CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Jeremy E. Barenholtz

Project Number
J1501

Project Title
I Scream, You Scream, We All Scream for Ice Cream!

Abstract

Objectives/Goals
The objective of this experiment is to compare three different types of ice cream, with different fat contents, to see which one melts the fastest or slowest.

Methods/Materials
Three different types of ice cream were made using the same ingredients except for the type of cream used in each. One had half and half cream in it, one had whipping cream in it, and one had heavy whipping cream in it. The three different types of ice cream were scooped into quarter cup measurements and were placed in identical glass bowls, then set on a table in 73 degrees Farenheit temperature, to melt. The time was noted as each type of ice cream's structure collapsed, indicating that the ice cream was completely melted. This experiment was conducted three times in total.

Results
The ice cream with the least fat content (half and half ice cream, containing 12% fat content) had the fastest melting rate by on average four and a half hours. The ice cream with the second least fat content (whipping cream ice cream, containing 30% fat content) melted the second fastest, approximately two hours faster then the heavy whipping cream ice cream, which contained approximately 37% fat content.

Conclusions/Discussion
The ice cream containing the least amount of fat melted the fastest. The hypothesis of this experiment was correct; as the fat content of the ice cream was increased the melting rate of the ice cream decreased.

Summary Statement
This project attempts to determine if the fat content of ice cream affects its melting rate.

Help Received
Mother helped in making the ice cream, Mother and sister helped in scooping the ice cream into quarter cup measurements.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Jennifer L. Bitterly

Project Number
J1502

Project Title
Red Hot Magnets

Abstract

Objectives/Goals
When deciding on this experiment, I wanted to know if magnets were affected by heat, and if so, to what extent. In my hypothesis, I stated that if the temperature increases, then the magnet's level of magnetism will weaken.

Methods/Materials
I used the force of repulsion to test the strength of the magnet at room temperature, in two heated temperatures (121 and 260 degrees Celsius), and in another final room temperature run. My device held two alnico magnets, with opposite poles facing each other. Looking through the slit in the stainless-steel tube, I continually added weights to the top magnet and progressively watched the distance shrink until the two magnets touched. Because weight is a force, the weight added upon the first magnet must be equal to the force of repulsion that is stopping the two magnets from touching.

Results
The room temperature had 1.437 N added on the magnet before the magnets finally touched. The 1st oven temperature, 121 degrees Celsius, has a touching point when 0.790 N were added, and in the hottest oven temperature (260 degrees Celsius) only 0.554 N were needed to make the magnets touch together. Also, when I did the final room temperature after the apparatus cooled down, the touching point for this run was when 1.215 N were added, which was 0.222 N less than what was needed for the 1st room temperature run.

Conclusions/Discussion
My results proved my hypothesis: higher temperatures really did affect the magnetic force. The level to which the magnets lost their magnetism was surprising. Although alnico's curie temperature is about 860 degrees Celsius, I could already see the magnets beginning to lose their magnetism just from 260 degrees Celsius! Part of this loss was permanent, as I saw when I did my second room temperature run.

Summary Statement
I used the repulsive force of magnets to determine whether magnets lost some of their magnetism when placed in high temperatures.

Help Received
My Father supervised me throughout the experiment, helped teach me the error analysis and curve-fitting techniques, and let me use his equipment.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Lucas Brumm

Project Number
J1503

Project Title
Do You Need Proof That Acid Rain Will Deteriorate Your Roof?

Abstract

Objectives/Goals
My science fair project will demonstrate which type of roofing material will resist deterioration due to acid rain. Acids can be measured using the pH scale from 1 to 14. Acids are on the lower end of the pH scale with neutral (pure water) being 7. Acid rain can have a pH ranging from 1 to 4. Acid rain can be formed in the atmosphere when Sulfur Dioxide and Nitrous Oxide combine and react with water, oxygen, and other oxidants in the clouds.

Methods/Materials
I will create a controlled experiment. I will place 1 wooden shake shingle, 1 asphalt shingle, and tile shingle in the 9-1 pint jars after recording the beginning weight of each sample. I will keep the samples in the water and the acid for 12 days. I will place a set of roofing materials (1 tile, 1 shake, 1 asphalt) in rain water, and a set in pure water, and the final set in acidified water. I will weigh each material before and after the project. I will also observe the liquids for clarity using the scale of 0 for clear and 10 for opaque after the project to determine the amount of material leeched into the liquids. Then I will dry each sample. After they are dried we will weigh them to get the results. We will use comparative weight losses for each material after drying since we don't have a good method to determine beginning or ending moistures. The 2 water samples will be used as a control.

Results
In conclusion, it appears that the acid rain affected the concrete roof tile the most followed by the asphalt roofing. Looking at the data, the cedar shake material all lost the same amount of weight whether immersed in the pure water, rain water, or acidified water. Since all these samples had to be dried after the test, it looks like the wood all lost the same amount of weight relatively. I can only conclude that since the wood all lost the about same amount of weight, the acidified water had little to no affect.

Conclusions/Discussion
Since my hypothesis was that the acid rain would deteriorate the wood at a faster rate, I was a little surprised that the concrete actually deteriorated faster compared to the water controls. I found an article called #A material loss; acid rain is leaving its mark on buildings, statues, automobiles and other man-made structures# discussing the erosion of the ancient stone cities of the Anasazi Indians in Colorado. This article discusses that the acid attacks the Calcium Carbonate in limestone, and cement.

Summary Statement
To determine which roof material will hold up best to acid rain.

Help Received
Mother helped with board. Dad helped me organize the project. and helped get the supplies.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Emily T. Cox

Project Number
J1504

Project Title
Sound Absorption Characteristics

Abstract

Objectives/Goals
I came up with this idea on the way to school when my sister was yelling at me. I wondered what material I could wrap her in that would block the most sound. I also have a relative that is legally hard-of-hearing because of his exposure to jet engine noise.

Methods/Materials
With the help of my grandpa, we attached an oscillator (frequency generator) and an alternating current volt meter to a speaker that was held in place by a cardboard box and styrofoam. We changed the frequency levels of the input from 50-15,000 cycles. For every material, the input signal was set at 2 volts. This made sure that all the frequencies we tested were tested at the same amplitude. We attached a microphone above the speaker in a second cardboard box. The microphone was attached to a pre-amplifier. We then placed the test material between the microphone and the speaker for each test frequency. We recorded the voltage with and without (always 2 volts) the test material. To convert the voltage readings to decibels we used the formula:

dB = 20 * Log10(volt with / volt without)

Results
All materials tested showed unique results. We tested seven different materials; acoustical tile, double pane glass, speaker cover, single pane glass, tapestry cloth, cardboard and printer paper. The double pane glass blocked sound the best overall. At different frequencies, some materials absorbed sound better than others. Surprisingly, at a few points, some of the materials like cardboard and printer paper resonated carrying the sound closer to the microphone resulting in a voltage measurement that surpassed that of the input voltage.

Conclusions/Discussion
All the materials tested reduced the sound level at most points. Because the double pane glass reduced the sound level more than any other material tested my hypothesis was proven correct. I was surprised that at some frequencies, the material resonated and made the voltage appear to be greater than the voltage without the material. I was also surprised that the speaker covering was not completely transparent. It blocked the sound a little bit at some points.

Summary Statement
Sound levels can be reduced more effectively by some materials than others at different frequencies.

Help Received
used equipment belonging to and under supervision of grandfather, George Taylor retired engineer

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Kurtis D. Dwinell; Steven Ellison

Project Number
J1505

Project Title
Hot Hats

Abstract

Objectives/Goals
Was there any differences between the types of fabrics used, and the amount of protection from the ultra violet rays that came from the sun.

Methods/Materials
Tested with a ultra violet sensor the amount of sun rays that pentrated through the different fabrics of baseball caps. I used a baseball cap of 100% cotton, a baseball cap of 100% wool, and a baseball cap of 100% acrylic.

Results
There was no mesurable difference between the different fabrics of the baseball caps, and the amount of ultra violet rays.

Conclusions/Discussion
A cap, or hat of any fabric will significantly block ultra violet rays from the sun.

Summary Statement
I tested fabrics to determine if there was a difference in the amount of uv rays blocked from the sun.

Help Received
My teacher, Mrs Paque, gave me instructions.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Riley R. Eldredge

Project Number
J1506

Project Title
What's on Your Roof? A Study of Roofing Material Emissivity and Albedo Properties

Abstract

Objectives/Goals
This experiment determined which type of roofing material had the highest emissivity and albedo properties. It was hypothesized that the lighter roof color will cause the temperature of a detector, receiving heat emitted from the test panel, to increase by 10ºC over a steady state temperature and have an albedo of at least 0.75. Scientists have suggested that global warming may be reduced by quickly returning heat and light from the sun back into space using roof surfaces.

Methods/Materials
Four roofing samples were tested: Standard Roof Shingles, Sheet Metal over Shingles, White Roofing Paint over Shingles, and Foil over Shingles. Two tests were conducted on each sample: (1) The temperature rise of the Black Body Reflectance Detector (BBRD) while exposed to the emissivity emitted from the test panel; (2) The amount of light reflected from the test panel, or albedo, was measured.

Results
Test 1 showed the Foil over Shingles emitted the most heat causing a dramatic rise in the BBRD temperature, followed by Sheet Metal over Shingles and the White Roofing Paint over Shingles which were comparable. The Standard Roofing Shingles did not emit much heat. Test 2 showed the White Roofing Paint over Shingles is efficient at reflecting light but it did not emit heat as well as the Foil over Shingles. Foil over Shingles and Standard Roof Shingles performed poorly during the albedo test.

Conclusions/Discussion
The hypothesis was incorrect; the materials in this study did not increase the temperature of the detector by 10ºC above steady state and the albedo did not reach 0.75. While the White Roofing Paint over Shingles and the Sheet Metal over Shingles performed similarly, the light colored Sheet Metal over Shingles may be the most practical choice in trying to improve the environment, since this material balanced emissivity and reflectance properties. This data supports that because a surface is bright, it does not necessarily mean it emits heat well.

Summary Statement
Four roofing materials were evaluated to determine which material had the highest emissivity and albedo properties.

Help Received
Mother helped type report, Father helped with construction of test panels and graphs.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Skylar T. Frantz

Project Number
J1507

Project Title
Burning Biofuels: Comparing Nonrenewable and Renewable Fuels

Abstract

Objectives/Goals
My goal was to find out if the energy in a renewable fuel was equivalent to the energy in the same amount of nonrenewable fuel?

Methods/Materials
Before testing begins:
Roll one gauze 6.7 cm x 6.7 cm around the metal rod. Tie each end of the gauze. Measure 10 ml of motor oil in the liquid measuring device and pour it onto the gauze. Place the metal rod at the bottom of the Bar-B-Que. Measure 100 ml of water and pour it into the empty, clean soda can. Place the open end of the plastic cup over the top of the soda can. Poke a hole the same diameter as the thermometer in the top of the cup over the opening in the soda can. Insert the thermometer through the plastic cup and into the soda can. The thermometer should sit in the water, but should not touch the sides of the can. Place the grill on the Bar-B-Que. Set the can on the grill centered over the oil soaked gauze. Set the Bar-B-Que in a well-ventilated area and on a non-flammable surface.
Testing:
Make sure to have an open box of baking soda in case of an emergency. Light the cotton using the fireplace lighter. Be sure to get the flame going. Start the stopwatch when the gauze lights. Stop the stopwatch when the flame goes out. Read the temperature on the thermometer. Watch it for a few minutes to make sure that it doesn't change. Once the temperature stops changing, record the value. Gently blow out the glowing, hot cotton. Repeat step 1-21, using motor oil, forty-nine additional times. Record all data. Repeat step 1-21, using vegetable oil, forty-nine times. Record all data.

Results
The results of my investigation on which fuel burns the hottest was confirmed by my testing. After 50 trials completed on each type of oil, I found that the renewable oil (vegetable oil) produced the most heat energy.

Conclusions/Discussion
The renewable fuel (vegetable oil) burned much hotter than the nonrenewable fuel (motor oil). The hottest reading was 69.2 degrees Celsius, the coldest reading was 55.5 degrees Celsius, and the average was 66.2 degrees Celsius. I completed 50 trial for each oil. From my results, I learned that the vegetable oil, or renewable fuel, creates more heat energy than the motor oil, the nonrenewable fuel.

Summary Statement
My project tests which fuel (renewable or nonrenewable) produces the most heat energy.

Help Received
My parents supervised me while I performed the testing, the burning of the fuels.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Riley M. Giller

Project Number
J1508

Project Title
Is It Green to Go White to Save Green $$$?

Abstract

Objectives/Goals
Energy Secretary Steven Chu recommended that flat roofs be painted white in the United States. He said it would be the equivalent in energy savings and carbon emissions of taking all the cars in the world off the road for eleven years. The objective of my project is to determine if energy costs are reduced by painting a sloped roof white and, thereby, impacting climate change by conserving energy and reflecting sunlight back into space.

Methods/Materials
Seven birdhouses were used to simulate real homes. Each was covered with roofing felt. Terracotta tiles were applied to two; asphalt tiles were applied to three; and, aluminum was applied to the remaining roofs. One of each roof type was painted white. The homes were applied to a board and an apparatus was built to which I attached heat lamps. The heat lamps were turned on and temperature readings were recorded every fifteen minutes for ninety minutes. In the first test run, the unpainted asphalt roofs began to melt. I adjusted the height of the heat lamps. The test was repeated three more times.

Results
The last three experiments yielded very consistent results. In all three tests, after ninety minutes, the painted terracotta tile house had the coolest temperatures among the three different roofs by approximately 5.33 degrees. The aluminum was cooler than the painted aluminum by approximately 6.66 degrees. The asphalt tiles had the greatest disparity between the painted and the dark asphalt at approximately 8.66 degrees.

Conclusions/Discussion
If you have a sloped terracotta or asphalt roof, you should paint it white in order to reduce your energy cost and reflect sunlight back into space, thereby reducing global warming.

Summary Statement
Does painting various types of sloped roofs white reduce the temperature inside of a home, thereby reducing energy costs and global warming?

Help Received
I received help from my step dad supervising construction of my project. My uncle also helped me by cutting the terracotta tiles and provided the roofing felt.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Kaci Hansen; Paxton Scott

Project Number
J1509

Project Title
The Effects of Different Salts on the Time Required to Make Homemade Ice Cream

Abstract

Objectives/Goals

Purpose:The purpose of this project is to see which of the six salts will make ice cream the quickest. It is also to see which of the salts will cause the temperature of the ice mixture in the ice cream maker to drop to the lowest degrees Celsius.

Hypothesis:Our hypothesis is that sodium chloride will make the ice mixture drop to the lowest temperature. We also hypothesize that the sodium chloride in the ice cream maker will make ice cream quicker.

Methods/Materials

Materials list

1. vanilla flavor; 2. Sugar; 3. Ice cream maker; 4. Beakers; 5. Thermometer; 6. Table salt (sodium chloride); 7. Driveway salt (calcium chloride); 8. Epsom salt (magnesium sulfate heptahydrate); 9. Potash (potassium chloride); 10. Baking soda (sodium hydrogen carbonate); 11. Ammonium chloride (nushadir salt); 12. Magnetic stirrer; 13. Stir bars; 14. Scale; 15. Ice; 16. Timer.

Procedure

1. While the salt was dissolving we mixed the ice cream ingredients into the Industrial Revolution Play and Freeze ice cream maker. 2. We put into the other side of the ice cream maker, 2000 ml or 2 liters of ice. We then put the dissolved salt mixture on top of ice in ice cream maker. The timer was started. 3. The ice cream maker was turn back over and the lid was removed from the side with the ice cream mixture. 4. We determined that the ice cream was complete when all of the liquid ice cream mixture appeared to have changed into ice cream. 5. Once the ice cream was made, we immediately put the lid on and turned over the maker, opened the other lid and measured the ice mixture's temperature using a (-20 - 110) oC alcohol thermometer. 6. The thermometer was taken out after 30 seconds and the temperature was then recorded.

Results

Salt Chemical Name (Chemical Formula)	Average Temp. with Average Deviation (seconds)	Average Temperature with Average Deviation (celsius)
Ammonium chloride (NH4Cl)	215 (+/- 3.3)	-11.0 (+/- 0.67)
Sodium chloride (NaCl)	231.7 (+/- 5.1)	-10.17 (+/- 0.56)

Conclusions/Discussion

Summary Statement

The purpose of this project was to determine what common salt will lower the freezing point of water the most.

Help Received

Paxtons dad Kip for teaching us about the chemistry of making ice cream and helping us put the graphs together. Paxtons mom Melissa for helping with getting materials setup. Kacis parents Liz and Brian for helping with the poster board.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Michelle A. Karpishin

Project Number
J1510

Project Title
Investigation of Sound Transmission of Variable Frequencies through Materials of Variable Densities

Abstract

Objectives/Goals
This project investigated how different frequencies were transmitted through different materials. Noise reduction is important in building materials and also for worker exposure since excessive noise may impair a human's hearing or put stress on the heart and other important organs. I think these experiments may help architects around the world make buildings that will absorb sounds, such as walls in an apartment.

Methods/Materials
Five tuning forks of different frequencies were recorded for the experiments so that volumes of each would be identical for all of the tests. With different materials between a speaker and a microphone, I measured the volume of the recorded frequencies by using a computer attached to the microphone. Solids were the materials being investigated in this study, except for one liquid, which is water. All of the materials tested were of approximately the same thickness but were chosen for their different densities, which I measured.

Results
The results demonstrated that the densities affected the sound transmission, however not in a consistent way. The brick and the wood materials were most effective at reducing the volume of all the frequencies. The frequency of the sound makes a big difference also, since the middle frequency transmitted through most of the materials with the loudest volume, while the lower and higher frequencies did not transmit as well.

Conclusions/Discussion
My results demonstrate that, depending on the specific sounds, you would need specific materials to reduce noise effectively. These experiments could benefit society in the future because the builders could make homes and businesses more sound-proof. Knowledge about sound travel is also helpful in understanding animal communication.

Summary Statement
This project investigated how different frequencies of sound were transmitted through different materials.

Help Received
Father helped set up computer and microphone and showed me how to calculate densities; mother helped with getting research materials.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Kaleb S. Kingston

Project Number
J1511

Project Title
Hot Pockets Continued

Abstract

Objectives/Goals
In a previous test, the inside material of a heating pad was tested. In that test it was concluded that beans retained the most heat. In the test this year the outside material of the heating pads was tested to see if the material on the outside of the pad made a difference in the retention of heat in the pads. If the materials did make a difference, which material is the best one to use for the purpose of a heating pad. When testing fleece, flannel, and thermal on the outside of the heating pad, I believe that thermal will get the hottest and retain the heat the longest.

Methods/Materials
Three heating pads were sewn the same size using different material on the outside. One was made with fleece, one with flannel, and one with thermal. Each pad was filled with four cups of dried pinto beans. Each pads temperature was measured with a digital thermometer and then placed into the microwave one at a time for 90 seconds. A temperature was taken immediately after the pads were done in the microwave and then logged. Temperatures were taken every two minutes for 15 minutes. This was repeated three times for each heating pad.

Results
The results of Test 1 were fleece won by only losing 13.14% of its heat. Flannel got second with a 21.79% heat loss. In last thermal got a 22.21% heat loss. In Test 2 fleece won again with a 15.25% heat loss. In second came thermal with a 17.81% heat loss. In last came flannel with a 18.22% heat loss. In Test 3 Fleece won with a 12.96% heat loss. Thermal came in second with a 16.35% heat loss. In last came flannel with a 20.28% heat loss.

Conclusions/Discussion
The hypothesis was wrong, thermal did not retain the most heat. Fleece had an average of 13.78% heat loss. Thermal was next with an average of 18.79% heat loss and flannel was last overall with an average heat loss of 20.97%. Even though fleece had the lowest percentage of heat loss. Fleece was actually the worst material to use for the heating pads, because the material is thick and the heat to soothe the muscles did not transfer well. Thermal is the best material to use for the purpose of a heating pad. The next test will be on the shape or the surface area of the heating pad, and whether or not that will make a difference in the function of the heating pads.

Summary Statement
Heat retention was tested by using different materials on the outside of a hot pad.

Help Received
Mother made the heat pads, helped with the board, and printed papers; Dad helped with testing and research.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Joshua P. Kisbye

Project Number
J1512

Project Title
Too Hot to Handle: A Comparative Analysis of Thermal Energy Retained in Tile

Abstract

Objectives/Goals
The goal of my investigation was to find an inexpensive, durable tile that can be used for reentry into Earth's atmosphere and for flooring and countertop use. This tile must not conduct heat very well.

Methods/Materials
1. Cut five, 1cm x 10cm rod from each 10cm x 10cm tile square except slate rock tile and cut five 1cm x 9cm slate rock tile rods. 2. Melt lard on the stove for 300 seconds on the "HI" temperature setting. 3. Label all ten test tubes. Two (2) test tubes for each number one through five (1-5). 4. Place the graduated cylinder into the metal pan and place the metal pan and the graduated cylinder in the testing area. 5. Place test tube 1in the test tube rack. 6. Poor fifteen (15) ounces of lard into test tube 1. 7. Place the test tube in the test tube rack in the refrigerator for 600 seconds. 8. Place a porcelain rod in the oven at 177 degrees Celsius (350 degrees Fahrenheit) on the 30cm x 45cm cookie sheet for 120 seconds, after the lard has been in the refrigerator for 480 seconds. 9. Take the lard out of the refrigerator after 600 seconds and take the tile rod out of the oven with the hot mitt on after 120 seconds and after fifteen (15) seconds of the rod being out of the oven and the test tube being out of the refrigerator, push the rod into the test tube with tongs while the test tube is on the test tube rack for twenty-five (25) seconds. 10. Pour melted lard into the graduated cylinder using the tongs. 11. Record results. 12. Wash the rod with cool water and remove all lard on the rod with the wash cloth. 13. Remove all lard in the graduated cylinder. 14. Repeat steps 2-13 (except step 3) for each tile rod and use test tubes labeled one (1) for porcelain, test tubes two (2) for glass, test tubes three (3) for slate rock, test tubes four (4) for ceramic, and test tubes five (5) for clay. 15. Test each tile 100 times.

Results
I found that porcelain was the least heat conductive (best) on average. After porcelain came slate rock, glass, ceramic, and clay. The order is from best to worst (least heat conductive to most heat conducive).

Conclusions/Discussion
In conclusion, if a craft like the International Space Station in lower Earth orbit or possibly a future luxury space hotel, needs tiles for flooring, countertops, or other such uses, they now know to use porcelain for countertops and clay for flooring (it gets down to -250 degrees Fahrenheit/ -157 degrees Celsius). They can use the information from my investigation to know this. They can use the porcelain tiles for emergency replacement of tiles in areas that need protection from heat for both reentry into earth's atmosphere and in orbit around earth. They also will now know that if they do not have porcelain, that they should use slate rock, then glass, followed by ceramic, and if desperately needed, clay.

Summary Statement
My project's purpose is to try help save NASA from being exterminated (because of the budget) by helping reduce material costs.

Help Received
My father and mother helped critique my board and papers. Mrs. Lopez and Mrs. Delgado helped me cut and mat my papers on my board. Mr. Metzler helped me cut my tiles into rods.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Josh R. LaRocco

Project Number
J1513

Project Title
S.S. Neoprene

Abstract

Objectives/Goals
To find out how saltwater and sunlight affect the elasticity and durability of noeprene.

Summary Statement
How saltwater and sunlight affect elasticity and durability of neoprene.

Help Received
Dad helped me spell check and build testing device, mom helped me put board together, Matuse Wetsuits supplied neoprene

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Madison P. Meredith

Project Number
J1514

Project Title
Going Green While Staying in the Black: An Alternative Material for Packaging

Abstract

Objectives/Goals
People mail boxes every day using Bubble Wrap, Styrofoam peanuts and other packing materials. Although these products work, they cost money and are not biodegradable. An alternative choice is shredded paper from a home office. Shredded paper is an effective way to recycle. Even FedEx, in an article discussing holiday shipping for Christmas 2009 recommended looking for "smarter, greener" Eco-friendly packing materials to cushion the boxes contents such as shredded paper. In this science project, I seek to eliminate the doubts about the protective capabilities of recycled shredded paper as a packing substitute; and, will show that using shredded paper as a packing material as reliable as using packing supplies purchased from a store.

Methods/Materials
My project examined the usage of Bubble Wrap, Styrofoam peanuts and shredded paper as practical packaging materials. Using 8 oz. Kerr Quilted Jars, scissors, Bubble Wrap, quarters, a camera, packing tape, shredded paper, Styrofoam peanuts, water, Soehnle Digital Scale, a 10' ladder, and 10 6.5" x 6.5" x 6.5" boxes. I will try to prove that shredded paper works just as effectively as Bubble Wrap and Styrofoam peanuts.

Results
There is a 3/10 probability that the item in the box will break/dent using shredded paper. There is a 4/10 probability that the item in the box will break/dent using Bubble Wrap. There is a 4/10 chance that the item in the box will break/dent using Styrofoam peanuts. I also figured out the expenses of paying for packaging materials for a month/year. With Bubble Wrap costing $20 for 35 feet, it would cost $80 a month and $960 a year. Styrofoam peanuts cost $22.99 for 7 cubic feet, cost $91.96, costing $1103.52 a year. Also, since household shredded paper is mainly discarded envelopes, it is free.

Conclusions/Discussion
My hypothesis turned out to be correct. I predicted that the shredded paper would work best, which it did. The item in the shredded paper box broke once. The item in the box with Bubble Wrap broke three times. The item in the box with Styrofoam peanuts broke two times. This happened because the density of the shredded paper fills the box making a compact package, something pushing on all sides of the object makes it move around less.

Summary Statement
My project is about using household shredded paper as an economical and enviromently safe packing method.

Help Received
Mother, Uncle, Grandma and Grandpa helped edit my research paper.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Andrew M. Peacock

Project Number
J1515

Project Title
Temperature's Effect on Magnets

Abstract

Objectives/Goals
The objective of this experiment was to find how the temperature of a magnet affects its magnetic strength.

Methods/Materials
Six ceramic magnets were tested at three different temperatures, 0C, 100C, and -79C. 0C was reached by placing the magnets in ice water. 100C was reached by placing the magnets in boiling water. -79C was reached by placing the magnets under two blocks of dry ice. The magnets were dipped into a bowl of ball bearings, which were removed and counted to find the magnetic strength of the magnet. Each magnet was then tested at each of the three temperature three times.
Ceramic magnets (6); Containers (2400 BBs each) of 4.5mm steel ball bearings (2); Dry ice (2 blocks); Ice; Large shallow pot; Large pair of wooden tweezers; Measuring cup (¼ cup); Medium bowl; Notebook; Open indoor area; Open outdoor area; Pair of insulated gloves; Pencil; Permanent marker; 0.65L plastic containers (6); 81/2 x 11 poster board; Protective clothing (sweatshirt, jeans, etc.); Safety goggles; Small bowls (7); Small sticky notes; Small Ziploc bags (6); Stove; Water (2L)

Results
It was found that the magnets tested at 0C had the greatest strength and the magnets tested at 100C had the least strength. The magnets picked up an average of 547 BBs at 0C, 425 BBs at 100C, and 470 BBs at -79.

Conclusions/Discussion
The results of this experiment did not support the hypothesis, as the magnets tested at -79C did not have a greater strength than the tests at 0C. The theory as to how the results did not support the hypothesis is that the magnets decreased in strength overall as they were in contact with the ball bearings

Summary Statement
In this experiment, 6 ceramic magnets were tested at three temperatures to find how temperature affects the magnetic strength of a magnet.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Andrew J. Poole

Project Number
J1516

Project Title
Fog Nets: Effectiveness of Spun Bonded Polyester vs. Polypropylene Netting

Abstract

Objectives/Goals
The purpose of this project was to test three types of fog netting materials to see if one material was more effective than the others in collecting water from fog. My research revealed that countries, such as Peru and Chile, use fog nets successfully to produce water for the local villages. San Diego, which is prone to drought, frequently produces low lying clouds. I wanted to see if fog nets could be used in San Diego to help provide a water source for my community.

Methods/Materials
I tested the following materials: 50% shade polypropylene fabric, 80% shade polypropylene, and spun bonded polyester. Polypropylene is the fog net material used in other countries to collect water. I strung 1.8m by 1.8m pieces of each of the three test materials between posts. I placed the posts in a line, due north/south, in order to maximize the amount of fog that would be caught from the prevailing west (on shore) winds. I built trough and pipe systems that collected the water from each of the nets and led the water to collection buckets. I measured and recorded the amount of water collected by the three fog nets twice a day for 28 days. I also recorded the outside humidity and temperature to see if there was a correlation between the amount of water collected and the humidity and temperature.

Results
My experimental fabric, the spun bonded polyester, produced significantly more water than either of the two polypropylene nets. In fact, the spun polyester collected more than five times as much water as the other two types of netting combined.

Conclusions/Discussion
While the research indicated that most fog nets are usually made from polypropylene, the results of my experiment revealed that spun bonded polyester netting may be more effective. I would recommend that spun bonded polyester be tested at locations that currently use fog nets.

Summary Statement
I tested three types of fog netting material to see which was most effective at collecting water from fog.

Help Received
My father helped me to build my fog net devices. My science teacher provided guidance. My mother helped me with my display board.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Davis R. Reid

Project Number
J1517

Project Title
Which Fabric Best Retains Heat?

Abstract

Objectives/Goals
To find the fabric that would retain body warmth best, over a period of time.

Methods/Materials
Four identical cardboard cups, each with a different fabric wrapped over the cup opening and secured with a rubber band, was filled with hot water at an approximate temperature of 160 degrees Fahrenheit. Each cup had a thermometer sticking out of it, and I recorded the temperature of each cup every 10 minutes. The control cup opening was left uncovered and it too had a thermometer.

Results
Wool and nylon had the highest temperatures throughout the tests while the control, cotton and silk had lower temperatures.

Conclusions/Discussion
It is best to wear either wool or nylon clothing during cold weather because they will retain a body's heat better than cotton or silk.

Summary Statement
I conducted three independant tests, on four different types of common clothing fabric to determine which fabic would retain heat best over a 90 minute period of time.

Help Received
Mom helped purchase materials needed.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Jenna L. Rosebrough

Project Number
J1518

Project Title
Melting with Metals

Abstract

Objectives/Goals
I wanted to know which type of metal conducts heat the fastest. I think aluminum will melt butter the fastest. My research found that Aluminum has the lowest specific heat capacity (24.2) out of the 5 metals. The lower the specific heat capacity the faster the metal will heat up and melt the butter.

Methods/Materials
Base clamp, Bunsen Burner, stop watch, camera, mini cup, wooden rod, metal wand with Nickel, Aluminum, Brass, Copper, and Steel spokes, foil, butter cut into equal chunks (2 TBSP)

Cut butter into equal chunks. Place on foil and refrigerate until use. Secure metal wand onto base clamp. Place Bunsen Burner under 1 metal spoke tip. Place butter chunk on metal spoke pushing it to the center axle. Turn burner on to heat tip of metal spoke. Using a stop watch time how long it takes for butter to begin melting. Record time on data chart. Let wand completely cool. Repeat two more times with same spoke. Then repeat all steps for remaining 4 metals.

Results
Copper melted butter with an average time of 56 sec., Brass 1 min. 9 sec., Aluminum 1 min. 15 sec., Steel 2 min. 52 sec., and Nickel 9 min. 36 sec. Copper, Brass, and Aluminum melted the butter relatively close in time. But Nickel wasn't close to any of metals.

Conclusions/Discussion
My data showed that Copper melted butter the fastest. I was surprised my results did not support my hypothesis. I based my hypothesis on specific heat capacity which tells you how much energy it takes for the metal to heat up. With further research, I found a property called Thermal Conductivity which describes the flow of heat through the metal rod. The higher the number of Thermal Conductivity the more heat flows through the metal. Copper's conductivity is 401 which is the highest of all 5 metals. Copper should melt butter the fastest and that is what I observed. I tried my experiment 3 times but trial #2 didn't turn out like the others. There were errors that may have caused the 2nd trial to be off. It was a breezy day. The wind could have made the flame flicker causing uneven heating. The tool used to cut the butter made it difficult to cut equal slices which may have made it take longer to melt on some trials. I was amazed at the range of time between the metals from 56 sec. for Copper to 9 min. 39 sec. for Nickel. I can say "Yes" the type of metal does affect how fast it can conduct heat.

Summary Statement
I wanted to find out which type of metal can conduct heat the fastest.

Help Received
My science teacher Mrs. Patterson helped me find an investigative question. My dad helped me gather my supplies, turn on and off the Bunsen burner, and conduct the experiment. My mom proof read my written paragraphs.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Shannon Sawyer; Theo Tebbutt

Project Number
J1519

Project Title
Fire from Water: Do Different Qualities of Water Produce Different Electrical Charges?

Abstract

Objectives/Goals
This project uses 'Lord Kelvin's Thunderstorm'(1867) to determine whether different water qualities produce differing amounts of electrical charge. We believe that the quality of water used will affect the results because water quality affects just about everything in life.

Methods/Materials
Two streams of water were run through two copper conducting rings cross-connected with copper tubing to two zinc-coated aluminum buckets resting on styrofoam insulation. Each bucket was connected to a length of insulated copper wire. These were brought near enough to each other to create a spark which was measured with a digital volt meter. Six different water qualities were tested and the five highest readings per quality used to create the average.

Results
There was a measurable difference in the voltage generated by the quality of water used, with the highest average (spun water) carrying 3.02 times the charge of the lowest average (bottled spring water).

Conclusions/Discussion
The quality of the water does affect the amount of voltage generated.

Summary Statement
This project seeks to demonstrate that the quality of water affects the strength of its electrical charge.

Help Received
Parents helped run trials, took photos and helped with board organization.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Bryon E. Scott

Project Number
J1520

Project Title
Stressed Out Chocolate

Abstract

Objectives/Goals
My goal was to determine if the temperature to which chocolate is heated will affect its strength after hardening.

Methods/Materials
Real milk, dark and white chocolates were each heated, in a double boiler, to eight different temperatures. Three temperatures were below, two were at and three others were above, the recommended chocolate tempering range. After reaching the appropriate temperature, which was checked with a candy thermometer, the chocolate was cooled in an ice bath then reheated to the recommended temperatures used in the chocolate tempering process. Plastic candy bar molds were each filled with forty grams of melted chocolate and placed in the freezer to harden for 10 minutes. After being unmolded the chocolate was allowed to sit at room temperature for 24 hours. Each chocolate bar was then placed on a modified 3 point bend test machine to determine how many grams were required to break it. A mathematical formula was used to figure the force/stress necessary to break the chocolate.

Results
Milk and dark chocolate were strongest when heated in the recommended temper range. White chocolate was strongest right below and in the bottom range of the recommended temper range. The further away the temperature was from the recommended temper range the weaker the chocolate became.

Conclusions/Discussion
The results showed that my hypothesis was correct. The closer to the recommended temper range the chocolate was heated to, the stronger it was. The temperature to which chocolate is heated did have an effect on the strength of the chocolate after it hardened. The strength of chocolate is important because of the consumer market. Stronger chocolate is more durable and better able to take the punishments of shipping and handling.

Summary Statement
The focus of this project was to determine if the temperature to which chocolate is heated has an affect on its strength after hardening.

Help Received
My father helped me build my 3 point bend test machine. My mother helped me with the layout of my board.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Cameron K. Stopforth

Project Number
J1521

Project Title
Silence Is Golden: The Soundproofing Properties of Materials

Abstract

Objectives/Goals
In this project, the goal was to find out which material would sound proof a room the most efficiently and at a reasonable cost. The prediction was that rubber matting would be the most efficient material to soundproof a room.

Methods/Materials
A box was built to simulate a room with a double drywall and wood frame like a house. The test materials were placed inside the box to insulate the "room". The sound was produced by the computer connected to the speaker inside the box. Then there was a sound meter outside the box to measure the sound that passed through the drywall. The materials that were needed to build the box are nails, drywall, and wood. The materials that were being tested inside the box were egg cartons, rubber matting, styrofoam, bubble wrap, cardboard, fabric, and foam board.

Results
The best material turned out to be 1/8th of an inch thick cardboard. Cardboard was at least 2 decibels lower than the box without anything soundproofing the box. Cardboard was also .5 decibels better than any of the other materials tested. Surprisingly cardboard was also the thinnest material. The worst material was carpet backing which was 1.3 decibels higher than the constant.

Conclusions/Discussion
The cardboard is less dense than the rubber matting, yet cardboard was cheaper and performed much better. The cardboard was effective because the sound waves are reflected into the on-coming sound waves and are distorting them to reduce sound. Further testing could be done by adding more layers of cardboard to increase the soundproofing quality.

Summary Statement
This project was done to find the most cost efficient soundproofing properties of materials.

Help Received
Father helped build box; Mother helped cut paper for board

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Adam C. Swayze

Project Number
J1522

Project Title
Keep it Quiet! Which Materials Block Sound Transmission Most Effectively?

Abstract

Objectives/Goals
In this project, I tested various materials including mass loaded vinyl, drywall, particle board, and egg cartons to see which materials would be most effective at blocking sound. My hypothesis was that when I had the box covered with a combination of drywall, particle board, and mass loaded vinyl, there would be the least amount of sound escaping from the box.

Methods/Materials
I built a five sided box with a 2 x 2 frame, a layer of 5/8 inch drywall, and after an air gap of three centimeters, a layer of 3/4 inch particle board. The inside of the box was lined with mass loaded vinyl, a sound resistant material. The top of the box was left open so I could place the material I wanted to test on the top of the box. As a control, I built a top for the box out of the same material from which the box was made. To generate sound, a 3162 Hz tone was set as a ring tone on a cell phone. To measure the sound escaping from the box, I used a digital decibel meter. A variety of sound insulating materials, in fact, a total of 14 different materials were tested multiple times for their ability to block sound on the open end of the box.

Results
I found that some simple materials such as a rubber floor mat can block sound more effectively than materials recommended by professionals. I even observed an egg carton was able to block a significant amount of sound.

Conclusions/Discussion
Overall, the most effective sound insulators were thick, heavy materials with double walls and an air gap between them.

Summary Statement
In this project, I tested various materials including mass loaded vinyl, drywall, particle board, and egg cartons to see which materials would be most effective at blocking sound.

Help Received
I'd like to thank my father for letting me use his phone and helping me build the box.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Fiateleimoana K. Tapasa

Project Number
J1523

Project Title
Flammability Burn Ignite

Abstract

Objectives/Goals
My project was designed to find which of the materials (among wool, cotton, nylon, and polyester) was the most flammable. Also, I wanted to learn about the characteristics and elements of the fabrics to understand their flammability.

Methods/Materials
For my project I used 5" x 5" pieces of material. I secured each piece of fabric to an elongated metal hanger with a metal paper clamp. I then hung the hanger from a pole and lit the material with a match. I repeated this with each material sample. Each piece was timed from the moment of ignition to the time it self-extinguished. I then took the elapsed times and divided each by twenty-five to find the burn rate (the time it takes to burn one square inch of the material.)

Results
The cotton had the quickest burn rate where polyester had the second. The nylon and the unrefined wool, from Chile, did not burn; they smothered the flame.

Conclusions/Discussion
In conclusion, my data indicates that, the cotton and polyester were the fabrics to have the quickest burn rate. I noted that the wool and the nylon did not ignite, as I later learned of the lanolin in the wool and other compounds that cause the materials to not ignite. Though my project was successful, I learned of some possible errors due to factors beyond my capability of indulgence. Examples include such things as: chemicals on the wire hangers and paper clamp, matches not working, human error in timing and carcinogens in the air.

Summary Statement
The flammability of a variety of fabrics were tested to accertain which had the highest burn rate.

Help Received
Sisters helped take pictures; Mom helped with ideas and gave me her special wool to use; Brother helped with equipment.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Emily N. Thielen

Project Number
J1524

Project Title
True Colors: A Chromatographic Comparison of Both Natural and Artificial Products on the Color Spectrum

Abstract

Objectives/Goals
The purpose of this experiment was to determine if the colors found in natural products are the same colors, or same blend of colors, as those found in artificial products. My hypothesis was that the artificial products would have a more complex set of colors on the color spectrum than the natural products.

Methods/Materials
In the experiment several types of natural products were used for comparison. These included fruit, vegetables and plants. The artificial products chosen for this experiment were marker pens and Kool-aid packets.

Using coffee filters, quart-sized jars and alcohol, chromatography testers were made to separate the colors found in these various products. Repeated tests were completed over a period of several weeks and the results were recorded.

Results
The artificial red products produced a 100% pure red color with no blended hues. The natural red products revealed a broad range color blends including pink, purple, yellow and red hues. In contrast, the artificial green products showed a significant blending of various colors to produce the green tint including blues, greens and yellows. The natural green products reflected a 90-100% pure green color with only minor blending of yellow or tan hues. Finally, the purple products showed a significant blending of hues in both the natural and artificial forms.

Conclusions/Discussion
My hypothesis stated that the variance of colors was centered on the artificial or natural aspects of the products tested. However, based on the data recorded, my conclusion is that the diversity in a specific color spectrum is not determined by the artificial nature of the product but on the specific color replicated.

Summary Statement
This experiment was conducted to determine if the colors found in natural products are the same colors, or same blend of colors, as those found in artificial products.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Shaelyn P. Topolovec

Project Number
J1525

Project Title
Keepin' Cool

Abstract

Objectives/Goals
The objective of this project is to determine what outside paint colors are best to keep a house cooler (or warmer depending on the climate) so that money and energy could be saved.

Methods/Materials
Seven siding pieces were cut 1'x 1' and were painted with different colors of paint. The wood siding was then attached to a scaled down wall built with R-13 fiberglass batt, wood, and drywall to simulate an exterior house wall. One at a time, each siding piece was attached to the small wall and then inserted into the center of an insulated box. A light bulb was used as a heat source on one side of the wall. Theremometers were used to measure the temperature in the 1 cubic foot of air space on each side of the small wall. The temperatures for each color were recorded every 5 minutes for 2 hours.

Results
Lighter siding colors always resulted in cooler interior temperatures. Darker siding colors resulted in hotter interior temperatures.

Conclusions/Discussion
A house in a warmer climate would save money and energy painted a lighter color. A house in a cold climate would do better painted a darker color.

Summary Statement
The purpose of this science project is to determine if the color of paint on the outside of a house can affect the temperature inside a house.

Help Received
Mother helped type and assemble board. Father helped build. Grandfather supplied materials. Sister advised on computer research. Teacher acted as project advisor.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Thomas V. Tuttle

Project Number
J1526

Project Title
Wave Blockers!

Abstract

Objectives/Goals
My project was to find out what materials could block Wi-Fi waves the best.

Methods/Materials
Using a transmitter (an Apple Time Capsule) and a receiver (an Apple MacBook Pro), I encased the transmitter in either aluminum foil, plastic wrap, wrapping paper, steel cake pans, a wooden box, a cardboard box or a lunchbox, and recorded the signal strength of the receiver (in bars, Max=4) at different distances up to 80 meters away. I also did a control test with no material surrounding the transmitter.

Results
The steel cake pans brought the signal down to 0 in both tests, while the cardboard box, lunchbox and wrapping paper always stayed at 4 bars.

Conclusions/Discussion
My conclusion is that steel is good for blocking Wi-Fi waves, and that a material's thickness may also be a factor when it's blocking Wi-Fi waves.

Summary Statement
My project was to find out what materials could block Wi-Fi waves the best.

Help Received
Father helped set up the transmitter and took pictures; mother handled the receiver and reported readings.

CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Margaret Yu

Project Number
J1527

Project Title
Elasticity Madness: If and How Temperature Will Affect the Elasticity of Nylon Stockings

Abstract

Objectives/Goals
The purpose of this project is to determine if and how temperature will affect the elasticity of nylon stockings. Research on thermoplastics, elasticity, entropy, and temperature suggests that temperature will affect the elasticity of nylon stockings. At lower temperatures, nylon stockings will be more elastic than at higher temperatures.

Methods/Materials
The hypothesis was tested using 15 nylon stockings (Fashion Knee-Hi Sandalfoot 96% nylon 4% spandex), a tough board 40 cm x 50 cm, a thermostat, 10 clips, and a metric ruler. The 5 Control stockings were stretched at 25°C, the 5 Experimental 1 stockings at 15°C, and the 5 Experimental 2 stockings at 35°C. The original length of each nylon stocking was measured first. Then the thermostat was set to the corresponding temperature. Each group was stretched with the clips over the board length for 4 hours. Afterward, the final length of each stretched stocking was measured. Then, the initial difference (50 cm - the original length), the stretched difference (50 cm - the final length), and the elasticity (stretched difference/the initial difference) was computed. These steps were repeated until all 15 nylon stockings were tested.

Results
The hypothesis was supported by the experiment. The average elasticity of the Experimental 1 stockings was 0.594 while the Experimental 2 stockings only had an average elasticity of 0.160. The Control stockings had an average elasticity very close to the Experimental 1 stockings: 0.581. The Experimental 1 stockings were about 73.1% more elastic than the Experimental 2 stockings.

Conclusions/Discussion
The hypothesis that the nylon stockings at lower temperatures would be more elastic was strongly supported. A relevant elasticity was measured by dividing the stretched difference by the initial difference.
This project explains why nylon stockings shouldn't be exposed to hot temperatures. The elasticity of thermoplastics can also be better preserved from this project.
If this experiment could be done again, the three groups would be arranged so that their average initial difference would be about the same to produce a more relevant elasticity. Also, the stretched length would be made longer to obtain more extreme results. Lastly, I would test to see if larger temperature intervals will give a more significant result and if there is a limit to how low the temperature can be in order for the elasticity to remain high.

Summary Statement
This project examines if and how temperature will affect the elasticity of nylon stockings.

Help Received
Parents helped buy materials.