CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

Haleema F. Abbasi

Project Number

J2101

Project Title

What's the Matteries with Your Batteries? Comparing Performance, Cost and Environmental Impact of "Green" NiMH Battery

Abstract

Objectives/Goals

The Nickel Metal Hydride battery is an example of a "green" product. Is the NiMH AA Battery better than an Alkaline, Lithium or Ni-Cad battery? To answer this question I must find out:
1. Which AA battery is best performer & value?
2. Which AA batteries have metal concentrations at levels that could impact the environment?
3.What batteries are people using? Are they recycling, or are these ending up in landfills?

Methods/Materials

Exp 1:Priced batteries. Measured voltage using a multimeter. Calculated average time for alkaline & lithium and total time for NiMH and NiCad. Calculated $/min. Exp 2: Worked with a lab to analyze batteries. Exp 3: Conducted survey with confidence level of 95%, margin of error as 5.5%, and California as the population. Visited battery recycler.

Results

Collected around 4,000 data points. Exp 1: NiMH=0.00059 $/min, Alkaline=0.0019 $/min, Lithium=0.004 $/min & NiCad=0.0091 $/min Exp 2: Neither NiMH nor Alkalines were found to be toxic. Exp 3: 407 surveys collected for accurate representation of selected population. Only 11% ±5.5 use NiMHs. 44%±5.5 throw used batteries in the trash. 79.2%±5.5 did not know it is illegal to throw batteries in the trash.

Conclusions/Discussion

You need at least 14 alkalines to get the run time of one NiMH, and in the long run, with some change in habits, the NiMH is an effective "green" product that is non-toxic even when thrown in a landfill and it meets user needs. More needs to be done to get people to use this battery, esp. since my survey shows that people are not aware of battery recycling laws. But NiMHs are taken to China for recycling. If you think about making a "green" product, travelling to China to be recycled is against that idea because it increases the carbon footprint, and the environmental laws in China are not strong enough to protect people and natural resources the way we do in the US.

Summary Statement

Comparing performance, cost and environmental impact of #Green# NiMH battery

Help Received

Mr. George Havalias of American Analytics helped me with the lab analysis and was very nice about explaining all the technical details. I could not have done this project without him. And my sister Aamna Abbasi for being a great pretend judge to help me practice!

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Jennifer D. Aguirre

Project Number
J2102

Project Title
Cold Water Detergent vs. Hot Water Detergent

Abstract

Objectives/Goals
The objective was to test whether cold water detergent or hot water detergent cleans better. My assumption was that cold water detergent would clean as well as hot water detergent.

Methods/Materials
The detergents I used were Tide Coldwater, Tide Original, Wisk Coldwater and Wisk Original. I placed four stains on four white cotton bandanas (wine, marinara sauce, chocolate sauce, grass/mud) and let the stains set for two weeks. I placed wax paper over the stains and recorded the number of sheets used before the stain was no longer visible. I washed each bandana once, in a separate load (with no other laundry), using the cold or hot water button on the washing machine and the appropriate detergent. After washing the bandanas, I dried them separately in the dryer and repeated the procedure with the wax paper to compare results.

Results
Cold water detergent cleans as well, and in some cases better, than hot water detergent. Tide Coldwater was superior to Tide Original, while both Wisk detergents were fairly similar in their results.

Conclusions/Discussion
In conclusion, I found out that you can wash your clothes in cold water detergent to save energy and money and have the same laundering results.

Summary Statement
Does cold water detergent clean as well as hot water detergent?

Help Received
My mother took me shopping for supplies and taught me how to use the washing machine/dryer.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Grant J. Anderson

Project Number
J2103

Project Title
A Sticky Situation

Abstract

Objectives/Goals
To determine which type of tape has the greatest adhesive force from among five types of tape: duct tape, scotch tape, black electrical tape, masking tape, medical tape.

Methods/Materials
Rig a pulley to the ceiling of the garage. Thread twine through the pulley. Attach small bucket to one end and tape applied to wood on the other end. Gradually fill bucket with sand until tape starts to peel. Find mass of sand and bucket then convert to Newtons to find adhesive force.
Scissors, 50.48 cm X 9.36 cm X 4.28 cm block of wood, 5 m thin nylon twine, scotch magic tape, masking tape, black electrical tape, duct tape, medical tape, small bucket with handle, sand, utility knife, metric ruler, triple beam balance, pulley, carabineer.

Results
Scotch tape, 1.80 Newtons. Duct tape, 6.19 Newtons. Black electrical tape, 4.00 Newtons. Masking tape, 4.39 Newtons. Medical tape, 5.50 Newtons.

Conclusions/Discussion
I accept my hypothesis that duct tape has the greatest adhesive force. I chose this project because I was fascinated by how tape adheres to surfaces. I tried to apply a force perpendicular to the attachment point of the tapes by rigging the pulley as high as possible. I tried to minimize error by trimming the tapes to the same length and width. Some tapes would rip before peeling off so I folded them back three times before attaching the twine. Next time I will test the tape on a less porous surface like glass. I would also test the tapes by pulling them backwards at a 45 degree angle.

Summary Statement
To determine which tape would withstand the most force while adhering to a wooden surface.

Help Received
Mother helped design and produce my display. Mr. Post helped design my data table and provided the triple beam balance and the basic idea for my testing apparatus. Father assisted in conducting the experiment and in making the computerized graph.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Nicolas A. Armenta

Project Number
J2104

Project Title
$ome Like It Hot

Abstract

Objectives/Goals
My goal was to find the most cost effective material for heat exchange when using a renewable energy source. If a person were too know my results, they could save money over time.

Methods/Materials
I submerged Copper, Stainless Steel and Pex piping one at a time in a tank of water one at a time for five minutes at a time. For one set of five minutes, i ran water through the pipes at one gallon per minute, for the next set i ran water through at two gallons per minute, and for the last set, i ran it at three gallons per minute. Every minute i recorded the starting and ending temperature of the water and in the end, averaged out the difference. FInally i calculated the total amount of money saved for each material

Results
I found that when using a very small system like mine, you could save $12,000 over thirty years using Stainless Steel piping. You could save $12,000 over thirty years using copper. Lastly, you could save $2,000 over thirty years using Pex piping.

Conclusions/Discussion
In the end, i found that when using a renewable energy source, Stainless Steel piping is the most cost effective material for heat exchange.

Summary Statement
My project is about finding the most cost effective material for heat exchange.

Help Received
Uncle helped run experiments; mother helped prepare board

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Jeremy E. Barenholtz

Project Number
J2105

Project Title
Sippin' on Sugar

Abstract

Objectives/Goals
The objective of this experiment was to test the accuracy of the Nutritional Value Labels, by comparing the actual sugar content of Coca-Cola, Pepsi, 7 Up, and Dr Pepper to their respective labeled content.

Methods/Materials
Two Liters of each of the sodas (Coca-Cola, Pepsi, 7 Up, and Dr Pepper) were tested for their sugar content. Before the testing of the sodas, a 10% sugar-solution was made to ensure the accuracy of the hydrometer (which was indeed accurate). Each soda was then poured back and forth between empty bottles for 10 minutes to allow the carbonation to escape. Before being tested each soda#s temperature was measured to record and control the temperature. Then a hydrometer was placed in each of the bottles three separate times, and all of the measurements of the degrees brix were recorded. Calculations were later conducted to discover the average degrees brix for each soda, and the sugar concentration in grams per milliliter, and final results were received.

Results
The Nutritional Value Labels were indeed accurate, and, at most, varied by only 0.05% to the calculated sugar percentages. Additionally, Pepsi had the highest concentration of sugar with 0.115g/mL, then Dr Pepper with 0.112g/mL, then Coca-Cola with 0.108g/mL, and lastly, 7 Up with 0.107g/mL.

Conclusions/Discussion
The Nutritional Value Labels were accurate. The hypothesis of this experiment was proven incorrect; the actual sugar content of the major soda brands were not greater than that of the sugar content written on the Nutritional Value Label.

Summary Statement
This project attempts to determine if the actual sugar content of major soda brands is greater than that of what is listed on the Nutritional Value Label.

Help Received
Science teacher purchased hydrometer; Mother purchased/obtained sodas, empty plastic bottles, kitchen scale, distilled water, sugar, and funnel.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

Brandon H. Brown

Project Number

J2106

Project Title

Dripping Wet: Which Swimsuit Fabric Is Fastest?

Abstract

Objectives/Goals

The objective is to determine if there is a difference between swimsuit fabrics and their speed. The hypothesis is that if the five different swimsuit fabrics are tested for changes in speed, then the speed of the Speedo FaskSkin Pro will be the fastest, because it has the highest percentage of spandex in its swimsuit fabric giving the Speedo FastSkin Pro more compression (body stability) and water repellency, and therefore creating the least amount of drag.

Methods/Materials

Five different swimsuits, with different amounts of spandex in the fabric, were tested. The first swimsuit had 0% spandex and the fifth swimsuit had the highest percentage of spandex at 30%. The swimsuits were the same size, cut to have just one leg, and sewed closed at the bottom of the leg. They were each placed over three different weights (1162g, 1370g, 1715g), dropped in a PVC pipe (25.4cm diameter) filled with water, and timed for a specific distance (2.7432m). Each swimsuit was tested 15 times at each of the three weight levels.

Results

In the trials with the three weights, swimsuits 4 & 5 recorded the fastest averages. Suimsuit 5, with the highst percentage of spandex, recorded the fastest time of any of the trials at 1.56 seconds, the lowest range at .22 seconds, the lowest average range at.46 seconds, and the fastest median speed at 1.75 seconds. Swimsuit 1, with no spandex in the fabric, recorded the slowest times in all the tests. Swimsuit 2, with the next least amount of spandex, was the second slowest.

Conclusions/Discussion

My conclusion is that the spandex in the swimsuit fabrics created a faster swimsuit, and the Speedo FastSkin Pro (swimsuit 5) with the highest percentage of spandex was the fastest. Spandex allowed the swimsuit to be tight against the weight and to be more water repellant, which created less drag. With the controversy over swimsuits in the last Olympics, and with the Olympics coming this summer, the scientific importance of the experiment was to see if one swimsuit fabric really is faster than another to help improve swimming performance. In swimming, hundredths of a second matter in a race, and swimsuit fabric does make a difference when it comes to speed.

Summary Statement

As a competitive swimmer, I wanted to determine if there is a difference between swimsuit fabrics and their speed, because the best swimsuit fabric may give a swimmer a competitive edge.

Help Received

Dallin Loder, a general contractor helped secure PVC Pipe for testing, parents helped with testing & editing report and board, brother helped with graphs, and science teacher taught me science terms and how to do a science fair project.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Sean T. Carroll

Project Number
J2107

Project Title
The Effect of Wine Bottle Closures on Dissolved Oxygen Levels in Wine

Abstract

Objectives/Goals
The objective of the experiment was to determine which of the following wine bottle closures would deliver the greatest dissolved oxygen level in wine over a 57 day period: Nomacorc premium closure (synthetic), Portocork highest grade natural cork, Stelvin screw top capsules. I believe that the order of highest to lowest dissolved oxygen level will be Nomacorc, Portocork natural, then Stelvin.

Methods/Materials
12 wine bottles were filled with the same amount of Merlot wine from the same keg, at the same time, using the same hand bottling technique. Twelve bottle closures were obtained; 4 each of Nomacorc premium, Portocork natural highest grade, and Stelvin screw tops. Eight bottles were corked using a floor corker and the 4 screw top bottles were closed using the Alfatek bottling line- a bottling line is necessary to apply the screw top. The bottles were stored in the same wine case in a wine cellar at 12.8 ° Celsius for 57 days. At day 57, the bottles were opened and dissolved oxygen readings were taken with an Orion probe.

Results
The screw cap and natural cork had identical four trial average dissolved oxygen readings. The synthetic closure had the lowest 4 trial average by .03 mg/ L.

Conclusions/Discussion
The experiment did show that there were differences in dissolved oxygen levels but not in the order expected. An automated bottling procedure or using liquid nitrogen to remove oxygen from the head space of the bottle may have decreased the oxygen in the screw cap bottles and made the result closer to expectation. Even though the hypothesis was not fully proven, the small differences in mg/L found in levels of dissolved oxygen are not likely to affect the quality of wine over a short period of time. My research supports that if you drink a wine within 57 days, the type of closure may not be of as much importance as people think. Therefore, more important issues should be considered such as the environmental impact of using synthetic closures over natural cork. Natural cork creates jobs, fixes carbon and decreases deforestation.

Summary Statement
This research helps to answer whether there is an important difference between natural, synthetic and screw cap wine bottle closures on wine oxidation

Help Received
Kevin Mills, Trinitas winemaker gave access to materials and acted as a teacher and mentor regarding winemaking. Mom typed and arranged meetings. Because of the topic, I wasn't able to complete all of the project in my home but I did not work with a professional research mentor

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Alvin B. Chan

Project Number
J2108

Project Title
Battle of the Baseball Bats

Abstract

Objectives/Goals
The objective is to determine which type of material used on a baseball bat would hit the ball the furthest.

Methods/Materials
To obtain results,one composite, aluminum, and wood bat are needed. 20 baseballs and one tee will also be needed as well as a machine that will be built that will sling back to hit the ball when pushed back. Testing will begin with one bat from the top of the bat. This position will be known as position A. Once 15 hits are completed from "A", the ball placement should be moved seven centimeters down from "A". This position is called "B". Seven centimeters below "B" is "C". Position D is 7 centimeters below "C". 15 hits will be done from each position. These steps will be done a gain with the other two bats.

Results
The composite bat had an overall average of 5.59 meters. The aluminum bat had an average of 4.521 meters, while wood had an average of 3.25 meters. Out of the four positions that were tested, position "B" had the highest total distance averaging 4.917. Howerver "C" had an average of 4.916, just 0.001 less than "B".

Conclusions/Discussion
It was thought that the compostie bat would have a 15 percent difference from the aluminum bat. However, there was a 25.857 percent difference. Between the composite and wood bat, there was a 72 percent difference! Aluminum and wood had a 39.1 percent difference. It was thought that there would be a 15 percent difference between the wood and aluminum bat. Part of the hypothesis was that the order from furthest average distance to least was: Composite, aluminum, wood. This was proven to be correct. Due to the "trampoline effect", these results suggest that composite bats have a softer barrel than the aluminum and wood bat, which allows less energy to be wasted.

Summary Statement
Determining either a composite, aluminum or wood baseball bat would hit a baseball the farthest.

Help Received
Dad helped supervise the building of the machine. My teacher Ms. Rosichan helped guide me throughout my experiment.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Abigail L. Chase

Project Number
J2109

Project Title
Sun vs. Sunscreen

Abstract

Objectives/Goals
My project was to determine if sunscreen has any affect on sun-sensitive paper. I think the sunscreen will stop the sun from going through the plastic bag, to affect the sun-sensitive paper.

Methods/Materials
In a darkened room, one piece of sun-sensitive paper was sealed into each of nine resealable plastic bags. Three types of sunscreen with Sun Protection Factors of 15, 30, and 50 were spread onto the bags, three of each. The bags were paper clipped to a piece of cardboard, then placed in the sun for two minutes. After two minutes, the papers were taken out of the bags and developed in a tray of water for one minute. Then they were put on another cardboard to dry inside the house.

Results
My results showed the sunscreen did prevent the sun from affecting the paper. However, it had to do with how thick the layer of sunscreen was on different bags. The bags with a thicker layer resulted in more white exposure than the bags with a thinner layer of sunscreen. It didn#t matter which SPF number I used because all three had the same result.

Conclusions/Discussion
In conclusion my hypothesis was correct because the sunscreen did stop the sun from going through the bag.
I had an unexpected variable which affected the results. The amount of sunscreen on each bag was not equally measured: the thicker layers of sunscreen did not dry as fast, and the opacity stopped the sun from going through the bags. The thinner layers of sunscreen dried clear and allowed the sun through the plastic.
On the other hand, my hypothesis was inconclusive due to the fact that I did not use equal amounts of sunscreen on each bag. If I were to redo this experiment, I would take that variable out by measuring equal amounts of sunscreen.

Summary Statement
My project is to find out if sunscreen will block the sun from going through a plastic bag, affecting sun-sensitive paper.

Help Received
Mother helped by taking pictures, timing and with typing the report; Friend helped during the experiement

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Winnie Chen

Project Number
J2110

Project Title
Lead in Makeup

Abstract

Objectives/Goals
My project was to test the amount of lead in different brands and types of makeup. I thought that color would affect the amount of lead in makeup. The darker the color, the more lead would be present. The lighter the color is, the less lead would be present. Lipstick should have the least lead present since its applied onto your lips and your can swallow it. As for containers, I thought that the containers with sharper or pointy edges, such as squares or rectangles would have more lead. The color would affect the amount of lead. The darker the more lead, the lighter the less lead will be present.

Methods/Materials
The makeup was split into four categories and ordered from the lightest color, to the darkest.360 different items were tested (including the containers).Each were tested 2 different ways and 10 times each. One way was by adding different chemicals and using different equipment to grind up the makeup, so that the volume would be equal. Some chemicals used were sulphide anion, bleach, and chlorine. This is a 9 hour process for each item. More than one item can be tested at once. The 2nd way to test lead is by using an XRF analyzer. It is an scientific gun that can determine all bad toxins such as lead. This way was more accurate and quick.

Results
The darker the color of the makeup got, the amount of lead increased. This is true for all the 4 makeup categories. Lipstick and other lip products in the lip category had more lead than expected. The XRF machine and hand test had very close and similar results. For containers, the darker the color got, the more lead was present. Containers with rounder edges such as circles or cones, had more lead than containers with pointier edges such as squares and rectangles.

Conclusions/Discussion
For food, such as candy bars, only 0.1ppm of lead is allowed. For lipstick, it is 5ppm. All of the lipsticks exceeded 0.1ppm of lead, but not than 5ppm of lead. They should lower the state regulation for lipstick, and make it similar to food. Lipstick is directly applied onto your lips and people can swallow it, so it is similar to food. The XRF machine and hand test had similar results which proves that both the testing conducted was accurate. Darker and rounder containers have a lot more lead then others. Avoiding these containers are recommended. Lead is extremely harmful to the body and everywhere. Another element should be used to replace lead.

Summary Statement
Testing lead in makeup and its containers.

Help Received
Father's friend help me rent XRF analyzer machine; Parents bought some of my supplies needed;

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Julie S. Chung

Project Number
J2111

Project Title
Which Soil Amendment Retains the Most Water?

Abstract

Objectives/Goals
My objective was to find out which soil amendment retained the most water. I tested sphagnum peat moss, newspaper, hair, coir (coconut fibers), and perlite. My hypothesis was that sphagnum peat moss would retain the most water.

Methods/Materials
I tested the soil amendments sphagnum peat moss, newspaper, hair, coir (coconut fibers), and perlite for their water retention properties. I also tested highly water retentive potting soil as a control to compare my
other variables to. The mass of 1000 cm3 of soil was recorded and placed into a container. A mesh lining was then placed over the soil to create a bowl-like shape and 300 cm3 of a soil amendment was placed into the mesh lining. 500 milliliters of water was steadily poured over the soil amendment. Then, the container was covered with plastic wrap to eliminate evaporation from occurring. Exactly three hours after the water was poured, the mesh lining and soil amendment were taken out of the container and the new mass of the soil was recorded. The experiment was repeated 5 times for each soil amendment.

Results
Peat moss retained an average of 83.8 grams of water, newspaper retained an average of 87.2 grams of water, hair retained an average of 33 grams of water, coir retained an average of 17.2 grams, perlite retained an average of 85.4 grams, and the control potting soil retained an average of 95.2 grams of water.

Conclusions/Discussion
My hypothesis was false. Newspaper by far did the best out of all of the soil amendments. My experiment also shows that materials that are not commercially sold as soil amendments (such as hair and newspaper) can do better than the commercially sold materials.

Summary Statement
My project tested the water retention capacity of soil amendments: sphagnum peat moss, hair, newspaper, coir (coconut fibers), and perlite.

Help Received
Mother helped cut and paste; Father gave inspiration

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Nicholas M. Clarksean

Project Number
J2112

Project Title
Open and Shut: Single vs. Double Paned Windows

Abstract

Objectives/Goals
The objective of this experiment was to see if the addition of a second pane of glass would lower the temperature of the glass when subjected to a heat source.

Methods/Materials
Using two pieces of equally cut glass, the first piece of glass was subjected to a heat lamp for five minutes. The temperature of the glass was recorded by use of a digital thermometer taped to the glass. After a cooling off period, an additional piece of glass was sealed with duct tape on top of the glass separated by the use of four one inch pieces of wood in each corner. After subjecting both pieces of glass to the heat lamp, the temperature of the glass was then recorded.

Results
The addition of a double pane of glass did reduce the temperature of the bottom piece of glass as compared to the temperature of the single piece of glass subjected to the heat lamp.

Conclusions/Discussion
The results supported the hypothesis. The conclusion reached through this experiment is that double paned windows provide better temperatue resistance to direct heat than single paned windows.

Summary Statement
This project tested to see if adding a second pane of glass to a window would lower the temperature of the glass when subjected to a heat source.

Help Received
Father helped cut wood pieces used to separate the two pieces of glass and helped box cut out the top of the shoe box.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Riley S. Coger

Project Number
J2113

Project Title
Snowboard Science

Abstract

Objectives/Goals
How does snowboard wax vs. candle wax vs. no wax effect the sliding friction of a snowboard? My hypothesis is that snowboard wax will have the least amount of sliding friction.

Methods/Materials
Three lanes were created on the base of a snowboard, one with snowboard wax, one with candle wax, and another with no wax. Fifteen ice cubes were tested in each of the three lanes by lifting the end of the board (using a home-made lift) and measuring the height at which the ice began to slide.

Results
When the results were averaged, the candle wax proved to be slightly faster than the snowboard wax. Both waxes were faster than no wax.

Conclusions/Discussion
I was not able to fully support the hypothesis. Candle wax allowed the ice to slide with the least friction on the snowboard. Further research from science books show that atoms between two smooth surfaces form weak bonds. These bonds are easier to break with a smaller amount of force. When the inclined plane (snowboard) was raised, the force of gravity caused the ice to slide. The smooth wax surface kept the ice and board atoms from making a strong bond so they broke easily when gravity pulled. The no wax lane had a rougher surface. Atoms on rougher surfaces form stonger bonds and a stronger frictional force. It took more force to break these bonds.

Candle wax made the ice slide faster than snowboard wax. Both waxes contain paraffin, which is made out of petroleum. However, snow wax companies have added secret ingredients that are not identified on the label. They are meant to keep the snowboard wax from wearing off in wet places and in dirt. It does work better and longer in more conditions than candle wax, but did not reduce the friction as much. Candle wax feels more slippery to the touch (may have more paraffin in it). This is probably what made it a better layer to reduce friction than snowboard wax. However, results show that both types of wax were close in their ability to reduce friction.

In future experiments, one could test other lubricants, like cooking oil, or test different shaped and sized ice cubes to see if the varying faces of the ice would slide more quickly, and if so, how much. Finally, one could test different types of snowboard wax brands to find which one creates the smoothest surface and least amount of friction.

Summary Statement
I tested the friction of a snowboard and ice using snowboard wax, candle wax, and no wax to see which one would help create less friction between the board and an ice cube.

Help Received
Dad worked with me to build the ramp; mom helped find age appropriate library books

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Noah R. Crousore

Project Number
J2114

Project Title
Investigating Optimal Sound Frequencies for Rescue Signaling

Abstract

Objectives/Goals
My family and I spend a lot of time hiking in the Idaho forest. Most of the time we don#t have cell phone service. I carry a whistle in case of emergency. This made me wonder if there might be certain frequencies that could be heard for greater distances. The goal of my project was to see if certain frequencies maintain their amplitude for greater distances than others. I believed some frequencies might demonstrate less decibel degradation than other notes.

Methods/Materials
I used two digital keyboards, a digital grand piano, an anemometer, a digital decibel meter, a metric measuring tape, an altimeter, a digital thermometer, a hygrometer, and phone "apps" for tuning and recording. I measured the decibel levels, from 75 meters away in a forest setting since attenuation is a consideration. I compared keyboard notes, a rescue whistle at 2.5 kHz, and sounds of yells (human voices).

Results
After performing more than 100 tests of 40 frequencies, I narrowed my optimal frequencies to 20 that seemed to sustain their amplitude for greater distances. I then found eight frequencies that seemed to show the least degradation at 75 meters. I used logarithmic doubling rules to extrapolate the decibels at 150 meters, 300 meters and 600 meters, and 600 meters with the impact of A-Weighting (the ear's sensitivity to certain frequencies, perceiving sounds as either louder of softer).

Conclusions/Discussion
Although the degradation for the eight notes did not vary greatly, a difference of even one decibel is a noticeable difference in loudness. When A-Weighting is considered, the perceived loudness of notes at similar decibel levels may be significantly different. Yells or "screams" had the least degradation, possibly due to the harmonics, formant resonance, and overtones in the human voice. The two chamber whistle at 2.5 kHz also lost less amplitude with distance, making it a good choice for rescue. I extrapolated to compare all music note frequencies at 600 meters. I found that of the keyboard notes I tested, Ab4 (417.9 Hertz) was significantly louder with distance than the other notes in the five octave range I evaluated.

Summary Statement
I investigated optimal sound frequencies for rescue signaling, explored loss of amplitude over distance in a woodland environment, then compared the test frequencies to a commercial rescue whistle and human "yells" for help.

Help Received
Thanks to my parents for their support and assistance when I conducted my tests. Thanks to my science teacher for lending me equipment and for her guidance.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Ryan C. Fong

Project Number
J2115

Project Title
Are Parents Poisoning Children with Baby Food? Investigation of Arsenic Concentrations in Store Bought Apple Sauce

Abstract

Objectives/Goals
In September 2011, The Dr. Oz show investigated levels of Arsenic in many brands of apple juice. Their studies indicated that Arsenic has been found in apple juice at concentrations higher than the allowable limit in drinking water. Performing a literature search on baby food apple sauce and Arsenic did not return with extensive information. My experiment focuses on investigating the concentration of Arsenic in store bought apple sauces that are fed to babies. I hypothesize I will find detectable levels of Arsenic in the apple sauces by digesting the samples with acids and analyzing them using an ICP-MS.

Methods/Materials
1.Apple sauce samples were weighed and transferred to digestion vessels.
2.Concentrated nitric acid was added to baby food and allowed to digest at 95C. Additional acid was added to the baby food samples until no further dark smoke was emitted during the heated digestion. Hydrogen peroxide was added to the samples to ensure complete digestion and brought to 100mL final volume. A blank and a laboratory control spike sample were also analyzed with the samples. The blank sample contained the same amount of acids as the samples but did not contain any apple sauce. The laboratory control spike contained a known concentration of Arsenic. The blank was used to ensure there would not be false positives results. The spike was used to ensure that the method worked well.
3.Once cooled, they were filtered and analyzed on an ICP-MS.

Results
The Agilent ICP-MS was calibrated with known concentrations of Arsenic to produce a calibration curve for the analysis of the samples. Three apple sauce vendors of the baby food contained Arsenic at low levels. Beech Nut had the highest Arsenic concentration average at 1.92 parts per billion, Full Circle had an average 1.51 parts per billion of Arsenic, and with the lowest average at 1.01 parts per billion was Gerber.

Conclusions/Discussion
Although the levels of Arsenic found in the different apple sauces were very low in comparison maximum allowable concentrations as published by the FDA, I believe that there is insufficient data with respect to exposure and long term effects in infants. Infants have a lower body mass, do not have developed immune systems, and the cells are still developing. These can lead toward increased possibility of contracting any of the diseases associated with Arsenic exposure.

Summary Statement
Investigation of Arsenic Concentrations in Store Bought Apple Sauce Baby Food using an ICP-MS.

Help Received
The instrumentation and chemicals were supplied by Agriculture & Priority Pollutants Laboratory in Clovis, CA and was mentored by Stephane Maupas and Leonard Fong.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Isaac W. Garner

Project Number
J2116

Project Title
The Dish on Washers

Abstract

Objectives/Goals
The Objective of my project was to determine what style of dishwasher, European or American, works better overall. Many think all dishwashers work the same but in fact they don't. How they heat the water and how they dry the dishes can be very different. I will compare the two major styles and determine who makes a better Machine overall.

Methods/Materials
One dishwasher made in Europe (Miele), and one dishwasher made here in America (GE), was used for testing. These machines represent some of the best available models from their region and were of the same price range ($1200-$1300). Various kitchen items were soiled with baked on food products to be cleaned by each machine. All Items, ingredients, quantities of food products, cook time/temps, were closely monitored and kept constant per my procedure. Each dishwasher was tested three times using only the normal cycle and the same amount, and brand of dish washing detergent. I Evaluated:, Power usage, water consumption, noise level, cleaning ability, cycle time, and capacity.

Results
Not all dishwashers of the same price range are created equal. After evaluating all parameters, the European dishwasher outperformed the American made dishwasher. Using a ten star system the Miele received eight stars while the GE only received four stars. Out of all the parameters, cleaning ability was the most notable difference between these machines.

Conclusions/Discussion
Unfortunately today many products aren't made very well, especially appliances. My results, along with my research of consumer satisfaction surveys, not only suggest I recommend a European made dishwasher but a Miele dishwasher, specifically. Miele dishwashers rank very high in consumer satisfaction ratings and Miele receives top honors for many of their other products. My results, confirm that Miele dishwashers perform very well compared to their domestic counterparts.

Summary Statement
Compare a European and American manufactured dishwasher to see what style works better overall.

Help Received
My Father connected the water and power meters to both dishwashers, handled the hot dishes, and helped with making my graphs.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Erik J. Godlewski

Project Number
J2117

Project Title
It Burns! Do Our Clothes Protect Our Skin from Harmful Ultraviolet Rays?

Abstract

Objectives/Goals
The objective was to determine which fabrics will best protect the wearer from ultraviolet rays. Does color matter? Does darkness of color or tightness of weave affect performance? Is polyester better than cotton? Does it matter if the fabric is wet or dry?

Methods/Materials
I tested 100% cotton broadcloth fabric in various bright colors and in black and white, as well as 100% cotton fabrics of different weaves, including gauze, voile, t-shirt fabric, and flannel. I also tested 100% polyester knit and lining fabrics. My procedure was to put a fabric piece in an embroidery hoop and set it under an ultraviolet lamp set up to produce a UV Index of 10 below the lamp. I measured the UV index beneath the fabric using an ultraviolet sunlight meter, and also using UV-sensitive color changing beads.

Results
This experiment showed that not all clothing provides the same level of protection, and that the type and characteristics of the fabric are important. The biggest difference in protection resulted from the weave of the fabric. My hypothesis was correct that a tighter weave provides more protection than looser weave. Polyester fabric blocked more UV light than cotton fabric. Wetting the fabric reduced protection, but it was only by a small amount. Various bright colors of the same fabric didn't make much difference in performance. However, darker colors protected better than lighter ones.

Conclusions/Discussion
In conclusion, I would recommend wearing a dry, dark, long-sleeve, tight-weave shirt, to provide the most protection from UV radiation. Looser weave fabric that reduces the typical Los Angeles summer UV Index from 10 to 2 under the clothing increases the safe exposure time by five. However, tighter weave fabric that reduces the UV index to 1 increases the exposure time by ten. This is especially important for people with skin types that burn easily.

Summary Statement
Determine which fabric characteristics provide the most protection from ultraviolet radiation.

Help Received
My parents helped with photos and with typing. My father helped with graphs.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Jacob T. Hanna

Project Number
J2118

Project Title
Sunscream

Abstract

Objectives/Goals
My objective was to determine if there is any correlation between Sun Protection Factor (SPF) of different sunscreens and the transmisson of UVA from sunlight. I hypothesized that for SPF 15, 30, 50, and 70 the UVA transmisson would decrease with higher SPF.

Methods/Materials
Four sunscreens of varying SPF were spread on a slide. Each slide was placed above the sensor of a UVA intensity meter. Placed in direct sunlight, the meter ran for five minutes taking cummulative measurements of the UVA energy for each slide.

Results
The sunscreens of higher than or equal to SPF 30 were not statistically different. SPF 15 had slightly higher transmission than the others.

Conclusions/Discussion
My hypothesis proved, to a degree, correct. I postulated that sunscreen would diminish UVA energy transmitted, but that the change observed would not be proportional. The data for SPF 30, 50, and 70+ showed no significant differences. Their confidence intervals overlapped. Since the results for SPF 30, 50, and 70+ were statistically similar, the UVA energy transmission was clearly not varying proportionally. The means of SPF 30 and SPF 70+ were very close. The data for SPF 15 was statistically different, but only slightly.

Summary Statement
My project explores the relation between sunscreen's SPF and UVA, the ultraviolet light most commonly linked to skin cancer.

Help Received
Father gave advice and supplied UVA meter from Alere, Mr. Kean D'Cruz created the graph using JMP software.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Maxwell P. Jenkins

Project Number
J2119

Project Title
To Dab or Not to Dab?

Abstract

Objectives/Goals
What percent of the total percent of fat in pizza is removed by dabbing with paper towels?

Methods/Materials
a. Materials
Amici's New York thin crust cheese pizza; (delicious); Pizza slicer; Paper towels; 50 ml plastic vials with caps for extracting pizza (pre-weighed); 10 ml glass vials with caps for sample analysis (pre-weighed); Analytical balance; Graduated 25 ml burette with rubber vacuum bulb; 1 ml analytical pipette; Fume hood; Hexane; High speed vortexer; Safety glasses & lab coat.

b. Methods
i. A small New York cheese pizza was purchased from Amici's in Redwood City. ii. The pizza was cut in half in such a way that the two halves were as symmetric as possible. iii. One half of the pizza was dabbed repeatedly with clean paper towels until no grease was visible on the towel. iv. 9 samples of roughly equal size were cut from each pizza half, then placed in pre-weighed 50 ml plastic vials, then tightly sealed with the cap. v. The resulting pizza samples were weighed in the capped vials and the weights recorded. vi. The mass of the pizza samples were calculated by subtracting the weight of the vial from the weight of the (vial + sample). vii. 5 mls of hexane per gram of pizza was then added to the vials, then the vials were tightly sealed. viii. The vials were then vortexed vigorously for 20 seconds. ix. The vials were placed in a cool area and allowed to sit for 5 days to complete the extraction and allow any chunks of pizza to settle to the bottom of the vial. x. Exactly 1 ml of the hexane solution was accurately removed from the sample vials using a very accurate 1 ml pipette and placed in the pre-weighed glass vials then capped. xi. Once all the samples were prepared they were placed in a fume hood, the caps were loosened so that the hexane could evaporate but no dust or other particles could enter. xii. The vials were allowed to evaporate for three days. xiii. The evaporated vials with the pizza fat residue remaining were carefully weighed. xiv. The mass of the pizza fat residue in each sample vial was calculated by subtracting the mass of the empty vial from the mass of the (vial + fat residue).

Results
In my experiment 39% of the total fat in pizza was removed by dabbing with paper towels

Conclusions/Discussion
my hypothesis was incorrect the amount of fat removed in pizza when dabbing was about one third. i guess about one half.

Summary Statement
removing fat from pizza with paper towels.

Help Received
Father gave me access to his lab.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Sahar A. Khashayar

Project Number
J2120

Project Title
Watt a Bright Idea

Abstract

Objectives/Goals
Over the years, I have become more and more aware of Earth's dwindling natural resources. Electricity is one of the most popular ways of consuming these resourses. I wanted to find out what kind of light bulb technology is the most efficient way of converting electricity to light.

Methods/Materials
I built a circuit to power LED, Incandescent and CFL light bulbs. I tested over 10 different bulbs with different power ratings of 60W, 75W and 100W. I measured current, decipated heat and light emission of each bulb.
Material:
Three each of: 60, 75, 100W Incandescent light bulbs; Three each of: 60, 75, 100W equivalent CFL; One 75W equivalent LED; One 60W equivalent LED; One light bulb 100W equivalent LED; Lab Quest Mini light meter; Lab Quest Mini thermometer; Two multi-meters (Current and Voltage); PC (e.g. Laptop) Camera; Sunglasses.
Circuit materials: Wires, light socket, switch, wire holder, cover, wooden board approximately 15x20x3/4 inches.

Results
The results of this experiment were as expected. The LEDs emitted the most amount of light, while giving off little heat, for the same amount energy input.

Conclusions/Discussion
The LEDs were the most efficient, but not necessarily the coolest. They were about the same temperature as the CFLs, however they produced more light.
With this experiment, I hope to make better choices in purchasing light bulbs. I also hope to help other people to think twice before they get a less efficient bulb. If many people around the world buy eco-friendly, energy efficient light bulbs, then, together, we can make a huge difference in preserving our environment.

Summary Statement
Study of the effeciency of different light bulb technology based on measurement of conversion of electricity to heat and light

Help Received
My dad was present while making measurements as I was working with 120V supply.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Bisma N. Khwaja

Project Number
J2121

Project Title
Cut It Out! Which Die Cut Machine Requires the Least User Interface & Effect of Design Intricacy on Machine Performance

Abstract

Objectives/Goals
The objective is to determine which die cutting machine (press, roller or electronic cutter) requires the least user interaction, resulting in most efficient use of time. I also determine how intricacy of design affects machine speed. I hypothesize that the press machine requires the least user time, because the platen plate exerts pressure evenly on the die to cut shapes. Intricate designs may take longer to cut, because they have more inches of steel rule embedded in the die than simpler designs.

Methods/Materials
I used 4 cutting machines: roller machine (plastic-coated roller), roller machine (steel roller), press machine, and electronic machine (with computer and eCAL software). I used 3 die designs: circle die, spiral die, and snowflake frame die. I also used necessary die tools, construction paper, and a timer. Each machine had a specific set-up and procedure, based on its mechanics. Stacks of paper were measured and cut in advance for each work station. I measured the amount of time I engaged with the machines to cut a sample size of 100 shapes per trial, excluding the amount of time the machines functioned independently. I ran three trials for each of the three die designs per machine, recording data in a chart. My experiment yielded 36 trials, with a total of 3600 shapes.

Results
Trial times were averaged for each design and recorded in units of minutes:seconds and hours:minutes:seconds. Circle, spiral, and snowflake frame results for the roller machine (steel roller) were: 11:41, 14:29, and 33:20. Results for the roller machine (plastic-coated roller) were: 6:36, 8:12, and 21:32. Results for the press machine were: 10:40, 10:54, and 1:21:03. Results for the electronic machine (with eCAL software) were: 11:57, 22:24, and 1:11:00.

Conclusions/Discussion
My product testing proved my hypothesis about the press machine to be incorrect. I found that the machine with plastic-coated roller demonstrated the least user interaction time for designs at each level of intricacy. Perhaps this is due to the mechanical advantage of the roller, distributing incremental pressure directly onto the blade of the die to cut the paper. My hypothesis about performance speed based on design intricacy was correct. The more intricate the design, the longer it took for all machines to cut the shape. Based on these results, I recommend the roller machine to users interested in cutting maximum shapes in a short period of time.

Summary Statement
In this study, I test the press, roller and electronic cutting machines to determine which machine saves the most user time overall, and at select levels of die design intricacies.

Help Received
I interviewed the Director of Research and Development at Ellison Educational Equipment, who provided me with the machines needed for my study.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Nicole M. Kuntjoro

Project Number
J2122

Project Title
The Extraction of Blots, Blemishes, and Stains

Abstract

Objectives/Goals
The objective of this experiment was to find a cost-effective cleaning agent that could remove stains.

Methods/Materials
Six cloths were stained with the same amount of red wine. This was repeated with the substances Sharpie, blood, and lipstick. These cloths were then submerged in the cleaning agents ammonia, bleach, Coca-Cola, detergent, and water. When finished, five cloths of the same stain were in different cleaners, leaving one dry to compare the color change at the end of the test. The cloths were taken out of the liquid, photographed, and any observations of the appearance were recorded at the half, first, second, and fourth hour mark. These cloths were also analyzed with a grid system and a color analyzer in the computer program Gimp.

Results
At the end of the test, the data proved that bleach performed the best. Bleach cleaned the wine and blood stains the quickest and was the only liquid to have an effect on the Sharpie stain. Ammonia was the second best, cleaning the wine and blood stains at a slower rate than bleach, but had no effect on the other two substances. Water and detergent were both mediocre, never completely cleaning the stains, but discolored them or left a faint outline. Lastly, Coca-Cola was the most ineffective because the liquid dyed the cloth brown, making the stains even worse.

Conclusions/Discussion
My hypothesis was supported by the data collected. Bleach proved to be the most effective cleaning agent.

Summary Statement
This project found that most effective cleaning agent that could clean selected stains was bleach.

Help Received
Parents helped purchase materials; Science teacher helped with instructions and advise

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Lucas G. Kurlan

Project Number
J2123

Project Title
Effectiveness of Fire Retardant Products on Pine and Redwood

Abstract

Objectives/Goals
The goal of this project was to answer a lingering question in the minds of many fire-wary California homeowners: How can I better protect my home, and do fire-retardant wood coatings really live up to their claims of fire protection? I designed this experiment to test the effects of NoFire A-18 and Flame Stop II either alone or with a topcoat of a typical paint, sealant, stain, or varnish on white pine and redwood.

Methods/Materials
The 80 tests were performed on 20 garden stakes (the samples) of redwood and white pinewood over, but not touching, a burner emitting a constant flame from a constant distance. The ignition test was the time from exposure to a flame to the time the sample caught on fire (there was very little variation from sample to sample). The burner remained on underneath the specimen for exactly 1 minute after the sample caught on fire, and the time to extinguish was recorded from the moment the burner turned off to the time the fire extinguished. During these tests, a suction fan ran on low to prevent an accumulation of smoke.

Results
The results of this experiment showed that for white pine, adding NoFire A-18, an intumescent (expanding) fire-retardant paint, under a topcoat of typical paint or by itself, consistently reduced the time to extinguish (getting the lowest results consistently), on average decreasing the time to extinguish by 77 percent. Raw pine wood saw a 97 percent decrease in the time to extinguish when a flame-retardant coating was added. The addition of flame-retardant paint and flame retardant sealant together to pine specimens showed inconsistent results. With the redwood samples, the time to extinguish was consistently reduced by an average of 70 percent when Flame Stop II (fire-retardant sealant) was added. The raw redwood had a decrease of 78.14 percent to extinguish.

Conclusions/Discussion
These results showed that the tested flame retardants work, consistently decreasing the time to extinguish. Unexpectedly, adding both retardants to a sample yielded inconsistent results. If one is willing to spend extra money on a tested flame-retardant coating, the most effective treatment would be a combination of Frazee enamel and NoFire A-18.

Summary Statement
My experiment showed the effects of fire-retardant paint and sealant on white pine and redwood.

Help Received
Thanks to my father and mother for their supervision during the experiment and for purchasing supplies. Thanks to my brother for his taking of pictures. Thanks to my science teacher for her guidance and edits. Thanks to Mrs. Rucker for her help with the graphs and the board.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Bridget E. Levy

Project Number
J2124

Project Title
Protect Your Melon!

Abstract

Objectives/Goals
Question: This project asked, "Which type of helmet protects your head the most during a crash, a bicycle helmet or a skateboard helmet?"
Hypothesis: The author hypothesized that that the watermelon(s) with no helmet will take on the most damage, then the watermelon(s) with the bicycle helmet, and that the watermelon(s) using the skateboard helmet will be protected from damage the most because of the helmet's thicker plastic, denser foam, and multi-crash resistant design.

Methods/Materials
Procedure: The experiment was conducted using a pulley system that placed a watermelon in a helmet that was dropped down onto concrete. This test was conducted with three variables: no helmet, bicycle helmet, and skateboard helmet. Each watermelon was dropped and had its damage recorded until it was unable to be further used, then the author moved onto the next test with a fresh watermelon.
Experimental Design: Organization of this experiment was a primary goal.
Manipulated Variable- The manipulated variable in this project is the helmet type.
Controlled Variable- The controlled variable in this project is the test(s) without a helmet (just watermelon); this test is conducted to have proof and comparison of what should happen without manipulation.
Responding Variable- In this test the author measured the amount of damage afflicted on the watermelon(s) after being dropped, such as bruises, scratches,or cracks.
Trials- There were 21 tests in total in this project.
Constant- The constants in this experiment are:
Length, height, and force of the watermelon drop.
Watermelon size and weight (in average).
Area in which experiment is taken (same concrete).
Temperature and climate (Tests will be taken same day)

Results
Results: Results showed that the watermelons without helmets took on the most damage. The watermelon with the bicycle helmet took on the second amount of damage. The watermelons using the skateboard helmet took on the least amount of damage for the longest amount of time.

Conclusions/Discussion
Conclusion: The author concluded that skateboard helmets are better at protecting watermelons (your

Summary Statement
This experiment tested the relative effectiveness of biycle helmets in comparison to skateboard helmets.

Help Received
Father bought watermelons and helped locate some supplies. Mother (occsasionally) assisted in the actual dropping of the helmet when the author was video-taping for future reference.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Katherine R. Miclau

Project Number
J2125

Project Title
An Egg White's Initial Temperature Affects Its Volume and Stability After Beating

Abstract

Objectives/Goals
To determine how an egg white's initial temperature affects its volume and stability after beating.

Methods/Materials
Groups of 3 eggs were brought to 4 different temperatures (40°, 50°, 60° and 70°). The egg whites were separated, their volumes were measured (to 105 mL), and they were beaten to a good foam. After beating, the egg white volumes were remeasured and the egg whites were allowed to sit for one hour, after which physical observations of foam quality were recorded. Each experiment was repeated five times.

Results
The results indicated that the warmer the egg white, the larger its volume when beaten to a "good foam." Colder egg whites stay more moist and elastic after beating compared to warmer ones. Additionally, the foams of colder egg whites did not collapse as much as those of the warmer egg whites.

Conclusions/Discussion
Under physical observation, colder egg whites stay more moist and elastic compared to warmer ones, which dry out and are more fragile over time. If the goal is to get as much volume as possible by beating an egg white, then room temperature eggs should be used. However, if one wants a more stable egg white foam that is less likely to collapse when incorperated in a recipe, as is often desired in baking, then cold eggs should be used.

Summary Statement
This project evaluates how an egg white's initial temperature affects its volume and stability after beating.

Help Received
My mother showed me how to seperate eggs more easily, and helped me assemble the materials for the project (bought the eggs). My father taught me how to make graphs and proof-read my poster.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Erika E. Pasia

Project Number
J2126

Project Title
Foam Home

Abstract

Objectives/Goals
My objective was to determine which type of off-the-shelf insulation of approximately half-an-inch thickness, contained heat the longest - Reflective Foil, Cellulose, Polyurethane Foam, Fiberglass, Polystyrene Foam Board.

Methods/Materials
Six clear plastic boxes of identical shape and size to form an outer container with an inner clear plastic box. One container was used as a control or without insulation, and the other five would contain each of the sample insulation. Five of the sample insulators of uniform thickness of approximately half-an-inch were filled/molded between the outer and inner plastic container. A baby food glass jar filled with hot water as the heat source is placed inside the inner container and quickly covered with the top insulation to contain and trap the heat. 6 thermometers were then used for recording the temperature of the water inside the jars at every half-hour.

Results
The Polyurethane Foam maintained a consistent rate in which the temperature decreased over time, allowing for the insulation to show that it is the best insulator. Even so, the Fiberglass insulation was also a good insulator lagging only by a few degrees, whereas the 3 remaining, Reflective Foil, Cellulose and Polystyrene Foam Board were behind by a slightly bigger gap between them and Polyurethane.

Conclusions/Discussion
The R-Values of both the Polyurethane Foam and Fiberglass Insulators, the best insulators out of the five, are relatively high. This means that both insulators are very capable of keeping in heat, as is the purpose of R-Value numbers. This was displayed quite clearly with the results of my tests, refuting my hypothesis that the Fiberglass would do the best, but still shows its ability to hold in heat more so than others, as the Polyurethane Foam had trumped my choice.

Summary Statement
My project was to determine which of the five most common types of insulation would be the best at holding or containing in heat.

Help Received
Sandra Pasia: Mother helped prepare the holes for the thermometers and assisted in covering the baby food jars so as to trap the heat at nearly the same time.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Roshni N. Ravi

Project Number
J2127

Project Title
Eco-Efficient?

Abstract

Objectives/Goals
The objective of the project was to observe the efficiency of green detergents and to determine the most cost-effective detergent.

Methods/Materials
Materials: Forty-eight 12" by 12" towels, Kenmore 3.6 cubic feet Top Load Washer, Measuring Cup, Heinz Ketchup, Tropicana No Pulp Premium Ornage Juice, Coffee, Mud, Tide Original, Gain Original, Seventh Generation Original, Green Works Original.
Method: Twelve 12" by 12" towels were stained with three teaspoons of Heinz Ketchup to form a stain with a radius od 2.5". Three towels were washed using the directed amount of Tide, three using Gain, three using Green Works and the last three using Seventh Generation. The method was repeated with the Tropicana Orange Juice, coffee and mud.

Results
Eco-friendly detergents are as effective as if not better than sunthetic detergents. All detergents were thorough in cleaning the towels stained with ketchup and orange juice. However, none of the detergents were able to remove the coffee stain. The towels cleaned by Tide, Gain and Seventh Generation eliminated the coffee stain. On the other hand, Green Works did not remove the mud stain.

Conclusions/Discussion
At only $0.17 per load, Seventh Generation is a better alternative to Tide which costs $0.23. Seventh Generation is the bets option as it is both eco-friendly and cost-effective.

Summary Statement
Are eco-friendly detergents as successful as or better than synthetic detergents?

Help Received
Mother helped with board; Father helped with experiment.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Christopher J. Robinson

Project Number
J2128

Project Title
The Effects of Different Exposures on Paints

Abstract

Objectives/Goals
Objective:
The purpose of my science fair project was to investigate which age of paint, casein paint, tempera paint, Renaissance paint, or modern oil paint, would sustain its color and luster (shine) through a series of exposures to extreme conditions such as sunlight, heat, freezing, and soaking in water and acidic water.

Methods/Materials
Procedures
A.Color Banks 1.Prepare all four ages of paint (casein, tempera, renaissance and modern) in all six color types (refer to Note Book Procedures).
2.Cut out 144, 6cm by 6 cm, non treated canvas cloth squares.
3.Prepare 6 banks of canvas squares (sun, heat, baseline samples, heat/freeze, soak water, and soak acid) of 24 samples, (6 of each color x the 4 ages of paint (casein, tempera, renaissance, modern)4.Keep 24 samples as a baseline reference (e.g. red casein, red tempera, red renaissance, red modern; yellow casein).

Results
A.Sun Exposure. In general, the exposure of all of the paint bases and colors to sunlight produces very little change both visibly and spectrally. B.Heat Exposure. Heating, causes the greatest affects on all of the colors and paint bases observed. In general all colors/ bases display visible darkening. C.Freeze/Heating Exposure.Results from freeze/heating of the color/bases produced practically identical results to heating alone. This indicates that freezing did little to decompose the colors/ base paints.D.Water Exposure.In general the greatest effects of water exposure on the color/bases paints was fading. Casein and tempera based paints were the most severely affected, while renaissance and modern oil paints were the least affected.E.Acid Solution Exposure.Results from acid solution exposure of the color/bases produced practically identical results to water alone.

Conclusions/Discussion
Conclusion:My original hypotheses that protein based paints (casein and tempera) would deteriorate the fastest under conditions such as the sun, heat, freezing, and soaking in both water and acidic water, because of their natural organic binders was acceptable under some conditions, but not all. Under some circumstances, Casein based paints remained very stable (heating, sunlight), where as oil based paints decomposed rapidly when heated. On the water exposure however, the oil based paints were consistently more durable than the natural based paints where significant fading was observed. Sunlight appeared to affect the paints the least.

Summary Statement
My project is about exposing paints from different eras to different conditions (Sun, freezing, heating acid and water) to determine difference in stability as observed visibly and by spectrophotometry.

Help Received
Santa barbara paint depot helped run the samples on the spectrophotometer

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Briana M. Rosas

Project Number
J2129

Project Title
Swallowing Medicine: Does Size and Texture Matter?

Abstract

Objectives/Goals
My objective was see if the size or texture of pills affected a person's ability to swallow them.

Methods/Materials
I designed an artificial esophagus using plastic tubing. I used beads to represent the different sizes, textures, and shapes of pills. I tested to see how well each type of pill would go down the tubing using water just as you would if you were swallowing pills.

Results
My results were that capsules were the best pills to swallow due to size and texture because they had a smooth texture. They were also thinner and smaller than other pills tested. The most difficult pill to go down the tubing were the tablets due to large size and rough texture.

Conclusions/Discussion
I concluded that size and texture does matter when swallowing medicine.

Summary Statement
My project was to see how different sizes, shapes, and textures of pills affect their ability to be swallowed.

Help Received
Parents helped purchase equipment needed; Grandfather helped install tubing; Mother helped with exhibit board

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Erin C. Rush

Project Number
J2130

Project Title
Is There Arsenic in Your Juice?

Abstract

Objectives/Goals
My objective was to determine the presence and levels of inorganic (harmful) arsenic in apple and grape juice. I hypothesized that organic juice, from fruit grown without pesticides, is less likely to contain arsenic than non-organic juice.

Methods/Materials
Thirty-nine juice samples were tested, including 13 different brands, six organic (4 apple; 2 grape) and seven non-organic (5 apple; 2 grape). Bottled water was used as a control. Three samples of each juice were tested using a government EPA approved, verified test kit for inorganic arsenic. Each sample contained 100 ml of juice, and temperature was constant. Three Chemical Reagents were added at specific times during the testing of each sample. Inorganic Arsenic compounds in the juice were converted to Arsine (AsH3) gas by the reaction of Zinc Dust and Tartaric Acid. Mercuric Bromide strips react with Arsine gas by changing color after 10 minutes if arsenic is present. The kit included a color chart to measure arsenic levels (range: 0-500 ppb).

Results
The average amount of inorganic arsenic was less in organic juice than non-organic juice (3.2 ppb versus 7.9 ppb), but the results were inconsistent. Contrary to my hypothesis, one organic sample had a high arsenic level of 20 ppb, and several non-organic samples had zero arsenic. Closer analysis revealed that 18 samples of juice were from concentrate, and 21 samples were not-from-concentrate. All the juice from concentrate had arsenic, ranging from 1 ppb to 60 ppb. All of the juice not-from-concentrate had zero arsenic. This experiment is still in progress.

Conclusions/Discussion
The most important variable predicting the presence of arsenic in juice is whether or not the juice is made from concentrate. Even juice labeled #organic# contains arsenic if the juice is made from concentrate. The arsenic found in American bottled juice comes from the dehydrated juice concentrates which are imported primarily from China (apple) and Argentina (grape), and then reconstituted in the U.S. before bottling.

Summary Statement
My project investigated the presence, levels, and source of inorganic arsenic in bottled apple and grape juice.

Help Received
Mother bought arsenic testing kit; Mother monitored me while using toxic chemicals for testing.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Arlene Sodhi

Project Number
J2131

Project Title
Light Bulbs and Fog

Abstract

Objectives/Goals
Which light bulb shines the brightest though fog?

Methods/Materials
3 Different light bulbs.
Multiple Crystal Geyser water bottles
Multiple milk bottles
Crystal bowl
3-way light meter
measuring cup
ruler

Results
The most modern bulb shined the brightest through fog. Incandescent (oldest bulb) had least amount of lumens.

Conclusions/Discussion
Most modern bulb is the safest, and is best if ever in the conditions of bad weather, and fog.

Summary Statement
I was trying to see which light bulb, out of the three I used, shines the brightest through fog.

Help Received
no one

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Reilly M. Tiglio

Project Number
J2132

Project Title
Stop the Runoff: Investigating Benefits of Geotextiles

Abstract

Objectives/Goals
Permeable pavers are an attractive landscaping tool and are beneficial to the environment. While reviewing literature on permeable pavers last year, I noticed the use of a geotextile material. It is a permeable material that prevents the bedding materials the permeable pavers sit on from combining. My hypothesis was that the geotextile material would be faster and more efficient in percolating water through the paver system.

Methods/Materials
I set up a paver system in a test box according to the manufacturer's guidelines. I used the geotextile material in the first tests. The second tests were with no geotextile material. For the third test I used a impermeable material: Visqueen. The first and second tests were repeated fifteen times. Due to the impermeability of the Visqueen, the third test could only be conducted once.

Results
The first series of tests with the geotextile material averaged 83.2%efficiency. The second series of tests with no geotextile used averaged 93.2% efficiency. The third test with the impermeable Visqueen had an efficiency rate of 0% as no water percolated. There was a significant difference of 10% efficiency between the Geotextile Material and the non-geotextile paver system.

Conclusions/Discussion
I found through the results of my testing that my hypothesis was not supported. In my geotextile tests, the water exfiltration moved through more slowly than with pavers alone. But with the geotextile material, the water was much more evenly distributed across the cloth before percolating through to the bottom of the box, so that the exfiltrated water was also cleaner sooner. This showed the geotextile material acted as a filter. I would like to perform more tests to see if the geotextile material might "clog" completely when functioning as a filter.

Summary Statement
My project tested water percolation in a permeable paver system with and without the use of a geotextile material.

Help Received
Grandmother supervised me, and Modern Builders Supply helped me obtain my project supplies. Nik Paris assisted me in creating my testing device. Science teacher provided guidance and support.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

Jonathan J. Vahala

Project Number

J2133

Project Title

Sunscreen SPF Effectiveness: A Spectral Study of Sunscreen Using a Mercury Vapor Lamp

Abstract

Objectives/Goals

I measured visible and UV wavelengths emitted from a mercury vapor lamp as they pass through a cell containing sunscreen of various sun protection factors (SPFs). I hoped to observe selective attenuation of the UV wavelength. Also, I wanted to estimate the thickness of sunscreen required to screen out UVA radiation.

Methods/Materials

Light emitted from a mercury vapor lamp was filtered by a monochrometer into 578nm (yellow), 546nm (green), 436nm (blue), 404nm (violet), and 365nm (ultraviolet-UVA) wavelengths. These wavelengths were passed through a cell containing the sunscreen and also through an alcohol (sunscreen solvent) control. A photo-detector measured the optical power in each wavelength (with the sunscreen and with the control) and a normalized spectral transmission was measured for pure SPFs of 15, 30, 50 and 100. Dilutions of SPF-15 were made to measure UVA transmission at 365nm.

Results

All SPFs were effective in attenuating 404nm (violet) and 365nm (ultraviolet). Even blue at 436nm was somewhat attenuated by the higher SPF values. Visible lines at 578nm (yellow) and 546nm (green) were fully transmitted. Dilution of SPF-15 by over 3000X was required to observe UVA radiation at 365nm. Using the liquid cell thickness of 3cm, I estimated that less than 10 microns of SPF-15 is effective in screening UVA radiation.

Conclusions/Discussion

The selective attenuation of UV light by sunscreen was confirmed. An estimated thickness required for effective screening of UVA was determined. In the future, these measurements could be repeated using deeper UV lines in the UVB band.

Summary Statement

I made a spectral study of 4 different SPF sunscreens using the 5 dominant emission wavelengths of a mercury vapor lamp to determine the thickness of sunscreen required for adequate protection.

Help Received

Father, Kerry Vahala: Helped with experiment and write-up. Mother, Karen Vahala: Helped procure materials, and prepare poster.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Claude R. Vargas

Project Number
J2134

Project Title
Clarinet Reeds and the Pitch of That One Tricky High D Note

Abstract

Objectives/Goals
The objective of my project is to determine if the brand of reed will affect reaching the pitch of the high D note on a clarinet. I will be testing three different reed brands: the Rico brand, the Vandoren brand, and the Mitchell Lurie brand. The Rico brand will be the control because it is the brand that is most commonly used. The Vandoren brand of reed for a clarinet will reach the pitch of a high D note because it was recommended by a music professional to be the best reed to use.

Methods/Materials
I will test three different reed brands (Rico, Vandoren and Mitchell Lurie) for a clarinet. I will test 5 reeds for each brand. Each reed will be tested 20 different times. I have created a measuring device using my tuner. The ideal reading on the tuner for a clarinet is at the top center of the gauge. I have used this gauge as a measuring device by adding numbers that range from 1 - 30. As the tuner measures the pitch of the notes and the gauge moves to the left it identifies it as flat. I will identify a flat note by using the numbers 1-14. The perfect note will be measured at number 15. As the tuner measures the pitch of the notes to the right it identifies it as sharp. I will identify a sharp note with the numbers 16 - 30.

Results
My results show that the Mitchell Lurie brand of reed averaged a tuner measurement of 15 on the scale that I created. This measurement is the ideal pitch of note for a clarinet. Both the Vandoren and the Rico were sharp.

Conclusions/Discussion
My hypothesis was incorrect. The Mitchell Lurie brand of reed for a clarinet is the better brand to reach the pitch of the high D note. This could be because this brand is thinner and allows for a fast response.

Summary Statement
My project is about testing different clarinet reeds to see which brand can produce the most accurate high D note.

Help Received
My mom purchased the reeds for me to test.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Ileana Vasquez

Project Number
J2135

Project Title
The Effect of Pill Coatings, Heat, and Antacids on Pill Solubility

Abstract

Objectives/Goals
I conducted this experiment to see the effects of pill coatings, heat, and antacids on pill solubility rate. For the different pill coatings, I wanted to see which type of coating would dissolve the fastest in simulated stomach acid. I wanted to test body temperature simulated stomach acid on different pills that were coated in different ingredients (enteric, film, gelatin, and non coated). For the antacid portion, my goal was to see if antacids had an effect on room temperature simulated stomach acid.

Methods/Materials
For the entire project, I used Ibuprofen, Allegra-D, Benadryl, Tums, magnetic stir bars, magnetic stirrer plate, beakers, simulated stomach acid (HCl, distilled water, potassium chloride, and table salt), incubator, and a timer. First, I poured 100 mL of simulated stomach acid into a beaker. I put in the magnetic stir bar, started the magnetic stirrer plate, dropped in the pill, and began the timer. Second, I poured 100 mL of simulated stomach acid in a beaker, placed it in an incubator set at thirty-seven degrees celcius, started the timer, and left the beakers in there until the pills were dissolved completely. Third, I poured 100 mL of simulated stomach acid into a beaker and placed antacids

Results
This information can be very useful in the pharmaceutical industry. If companies want their pill to dissolve as fast as possible, they may want to make pills coated with film. But, if companies want their pill to give long lasting relief or dissolve in the small intestines, they can use gelatin coated pills. Other useful information can come from this to the consumer. If the consumer is looking for painkillers with fast relief, they can look for pills that are coated with enteric. Knowing this information may bring them faster pain relief and make their money worth spending.

Conclusions/Discussion
I found that Allegra (film coated) dissolved the fastest as the independent variable, Ibuprofen (enteric coated) dissolved the second fastest, and Benadryl KapGels (gelatin coated) dissolved the slowest. Ibuprofen took an average of 8 minutes, Benadryl took an average of 3 hours, Allegra took an average of 2 minutes, and Aspirin took an average of 40 seconds.

Summary Statement
I tested pill coatings, heat, and antacids in simulated stomach acid to see their effect on pill solubility rate.

Help Received
Teacher helped create simulated stomach acid by diluting HCl.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Caity D.P. Williams

Project Number
J2136

Project Title
Long Lasting or Marketing Scam?

Abstract

Objectives/Goals
My objective was to find out which brand of drugstore makeup created the most waterproof mascaras.

Methods/Materials
Forty total false eyelashes were hot glued to forty total popsicle sticks. One even coat of mascara was applied to a false eyelash piece. This was then dipped into one cup of water and and soaked for thirty seconds. After, it was taken out of the water and held in a vertical position for thirty seconds, allowing it itme to streak mascara. This streak line was measured in centimeters. The process was repeated ten times for each mascara, and ten for the control group (no mascara was applied to the false eyelashes in the control group). The ten measurements from each mascara and the control group were averaged (using the measurements from all ten tests for each mascara).

Results
Covergirl's Proffesional Remarkable Length Mascara was the least waterproof with an average of 3.83 cm. Maybelline's Volum' Express (sic) Waterproof Mascara came in second with an average of 0.56. Neutrogena won most waterproof with an average of .01.

Conclusions/Discussion
Every company claims that they have the best waterproof mascaras, but which one is really? From doing this experiment, I learned that Neutrogena is the real most waterproof. My project suggests, instead of cluelessly going through bottle after bottle of mascara that promises to be the best, women and girls cna easily figure out which company's claims are true and which are false.

Summary Statement
I tested three different brands of drugstore brand mascaras to find out which one is the most waterproof.

Help Received
Teacher, Mr. Jennings, provided the idea; Father bought supplies; Mother helped with testing proecedures