipment: Butcher Paper, Pump, Digital Pressure Gauge, Yard Stick, Sony camera-handy cam, Tripod-magnum XL, Cooler, Thermometer, Turkey Bags, Ice, Hot Water, Rubber Basketball, Recycled Basketball, Synthetic Basketball

Methods: All balls were placed in an area at room temp. for 2 hours. The room temp. was measured using a thermometer. The balls were all dropped from 10 feet individually and the height was measured by using a video camera. The balls were dropped 10 times, and in between each drop the pressure was measured. Then the balls were sealed in bags and put in a cooler filled with ice for two hours, and the process used above was repeated for dropping the ball. The same process was repeated when the balls were placed into hot water.

Results

Measurements: The raw data included 90 data points recorded for bounce height (cm) and 90 data points recorded for pressure (kgf/cm2). The raw data will be available for review at the science display. The "mean" results for bounce height and pressure across low (0C), ambient (22C), and high (48C) temps were:

- Synthetic: low (181cm,0.509kg), ambient (214cm,0.597kg), high (224cm,0.657kg)
- Rubber: low (201cm,0.534kg), ambient (225cm0.599kg), high (240cm,0.676kg)
- Recycled: low (195cm,0.502kg), ambient (225cm,0.599kg), high (238cm,0.646kg)

Conclusions/Discussion

With an extreme temperature change, the bounce height and pressure increased at the high temperature and decreased at the low temperature. However there was not a lot of variation across the balls. These results were consistent with the Ideal Gas Law (PV=nRT). Rubber balls were the least affected by the change of temperature, and the synthetic balls were the most affected. The affect on the recycled ball was less than synthetic and less than but similar to rubber. Since the recycled ball is better for the environment, and since its performance is better than or equal to other leading outdoor basketball types(synthetic and rubber), then...YOUR BASKETBALL SHOULD BE GREEN!

Summary Statement

The project determines if recycled basketballs (better for the environment) perform as well as other balls.

Help Received

Father reviewed work as a mentor and videotaped; Mother assisted with board layout.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Sierra A. Stingl

Project Number
J1527

Project Title
Algae Fuel to the Rescue!

Abstract

Objectives/Goals
Can algae be cultured to help produce a bio-diesel fuel? Can oil be extracted from the algae? How will the characteristics of this Algae Fuel such as burn time and temperature compare to regular #2 diesel fuel?

Methods/Materials
* Bleach all materials being used and rinse
* Pierce the caps of two 2 liter bottles and connect 50mL tubing to each
* Insert tubing to the bottom of the bottles
* Connect tubing to a 4 gang manifold and connect to an air pump
* Set up a fluorescent light next to the culturing bottles
* Pour sterilized water and algae into the bottles
* Feed algae 0.3 mL of nutrients using a 1 mL Monojet syringe
* After 2-3 weeks harvest the algae by pouring liquid through coffee filters
* Mix dry algae with sterile sand and blend thoroughly
* Add 50 mL 91 octane gasoline
* Boil the mixture
* Extract algae oil by adding 25 mL #2 diesel fuel and pouring through 2 coffee filters
* Take 1 mL of the produced Algae Fuel and light on fire
* Record time that the product burns and the temperature increase of 10 mL of water
* Repeat 10 times
* Take 1 mL #2 diesel fuel and repeat 10 times as above

Results
Results indicate substantially longer burn times for #2 diesel in comparison to the Algae Fuel. Heat production data is still being compiled. Algae Fuel produced less visible smoke and left less residue in the mortar indicating a cleaner burn.

Conclusions/Discussion
I conclude that algae can be cultured to make burnable oil, that this algae oil is extractable, and that the algae oil can be mixed to make Algae Fuel. This fuel has the ability to produce heat and run an engine, although less effectively than the regular #2 diesel fuel. The Algae Fuel burned cleaner and was less toxic than the regular #2 diesel fuel. The question remains, is the world ready to begin producing bio-diesel fuels such as Algae Fuel?

Summary Statement
I produced an algae based bio-diesel fuel and compared the burn characteristics to regular #2 diesel fuel.

Help Received
E-mailed an engineer to ask questions when I was confused.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Isaac Y. Trotta

Project Number

J1528

Project Title

Strength of Earth for Earthbag Construction

Abstract

Objectives/Goals

The objective is to determine the strongest combination of fill materials for an earthbag structure to be used for a medical clinic and homes in Tonj, Sudan.

Methods/Materials

Different combinations of fill material were compacted into samples to determine the strongest ratio. The fill materials used were portland cement, lime, all purpose sand, soil and water. Thirty combinations were compacted into core samples, allowed to cure for 16 days and then were tested for strength using an Istron testing machine.

Results

The results showed that the sample with 10 parts sand and 2 parts cement proved to be the strongest ratio. The strongest samples were the samples with cement and a high percentage of sand.

Conclusions/Discussion

In conclusion, a fill ratio with a high sand content and cement produces the strongest samples. I would also like to find if I could lower the cement content and still be strong enough for construction in order to reduce the cost of materials.

Summary Statement

This project determines the best combination of fill material to use for earthbag construction.

Help Received

Mother helped with board layout. Father helped type report. Ted Miyake provided Istron testing machine, Trey West helped test the core samples, Galyn Thompson provided advice and direct application of finding.