CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Melody Aaron

Project Number
J1101

Project Title
Silk Sari vs. Cotton Kenta: Water Filtration in Rural Populations

Abstract

Objectives/Goals
My objective was to determine if cotton fabric would filter bacteria as well as silk. A National Geographic article stated that when Indian women use their silk saris to filter water, the incidence of Cholera drops significantly. In other parts of the world, silk is not so common, but cotton is.

Methods/Materials
I collected water samples and filtered them through silk, cotton, nylon, and a hiking filter. I performed about 100 tests (oxygen content, turbidity, E. coli and coliform bacteria counts). Samples were collected from four sites: standing water in a puddle at Hahamongna watershed park, the Hahamongna riverbed, from one spot of the Big Tujunga River, and five miles upstream in the same river. The water was checked before and after filtering.

Results
The hiking filter removed all bacteria (as advertised). The number of bacteria was reduced about 50% by the silk, cotton, and nylon even though bacteria are much smaller than the gaps between the threads. They are often attached to larger particles, which are filtered successfully. The nylon was not quite as effective as the silk, but the cotton seemed to be slightly more effective than silk.

Conclusions/Discussion
Filtering water with of silk, cotton, or nylon will reduce the bacteria content about 50%. Bacteria are too small to be filtered directly, but they are often attached to particles in the water, so they are removed along with the particle. Surprisingly, cotton was slightly more effective than silk at removing bacteria from water. Nylon was a little less effective than silk.

If people in other parts of the world were taught to filter water through cloth, it could reduce disease significantly.

Summary Statement
I measured about a 50% reduction in bacteria count when water is filtered through silk, cotton, or nylon.

Help Received
My mother suggested the project and helped with collecting samples. She also helped with preparing the display board.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)

Megan Ashjian; Katelyn Jundt

Project Number

J1102

Project Title

Wood Stability: How Does Age Affect the Dimensional Stability of Wood?

Abstract

Objectives/Goals

Our objective was to determine if the dimensional stability of wood is affected by age (when the tree was milled). We also wanted to be able to predict which pieces of lumber would be the most stable for construction, by simply looking at the growth rings in each piece of lumber.

Methods/Materials

Our method was to find which pieces of wood were better for construction by determining which was the most stable. We used wood milled from 1870-2002, and obtained from remodeling and demolition projects. We dried the wood, and measured the moisture content and starting length using an oven, a micrometer and scales. We found the moisture content of each sample by cutting small blocks from each sample and baking them. We measured the increase in length after saturating the samples and counted the number of growth rings per inch.

Results

After comparing the change in length from each piece of wood, our experiment proved that older wood (milled over 50 years ago) expanded less than the newer lumber, making it more stable. Since the older wood is more stable, it is not likely to cause cracks in the ceilings of homes built with trusses. The width between the growth rings and the length change helped us determine which lumber would be better for construction.

Conclusions/Discussion

We were able to determine which pieces of lumber would be better for construction and least likely to cause damage such as ridging and cracking in the ceilings of homes, which cost more than $22-65 million annually to repair. We noticed that most of the expansion occurred over the first week, then expanded slowly and slightly the next few weeks. The quick change in length means that builders can minimize cracking by heating and drying homes before putting drywall on the ceilings and walls.

Summary Statement

Our project determined how the age of milled lumber affected its dimensional stability, which will help home owners, home builders, and truss companies select and use better lumber to minimize costly ridging and cracking problems.

Help Received

Both dads helped us with the table saw used to cut the pieces of lumber. Both dads helped cut the foam board with an exacto knife so we would not injure ourselves. We also got help from an engineering company that loaned us the display truss.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Amanda J. Bassett

Project Number
J1103

Project Title
A Hair Raising Solution

Abstract

Objectives/Goals
My science fair project revolves around showing beef cattle, which is my hobby. Fitters and exhibitors like to have their cattle walk in the show ring looking like a champion. To give the impression of being the champion the fitters and exhibitors must get their heifer's or steer's hair to "pop" (to have all the hair standing up). As an exhibitor of cattle I have Purchased a variety of products to help "pop" my heifer's hair. The problem is which solution "pops" the hair the best. I believe that the control solution Kleen Sheen will "pop" the cattle's hair the best.

Methods/Materials
One Angus heifer (female calf), Zoom Bloom, Kleen Sheen, Liniment, Show styling foam, blower, chute, Dawn soap, hose, Rice root bursh, Scotch Comb, Rubber brush, and a centimeter ruler. Wash the heifer using the dawn soap and then blow the heifer's hair dry. When heifer is dry spray Kleen Sheen on the calf and blow the hair for 20 minutes. Then blow the calf's hair up and measure it. Wash the heifer make sure to get out all the Kleen Sheen. Blow dry and then spray with the Kleen Sheen mixed with liniment on the calf. Blow it in for 20 minutes. Pop the hair up and measure it. Wash the calf again make sure to get out all the mixture. Blow the calf completely dry and then spay the Zoom Bloom on and blow it in for 20 minutes. Blow the hair up and measure it using the ruler. After measuring the calf's hair wash the calf's hair again make sure to get all the Zoom Bloom out. Blow the calf completely dry. After blowing the calf completely dry spray on the foam and the Kleen Sheen and blow it in for 20 minutes. After blowing the foam and Kleen Sheen in well blow the hair up and measure using a ruler. Record your data. Repeat the Experiment more times.

Results
The results of a Hair Raising Solution trial proved my hypothesis was incorrect.
The spray bottle with the Kleen Sheen popped the Calf's hair 5cm. The spray bottle with Kleen Sheen mixed with liniment popped the calf's hair 6cm. The spary bottle with Zoom Bloom popped the calf's hair 7cm. Show styling foam mixed with Kleen Sheen popped the hair 8cm.

Conclusions/Discussion
My hypothesis was incorrect. The Kleen Sheen did not pop the calf's hair the best. The Kleen Sheen and foam popped the hair the best by 4cm.

Summary Statement
Which solution pops cattle hair the best.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Christopher Battaglia; Ryan Jacobs

Project Number
J1104

Project Title
Photography: Finding the Perfect Exposure

Abstract

Objectives/Goals
Our objective was to find out how to produce the "perfect photograph" by discovering how different optical densities, lighting, and film speeds affect a black and white print's exposure value.

Methods/Materials
We took pictures with 400 and 100 speed film and shot into different light sources- Florescent and 100 watt bulb-while placing densities-plexiglass, glass and fiberglass- over the lens. We designed and built our own densitometer, a contraption which shines light through negatives to determine its exposure value from a light meter.

Results
We found, that 100 speed film was 6% closer to being perfectly exposed (balance of dark and light) than pictures taken with 400 speed, making it the best choice. Glass was the best medium to shoot with 100 speed film, and plexiglass was best for 400 speed. We found Fluorescent lighting takes better pictures than the 100 watt bulb because the average of the prints was 2% closer to perfect exposure.

Conclusions/Discussion
A combination of 100 speed film taken with glass and a Fluorescent light produces an optimum print. Our results definately enabled us to obtain our objective of finding the conditions to produce the "perfect photograph." A combination of 100 speed film taken with glass and a Fluorescent light produces an optimum print. These results can be used in many situations photographers encounter in the future. They can be used when determining which film speed and lighting to use in studio/home settings, and deciding which filters to apply for the appropriate situations. We believe that photography manufacturers should experiment with plexiglass filters instead of glass.

Summary Statement
Our project is about finding how optical density, film speed, and lighting affect a black and white prints exposure.

Help Received
Kevin Fitzgerald lent us his manual light meter for the testing with our denitometer.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Julie M. Brodfuehrer

Project Number
J1105

Project Title
The Effect of Tooth Whiteners on Denture Teeth

Abstract

Objectives/Goals
There are many different products and ingredients used to whiten teeth in different ways. Products containing carbamide peroxide, sold by dentists, use an oxidizing process to whiten, are known to be the most effective. The hypothesis was, products with carbamide peroxide as their active ingredient will be the most effective, then products with hydrogen peroxide as their active ingredient will be less effective, products with neither of these active ingredients will be the least effective.

Methods/Materials
To test which whitener is most effective, denture teeth were soaked for seven days in a mixture of coffee and tobacco that had been boiled. Then, whiteners were applied as directed on their package. The effectiveness of the whiteners was based on a tooth shade color chart. A stained control tooth was kept, which did not have whiteners applied. The manipulated variables were the various tooth whitening products. The responding variables were the number of tooth shade changes.

Results
After trial one, Rembrandt Plus toothpaste and Close Up toothpaste whitened most effectively. The retests of those two products whitened just as effectively. Overall, the toothpastes whitened more effectively than the gels. This might be because they contain abrasives, such as hydrated silica, which work like sand paper to scrub away the stain. Deeper stains, such as ones caused by the anti-biotic tetracycline, would whiten more effectively with products containing carbamide peroxide because they go deeper into the tooth to remove stains.

Conclusions/Discussion
I would like to thank my parents, James and Joy Brodfuehrer and my science class.

Summary Statement
The effect of tooth whiteners on denture teeth.

Help Received
father supplied denture teeth and Opalessence, mother supplied toothpastes, gels, coffee, and tobacco, science class supplied constructive criticism

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Patrick T. Burns

Project Number
J1106

Project Title
Rust Busters

Abstract

Objectives/Goals
My dogs have chewed through the fence in our yard and we need a new fence that is durable and rust resistant. My project was to determine which metal would be most rust resistant out of steel, zinc, copper and aluminum and would make a good fence material that my dogs could not chew through.

Methods/Materials
I prepared four test tubes with tap water and four tubes with salt water. I cut eight lengths of wire, two of each type, zinc, copper, steel and aluminum. I prepared two pencils by wrapping one type of each wire so that four wires would hang from each pencil. I placed one pencil so the four wires hung into the tap water and one pencil so that the four wires hung into the salt water. I observed the changes in the wires over ten days. I recorded the changes on an observation log that I made. I created a measurement scale and assigned a scale value to each observation so that I could graph my results.

Results
I found that the aluminum wire showed no changes over the ten-day period in tap water and only a slight change in salt water. The other wires all showed signs of rust during the ten-day period in both salt and tap water.

Conclusions/Discussion
After my experiment, I found that aluminum was most rust resistant metal in both salt and tap water. It would be the best choice of material for a fence for my dogs.

Summary Statement
My project is about finding the most rust resistant metal for a fence.

Help Received
I received typing help on the report. All other typing was done by me.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Hayley Chilton; Amanda Elliott

Project Number
J1107

Project Title
Bugs on Brushes?

Abstract

Objectives/Goals

Our pupose was to protect teeth against bacteria, by testing toothbrushes stored washed and used in different ways, for bacterial growth.

The participants in our project are students from a fourth grade elementary class. These students kept their toothbrushes in their desks and were instructed to brush their teeth everyday after lunch without using toothpaste or water. They were only allowed to rinse their toothbrushes in water once a week in the classroom sink. We analyzed bacterial growth on toothbrushes from the classroom, from home and brand new ones from the store.

Methods/Materials

First we collected toothbrushes from home, brand new ones from the store and ones in the classroom. We then made a solution of sterile saline, which is a salt solution (salt and water)found throughout your body, including in your mouth. We then swished each toothbrush in its own container of sterile saline. After that, a sample was taken from each container and placed on a sterile petri dish using a sterile glass spreader for each new sample. Each of the petri dishes was then sealed with parafilm and placed in an incubator set at 98 degrees (body temperature)for three days. We then observed the results.

Results

The results on our graphs clearly show that bacteria is being transported from our mouths and from our outside emvironment to our toothbrushes, then from our toothbrushes back into our mouths. It also shows that the amount of bacteria grown on the classroom toothbrushes was greater than the amount grown on the toothbrushes from home.

Conclusions/Discussion

There are bacteria living in your mouth all the time. We discovered that if the toothbrush is not washed or if the bacteria is not removed from it, the bacteria currently residing on its bristles will quickly multiply and be more likely to infect the mouth. However, even the toothbrushes that were washed at home regularly were infested with some bacteria. This demonstrates the fact that our toothbrushes need to be cleaned vigorously. If they become neglected, or not properly cleaned and stored, then the state of one's teeth and gums may become contaminated and stained because of bacterial growth on the the toothbrush. These results are significant, because they show that it is essential to keep toothbrushes clean to help maintain healthy teeth.

Summary Statement

To see if prolonged toothbrush use increase bacteria growth.

Help Received

Used lab equipment at Westmont College/ advised by Dr. Percival

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Daniel J. Combs

Project Number
J1108

Project Title
How Fire-Safe Is Your Baby? Do Flame-Resistant Baby Clothes Lose Their Effectiveness after Repeated Washings?

Abstract

Objectives/Goals
The purpose of my project is to see if flame-resistant baby clothes lose their effectiveness after repeated washings. My hypothesis is that the older, washed flame-resistant polyester garments will catch fire more easily than the new, unwashed flame-resistant polyester garment because the flame retardant will have washed away.

Methods/Materials
My procedure was to place a 4" square sample of fabric on the burn platform. I placed the lit candle 2" below the sample and simultaneously started the stopwatch. My mom wrote down the ignition times while I kept track of the burning process. My materials were: burn platform with grill, small oil lamp, 1" diameter tea candle, lighter, fire extinguisher, stopwatch, camera, notepad. Fabric samples: 2washed flame-resistant polyester, 1 unwashed flame-resistant polyester, 1 cotton non flame resistant, 1 sample Nomex, 1 denim.

Results
For all of the polyester samples, when indirect flame was applied, they didn't catch fire; a hole melted in the fabric. With indirect flame the unwashed polyester garment took longer for a hole to appear and also to finish forming. However, when a direct flame was applied, the 2 polyester samples that had been repeatedly washed, did better. They took longer to catch fire and stopped burning sooner than the unwashed polyester garment. The Non flame-resistant cotton garment took longer for a hole to appear, but once it did it caught fire and continued to burn until the entire sample was consumed.

Conclusions/Discussion
My hypothesis was partially correct. The new polyester garment did better with indirect flame, but when direct flame was applied, it caught fire sooner and burned longer than the other garments. I was concerned with how the polyester fabric burned. The oil-resin that dripped from the burning fabric would probably stick to the skin and cause a far worse burn than they would get if the garment were cotton.

Summary Statement
Do flame-resistant baby clothes lose their flame retardant qualities after repeated washings?

Help Received
Mom took notes, helped type report and decorate display board. Dad helped build the burn platform and took photos.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)

Lindsay Dickerson; Jennie Fordyce; Stephanie Kaufmann

Project Number

J1109

Project Title

A Burning Question: The Effects of Selected Materials in Protecting Against UV Radiation

Abstract

Objectives/Goals

Our objective was to find out what effects glass and other materials have in protecting against harmful ultraviolet (UV) rays, and the sunburns and health problems that UV causes.

Methods/Materials

We did research on UV radiation and purchased a SolarTech meter that primarily measures dangerous UV-B light in the 297-310 nanometer (nm) range, with some response to UV-A. Next, we collected materials from our families and nearby businesses. These included: automobile and home window glass, regular and UV-resistant films and plastics, shirts (several UV-resistant), a straw hat, and two kinds of sunglasses. We took readings in full sun with each material screening the light. We also took readings for reference on overcast days, in the shade, at high altitude, and at various times on a given day.

Results

We've taken two sets of readings (January and March), and will take one more set in May to track how UV increases--due to the angle of the light--as summer approaches. UV Index (UVI) numbers (based on a widely used 1-10+ scale) nearly doubled from January to March, and we expect a similar increase in May. In comparing materials, our data showed that auto glass lets in a lot less UV than plain house glass--4% of full sun compared to 25%. Our red polo shirt protected much better than a white polo or t-shirt, although the UVI was quite small. Not all fabrics promising UV resistance fully stopped UV. Our UV-protected dress shirt allowed about the same UV to pass as the red polo. "Body armor" for surfers did screen out almost all UV. UV-resistant plastic let 14% of full sun pass, a lot if the photo it's protecting is exposed to sun every day. We were very surprised by how much UV light penetrates the shade (39% of full sun) or the clouds (35%). We also found that UV is highest between 10 a.m. and 2 p.m.

Conclusions/Discussion

We started out wanting to know if we could get sunburned riding in a car. We learned that we're pretty safe there, compared to taking a nap in a sunroom. We discovered some materials and clothes protect considerably better than others, and that many UV-resistant materials don't provide as much protection as we would have expected. We also discovered that UV is everywhere, even in the shade or when the sun's behind the clouds. Finally, we learned what the most dangerous times are. Most of all, we now know not to argue when our parents tell us to put sunscreen on!

Summary Statement

Our project was explore how the intensity of UV light changes under various conditions, and learn how selected clothing, glass and plastic might help screen out some or all of these dangerous rays.

Help Received

Gary Apsit (grandpa); Faith Borden, National Weather Service; John Cofer, Independent Glass; Lynne and Francis Dickerson; Jill Fordyce; Carrie Kaufmann; Steve Mackin, SolarTech; Village Glass & Mirror; Tap Plastics.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Darrick L. Gowens

Project Number
J1110

Project Title
Comparing the Water Repellent Properties of Different Glass Treatment Substances

Abstract

Objectives/Goals
The objective of my project is to determine the repellent properties of water and water solutions and the products that repels them.

Methods/Materials
I am using different types of water solutions, plain water, salt water, and acid rain. In the control group I will use a plain piece of glass cleaned with ammonia and alcohol. I will place one drop of water onto the glass. I will raise the glass 1º until the water starts to move. I will measure the angle degree when the water droplet reaches 5cm. I will do this with each water solutions. I will repeat the test thirty times. I will calculate and average the degree of angle of the glass for each test and test variable.

Results
Rain X has the highest repellent property, when compared to plain glass and other substances.

Conclusions/Discussion
My conclusion on using different types of water solutions and repellent products can have an effect on the repellent properties. I found that certain kinds of waxes can have different repellent properties in their ingredients. I also found that some liquid detergents can act as a degreaser and aid to the repellent property.

Summary Statement
My science project is to determine the repellent properties of water and water solutions and the products that repels them.

Help Received
My mom help me hold the protractor in place and watched to make sure I only move the angle of the glass one degree at a time. She help me look for errors in my writing and typing and helped me put my board together.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Elijah Hanes; Ras Smith

Project Number
J1111

Project Title
Treated Wood Is No Good

Abstract

Objectives/Goals
Our objective was to see if arsenic was leaching out of chromium copper arsenic-treated wood and contaminating the dirt around it.

Methods/Materials
Our research showed us that arsenic is very toxic and harmful to humans and other animals. The research also said that arsenic doesn't go away. We went to several different sites where there was treated wood. Using an arsenic test kit, we tested samples of dirt from around the treated wood. We measured and tested the soil at different distances from each piece of treated wood, and we tested several different ages of wood.

Results
We found arsenic in different amounts in the dirt samples from around the treated wood. The dirt that was closest to the treated wood had the most arsenic. We also found that the dirt around the oldest wood had the highest levels of arsenic.

Conclusions/Discussion
We found that our hypothesis was correct: arsenic was leaching out of the treated wood and there was more arsenic in the dirt that was closer to the wood. The safety standard for arsenic in drinking water has been determined to be 10 parts per billion. We found as much as 1500 parts per billion in the soil we tested. Even at 10 centimeters away from the treated wood, the arsenic level far exceeded the 10 ppb standard for safe drinking

Treated wood is found in playgrounds, in schools, and even in homes. Arsenic is a big, everyday danger in our world. We hope that this project can convince people to not use treated wood.

Summary Statement
Our project is about testing soil for arsenic near chromium copper arsenic pressure-treated wood in order to see if the arsenic leaches out into the soil.

Help Received
Our teacher, Mr. Woods, helped us choose our topic and showed us how to use the arsenic testing kit. He also advised us about our procedure, explained what an abstract was, and helped us find samples of treated wood. My mother helped us edit our final drafts.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Stephanie L. Henderson

Project Number
J1112

Project Title
Gold Medal Finish

Abstract

Objectives/Goals
My project was to determine which of the swimsuit material types would be the fastest in competition. I believe that a material sample that is light, clingy, and stretchy will create the least drag in water and be the fastest.

Methods/Materials
Ten different swimsuit material types were sewn into 5 1/2" by 1" pockets. Each material pocket was tested ten times by placing a penny in it, dropping the pocket down the tube filled with chlorinated, tap, or salt water, timing each test, and recording the results.

Results
Swimsuit material sample 4 was the fastest in all three water types.

Conclusions/Discussion
My conclusion is that the finest, sleekest and the lightest swimsuit material will create the least drag in water and, therefore, be the fastest.

Summary Statement
My project is about finding out which swimsuit material is the fastest for competition in tap, salt and chlorinated water.

Help Received
Mom and dad helped me with pouring water, photos, and making the water tube.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Ann E. Kashanski

Project Number
J1113

Project Title
Acid Rain on the Face of Things: The Effect of Acid Rain on Building Materials

Abstract

Objectives/Goals
My project was to determine the effect of acid rain (using lemon juice, ph2) on various building materials in direct sunlight and indirect sunlight as compared to the effect of unpolluted rain water.

Methods/Materials
Samples of six building materials - copper, steel, brick, granite, sandstone and marble were placed on a grating on top of four different buckets. The buckets represented acid rain/direct sun; acid rain/indirect sun; unpolluted rain water and a control. All were placed in direct sun except one which was placed in indirect sun (shade). Acid rain samples were sprayed 20 times every day at 7 a.m. and 7 p.m. with lemon juice and unpolluted samples were sprayed the same but with distilled water. Samples were weighed every two days with changes in appearances also recorded. A secondary experiment was done also.

Results
All six materials were affected differently with sandstone having the most erosion or loss of material and marble the second most. Direct sun had a greater effect. Some weights didn't change, but the physical appearance did as in the case of copper and steel.

Conclusions/Discussion
My hypothesis was correct in stating that acid rain affects and erodes or corrodes building materials more than unpolluted rain and the effect is greater in direct than indirect sunlight. Buildings, monuments, bridges and artworks are affected. The pollution creating acid rain must be controlled and renewable sources of energy must be developed and used or we will lose millions of dollars in repairs, as well as our historical architecture and artworks.

Summary Statement
My project is about the effect of acid rain on building materials.

Help Received
My mother helped with some typing and took photos of me with my project. She helped me handle the sticky spray mount and brads on the board. My mother also supervised when I used toxic products.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Jeffery J. Kearns, Jr.

Project Number
J1114

Project Title
Does the Color of a Shirt Make a Difference in Ultraviolet Protection? Does Rit Sun Guard(TM) Really Work?

Abstract

Objectives/Goals
Part one was to find out if color of a shirt makes a difference in blocking ultraviolet rays. Part two was to determine if using Rit SunGuard increases the ultraviolet protection.

Methods/Materials
I used four shirts identical except in color. A black light and photo sensitive paper. I ran time tests at different exposer lengths. The paper would read the longer the exposer to time to light, the darker the blue the paper would become.
Part two of the experiment I took the same shirts and wash them in the product then repeated the test.

Results
When all shirts were exposed to the light for 30 minutes, all shirts had the same amount of ultraviolet protection. When the time exposure to the light was increased to longer times, the amount of ultraviolet protection decreased greatly in the white and the blue having the best protection.This showed me that all of the shirts have some UV protection form the sun rays for a short amount of time. The darker the color shirts continual to have better protection from UV rays as the time exposer to the light increased. Part two the photo papers stay almost white in color for most of the time exposer test. Not until you got to longer exposer times did you see the paper taking on blue in color.

Conclusions/Discussion
I ran the test serval times to make sure my results were accurate. Color does make a difference in UV protection. While all shirts have some UV protection, the white shirt would let the most ultraviolet light thought. The blue, the darkest of the shirts was the best color for blocking ultraviolet light.
The product Rit SunGuard does increase the blockage of UV sun rays from passing though the clothing.

Summary Statement
Does the color of a shirt, and the product Rit Sun Guard make a difference in Ultraviolet Protection?

Help Received
Mother helped type report.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Trevor W. Kimball

Project Number
J1115

Project Title
The Effects of Peri-implantitis on Hydroxyapatite Coated Dental Implant Systems

Abstract

Objectives/Goals
The purpose of this study was to find which hydroxyapatite coated root form dental implant system was most resistant to the acidic environment produced by peri-implantitis.

Methods/Materials
Eight root form dental implants from Centerpulse, Steri-Oss, Spectra System, and a new, "generic" company were acquired, weighed, placed in a 25 percent citric acid solution (to simulate the conditions of the acidic exudates that surround the implant during peri-implantitis), then taken out and weighed at ten minute increments. The implants were weighed six times for a total of 60 minutes in solution. The final weight of the implants with the hydroxyapatite coating completely dissolved was used to calculate the rate of deterioration as a percentage. These measurements were used to find the average failure time of each implant, with failure point set at a two-thirds loss of hydroxyapatite.

Results
The Centerpulse and Steri-Oss implant samples failed at an average time of 40 minutes in solution; while the Spectra implants failed at 30 minutes and the generic failed at 20 minutes in solution.

Conclusions/Discussion
This study suggests that implant systems vary in their response to the acidic environment produced by peri-implantitis and that the coating of the hydroxyapatite is more superior in some implant systems than others. Due to the high cost of dental implants the sample size for my study was small, hindering the statistical significance.

Summary Statement
I studied hydroxyapatite coated titanium root form dental implant systems from four different companies to see which of their hydroxyapatite coatings best resisted the acidic environment created by peri-implantitis.

Help Received
Bill Kimball, DDS (father), assisted experimentation and board construction, Bob Mensuado, DDS, Celia Chen, and the Misch Institute contributed implants, and Mr. Bartel lent out lab equipment.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Andrew K. Kishimoto

Project Number
J1116

Project Title
Flaming Fabrics: Which Material Burns Fastest?

Abstract

Objectives/Goals
My project is an experiment to see how quickly different materials burn and how they burn.

Methods/Materials
After doing research I found eleven different types of fabrics. I cut each on into 3 5x15cm strips. I then took tongs and matches and lit each strip three times and timed how long it took to burn. I repeated this until all materials were tested. Safety precautions included Adult supervision, fire extinguisher and water.

Results
The loose weave dress burned the quickest. I believe that it would burn the quickest because the loose weave would let the flame have more oxygen. The Nomex shirt did not burn at all.

Conclusions/Discussion
My conclusion is that fabrics with a looser weave will burn a lot quicker than one with a really tight weave. This shows that the cost of materials such as Nomex may be a lot more than regular pants, but the Nomex is a lot safer.

Summary Statement
This is an expeiment about which clothing material will burn the fastest?

Help Received
Parental supervision during the experiment dealing with fire.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Stephanie M. Kroll

Project Number
J1117

Project Title
Which Whitening Toothpaste Has the Best Short-Term Whitening Effect on Teeth?

Abstract

Objectives/Goals
My objective was to figure out which whitening toothpaste whitened teeth the fastest. I believed that the toothpaste that contained the most titanuim dioxide, hydrated silica, soduim bicarbonate, and sondium carbonate woulkd have the best effect on teeth because these ingrediants take off surface stains on the teeth and coat the teeth to make them appear white.

Methods/Materials
Four whitening toothpastes were tested on four people for a one month period.Of the four toothpastes, three had an ADA (American Dental Association) seal, and one did not. All of these toothpastes contained at least one of the following whitening ingrediants: titanium dioxide, hydrated silica, sodium bicarbonate, and soduim carbonate.

Results
The participants brushed their teeth twice a day with their assigned toothpastes. Every Sunday for the four week period, between eight and eight thirty p.m., I took the tooth shade measurements of the participants teeth. Eahc time, I mad sure to measure the same tooth, in the same light and room. At the end of the four week period, I was able to calculate the average tooth shade and the difference in tooth shades, which helped me to make my conclusion.

Conclusions/Discussion
After conducting the experiment, I found that my hypothesis was correct. My conclusion was that the toothapste that contained the highest ammount of titanium dioxide, hydrated silica, sodium bicarbonate, and soduim carbonate, had the best whitening effect on the participant's teeth.

Summary Statement
My project is about the short-term effects of whitening toothpastes on teeth.

Help Received
I recieved a shade guide and instruction on how to use it from Dr. Kroll of Ventura.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Mark D. Langer

Project Number
J1118

Project Title
What Factors Make the Brightest and Longest Lasting Light Bulb?

Abstract

Objectives/Goals
Objective: My project was to find the factors that make up the brightest and longest lasting light bulb.

Methods/Materials
Materials and Methods: Steel, carbon, and copper were chosen as the three filaments. Those three filaments were tested with a twelve-volt battery charger to see how long they lasted, and the length of time they glowed was recorded. Next, steel filaments were tested to find if the length of the filament made it glow longer. (Copper was not used because it did not last long at all.) The brightness of steel, copper, and carbon filaments was also compared. The filaments were set up in a dark place and a camera was focused on it. The camera's F-stop was set on four and when the filament was turned on, the shutter speed needed for a proper exposure was measured. After that, carbon and steel were tested in different atmospheres: normal air, a vacuum, and in argon. These results were measured and recorded.

Results
Results: Carbon worked the best when in argon. It was very bright and it lasted so long we finally just stopped timing it. Steel lasted a long time, but not as long as carbon. Steel was also not as bright as carbon. Copper the least bright and shortest burning filament.

Conclusions/Discussion
Discussion: Carbon and steel were the best filaments. Carbon was the best filament overall, but it was hard to work with because it only came in set sizes. A five-inch long piece was tried but it was too thick to work, it only smoked. Steel worked well mainly because it lasted so long and was easy to work with. Copper did not work well as a filament but it was very easy to work with. It lasted the best at twelve inches long, but it was not bright at all. The shape of the filament was also tested, whether wound or straight, but it did not make a big difference in the lasting brightness of the filament. The best atmosphere was argon. The vacuum might have worked better if we had a vacuum pump instead of a water aspirator to make the vacuum.

Summary Statement
My project showed what materials and conditions make a good filament for a light bulb.

Help Received
I used equipment at Loma Linda University under the supervision of Dan Rogstad and Katie Noyes (graduate students). My Dad helped me work with the filaments and the battery charger.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Catharine (Catie) R. Marron

Project Number
J1120

Project Title
ZAP! Clothing and Car Seats Collide

Abstract

Objectives/Goals
The purpose of this experiment is to explore the dangers of static electricity at gasoline fuel pumps. There have been many articles written reporting that electrical sparks caused from common everyday static electricity were causing vapors from the gasoline at the fuel pumps to ignite. The problem occurs when a driver's clothing rubs against the car seat producing a build up of static electricity. When the driver touches the metal fuel pump, a spark can occur causing the vapors to ignite. The experiment conducted tested which type of car seat materials and clothing materials would produce the least amount of static electricity to avoid fuel pump fires and which produced the most static electricity to produce fuel pump fires.

Methods/Materials
Three types of car seat materials, cloth, leather, and vinyl and five types of clothing materials, wool, cotton, polyester, nylon and silk were tested. Equal sized balloons were rubbed ten times with each of the materials and then observed how strong the static electrical attraction was to each type of car seat. The terms strong, medium, weak or not at all were used to describe the attraction.

Results
The data supports the hypothesis that polyester clothes combined with vinyl car seat material will create the least amount of static electricity. The data concludes that the lowest frequency of static electricity was produced between the polyester fabric and the vinyl car seat, shown by weak or none at all during the experimental trials. The cotton fabric rubbed on the cloth car seat also showed weak levels of static electricity. 100% wool and 100% silk made the strongest levels of static electricity will all three types of car seats.

Conclusions/Discussion
According to the data, the vinyl car seats produced the least amount of static electricity with the five fabrics tested. Vinyl is not widely used in making car seats anymore, but a lot of older cars still have vinyl car seats. Leather car seats caused the strongest levels of static electricity with all five fabrics tested. This is a problem since many people choose leather car seats in the newer cars. The data showed that most of the combinations of materials and car seats created a lot of static electicity, which could increase the chance of a spark being produced.

Summary Statement
The purpose of this experiment is to explore the dangers of static electricity causing fires at gasoline fuel pumps by test ing five clothing materials against three car seat materials.

Help Received
Mother and Father let me use their cars. My next door neighbor, Mrs. Mathews let me use her car. My mother helped me type my report.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Kate A. Mattson

Project Number
J1121

Project Title
Toothpaste: A Cloth Stain Remover?

Abstract

Objectives/Goals
My objective was to learn which brand of toothpaste is the most effective cloth stain remover.

Methods/Materials
Lawn grass, chocolate syrup, ballpoint ink pen, and soy sauce stains were each separately applied to 15 one inch squares of white cotton cloth. Divided into three trial groups of 5, each stain was brushed with either water (control) or one of 4 different brands of toothpaste (2 sodium fluoride and 2 sodium monofluorophosphate). The cleaning effectiveness results of the 60 treated stains (12 trials) were visually compared and rated using a 5 point scale. The total points and averages established which toothpaste was the most effective cleaner.

Results
Ultrabrite Advanced Whitening was the most effective toothpaste cleaner, but only by 1 point over two other brands that tied for second. All the toothpaste brands were effective cleaners of all the stains. The analysis/data showed that the sodium fluoride brands had a better cleaning effect on the food stains and the sodium monofluorophosphate brands worked better on non-food based stains.

Conclusions/Discussion
The data gathered by the point scale provided my objective of finding the most effective toothpaste cleaner. The chemical ingredients of all four different toothpaste brands were shown to be effective white cotton cloth cleaners.

Summary Statement
My project uses 4 different toothpaste brands to remove 4 different types of stains from white cotton cloth samples to discover which toothpaste is the most effective cloth stain remover.

Help Received
My mother helped me with photographs, copy editing of typed information, and measuring, cutting, stapling, and taping for the board layout.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Madeleine Y. McCambridge

Project Number
J1122

Project Title
Generic Ink vs. Name Brand Ink: Do You Get What You Pay For?

Abstract

Objectives/Goals
I wanted to see if the results using name brand ink justified the additional cost compared with results using less expensive generic ink.

Methods/Materials
In order to compare results using generic ink and name brand ink I printed out fourteen photographs each using Epson Photo Paper and printing them out on an Epson Stylus Color 880 printer. After doing so, I obtained the opinions of forty-five people using side-by-side comparisons of the pictures. They were told that one type of ink that was used was less expensive than the other but were not told which one was which, then the people were asked to choose which photograph looked better.

Results
In only three out of the fourteen photographs, slightly more than half of the people felt that the photograph produced using name brand ink looked better than its generic counterpart. In the remaining eleven photographs, people either felt that the photographs produced by generic ink looked better than those produced by name brand ink or they simply could not tell the difference between the two.

Conclusions/Discussion
The side-by-side comparisons indicate that the majority of the people cannot tell the difference in the two types of inks, thus making the name brand ink's cost unjustified.

Summary Statement
I wanted to see if the cost of name brand ink is justified so I asked people which photograph looked better using side-by-side comparisons of generic and name brand ink.

Help Received
Father helped order the constants/materials.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Alyssa C. Medeiros

Project Number
J1123

Project Title
Is It Really Clean?

Abstract

Objectives/Goals
The objective of my project is to determine which cleaning agent is the most effective at removing germs and bacteria from a cutting board surface. I predict that a solution of Clorox bleach and water, and Clorox disinfecting wipes will be more effective than a solution of hot water and antibacterial soap

Methods/Materials
Four non-porous cutting boards were washed and a raw chicken thigh was placed on each one, cut, and then removed. The appropriate cleaning agent was used on three of the boards and one was left alone to be used as the control. The agents were bleach and water, hot water and soap, and Clorox disinfecting wipes. Each board was sterilized with its corresponding solution. Then, each was swabbed, and a petri dish containing an agar growing medium was swabbed with the matching cotton swab. The bacteria (if any) were allowed to grow on the medium for 48 hours. I repeated this method three times.

Results
In the first experiment, visible bacteria grew on the soap and water medium and the control, and no bacteria grew on the Clorox wipe or bleach and water mediums. In experiment #2, bacteria grew on the soap and water, Clorox wipe, and control mediums. No bacteria grew on the bleach and water medium. The third experiment showed that bacteria had grown on the control and the soap and water medium, and only a small amount of visible bacteria was on the Clorox wipe medium. Again, there was no growth on the bleach and water medium.

Conclusions/Discussion
I conclude that the bleach and water did the best job of removing the germs from the cutting board surface that had been infected by a piece of raw chicken. I believe this is because the sodium hypochlorite in the bleach poisoned the bacteria, killing them. The Clorox wipes removed most of the germs, but not all of them, and the soap and water removed only a minimal amount of bacteria from the cutting boards. These results tell me that I was correct in my hypothesis and show that commercial cleaning agents, such as Clorox wipes, are not the most effective in bacteria removal and control.

Summary Statement
I tested three cleaning agents to see which would effectively remove bacteria from a cutting surface.

Help Received
My mother and father helped in the procedure of my experiment by assisting me with infecting the boards with the raw chicken bacteria and preparing the cleaning agents.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Taylor A. Moreland

Project Number
J1124

Project Title
The Battle of the Laundry Detergents

Abstract

Objectives/Goals
The purpose of this project was to find out which laundry detergent worked best on removing stains. I think that Tide laundry detergent will work best on removing stains.

Methods/Materials
My experiment involved staining pieces of 100% cotton flannel material with mustard, ketchup, mud, grass and Coke. After the stains dried for 24 hours, the pieces of material were washed in various laundry detergents and dried.

Results
After washing the 100% cotton flannel pieces of material in the specific laundry detergents outlined in my procedure, I found that one detergent did not work best on all stains. For example, Cheer detergent worked best on the mustard stain, yet Tide worked best on the mud, grass and ketchup stains. Both Tide and Cheer removed the Coke stain about the same.

Conclusions/Discussion
By performing this experiment, I found that overall Tide detergent removed the majority of the stains the best. It worked best on 3 of the 5 stains. It took out most of the mud, grass and ketchup and tied with Cheer detergent on the Coke stain. My experiment therefore supported my hypothesis that Tide would work best at removing stains. I feel that further experimentation needs to be done, a larger sample of stains and laundry detergents need to be used to determine which laundry detergent really is the best.

Summary Statement
I used various laundry detergents on everyday stains to determine which detergent works best on removing stains.

Help Received
I would like to thank my family who helped me with this project: my dad, who helped with my research and my display board, and my mom, who helped me with typing and proofreading my report. A very special thank you to Ms. Asherson, my science teacher at Pinecrest Middle School in Simi Valley, for

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Briana L. Murphy

Project Number
J1125

Project Title
Ripening Bananas with Ethylene Gas

Abstract

Objectives/Goals
The objective of my experiment was to see if different environments will accelerate or decelerate the ripening process of a banana. Also, what effect temperature and/or light would have on a banana.

Methods/Materials
I placed one banana in three different environments: refrigerator, under a window, and inside a brown paper bag. Every day I wrote a description of each banana and the temperature of their environment. Every other day I took a picture of each banana.

The materials used in this experiment were three green bananas, a refrigerator, a brown paper bag, one refrigerator thermometer, two regular thermometers, a camera, and film.

Results
The banana placed inside the refrigerator, with a temperature ranging from 2-10 degrees Celsius, ripened the slowest. The banana placed inside the brown paper bag had a ranging temperature of 20-23 degrees Celsius. This banana ripened the fastest. The banana under the window had a ranging temperature of 21-24 degrees Celsius and ripened the second fastest.

Conclusions/Discussion
My conclusion is that the lower the temperature is in an area the slower the banana will ripen. The higher the level of ethylene, the gaseous hormone responsible for the ripening of fruits and vegetables, the faster the banana will ripen.

Summary Statement
My project is on the ripening process of a banana and how it can be affected by different variables such as the level of ethylene gas, temperature, and light.

Help Received
Mother helped type journal entries and helped with project board; Neighbor helped with project board graphics.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Keeton C. Nerhan

Project Number
J1126

Project Title
Building a Better Dam

Abstract

Objectives/Goals
The overall concept of this project is to determine if the size and shape of rock used in a rock fill dam will affect the permeability and saturation of the dam.

Methods/Materials
In order to accomplish this, several dams of various rock configurations were constructed using rock varying in texture and ranging in size from 1/8" to 3/4". A clay liner was placed at the bottom and sides of the dam in order to stop any water from penetrating in those areas. A specific amount of water was then poured towards each of the dams and timed to test the rock's holding power. The run-off water was measured to determine how much water was retained in the dam. The results were achieved by calculating the amount of water retained in the rock and the time it took the water to pass through the dam.

Results
After measuring the times and amounts of water retained in the dam, it was determined that the dam using a variety of smooth rock ranging from 1/8" to 3/4" was the best over-all design.

Conclusions/Discussion
Building a dam with smooth rocks of various sizes allowed for the least amount of permeation. This was a surprise as the greater amount of surface area on the rough rock would seem to have allowed for less permeation. The dams constructed completely with 1/8" rock retained the most water. This occurred because of the close proximity of the rock to each other, leaving little space for the water to escape. Further research could be conducted to test different types of rock such as volcanic, limestone, etc. The ability of dams to be effective can be determined by the materials used in their construction.

Summary Statement
The varied size and shape of rock determines the permeability and saturation of rock fill dams.

Help Received
All rock was donated by Lyngso Materials, Inc., My mother drove me to various locations and paid for other materials, my teacher Mr. Dolyniuk gave me class time to prepare this project. My inspiration was from my grandfather who designed and built the tallest dam in India in 1959.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Christopher R. Pocock

Project Number
J1127

Project Title
What Is the Quality of Automated Vending Machine Water?

Abstract

Objectives/Goals
The objective of my project was to determine the quality of automated vending machine water by testing for pH level, water hardness, alkalinity, and free and total chlorine compared with distilled water, drinking fountain water and Arrowhead Mountain Spring bottled water. Another objective was to see if any of the water had Coliform Bacteria.

Methods/Materials
The objects I used for my project were the empty bottles from 21 Arrowhead Mountain Spring Bottled Water (and I bought one more to use for the actual Arrowhead Mountain Spring Water); 1 Arrowhead Mountain Distilled Water; Aquachek strips which I used to check the water hardness, alkalinity, pH level, and free and total chlorine; straws I used for eye-droppers; and the lactose broth that I used to see if the water contained Coliform Bacteria.

Results
My results were that the automated vending machine water had lower levels of all five factors compared to the Arrowhead Mountain Spring bottled water and the tap water from my school drinking fountain. Also I discovered that the Automated Vending Machine water and the distilled water had about the same levels of all five factors, although they differed by a small amount. My results did not support my hypothesis.

Conclusions/Discussion
In my opinion, I feel that water from Automated Vending Machines is good to drink, but I did not test for purity in my project. However, the high levels of water hardness in the Arrowhead Mountain Spring bottled water and the water from my school drinking fountain was surprising. I thought there would be quite a bit lower level of water hardness in the Mountain Spring bottled water because hard water is not as good to drink than softer water. I feel that there should be something done about this and that the water that Arrowhead Company makes should be softer. Hard water does not pose a health risk to you if you drink it, but it does not keep its suds if you are washing dishes. It also does not taste as good, in my opinion.

Summary Statement
In my project, I tested automated vending machine water for alkalinity, water hardness, pH level, free and total chlorine and Coliform bacteria.

Help Received
Mrs. Reed, my science teacher, provided the testing materials for my project and gave me great advice. My mother taught me Microsoft Excel so I could do the charts and she helped with the lay-out of my board. My dad drove me all over San Diego to get the water samples for my project.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Ariele V. Pratt

Project Number
J1128

Project Title
What's Hiding on Your Kitchen Countertop?

Abstract

Objectives/Goals
To determine which household cleaners effectively disinfect kitchen countertops contaminated with raw ground beef.

Methods/Materials
I contaminated a kitchen countertop surface with raw ground beef and then cleaned/disinfected the surface with three commonly used household cleaners. Following the cleaning I swabed the now clean surface with a sterile applicator and applied it to a LB agar plate to screen for the presence of E. Coli bacteria.
Materials
1. 1 lb. of raw Ground Beef
2. Latex gloves
3. Sterile Dacron # tipped applicators
4. Plastic storage bags
5. Masking tape
6. Nutrient agar plates (containing Tryptone, yeast, and sodium chloride)
7. Three cleaners; Lysol Kitchen Cleaner, Clorox Clean- Up Cleaner,and Orange Plus Cleaner
8. 2 ply paper towels

Results
I discovered cleaning solutions that contained bleach disinfected E. Coli from contaminated countertops better than cleaning solutions without bleach. This was evident by the fact that no bacterial growth was observed on agar plates that had been exposed to swabs of a countertop disinfected with Clorox Clean- Up Bleach.

Conclusions/Discussion
In my Observations and Data I had pretty consistent results. The Chlorox Cleaner was the most effective cleaner. The Lysol Kitchen Cleaner provided the second best disinfectant properties. I observed some to moderate bacterial growth in the Lysol Kitchen Cleaner. In contrast, the Orange Plus Cleaner appeared to provide no disinfectant properties. For examplem there was moderate to severe growth following 24 hour, 48 hour, and 60 hour time periods. In fact, the bacterial growth found in the Orange Plus Cleaner looked similar to the growth observed on the positive control plate which received no cleaning at all. Also as expected I observed no bacterial growth on the negative control plate.

Summary Statement
To determine which household cleaners effectively disinfect kitchen countertops contaminated with raw ground beef.

Help Received
My Pops supplied the agar plates and sterile swabs.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Heidi Richardson; Anneke Say

Project Number
J1129

Project Title
Stuck On You

Abstract

Objectives/Goals
The purpose of our experiment was to see which chemical substance would most efficiently and effectively remove chewing gum from cement. Our prediction was that lemon juice would work because its acidity level is high.

Methods/Materials
First, we gathered all of our materials and brushed our teeth. We chewed a piece of gum one hundred twenty-five times, and then placed it onto the cement inside the labeled circle. Both of us waited thirty minutes after chewing each piece of gum. While we were waiting the thirty minutes, scientist 1 crushed the gum pieces into the cement. Once all eighteen pieces of gum were chewed, we let them sit for twenty-four hours. The next afternoon, we measured out 1/4 cup of each chemical onto the labeled gum. We let all of the substances sit for twenty-four hours. The next day, we collected our razor blade and hammer, and started the removal process. Scientist 2 held the razor blade just under the bottom edge of the gum while scientist 1 stood six inches from the razor. Scientist 1 used the hammer to hit the razor with an equal amount of pressure for each hit. We counted the hits and recorded them. Once all the gum pieces were removed, we studied the left over blotches and rated the efficiency. After that, we had an adult rate the blotches and we had the same results.

Results
As it turned out, lemon juice was the best working substance. It removed the chewing gum the most efficiently and effectively. Vegetable oil was next. It only left a few blotches of gum. After vegetable oil, was alcohol and hair spray. They left a few more blotches than vegetable oil. The worst working substances were peanut butter and mayonnaise. They worked horribly.

Conclusions/Discussion
Our background research stated that lemon juice had an extremely high acidity level. This information was consistent with our findings. Lemon juice did work the best because of its acidity level. It came off very efficiently and effectively. So, in conclusion, if you ever need to remove gum from the cement, we would suggest using lemon juice.

Summary Statement
Our project involved finding out which chemical substance would remove gum from cement the best.

Help Received
Scientist 1 mother helped supervise removal process and rated efficiency, friend helped edit report.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Roxanne L.G. Salas

Project Number
J1130

Project Title
A Comparison of Four Woods

Abstract

Objectives/Goals
To determine the practical uses of four woods by comparing their properties including fire resistance, water absorption, flexibility and cost.

Methods/Materials
Fire Resistance-Cubes of each sample were exposed to heat and flame and timed. Water Absorption-Cubes of each sample were placed in beakers of water and allowed to stand for 24 hours. The cubes were removed and the remaining water was measured. Flexibility-Strips of each wood were clamped to a table, a cup suspended from one end was filled with coins until the strip had flexed 2.54cm. The coins were weighed. Cost-Contacted wood dealers and asked for the retail price.

Results
Fire Test: Balsa was the least heat tolerant. Pine proved to be the next flammable. Redwood came next, and finally, the most heat tolerant was Oak.
Water Absorption: The Balsa wood had absorbed the most water. Redwood came next, followed by Pine. Oak was the least absorbent.
Strength & Flexibility: The Oak was the stiffest. Pine was the next strongest, however Redwood was very close to Pine. The weakest of all was Balsa.
Price comparison of each sample wood:Oak is the most expensive costing $5.52 a board foot. Redwood cost $4.36 a board foot, followed by Balsa which cost $3.00 a board foot. Pine was the cheapest at $1.47 a board foot.

Conclusions/Discussion
I found the most durable wood in terms of strength, tolerance to heat and least absorbent to water is Oak. The next is Redwood, only because it was more tolerant to heat than Pine. Balsa has no use where strength and durability are concerned as it is the least heat tolerant and absorbs the most water. Even though Oak is the most durable wood, it is also the most expensive. Pine is the least expensive, but relatively durable. Redwood is almost three times the expense of Pine for about the same strength rating. Balsa is expensive and hard to find. Pine is the best choice for a big project like building a house. Oak is durable and is a pretty wood so it is most used for cabinets and furniture. Redwood is strong and tolerant to the outdoors so is used for making outdoor furniture. Balsa is best used for hobbies like model airplanes. My conclusion is that although there may be a stronger or better-looking wood, price will be a big factor in determining the practical use.

Summary Statement
My project is about determining the practical uses of four woods, balsa, pine, redwood and oak based upon a comparison of their properties and costs.

Help Received
Dad helped cut the wood and supervised the some of the experiments, Mom did some typing and helped with editing

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Victoria H. Sims

Project Number
J1131

Project Title
Popcorn Puzzle

Abstract

Objectives/Goals
My objective was to find out which brand of microwave popcorn was a better buy. My hypothesis was that the cheapest brand of popcorn purchased would have the most unpopped kernels and that the most expensive popcorn brand would have the least amount unpopped kernels.

Methods/Materials
I purchased six boxes of different brands of buttered popcorn. Then I popped the 18 bags of popcorn using a consistent time and temperature in a microwave oven. After popping a bag I poured the popcorn into a bowl and separated the unpopped popcorn kernels from the popped popcorn. Then I recorded the number of unpopped kernels. Since the box weights differed, I had to weigh the unpopped kernels so that I could accurately compare my results. Then I divided the weight of the unpopped kernels into the weight of the bag of popcorn to arrive at a percentage of unpopped kernels. I used the price for each bag of popcorn and divided that price by the number of grams in a bag of popcorn to get the price per gram of unpopped popcorn. To determine how much was really paid for each gram of popped popcorn, I divided the price by the actual popped serving size (the number of grams per bag minus the number of grams that the unpopped kernels weighed).

Results
A summary of the relavant results which pertain to my hypothesis are as follows: Act II cost $0.0057 per gram unpopped, had an average of 13.33 grams of unpopped kernels and as a result cost an average $ 0. 0065 per gram popped. Orville Redenbacher cost $0.0089 per gram unpopped, had an average of 6.33 grams of unpopped kernels and as a result cost an average $0. 0094 per gram popped. Newman's Own cost $0.0111 per gram unpopped, had an average of 11.33 grams of unpopped kernels and as a result cost an average $ 0. 0127 per gram popped.

Conclusions/Discussion
Based on my calculations, my hypothesis was not validated. I found that the cheapest popcorn was Act II, however it did not have the most unpopped kernels, after popping. The highest priced popcorn was Newman's Own. Surprisingly, it did not have the least amount of unpopped kernels, after popping. The best popcorn to buy, if you are looking purely at price, is Act II. IF you are looking for the best yielding popcorn, Orville Redenbacher had the best results in my testing. My project enlightens us about materials science because making comparisons systematically teaches us about comparing products for their value and usefulness.

Summary Statement
For my project, I tested 6 different brands of popcorn to determine which was the best value.

Help Received
My mother proof read my reprot and my Dad taught me how to use microsoft excel to make the graphs.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Evan Ann Snyder

Project Number
J1132

Project Title
Who Are You? Analyzing the Performance of Fingerprinting Powders

Abstract

Objectives/Goals
This project attempts to answer the question of which fingerprint powder lifts the clearest prints and is the best to be used in a criminal investigation.

Methods/Materials
The project utilized no powder (the control) and the four available fingerprint powders: black powder, silver black powder, magnetic black powder, silver black powder. The independent variable in this experiment is the fingerprinting powders. The dependent variable is the points of minutiae, which are identifying points on a fingerprint.

First, five people's fingerprints were recorded with notary ink. After washing their hands they picked up and held five tiles, one at a time, placing their four fingers on the top of each tile. Fingerprints were then dusted and lifted using the four types of powders and the control of no powder. Finally, the number of points of minutiae on each print were counted and visually compared to the recording cards of the participants.

Results
Black powder worked the best disproving the hypothesis that silver black magnetic powder would work the best.

Conclusions/Discussion
After conducting this experiment, I have concluded that black powder is the most effective fingerprinting powder, giving the clearest prints. This conclusion proves my hypothesis to be null. Contrary to what I predicted, black powder had the most average points of minutiae, .4 more than silver black magnetic powder.

Summary Statement
My project is attempting to determine which type of fingerprinting powder is the most effective, meaning it produces the clearest fingerprints with the most visible identifying points.

Help Received
Help was received from a forensic agent who supplied the materials necessary, the school science teacher who gave advice concerning the report, and parents who also advised and proofread the report.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Morgan A. Toy

Project Number
J1133

Project Title
To Clean or Not Too Clean?

Abstract

Objectives/Goals

Problem Statement: Which household cleaning object is most susceptible to bacteria, and which noncommercial disinfectant cleans most effectively?

Hypothesis: I believe the household dishwashing sponge would retain the most bacteria because of its porous structure. Eventually some food would get caught in its pores and promote bacterial growth. I also think that the best method for cleaning the media would be the bleach solution because it is sometimes an ingredient in commercial disinfectants.

Methods/Materials

Materials:

a. Assorted media- dishtowel, sponge, scouring pad
b. Incubator with heating pads and Celsius thermometer
c. TSA blood agar plates
d. Sterile saline solution
e. Bacteria loop
f. Disinfecting materials-dishwasher/dishwashing soap, microwave, Clorox bleach, air dry

Investigation:

1. Take the three types of media and expose them to identical bacterial conditions
2. Immerse in a sterile saline solution and incubate for 48 hours at 37 degrees Celsius
3. Compare test samples to sterile media samples to find the most contaminated
4. Expose each media to the same disinfecting processes-bleach solution, dishwashing, microwaves, air drying
5. Compare disinfected test samples to the bacteria exposed test samples to find the most effective cleaning method

Results

The scouring pad was the most susceptible to bacteria growth. For cleaning these media, the bleach solution and the dishwasher were the most effective methods. Microwaves failed to kill bacteria as effectively as the bleach solution or dishwasher despite the samples being subject to microwaves for three whole minutes. Air drying worked the least effectively and actually encouraged bacterial growth

Conclusions/Discussion

In the household kitchen, the scouring pad harbors the most bacteria and needs to be cleaned most often, and in disinfecting the items, a bleach solution and dishwashing cycle are the most efficient alternatives.

Summary Statement

I am determining which household kitchen cleaning objects retain the most bacteria after exposure to identical bacterial conditions and which noncommercial disinfectants work the most effectively in killing bacteria from the samples.

Help Received

My father helped build the incubator, and my mother supervised my testing. St. Joseph's Medical Center donated media, a bacteria loop, and a Celsius thermometer.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Grant Van Horn

Project Number
J1134

Project Title
Electromagic: A Comparison of D-Cell Batteries' Electromagnetic Field

Abstract

Objectives/Goals
Which battery will last the longest while inducing a magnetic field that will hold up three safety pins. The most powerful battery will hold the safety pins for the longest, and the weakest battery will hold the safety pins for the least longest. The most powerful battery is usually the battery that can last the longest and will have the most milliamps. Milliamps distinguish the strength of a battery and refer to the battery capacity

Methods/Materials
The first thing I did was buy all the materials I would need to complete my experiment. To accomplish my project I needed to build a wooden base, which I completed with the help of my father. We first sawed a board into two pieces and screwed the two pieces together at a ninety degree angle with three screws. Secondly, I drilled two horizontal rows of holes across the board and had a total of sixteen holes. Thirdly, I put the 5/16" # 5 ½" bolts into the holes that I drilled and applied the washers and nuts to them. Then I measured eight lengths of copper wire, each one measured 40 inches long. Next I wrapped the wire around the bolts twenty times and left a little extra to attach to the batteries. I bought all the batteries I would need and taped the wires to the batteries. I placed three safety pins on each electro magnetized bolt and then I began my experiment. I started a watch to time the batteries. I watched the magnetized bolts carefully for a safety pin to fall off.

Results
My experiment was successful and I received my results in less than twenty hours. My results showed that the Duracell Ultra battery lasted the longest holding three safety pins and the RadioShack battery held the safety pins for the least amount of time. The rest of the batteries finished in between thirteen and nineteen hours.

Conclusions/Discussion
My hypothesis proved correct with the results I gathered. The Duracell Ultra battery powered an electromagnetic field which held three safety pins, and lasted 19 hours and 47 minuets. This was a full hour and forty-two minutes longer than the second best battery, Energizer Max. All of the batteries finished within 5 hours and 37 minutes of each other.

Summary Statement
This experiment compares the Electromagnetic strength of several popular batteries.

Help Received
My dad helped me build my experimental apparatus.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Jessica L. Wertheim

Project Number
J1135

Project Title
Sodium Polycrilate: Out with the Old, Absorb with the New

Abstract

Objectives/Goals
The objective is to determine which different type of disposable diaper and cloth diaper can absorb the most water, and how the sodium polycrilate affects the absorbency.

Methods/Materials
Twenty Huggies diapers, twenty Pampers diapers and five cloth diapers were tested by pouring water from a 50 mL beaker into them until they started to leak. Each time after the cloth diaper was tested, it was washed in the washing machine. The sodium polycrilate was taken out of the Huggies diaper and weighed on a scale as well as the sodium polycrilate from the Pampers diaper.

Results
The Huggies diaper weighed 50 grams, had the average absorbency of 507.6 mL and had 22.27 grams of sodium polycrilate inside. The Pampers diaper weighed 45.65 grams, had an average absorbency of 392.1 mL and had 17.29 grams of sodium polycrilate inside. In both cases the absorbency of the polycrilate was approximately 23 mL of water/gram of polycrilate. There was a difference of 5 grams in total weight of the disposable diapers and a difference of 5 grams on the polycrilate. The weight of the cloth diaper was 31.6 grams and could only hold an average of 14.2 mL of water.

Conclusions/Discussion
The Huggies diaper was the most absorbent diaper out of the other two by far. About half of the Huggies diaper was filled with the sodium polycrilate and that's what made it have the best absorbency. A pack of 40 Huggies diaper costs about 10 dollars whereas the Pampers diapers which costed around 12 dollars for a pack of 40. Even though the amount of polycrilate is higher in Huggies, the Huggies are less expensive. Because the cloth diapers are made of 100% cotton, they shrank every time they were washed and became very thin. The cost of each cloth diaper was around five or six dollars. With less leaks from the disposable diapers, there will be less waste produced because they can be used on the child longer. With cloth diapers, there would be more soiled laundry which would increase the use of water in both cleaning the diapers and having to clean other clothing that might have gotten soiled. Although the disposable diapers contribute to the landfill issue, they are saving water and electricity.

Summary Statement
My project is about the sodium polycrilate that are inside the disposable diapers, and how it affects the absorbency.

Help Received
My Mother helped me test the diapers. My teacher helped me with my abstract.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Celeste E. Wychopen

Project Number
J1136

Project Title
The Candle Wax that Burns with the Least Amount of Particulate Emissions

Abstract

Objectives/Goals
My objective was to determine which of three common candle waxes (soy, beeswax and paraffin) would emit the least amount of particulate matter (soot, etc.) when burned in votive candle form.

Methods/Materials
I made four identical candles from each of the three waxes. I used German coreless, freestanding, four-inch wicks for uniformity. I burned each of these candles in a controlled testing environment. Particulate emissions from the candles were collected on Melitta unbleached #6 cone coffee filters supported by wire frames. The filters were taken to a laboratory at a Junior College and weighed on a milligram scale before testing. I controlled for drafts using standard banker boxes placed over candles during burning. The candles were burned for two hours. The filters were placed in sealed plastic bags and weighed again. Three tests were performed for each type of candle.

Results
At the conclusion of the experiment all of the filters weighed less. However, the beeswax filters consistently weighed the least followed by the soy filters and then the paraffin.

Conclusions/Discussion
I concluded that during testing the filters were dehydrated by the heat of the candle flame. However, I believe that I was still getting accurate readings regarding the particulate emissions of each candle; therefore I have deemed my hypothesis correct. The beeswax candle had the lowest particulate emissions

Summary Statement
I wanted to determine which type of candle wax emitted the least amount of particulate matter.

Help Received
Phyllis Ashmead, assisted with candle making; father helped with overhead arch and general experimental advice; family edited and proofread all work, milligram scale was used at Columbia Community College.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Harrison B. Yager

Project Number
J1137

Project Title
Coming Clean: Alcohol-Based Hand Sanitizer vs. Antibacterial Soap, Which Cleans Best?

Abstract

Objectives/Goals
Will antibacterial soap or alcohol-based hand sanitizer kill the most bacteria?
Hypothesis
Antibacterial soap and alcohol-based hand sanitizer will both kill the same amount of bacteria.

Methods/Materials
Twenty randomly chosen subjects were divided into two groups; ten subjects used antibacterial soap, running water and paper towels and ten subjects used alcohol-based hand sanitizer.
Taking a sterile swab, each subject's hand was swabbed from the outer edge of the palm, along and in between each set of fingers, to the outside of the palm, to the back of the hand, and then back and forth on the palm. The swab was then rolled on an agar plate in a zig-zag pattern. Two control swabs were taken on unwashed hands.
Twenty-two agar plates were labeled and placed in an incubator at 37 degrees Celsius.
The plates were examined at 24, 48 and 72 hour intervals. Each plate was removed from the incubator and held up to a light source. Bacterial colonies visible to the naked eye were counted and recorded.
Materials
1 bottle alcohol-based hand sanitizer,1 bottle antibacterial soap, paper towels,
running water, sterile MacroPur swabs, agar culture dishes, incubator.

Results
The antibacterial soap test group had 41 colonies at 72 hours versus 25 colonies in the alcohol-based hand sanitizer test group.
Subjects using antibacterial soap had 64% more bacterial colonies than those subjects who used the alcohol-based hand sanitizer.
Not surprisingly, the control plates grew the most bacterial colonies.

Conclusions/Discussion
The alcohol-based hand sanitizer killed more bacteria than the antibacterial soap. This means that the data disprove my hypothesis.
My experiment shows that alcohol-based hand sanitizers do a better job at killing germs than antibacterial soaps. Factors affecting my experiment included
people's hands might not have been equally dirty, they may not have cleaned their hands in the same way.

Summary Statement
I compare the number of bacterial colonies grown from two groups: those using antibacterial soap and those using alcohol-based sanitizer.

Help Received
Mom helped type some of report. Used dad's incubator. Bought agar plates from dad.