



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Larisa M. Assadourian	Project Number J2001
Project Title The Effect of Moisturizers on Skin Moisture Retention	
Abstract Objectives/Goals To find what type of skin moisturizer keeps the skin hydrated the most and why, using Jell-O as a human skin model. Methods/Materials Material:  Moisturizers - Cocoa Butter, Baby Oil, Aruba Aloe, Elite, Petroleum Jelly  Jell-O (green)  Graduated cylinder  Petri dishes (18 of them) Method: 18 petri dishes filled with 60 mL of Jell-O each were prepared to experiment the effect of 5 different moisturizers, as well as no moisturizer, on Jell-O weight and height retention through time (15 days). Results 1. Petroleum jelly retained 100% of the weight and most of the height. 2. Baby Oil retained almost 100% of the weight but lost a little height. 3. Aruba Aloe retained 93% of the weight with some height loss. 4. Cocoa Butter retained 77% of the weight and 72% of the height. 5. Elite Citrus Coconut retained 74% of the weight and the height. 6. Jell-O with no moisturizer retained only 62% of the weight and 37% of the height. Conclusions/Discussion Petroleum Jelly has retained moisture in the Jell-O the longest. If I do this experiment again, I would pick darker colored Jell-O, to improve the contrast with the light colored moisturizers. I would also use different types of moisturizers, some in the market with prescription, and one that I will make myself with Petroleum Jelly and Cocoa Butter.	
Summary Statement Finding skin moisturizer and it's ingredient that retains moisture in Jell-O (used as human skin model) the longest.	
Help Received Parents helped prepare the Jell-Os and take pictures.	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Ashton C. Authement	Project Number J2002
Project Title Beware of the Cookware	
<div>Objectives/Goals<p>My objective was to test different types of metal cooking pots to determine which one would leach the most amounts of metals when boiled in a 25% citric acid solution for 30 minutes. My goal was to support my research and hypothesis that softer porous metals (like cast iron and aluminum) would release the most metal into the citric acid solution.</p></div> <div>Abstract<p>I tested and analyzed the metal content released by six different metal cooking pots: (1) aluminum; (2) grades of stainless steel; (1) copper; (1) cast Iron; and (1) non-stick. The test was performed by dissolving citric acid crystals in water to make a 25% citric acid solution. 200ml of the solution was then boiled in each pot for 30 minutes. The solution left in each pot was collected and observed by a spectrophotometer for eight metal indicators (copper, chromium, iron, nickel, aluminum, zinc, cobalt, and cadmium). The concentration and intensity levels of each of the eight metal indicators were analyzed for each pot.</p></div> <div>Methods/Materials<p>I tested and analyzed the metal content released by six different metal cooking pots: (1) aluminum; (2) grades of stainless steel; (1) copper; (1) cast Iron; and (1) non-stick. The test was performed by dissolving citric acid crystals in water to make a 25% citric acid solution. 200ml of the solution was then boiled in each pot for 30 minutes. The solution left in each pot was collected and observed by a spectrophotometer for eight metal indicators (copper, chromium, iron, nickel, aluminum, zinc, cobalt, and cadmium). The concentration and intensity levels of each of the eight metal indicators were analyzed for each pot.</p></div> <div>Results<p>All six metal cooking pots tested leached different types and concentrations of metals during the heating process. The cast iron leached the highest amount of metal (iron, chromium, and surprisingly cadmium). Cadmium is very toxic and harmful to the human body. The aluminum pot leached the second highest amounts of metals with large concentrations of aluminum, which can be toxic in high quantities. It also leached small amounts of copper, chromium, iron, zinc, and cobalt. The non-stick pot (third) leached a good amount of metals (copper, chromium, iron, zinc, and cobalt). The ordinary stainless steel pot (fourth) leached copper, chromium, iron, nickel, and cobalt; followed by the higher quality 18/10 stainless steel that leached copper, chromium, iron, zinc, and cobalt. Finally, the copper pot leached the least but surprisingly showed more iron than copper. The results showed the pot used in the experiment was likely an alloy.</p></div> <div>Conclusions/Discussion<p>Through the use of metal indicators and a spectrophotometer I was able to analyze my test results to support my research and hypothesis that the cast iron pot boiled in 25% citric acid solution would leach the most metal. All pots tested had varying traces of metal. This creates a challenge for pot designers who are trying to find the perfect metal combination to solve a major problem in cooking: designing a 'healthy' pot that leaches the least amount of metal into food.</p></div>	
Summary Statement <p>I tested different types of metal cooking pots to determine concentrations of metals which could be leaching into our foods while cooking.</p>	
Help Received <p>I used an Inductively Coupled Plasma - Optical Emission Spectrophotometer from the University of California, Riverside to test metal content of samples under the supervision of Kenneth Flack (Chemistry Dept., Graduate Student). My parents helped me proof read my report and attach items to my board.</p>	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Isabella Bartoughian-Woodruff	Project Number J2003
Project Title Pucker Up	
<div><div>Objectives/Goals If you use Carmex lip balm SPF 15, then you will have better UV protection over Baby Lips, EOS and Neutrogena.</div><div>Methods/Materials After purchasing 5,000 UV beads and stringing them up in 100 bead strings, you apply lip balm on each bead. There will be fifty strings of 100 beads divided into five groups: Control group, Neutrogena, Baby Lips, EOS and Carmex. Each string will be placed on a separate individual plate and independently placed outside to record how long it would take for them to change color. A stopwatch was used to record the time the beads started to change color. This was repeated 50 times, to ensure the most accurate results.</div><div>Results Carmex was the best lip balm with the highest average time in the experiment, 24.756 seconds. EOS had the worst results with 8.292 seconds. Neutrogena was not far behind Carmex at 21.086.</div><div>Conclusions/Discussion My hypothesis was strengthened because I predicted that Carmex would be the best protection for your lips. Even though Carmex had the highest average in seconds of UV ray exposure the time was not very good. EOS had the worst protection. This was very surprising because it is a very popular brand. SPF 15 is too little of protection for the harmful rays.</div></div>	
Summary Statement Testing 4 different lip balms with SPF 15 to see which one works the best.	
Help Received	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Tabitha P. Behnke	Project Number J2004
Project Title Fireflies in a Tube: How Does Temperature Affect the Glow of Light Sticks?	
<div><div>Objectives/Goals Light sticks are valuable in natural disasters and are also frequently used by emergency responders. In these type of situations how bright or how long a light stick glows can make the difference between life and death. Therefore, the purpose of my experiment was to test how temperature affects the brightness of light sticks and the length of time they glow. Since the light emitted by a light stick is produced by a temperature sensitive chemical reaction called chemiluminescence, I hypothesized that, although heat would produce a more intense glow, freezing temperatures would cause a light stick to remain lit up longer.</div><div>Abstract Two trials were conducted in which identical light sticks were simultaneously placed in insulated cups of boiling water, warm tap water, cold tap water, or freezing ice-water. In each trial, the brightness of each light stick was compared and ranked over time until the light stick had completely faded and the total amount of glow time was measured.</div><div>Methods/Materials In both trials, the light sticks placed in the boiling water were immediately the brightest, yet they were the dimmest by one hour and had extinguished after two and one-half hours. Conversely, the light sticks in the freezing water were initially the dimmest and did not become the brightest until five and one-half hours however they lasted the longest amount of time and continued to glow for more than four days. Also, the light sticks in the warm water became brighter faster than the light sticks in the cold and freezing waters, but the glow did not last as long.</div><div>Results Therefore, since heat produced a brighter glow, but freezing temperatures caused the glow to last longer, if an emergency required an intense light for a short period of time, warm the light stick. On the contrary, if the light needed to last a long time but did not have to be bright, try to keep the light stick cold.</div><div>Conclusions/Discussion</div></div>	
Summary Statement The effect of temperature on the brightness of light sticks and the length of time they glow.	
Help Received My Mom helped me understand some research, assisted with experiment set-up, especially boiling water and maintaining water temperatures, and edited my report with me, including tables and graphs. My Dad and Mom helped me mount some of the display.	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Andrew W. Brawders	Project Number J2005
Project Title TEC Peltier Tile Efficiency for Cooling and Heating	
<div><div>Objectives/Goals My science fair project tests my hypothesis on whether the Peltier tile is more efficient in cooling or heating. Also to see if it can be used in daily life.</div><div>Methods/Materials A platform made of some metal and wood, heatsinks, a Peltier tile, an adapter for the power source/peltier tile interface, and a power source .</div><div>Results Opposite of what I expected in my hypothesis. The heating was more efficient than the cooling, bigger heatsinks were needed. I also calculated the efficiency of both sides of Peltier tiles.</div><div>Conclusions/Discussion In conclusion, its efficiency is too low and is not energy efficient. Although it is small , you need a large heatsink to counteract the large amount of heat it produces to keep it from burning out.</div></div>	
Summary Statement My project is to see if a Peltier tile is efficient and practical enough to be used in heating or cooling applications .	
Help Received Parents and teachers	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Lance H. Brown	Project Number J2006				
Project Title Flame War: Which Combustible Fuel Is the Most Efficient?					
<div><div>Objectives/Goals<p>The reason I am trying to find out what combustible fuel source produces the most energy, is because most fuel sources are limited, and we need to find a sustainable fuel source to power technology.</p><p>If I burn 10 grams of the following fuels: 91% alcohol, 70% alcohol, wood, charcoal, sterno and gasoline, then I believe gasoline will produce the most heat, followed by sterno, 91% alcohol, 70% alcohol, charcoal and then wood. The constants in my tests were the amount of water heated and the amount of fuel. The variables were the fuels I used. My control was gasoline, because it is a very common fuel and produces a great amount of energy.</p><p>The results of this experiment will help determine what combustible fuel should be used for a specific job based on its supply, cost and efficiency.</p></div><div>Abstract</div></div> <div><div>Methods/Materials<p>I positioned a flask of water above the fuel source and recorded the change in water temperature before and after burning the fuel. Using the specific heat of water I calculated the energy produced.</p><p>Materials; 1.125mL Erlenmeyer flask, 2. Tripod with mesh screen, 3. Matches, 4. Scale, 5. Stopwatch, 6. Wood, 7. Sterno, 8. Rubbing Alcohol 91%, 9. Rubbing Alcohol 70%, 10. Gasoline, 11. Charcoal, 12. Ceramic bowl, 13. Thermometer</p></div><div>Results<p>The fuels tested produced the most heat in the following ranking: 1. Gasoline, 2. 91% Alcohol, 3. 70% Alcohol, 4. Sterno, 5. Wood, 6. Charcoal</p></div><div>Conclusions/Discussion<p>My results were not exactly what I thought they were going to be. I thought that the order would go gasoline, followed by Sterno, 91% alcohol, 70% alcohol, charcoal and then wood. I realized that Sterno was not as good of a fuel as I thought. I also thought charcoal would produce more heat. I also found out that 91% alcohol produced almost as much energy as gasoline.</p><p>91% Alcohol would be a good substitute for gasoline in vehicles because it burns cleanly, but it is more expensive. Wood and Sterno are good for heating food because they produce a medium amount of heat for a long time. Charcoal would be a good fuel if it was available in large quantities.</p></div></div> <tr><td colspan="2">Summary Statement<p>My project will help people make the right choices about what fuel to use because fuel sources are limited.</p></td></tr> <tr><td colspan="2">Help Received<p>My dad helped me design the apparatus and helped me find the equation to calculate the amount of energy produced.</p></td></tr>		Summary Statement <p>My project will help people make the right choices about what fuel to use because fuel sources are limited.</p>		Help Received <p>My dad helped me design the apparatus and helped me find the equation to calculate the amount of energy produced.</p>	
Summary Statement <p>My project will help people make the right choices about what fuel to use because fuel sources are limited.</p>					
Help Received <p>My dad helped me design the apparatus and helped me find the equation to calculate the amount of energy produced.</p>					



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Dante P. Cavaz	Project Number J2007
Project Title Shooting Sharp: An Experiment Testing What Pellet Shape Is the Most Accurate	
<div>Objectives/Goals The objective is to determine what pellet shape is the most accurate.</div> <div>Methods/Materials Informed consent was obtained by 5 subjects to shoot three pellets from the air rifle (Gamo Silent Cat 1250 fps) at 3 distances for the four types of gamo ammo twice for the two trials.</div> <div>Results When shooting the four types of pellets (pointed, round, pointed with skirt, and flat), the flat pellets proved to be the most accurate. The average accuracy of the flat shaped pellets were 51.56% as opposed to the very close second place round shaped pellets with 51.34% and the last place pointed with skirt pellets averaging 42.45%.</div> <div>Conclusions/Discussion After completing my project I concluded that both flat and round pellets have similar accuracy. I believe that experimental error (the variation in shooting between the subjects) is the reason for the change in the results between the round and flat pellets. Therefore, either type of ammo could be used to achieve the greatest accuracy in target shooting. In addition, my project applies to the real world because it provides information on pellet characteristics and performance for target shooting. Pellet gun shooting has always been a popular activity among both children and adults. My project helps by providing useful information on selecting the best-shaped pellet for target shooting.</div>	
Summary Statement My project tests what pellet shape is the most accurate.	
Help Received Brother was a subject; Mom helped edit report; Dad was a subject and helped with the board.	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Aaron Geoffrey Celis	Project Number J2008
Project Title Are LED Bulbs the Most Efficient Light Source?	
<div><div>Objectives/Goals The objective of this project was to provide useful information to consumers regarding which type of light bulb would be the most beneficial to purchase. If I needed a new light bulb, an LED would be the most efficient bulb to buy.</div><div>Methods/Materials I gathered 8 different bulbs, 7 of which were 60W equivalents (Clear Incandescent; Frosted Incandescent; First Gen. Unused CFL [13 yrs. old]; First Gen. Used CFL; Mint Condition LED; Halogen; New Gen. CFL; New Gen. CFL [may not be 60W equivalent]), a light meter, a Kill-a-Watt (watt meter), and an infrared thermometer. Each bulb was mounted in the same place one meter away from the measuring tool, and their temperature, EV (exposure value), and wattage were taken. EV measurements were converted to lumen units using an online calculator, and Fahrenheit was converted to Celsius. The data was recorded on site and rewritten in a neater format. It was also compared to the manufacturers' stated ratings.</div><div>Results The bulbs had a variety of measurements ranging from 9 to 56 watts, 5.1 to 8 EV and 83.6 to 314 degrees Fahrenheit. The given results revealed that incandescent light bulbs reach the highest temperature, CFLs (Compact Fluorescent Lights) use the least amount of wattage, and LED light bulbs ,do in fact, emit the most amount of lumens, and the manufacturers# claimed wattage and lumen measurements were fairly accurate compared to the measured results.</div><div>Conclusions/Discussion To conclude, the outcome of the experiment did support my hypothesis, showing that LED light bulbs would be the most energy efficient bulb type to purchase because it requires a minimal wattage, emits a large amount of light and keeps a cool temperature. CFL bulbs were the second most efficient and incandescent bulbs were the least energy efficient. Although, there may have been some inaccuracies in the taken readings because some of the instruments were not kept stationary during measurements and the bulbs were mounted in a non-traditional manner.</div></div>	
Summary Statement My project tests what type of light bulb is the most energy efficient.	
Help Received Dad took pictures, printed them and bought watt meter and some bulbs. Mom and my sister helped cut out, label and paste elements of the display board.	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Xane-Anthony V. Cherland	Project Number J2009
Project Title Antacid Potency	
<div><div>Objectives/Goals Which antacid works best at neutralizing acids? I believe that Equate will work the most. Gaviscon will work the second best and Walgreens will work the least efficiently.</div><div>Methods/Materials<ol style="list-style-type: none">1. Test tubes2. Eye droppers3. Grape juice (purple unsweetened)4. Lemon juice (fresh squeezed)5. 3 different brands of Antacids</div><div>Results Upon finishing my experiment I found interesting results. The Equate antacid used 3 drops on the first attempt, 2 on the second and 4 on the third. The Walgreens antacid used 6 drops on the first, 5 on the second and 6 on the third. The Gaviscon antacid used 10 drops on the first, 9 on the second and 5 on the third. Due to the random result of 5 for third attempt of the Gavison brand I decided to test each antacid a total of 10 times to get a more accurate result. The Equate brand results were, 4th-2, 5th-3, 6th-5 7th-4, 8th-3, 9th-3, 10th-4 with an average of 3. The Walgreens brand results were, 4th-7, 5th-6, 6th-6, 7th-5, 8th-7, 9th-5, 10th-6 with an average of 12. The Gavison brand results were, 4th-8, 5th-9, 6th-7, 7th-8, 8th-10, 9th-9, 10th-7 with and average of about 8.</div><div>Conclusions/Discussion As it turns out, all the glitters isn't gold seeing as how the most expensive liquid antacid took the longest to work properly. As for the Walgreens and Equate brands, my hypothesis was slightly correct, the Equate brand did work best, but the Walgreens brand worked second best instead of last. In conclusion you should save your hard earned money when buying Antacids and check the Active Ingredients before buying them.</div></div>	
Summary Statement Tested three antacid brands to determine which worked the best.	
Help Received My parents helped with the materials I needed.	



CALIFORNIA STATE SCIENCE FAIR

2015 PROJECT SUMMARY

Name(s) Emma A. Dolan	Project Number J2010
Project Title SPF Test	
<div>Objectives/Goals<p>My mom was diagnosed with Melanoma when she was 40 years old, and my grandma has had several basal cell and squamous cell carcinomas removed in her lifetime. I take after them with fair skin and hair, and I wanted to learn about protecting myself from ultra-violet (UV) rays so I won't go through the same experiences with my skin.</p><p>The objective of my project was to find out if higher Sun Protection Factor (SPF) sunscreens are more effective in blocking ultra-violet rays by using UV reactive beads.</p></div> <div>Abstract</div> <div>Methods/Materials<p>Materials: Neutrogena Ultra-Sheer Broad Spectrum Dry Touch Sunscreens with SPFs 30, 45, 55, 70, 85+, and 100+, 630 UV Reactive Beads, 21 small plastic bags, and a timer.</p><p>Method: First, label 7 small plastic bags with time of test and one with each SPF. Next count 30 UV beads and put in each bag. Then measure out 1/4 teaspoon of each SPF sunscreen and spread evenly on to the coordinating plastic bag. One bag will be left with no sunscreen. Finally, place all bags in the sun for 5 minutes. Record observations. Record the number of beads that were protected (or showed no change in color). Repeat all steps at 3 different times of the day placing the bags in the same location each time.</p></div> <div>Results<p>The SPF 100+ was proven to be the most protective sunscreen in 2 out of the 3 tests. SPF 100+ had blocked the most UV rays which was shown by the number of beads that did not change color in the sun. SPF 55 was proven to be better than SPF 75 and 85+, and in fact the SPF 55 blocked more rays than SPF 100+ on one of the tests.</p></div> <div>Conclusions/Discussion<p>Before the results were averaged numerically (by number of beads unchanged), it was harder to tell the difference between the different SPFs visually. However, after the results were averaged, it became clear that the results were in fact very different. In general, SPF 55 and above were all proven to be very protective. When people are buying sunscreen, they should purchase one that is SPF 55 or above (but of course still remember to reapply it often).</p><p>Next year I plan on doing another sun protection test. I will test UV protective clothing to see if they are as effective as sunscreen. I would hope that would give me more valuable information on UV protection.</p></div>	
Summary Statement <p>My project was testing the effectiveness of different SPF sunscreens on blocking the UV rays from UV color changing beads.</p>	
Help Received <p>My mom and my sister helped carry bags outside and by taking pictures.</p>	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Jaylene A. Harmon	Project Number J2011
Project Title Soap Wars: Comparing Dishwashing Liquids in Oil Spill Cleanups	
<div><div>Objectives/Goals My objective was to determine if there was another dishwashing soap that can clean oiled birds as well as Dawn. I hypothesized that another brand of dishwashing soap will clean oiled birds just as well as Dawn, which is currently used by rehabilitation centers.</div><div>Methods/Materials I soaked a duck feather in motor oil and cleaned it with Dawn. I repeated this process with four other feathers and four other dishwashing liquids. The cleaning process was timed and the number of cleaning attempts, until there was no longer any visible residue, was noted.</div><div>Results Three of the five dishwashing liquids took 3 or more cleaning attempts. Dawn and Seventh Generation each took two cleaning attempts to remove the oil from the duck feather.</div><div>Conclusions/Discussion Although Dawn and Seventh Generation appeared to have the same number of cleaning attempts, oil residue was discovered to have soaked onto the project board days later. It is now clear that Seventh Generation worked the best at cleaning the feathers. As can be seen on my board, Seventh Generation has the closest shape to the original feather and Dawn has residue. It is clear that other factors are used by rehabilitation centers when determining which product to use.</div></div>	
Summary Statement Determining which soap is the best at cleaning oiled birds.	
Help Received Parents bought all supplies and mom helped with the timer.	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Tyler J. Hawes	Project Number J2012
Project Title Twinkie Resist	
<div><div>Objectives/Goals I did this test to see if Twinkies can resist water, similar to a store bought water resist for leather. I tested to see if my different Twinkie mixes stood up to water resist, or did not. I thought that if water resist can use any chemicals they want to get the best turnout, it is a bit of a public safety concern that an "edible" product may do the same job better.</div><div>Methods/Materials Materials: 4 unfinished leather scraps 1 box of Twinkies 3 mixing bowls wooden spoon eye dropper/ water boot water resist I separated the Twinkies into just bread, just filling, and exactly one Twinkie. I made these into spreadable pastes and spread them on leather and had a water resist sample. I dried them before the tests. I did two tests where I timed how long it took to absorb water droplets off the leather's surface. I did one test after an hour of application, and one after a week.</div><div>Results The Twinkies performed much better than boot resist, and improved over time. The filling sample dropped off in time, but everything else increased effectiveness. The water resist did 2-3 times worse than the Twinkies at some points.</div><div>Conclusions/Discussion My hypothesis has proven partially correct. I thought the various Twinkie mixes would not do better than the resist, but to my surprise, they did. I think that if I did this again I would not go into the test with little knowledge or a sure idea of how I was going to test the water solubility, and would really think about the whole process more. Right before the testing I decided that a blank leather scrap would not be necessary because I was not testing if the water resist and the Twinkie mixes worked, but instead only how well the types of Twinkies did compared to the resist. This blank sample was in my preparing photos.</div></div>	
Summary Statement Twinkies have lipids, petroleum, and many other things that may resist water and I tested this property on leather against storebought water resist.	
Help Received Parents helped with original idea, and how to test the water absorbtion.	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Emma R. Hern	Project Number J2013
Project Title The Durability of Nail Polish	
Objectives/Goals The goal of this project is to find the most durable nail polish utilized in various lifestyles, while minimizing exposure to harmful chemicals.	
Abstract Methods/Materials Six nail polishes were used on two individuals with different lifestyles. The same polishes were used on ping pong balls in order to perform a rub test. Each person had both hands painted with two coats of polish. Polish was worn for one full week. Pictures were taken on days one, three, five and seven to compare results. Finally, a marked section of each ping pong ball was polished with two coats. The ping pong ball was rubbed on standard paper until it showed visible signs of wear. The results of both tests were compared to see if results were similar.	
Results The ping pong ball test showed Wet N Wild took seven rubs to show a visible difference on the painted surface. Maybelline was second lowest with seventeen rubs. Essie was third lowest at nineteen rubs. The next polish had more than a 200% increase in rubs. Sally Hansen took forty rubs to see a visual difference, Cover Girl took forty-one and OPI took sixty-one rubs on paper until there was a visible difference on the painted surface. Throughout the finger nail tests, Wet N Wild showed noticeable chipping and damage on at least 50% of the nails by day three and significant chipping by day seven. Maybelline and Essie also showed noticeable chipping after three days of wear on at least 50% of the nails. Sally Hansen showed minor chipping on less than 30% of the nails at day three and didn't have comparable damage to Essie, Maybelline or Wet N Wild until day five. Cover Girl showed minor chipping at day three and lasted five days until there was noticeable chipping on greater than 50% of the nails. Finally, OPI showed less than 10% chipping by day three and lasted five days until there was chipping on 50% of the nails.	
Conclusions/Discussion The results of both tests, ping pong balls and nails, both supported the hypothesis that OPI was most durable polish and Wet N Wild was least durable.	
Summary Statement This project studies the most durable nail polish in a variety of situations.	
Help Received Testing help, data recording, proofreading and support from my mom. Proofreading and support from Mrs. Gillum. Other information as it related directly to nail polish and chemical bonds by Paul Bryson, PhD	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Daniel Kazarian	Project Number J2014
Project Title Can Crystal Power Cells Outlast Alkaline Batteries?	
<div><div>Objectives/Goals To determine if crystal power cells can outlast alkaline batteries.</div><div>Methods/Materials Run times of AA,AAA,crystal dry cell and crystal wet cell batteries were tested and examined including voltage readings using multi-meter at certain intervals. Three flashlights were used in this experiment. Crystal power cells were constructed using copper end caps, magnesium rods, and mixture of Alum, Borax, Potassium Chloride, and Epsom Salt.</div><div>Results In terms of hours of operation, both crystal dry cells and crystal wet cells, have out performed alkaline batteries. The maximum run time of alkaline battery powered flahlights were six hours and forty five minutes, while crystal powered wet cell required only the addition of few drops of water every 24 hours, and 15 to 20 minutes to recharge itself. The crystal powered wet cell recharged itself in six hours.</div><div>Conclusions/Discussion The crystals are piezo electric and thermoelectric. They are able to produce and store energy in the presence of surrounding sound and heat. By contrast, alkaline batteries contain limited amount of stored chemical energy, and when the oxidation reduction reaction inside the battery is completed, it must be discarded. Crystal power cells batteries, are ideal source of power in an emergency situations. By connecting them in series, it is possible to power emergency radio, communication devices, provide emergency lighting, etc.</div></div>	
Summary Statement Can Crystal Power Cells Outlast Alkaline Batteries?	
Help Received My Father helped me with purchasing Items need to construct crystal power cells.	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) William A. Labrador	Project Number J2015
Project Title The Time Dependent Effects of Humidity on Tortilla Chips	
Objectives/Goals My experiment was designed to demonstrate the time-dependent effects of humidity on tortilla chips. My hypothesis was that humidity is a leading cause of decreasing crispness or increasing staleness of chips.	
Abstract Methods/Materials To test this theory, I created a dry environment using desiccant in a sealable plastic container, a humid environment using evaporating water in another container, and an uncontrolled #household# environment. Temperature and other conditions were the same for the three containers. I sealed test chips in the dry and humid containers and placed chips in the open #household# container. I used humidity loggers in each of these environments. I defined crispness as the number of pieces a chip breaks into when hit by a fixed impact. Fresher, crispier chips break into more fragments. Using chips exposed to these three environments, I measured the crispness of chips over time by dropping an empty plastic bottle down a PVC pipe onto test chips, and I would count the number of fragments above a certain size. I plotted average counts versus time for each of my environments.	
Results The dry environment preserved the crispness of chips. The humid and household environment turned the chips stale, as measured by statistically significant declines in the number of broken chip fragments over time. The humid environment turned the chips stale at a faster rate than the household environment. In a preliminary test, I demonstrated that temperature was likely less of a factor by testing dry chips placed in a freezer. There was no statistically measurable change in crispness compared to room temperature dry chips.	
Conclusions/Discussion My hypothesis was demonstrated because the dry chips retained their crispness, while high humidity rapidly made chips less crispy.	
Summary Statement My project demonstrates the effects of humidity and the reduction it causes on the crispness of a chip over time.	
Help Received My father was my advisor in the project and also proofread my work.	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Matthew L. Lanum	Project Number J2016
Project Title Bicycle Helmet Bust	
<div><div>Objectives/Goals The purpose of my experiment was to find out if the brand or price of childrens bicycle helmets affect the integrity of the helmet in a crash.</div><div>Methods/Materials I tested various types and brands of helmets, from different manufacturers and price ranges by dropping a series of weights on the top of each helmet at a fixed height of 1.2192 meters (4 feet). I then recorded the weight at which the helmet first cracked, and the weight at which the helmet's integrity was considered completely compromised. I repeated the procedure once more with identical helmets and averaged the results.</div><div>Results The results were that more expensive helmets did not provide any greater structural integrity in comparison to the less expensive helmets.</div><div>Conclusions/Discussion The results were that more expensive helmets did not provide any greater structural integrity in comparison to the less expensive helmets. There was an outlier, the C-Preme Crash. This helmet was a mid-priced helmet with a rubber mohawk. The mohawk seemed to help protect the helmet, and it performed substantially better than the other helmets.</div></div>	
Summary Statement Does the brand or price of a childrens bicycle helmet affect the integrity of the helmet in a crash?	
Help Received Father payed for the helmets.	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Tyler R. Legnon	Project Number J2017
Project Title Do Solar Panels Work Better in Artificial Light or Natural Light?	
<div><div>Objectives/Goals My goal/objective is to figure out if solar panels work better in Artificial Light or Natural Light.</div><div>Methods/Materials My materials were one DCV meter, a solar panel, and one light bulb.</div><div>Results My results were that solar panels work better in Natural Light than Artificial Light.</div><div>Conclusions/Discussion My conclusion is that solar panels work better in Natural Light than Artificial Light. My discussion is that I think that solar panels work better in Natural Light because Natural Light produces more light than Artificial Light.</div></div>	
Summary Statement My project is about figuring out if solar panels work better in Artificial Light or Natural Light.	
Help Received My Mom helped me with my graph, and my Dad helped me wire the DCV meter.	



CALIFORNIA STATE SCIENCE FAIR

2015 PROJECT SUMMARY

Name(s) Jennel A. Manalo	Project Number J2018
Project Title Do SPF Levels in Sunscreen Really Matter?	
Abstract Objectives/Goals Sunscreen is known and widely used to prevent damages to skin such as skin cancer and photo aging. While some effects of UV rays are acute and reversible, others are chronic, permanent, and can potentially harm and even kill those affected by it. The SPF level is the ability and length of protection against UV rays. My project was to determine whether or not the different levels of SPF 15, 30 and 70 do a big difference in comparison to each other. I wanted to find out if high levels of SPF are really worth the extra time to find them in the store and the extra money to we pay for them. Methods/Materials Three different test subjects and three different SPF levels (15,30 and 70)were used.For each test subject, positive control, negative control and different levels of SPF were compared. The test subjects received sun exposure for a certain period of time (varying to the sensitivity of each test subject) then checked afterward for color change. SunPrint Paper was for exposed 90 seconds, UV beads for 40 seconds, and hot dogs for 2 hours. There were three trials for each test subject. The color change of the test subjects were rated on a scale from 1-10. Results The test subjects tested with SPF 30 and 70 had a very small difference in comparison to each other, which supported my hypothesis. SPF 15 had a more visible difference compared to the other two levels. The original procedure did not work out as well as planned, so it had to be revised multiple times. As an example, on the first few tests,the sunscreen did not cover all of test subject, causing the UV to seep through the exposed areas.By figuring out a suitable way to apply the sunscreen, adjusting the time limit, and making sure that UV rays cannot get through the areas where sunscreen is not being applied, I was able to receive more accurate data for my tests. Conclusions/Discussion My conclusion is that from SPF 30 and above, the different levels of SPF typically don#t matter and would not do a big difference for your skin protection unless you are very light skinned, have a family history of skin cancer, or have a disease that makes you sensitive to light, which supports my hypothesis.Therefore, if you do not have any of the conditions mentioned above it would be a waste of time and money to get the high levels of SPF if it barely does any difference for your skin. Since money accumulates over time,it saves you plenty in the long run.	
Summary Statement This project wants to prove that SPF levels 30 and above provides about the same sun protection against UV exposure so we shouldn#t waste time and money on high levels of SPF.	
Help Received I received help from my parents in getting all the supplies needed and organizing the information onto my board.	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Lindley Kate McKenzie	Project Number J2019
Project Title Radio Microwaves and Cell Phone Use	
<div style="display: flex; justify-content: space-between;"><div style="width: 40%;">Objectives/Goals My goal was to determine if different generations of smart phones are affected by different functions.</div><div style="width: 40%; text-align: center;">Abstract</div><div style="width: 20%;"></div></div> <div style="padding-left: 5px;">Methods/Materials Materials: iPhone 3, iPhone 4, iPhone 4s, iPhone 5, iPhone 6, iPad 2, iPad 3, iPad Mini, TriField Meter Model 100XE EMF detector, DIY template so that the EMF detection meter is 2.5, 7.6, 15.2 cm away from the device antenna. Take EMF reading on Airplane Mode, on a non-metallic surface to detect any radio frequency field. Place the cellular phone in a standardized position 2.5, 7.6, or 15.2 cm away from the EMF detector on Airplane Mode to determine any activity in the absence of cellular transmission. Calling: Place a call from the cellular device to a nearby landline. Count the number of spikes that the meter detects over a period of five minutes and record results. FaceTime# : Place a call from the cellular device to a nearby landline. Count the number of spikes that the meter detects over a period of 5 minutes of the FaceTime# and record results. Loading a browser on the web: Place a call from the cellular device to a nearby landline. Count the number of spikes while it loads the page. Record results and analyze data. The plan was to do 15 trials per device per activity; this was overwhelming. So, I kept the trials that had been completed and reduced the number of trials from 15 to 3 for the distances 2.5 cm and 7.6 cm.</div> <div style="padding-left: 5px;">Results I wanted to test which functions of the smartphones emitted the most EMFs. I tested different generations of iPhones and measured the emissions at different distances and emissions for different tasks. There was a trend of low activity while web surfing in all phones. For calling, the amount of EMF microwaves was low compared to FaceTime#. There were times using both FaceTime# and calls when the phone emitted frequent and intense microwave activity. The iPhone 6 (1) emitted a long and intense period of spiking during our trials, lasting 20 min. I did the most trials at 15.2 cm and a long period of intense and sustained spiking of microwaves was detected. During the 2.5 cm trials I saw only one brief intense period. In the 7.6 cm trials, there were no intense periods of spiking. The isolated and infrequent long spiking may be explained by the cell phone transmitting to the cell tower.</div> <div style="padding-left: 5px;">Conclusions/Discussion This data supported my hypothesis when it came to Calling, Airplane Mode, and Web surfing. It did not</div>	
Summary Statement Electromagnetic fields from different generations of cell phones with different activities at different distances were the highest for FaceTime# and lowest for Airplane Mode.	
Help Received Mom helped set-up board; Dad helped edit and supervise and purchased meter; My science teachers helped edit and improve my writing; Mrs. Takata helped with this application	



CALIFORNIA STATE SCIENCE FAIR

2015 PROJECT SUMMARY

Name(s) Naya K. Menezes	Project Number J2020
Project Title Effective Headgear in Soccer	
<div><div>Objectives/Goals<p>The goal of this experiment was to compare five brands of soccer headgear to observe differences in the forces of impact, at four different speeds, on each of the four sides.</p></div><div>Methods/Materials<p>Five brands of soccer headgear were used for this experiment: Donjoy, Full 90, Storelli, Headblast, and Forcefield. An accelerometer was inserted inside a hollow mannequin that was fixed onto a wooden pallet to restrict movement. A pitching machine projected tennis balls at the mannequin head where the headgear was placed. A GoLink adapter connected the accelerometer to a computer installed with Logger Lite software to collect data. Each side of every headgear was hit 20 times at four different speeds, 40 mph, 45 mph, 55 mph, and 65 mph.</p></div><div>Results<p>The analysis from the data indicate a varying percentage of decrease at each speed for each headgear. The data shows that at 40 mph Forcefield was the best overall, but the best for each side varied among the headgear. At 45 mph, Full 90 and Forcefield reduced force most. At 55 mph, Forcefield experienced the highest percentage decrease, and was the most effective on all the sides but the left. Finally, at 65 mph, Headblast showed the highest reduction of force overall, being the most effective on all sides but the front. Overall, comparing all the speeds, at 45 mph, the headgear reduced force more than at any other speed. There was a significant difference in force reduction between the lower and upper speeds, where the overall decreases dropped by 63% from 45 mph to 55 mph.</p></div><div>Conclusions/Discussion<p>In this experiment, Storelli was the least effective at reducing the force of an impact at the lower two speeds, while Donjoy was the worst at the higher two speeds. Forcefield was the best, reducing force by 81.2% for both 40 mph and 45 mph and by 22.4% and 21.3% at 55 mph and 65 mph respectively. At the lower two speeds, all the headgear were successful at reducing force by 75% or more. At the higher two speeds, the headgear were not as successful at reducing force. The force reductions at the higher two speeds were between 10% and 30%. The data from the lower two speeds supports the claims set by the manufacturers and exceeds the expectations set by the hypothesis. At the higher two speeds, the claims are refuted, and they do not meet the levels stated in the hypothesis. This data can help scientists create better and more effective headgear to provide more safety in soccer.</p></div></div>	
Summary Statement <p>The purpose of this experiment was to compare five different brands of headgear and observe how much they reduce the force of an impact and how effective they are at four different speeds</p>	
Help Received <p>Family helped with experimentation by taking shifts working the computer, spotting, and collecting balls. Parents helped proofread the paper. Dave Vernier, President of Vernier, sent accelerometer replacements. Dr. Kevin Carneiro was my mentor and helped with the paper and resources. Mr. Matt from Storelli and</p>	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Tori L. Moore	Project Number J2021
Project Title Slipper Stick: A Study on the Coefficient of Static Friction	
Abstract Objectives/Goals The purpose of this experiment was to study the coefficient of static friction created by ballet, tap, jazz, lyrical and hip hop shoes and three common dance floor treatments: rosin, hairspray and Coke. This experiment then calculated the frictional force required to overcome the identified coefficients. Methods/Materials A measuring instrument was designed and built to measure the slip angle and slip height of a shoe as it began to slide down the plank. The average slip angle was then calculated from five trials. Using the formula: coefficient of static friction = tangent of the angle, the coefficients of static friction for each shoe and floor type were determined. The frictional force was then calculated with comparison made between the individual shoes and floor treatments. Five different shoe types were individually tested. Three different floor treatments were applied and tested with a standard ballet shoe. Results The results from my experiment partially supported my hypothesis. The coefficient of static friction for the hip hop shoe was 1.25 and the frictional force (Ff) was calculated to 7.5 Newtons (N). The ballet shoe was next with a coefficient of .56 and a Ff of 2.45 N. The jazz shoe followed with a coefficient of .49 and a Ff of 2.23 N, then the tap shoe with a coefficient of .37 and a Ff of 2.26 N. Finally, the lyrical shoe had the least coefficient of .31 with a Ff of 1.24 N. Of the three floor treatments studied, hairspray had the greatest coefficient value at 1.04 with a Ff of 4.4 N. Followed by Coke with a coefficient of .9 and Ff of 3.8 N. Next came the rosin at a 0.7 coefficient and Ff of 3.0 N. Lastly, having no treatment on the plank demonstrated the least coefficient value at .53 and a Ff of 2.24 N. Conclusions/Discussion My conclusion is that the hip hop shoe had the highest coefficient of static friction and the lyrical shoe had the least. The floor treatment with the highest coefficient of static friction was hairspray and no floor treatment had the least. It is important for dancers to be aware of frictional forces at play during their dance performances. A shoe or floor type with a low coefficient of static friction may not be safe for a dancer because of the possibility of slipping and injury. A higher coefficient may provide the dancer with the friction needed to turn beautifully.	
Summary Statement This experiment looked at the frictional force required to overcome the identified coefficients of static friction for various dance shoes and floor treatments.	
Help Received My grandpa helped with building the measuring slip angle instrument. My mom explained the math required for this experiment.	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Anusha Mubin	Project Number J2022
Project Title Radioactive Particle Protection	
Abstract Objectives/Goals The goal of this project is to find out which cloth (cotton, linen, or polyester) is the most effective at blocking radiation. My hypothesis is that cotton will be the most effective because it has the same main ingredient as paper, cellulose, and paper has been known to be able to block alpha radiation. Methods/Materials A radioactive needle was used as the radiation source. In order to quantify the data, this project required some way to observe the radiation, so a cloud chamber constructed from Peltier coolers was used. After saturating a sponge with alcohol, the chamber was cooled until tracks coming from the radiation source were rendered visible. Then, one of the three cloths was placed on the source to observe how much radiation came through the cloths. Results When polyester was placed on the source, under three tracks were visible in each trial. When linen was placed on the source, the first time, three tracks were visible and, after that, less than three tracks were observed. Cotton had three tracks in the first two trials and then showed two in the last. Polyester was the most effective while cotton was the least effective. Conclusions/Discussion This experiment disproved my hypothesis. Polyester did significantly better than cotton. This data suggests that the composition of a material is not the only deciding factor in how much radiation will be blocked.	
Summary Statement This project is about radiation and which materials are the most effective at blocking it.	
Help Received Dr. Dumlao supervised me and my father helped me buy the materials..	



CALIFORNIA STATE SCIENCE FAIR

2015 PROJECT SUMMARY

Name(s) Sage Nguyen	Project Number J2023
Project Title Bounce!	
<div><div>Objectives/Goals Does the brand or type of tennis ball effect its bounce height and durability on a hard court? I hypothesize that tennis balls bounce height and durability will be affected by the type of tennis ball used. The brand of tennis ball will not significantly affect its height or durability.</div><div>Abstract</div><div>Methods/Materials Materials List: Penn Extra Duty tennis balls, Wilson Extra Duty tennis balls, Penn Regular Duty tennis balls, Wilson Regular Duty tennis balls, Measuring paper, Racquet, Pen, Tennis backboard. 1)Record time, temperature and humidity before data collection starts. 2) Bounce height measured with a ball from each new can, four total. This is accomplished by taping measuring paper to a wall and videotaping the ball in slow motion being dropped from a height of 60 inches. By videotaping it, a more accurate measurement will be achieved. 3) Next, each of the same balls will be hit against a wall 75 times. 4) Repeat step #2 with the now #used# balls. 5)The balls are hit another 75 times against the wall. 6)Repeat step #2 again. 7)Review the video to record the bounce heights.</div><div>Results With the balls brand new, Penn Regular had the highest average bounce height of 37 inches. After 75 hits, Penn Extra Duty had the highest average bounce height of 36 inches. After 150 hits, Penn Extra Duty still had the highest bounce height of 35.33 inches.</div><div>Conclusions/Discussion I conclude that the Penn Regular Duty and the Penn Extra Duty tennis balls have a higher bounce than the Wilson Regular and Extra Duty. I also conclude that the type of tennis ball also affects the height and durability. My hypothesis was incorrect regarding the brand of tennis ball not affecting bounce height and durability but was correct in regards to the type of ball affecting bounce height and durability.</div></div>	
Summary Statement My projects was to determine whether the brand or type of tennis balls have an effect on its bounce height and durability.	
Help Received My dad helped me record video of the ball drops and buy my materials; my mom helped me cut and layout my posterboard.	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Katrina G. Ordway	Project Number J2024
Project Title Do Marmoleum or Vinyl Flooring Effectively Inhibit Microbial Growth?	
Objectives/Goals I wanted to help my grandmother find the best kind of anti-microbial flooring to fit her needs. When I researched types of flooring, I came across Marmoleum and vinyl flooring both of which were anti-microbial. I decided to investigate which one of these two types of flooring had more effective anti-microbial properties. I hypothesized that Marmoleum would inhibit the growth of all microbes, while vinyl flooring would only repel certain kinds of microbes, but not all.	
Abstract Results After researching, I found that vinyl flooring and Marmoleum have many differences. Marmoleum is environmentally friendly, and vinyl flooring is not. Vinyl flooring is made out of a material called PVC, or polyvinylchloride. This substance is known to emit harmful toxins into the air. Marmoleum is made out of natural materials such as minerals for the topsheet, and woven jute for the backing. Vinyl can imitate hardwood, stone, or tile. Marmoleum does not have all of the decorative options. Many different microbes have some kind of effect on almost all flooring materials. It is for this reason that anti-microbial flooring may be a necessity. My results showed that Marmoleum was more effective than vinyl at inhibiting growth of microbes. Very few of the Marmoleum test plates showed any signs of bacterial or mold growth, in fact, most appeared sterile. No plates inoculated by Marmoleum samples grew coliforms, only a few grew noncoliform bacteria and none of the Marmoleum plates contained E.coli. The vinyl flooring inoculated plates showed more microbial growth, which included coliforms, noncoliforms, and molds. Many of the plates of vinyl flooring were contaminated, although none of the plates contained E.coli. E.coli was only seen in the positive control plates. Conclusions/Discussion I hypothesized that both types of flooring would inhibit E.coli, which was supported. I also believed that Marmoleum would show little to no microbial growth in general, while vinyl flooring would not be as effective in inhibiting microbial growth. Most of the plates of Marmoleum appeared sterile, if any contamination existed it was due to noncoliform bacteria. The vinyl flooring samples showed significantly more microbial growth. Neither flooring showed any growth of E.coli.	
Summary Statement The purpose of my project was to investigate whether Marmoleum flooring or Vinyl flooring possessed effective anti-microbial properties.	
Help Received My father bought the tile samples for me.	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Kaanthi C. Pandhigunta	Project Number J2025
Project Title Super Absorbent Soil: The Effect of the Addition of Polyacrylamide to the Water Retention of Soil	
<div>Objectives/Goals Cross-linked polyacrylamide, a hydrogel, has the ability to absorb water up to 800 times its own weight. The purpose of this experiment was to determine the efficacy of polyacrylamide on the water retention in soil.</div> <div>Abstract 5g of polyacrylamide crystals were mixed with soil and filled into pots whose overall weight was 400g. Three sets of experiments were conducted with 200g, 300g and 500g of water added to three different sets of pots filled with soil and polyacrylamide mixture. The pots were left in an open room and their weights were recorded on a daily basis for a period of 2 weeks. Then, the original weight was subtracted from the current weight to determine the amount of water still in the soil.</div> <div>Methods/Materials The water retention in pots with 200g and 300g of water added was not very different from that of the control. However the water retention in pots added with 500g of water was significantly higher than that of the control. This proves that a judicious mixing of polyacrylamide with soil can help retain excess water and can keep the soil moist for a longer duration of time by slowly releasing the stored excess water.</div> <div>Results Though there are demonstrable benefits with respect to water retention, the long term environmental effects of use of polyacrylamides must be studied further, because the monomer of polyacrylamide is acrylamide, a deadly neurotoxin, and the biodegradability is uncertain. The addition of polyacrylamide can improve agriculture in areas of excess rain, as well as areas of drought. Polyacrylamide-enriched soil can help agriculture in parts of the world with too much rain by absorbing all the excess water that would normally drown the plant. Later, the polyacrylamide will release the water when the plant needs it, by the process of osmosis. In areas afflicted by drought, the farmer will only have to water his/her plants heavily once or twice during the crop year with polyacrylamide-enriched. The plant will absorb the water it needs at the moment, and the polyacrylamide will absorb the rest of the water that would normally evaporate or run off, releasing it later on as the plant needs it.</div> <div>Conclusions/Discussion</div>	
Summary Statement This purpose of this project was to determine the efficacy of polyacrylamide on the water retention of soil.	
Help Received Father helped order materials; Parents helped put the soil into the pots;	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Dharma A. Patel	Project Number J2026
Project Title Air Filters: Are You Getting What You Paid For?	
Objectives/Goals For my science project, I investigated how well cheap air filters and more expensive filters improved indoor air quality. I measured the air quality in my home using a range of filters of the same brand. I used an air quality monitor that counts the amount of small particles (<2.5 microns) and large particles (<10 microns) in the air per every ten seconds that the air is drawn through it. My goal was to see whether the more expensive air filters performed better than the less expensive filters in a home setting.	
Abstract Methods/Materials I used an air quality monitor (Dylos DC1100 Air Quality Monitor) to measure the amount of small and large particles that were present in the air. I monitored the air with a range of air filters installed in my home (Filtrete 300, Filtrete 800, Filtrete 1200 and Filtrete 1900). The higher the quality of filter, the higher its cost.	
Results I ran five tests per filter and for no filter, and each of the them ran for twelve hours a day for five days. Because each of the five variables had five days of testing, there were twenty-five tests. After I took down the data, I made averages for each variable. I found out that as the quality of the filters increased, the amount of small and large particles in the air significantly decreased.	
Conclusions/Discussion My results showed that the less expensive filters improve the air through mainly decreasing the amount of large particles in the air, while the more expensive filters improve the air by decreasing the amount of small particles in the air. Large particles include household dust, lint, dust mite debris, mold spores, and pollen. Small particles include smog, pet dander, smoke, bacteria, and viruses.	
Summary Statement My project is about finding whether or not more expensive air filters clean the air more effectively than filters of a lower cost.	
Help Received My father helped with expenses and construction of the experiment; science teacher made helpful adjustments to my project.	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Remy A. Reeb	Project Number J2027
Project Title Reducing Food Waste: Better Preservation Techniques for Ice Cream	
Abstract Objectives/Goals 24% of all ice cream is wasted every year in the United States creating a tremendous waste of resources. Formation of ice crystals is one of the main reasons people throw ice cream away. My hypothesis is that better preservation techniques will reduce the formation of ice crystals in ice cream resulting in less ice cream wastage. Methods/Materials To test my hypothesis, five different ice cream preservation techniques (plastic bag, plastic wrap, Sponge, Ice Pack and metal hitch) were tested against a Base Case with no extra preservation. In addition, "before" and "after" taste and appearance tests were conducted with test subjects to see if any preservation technique had an impact on the flavor or look of the ice cream. 18 tubs of ice cream were observed every other day for three weeks, and ice crystal counts (per square inch) and sizes were measured. Results My tests indicated that there is a correlation between ice crystal count, preservation technique, flavor, and appearance. Two preservation techniques (Sponge and Ice Pack), produced significantly lower ice crystal counts than the Base Case, as well as smaller average crystal sizes. The "Sponge" technique also resulted in the smallest decline in both flavor quality and appearance appeal according to the test subjects. Conclusions/Discussion In conclusion, my hypothesis has been confirmed that better preservation techniques can reduce the formation of ice crystals, which results in better flavor and appearance preservation. Lower crystal counts and better looking and tasting ice cream should result in less ice cream being thrown away.	
Summary Statement Exploring preservation techniques to help save resources by reducing the amount of ice cream thrown away every year in the U.S.	
Help Received My father, Pete Reeb, helped me take measurements and create excel charts, and Mrs. Lopatka, my science teacher, provided insights.	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Juliana H. Rosen	Project Number J2028
Project Title Open Wide!	
<div><div>Objectives/Goals The goal of this project was to find out which toothpaste protected your teeth the most.</div><div>Methods/Materials Egg shells were used to simulate teeth and vinegar was used to represent acids that are eaten. I tested to see which toothpaste protected teeth the most. To do this, I put an egg brushed with Colgate, Aquafresh or Crest toothpaste in a cup of vinegar. After 9 hours, I took the eggs out, rinsed them, and drained the insides out of the eggs. Next, I let the egg shells dry and then weighed the egg shells.</div><div>Results The egg shell from the egg covered with Crest toothpaste weighed more than Aquafresh and Colgate covered egg shells.</div><div>Conclusions/Discussion Crest toothpaste protects the egg shell better than the other toothpastes because it weighed more which means the acids didn't eat away at the egg shell as much.</div></div>	
Summary Statement The experiment tested how toothpaste protects your teeth.	
Help Received My parents helped me gather supplies for my experiment and my poster board.	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Maya E. Safadi	Project Number J2029
Project Title Are Energy Efficient Light Bulbs Really Worth Their Cost?	
<div><div>Objectives/Goals My project is about finding the best type of energy efficient light bulb. The purpose of this project is to inform people about the type of bulb that is truly most worth its cost in order to save people money and electricity.</div><div>Methods/Materials Materials 10 LED bulbs - 60watt replacement, 10 CFL bulbs - 60watt replacement, 7 incandescent bulbs - 60watt, Desk lamp, Watt-meter (to measure electrical consumption), 120 volt power supply (a standard United States wall socket), Clock or timer Steps for Testing 1. Make sure desk lamp and watt-meter are unplugged. 2. Screw a light bulb into the desk lamp. 3. Plug the desk lamp into the watt-meter. 4. Plug the watt-meter into the wall socket. 5. Set the timer for 10 hours. 6. Turn on the lamp and start the timer at the same time. 7. When the timer goes off, record the kilowatt hours, volts, AMPs, and watts indicated on the screen on the watt-meter. 8. Repeat for the other 29 light bulbs.</div><div>Results As a result of my experiments, I found that of the two types of energy saving bulbs I tested, the CFL was most worth its cost. Based on measurements I collected during my experiment, I calculated the average time it would take for each type of bulb to make up its cost in energy savings. The CFL bulb took about a third as much time to make up its cost as the LED did. These results supported my hypothesis because I hypothesized that the CFL would be most worth its cost. Based on my results, the LEDs were overall more efficient than the CFLs, but their average cost was by far higher than the CFLs#. This high price is what caused the longer repayment time.</div><div>Conclusions/Discussion The data I collected strengthened my hypothesis. My hypothesis stated that if I tested each type of bulb for an equal amount of time, the CFL would be most worth its cost; this proved to be true. All the energy efficient light bulbs I tested saved enough electricity to offset their high purchase price. The CFLs were the cheapest investment because the LEDs did not have great enough energy savings to make up its high price before the CFL did. If I were to do this experiment again, I would test even more brands and varieties of bulbs to get an even more accurate overall result.</div></div>	
Summary Statement My project is about finding the type of energy efficient light bulb that is most worth its cost.	
Help Received father purchased my materials, my teacher gave me advice on my project	



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Sarah E. Scherzinger	Project Number J2030
Project Title Modern Insulators	
Abstract Objectives/Goals The objective of this experiment was to find out which commonly used, modern insulation retains the most heat. Methods/Materials To complete this experiment three different types of modern insulation were cut, and inserted into cardboard file boxes. The insulations used were fiberglass, polystyrene board, and polyurethane foam. One file box was left without insulation to serve as the control. The file boxes were brought inside, so they could rise to a internal temperature of over 70°F. Then the boxes were moved outside, into a colder environment in order to observe the internal temperature fall to that of the external. The internal temperature of each box was taken every 15 minutes, and recorded. Results The results of this project showed that polystyrene board retained the most heat over time, while fiberglass retained the least. Conclusions/Discussion In conclusion, the data showed that polystyrene retained the most heat the majority of the time. It also showed that though fiberglass is the most commonly used insulation in modern structures, it does not retain heat as well as the other 2 insulations tested.	
Summary Statement This project was conducted to determine which commonly used insulation would retain the most heat.	
Help Received My father supported me with the construction of the boxes.	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Paige E. Silong	Project Number J2031
Project Title Hear Today, Gone Tomorrow. Comparing Sound Levels: Safe or Damaging?	
Abstract Objectives/Goals The objective of my experiment was to test three listening devices at varying volume levels to determine which device would provide the safest sound level for listening to music. I believed that earphones would produce the most unsafe decibel sound levels when compared to headphones and speakers at equivalent volume settings. Methods/Materials I downloaded a noise meter app to my cell phone which I used to measure and record sound levels in decibels (dB). I chose three listening devices (headphones, earphones and speakers), three volume settings, and three different songs in three different music genres all sung by female artists. The music was played on my iPod Touch. I ran a total of 27 tests (9 tests for each listening device) in a quiet room where I measured the dB levels of each artist for the first 30 seconds of each song. Once I completed the tests, I used the app to email myself the recorded dB data which I then analyzed and compiled my results. Results An excerpt of some of my results at high volume settings of recorded dB levels showed earphones at 94.63 dB, headphones at 97.68 dB, and speakers at 92.58 dB. The Center for Disease Control (CDC) and National Institute of Occupational Safety and Health (NIOSH) has determined that possible hearing damage may occur after a permissible exposure time of only thirty minutes to one hour at 94 to 97 dB. Conclusions/Discussion I concluded that my hypothesis was incorrect because of the three compared listening devices (earphones, headphones and speakers), the headphones were the most unsafe device of the three tested. Through this experiment, I also determined which iPod Touch volume level settings produced unsafe levels that could cause possible hearing damage.	
Summary Statement My project is to test three listening devices at varying volume levels to determine which device provides the safest sound level for listening to music.	
Help Received My mom helped me by cutting paper for my board and with the organization of the board. My dad assisted me with using the app necessary to conduct this experiment. My dad also used his excellent computer skills to help me put all the test results into graphs and a result table.	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Leila Soliman	Project Number J2032
Project Title Which One Wood You Burn?	
<div><div>Objectives/Goals The purpose of this project is to burn different types of wood to see which one lasts the longest. The results will help people choose the longest lasting wood to burn in a fireplace in order to save on wood. It is hypothesized that the hard woods (birch, mahogany, walnut, red oak) will burn longer. Based on research, I hypothesized that the hardest of my wood samples, red oak, will last the longest before it completely burns.</div><div>Methods/Materials Materials: Three 5.5 in. x 1 in. square pieces of: poplar, select alder, cherry, red oak, birch, maple, walnut, and mahogany, a BBQ gas grill, and a stopwatch. Procedure: After igniting the BBQ, two rows of three wood squares (same type in each row) were placed on the grill. The time that each wood block started to burn was recorded and after 10 minutes, the grill was turned off. The height of the flames were measured using the middle rack of the grill as a measuring tool. As the wood continued to burn while the grill is off, the time when each block of wood was completely burned was recorded. Repeat until all 24 samples of wood are burned.</div><div>Results Based on the data, poplar, alder, and maple took about 10 minutes to burn. Cherry, birch, walnut, and mahogany burned in about 14-15 minutes. The longest burning wood, red oak, took an average of 17 minutes. Additionally, it is noted that the woods that produced small flames, burned longer with the exception of walnut.</div><div>Conclusions/Discussion In conclusion, my hypothesis was proven correct in that red oak burned the longest.</div></div>	
Summary Statement The purpose of this project is to burn different types of wood to see which one lasts the longest.	
Help Received Mom bought the supplies; Mentor supervised while using the BBQ grill.	



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Kelsey E.J. West	Project Number J2033
Project Title Rays of Our Lives: Where Color Matters. UVAB Penetration of Different Color T-Shirts Treated/Untreated w/ UV Protectant	
<div>Objectives/Goals My objective was to determine if the amount of UV protection that clothing provides to a person's skin is dependent upon the color of the fabric and whether it has been treated with Sun Guard, a UV sun protectant for fabrics, then the untreated lightest color fabric (white) will provide the lowest UV protection and the UV protectant treated darkest color fabric (black) will provide the greatest level of UV protection.</div> <div>Abstract Methods/Materials Materials: Digital UVA UVB Light Meter; 10 new cotton T-Shirts (White, Natural, Azalea, Yellow, Retro HTH Purple, Kelly, Burnt Orange, True Red, Royal Blue, and Black); Sun Guard; 1 piece white paper. Procedure: Experiment #1- Brand new t-shirts: Cut t-shirts in 3 pieces. Use 1st piece of t-shirts. Steps for measuring UV penetration of each color shirt: Select spot in full sun to conduct experiment. Do experiment between +/- 1 hour from solar noon. Do the following with each shirt: enter in data table: solar noon, time of day, temperature, humidity, UV Index and air quality. As a control, take a UV measurement with UV meter on piece of white paper. Place one shirt at a time over the UV sensor of the meter and note UV level. Repeat 8 times. Experiment #2 - Washed t-shirts without Sun Guard Additive: Wash and dry 2nd piece of t-shirts. Follow steps above for measuring UV penetration. Experiment #3: Washed t-shirts with Sun Guard Additive: Wash 3rd piece of t-shirts with Sun Guard according to directions. Follow steps above for measuring UV penetration.</div> <div>Results I found, in general, the treated darker colored t-shirts allowed for less UV penetration thereby providing more protection from the sun's damaging rays while the untreated lighter colors allowed for more UV penetration providing less protection.</div> <div>Conclusions/Discussion Conclusion: The data collected has proved the hypothesis to be generally correct. This means that the darker colored t-shirts are likely to protect you the most from the UVAB rays from the sun. Also, the Sun Guard provides additional protection the sun, particularly when applied to the lighter colored t-shirt (Unwashed T-Shirts [No Sun Guard] White t-shirt-94.37%; Washed With Sun Guard White t-shirt-96.58%).</div>	
Summary Statement A Comparative Study of The Ultra Violet A & B Ray Penetration Through Different Color Cotton T-Shirts Treated and Untreated with Sun Guard an Ultra Violet Ray Fabric Protectant.	
Help Received My dad cut the sun out of the form board because it required using a large knife. My mom showed me how to use the graphing function in Excel.	