



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Richard L. Agajanian	Project Number J2201
Project Title Broken Barcodes	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My project was to test which barcode symbology is best constructed for readability when damaged. My hypothesis was to prove that the 2 dimensional Data Matrix barcode was the best barcode symbology for readability when damaged.</p> <p>Methods/Materials I used barcode creation software to build Code39, Code128 and GS1-128 linear barcodes and QR Code, PDF417, Data Matrix and Aztec two dimensional barcodes. The barcodes were then read using a Motorola MC75 Mobile Computer with integrated barcode imager. I then proceeded to damage the barcodes by cutting 25% of the barcode in the horizontal and vertical directions. I also damaged the barcodes by tearing a hole in the middle and through wrinkling. I attempted to read each damaged barcode with the barcode reader and recorded the results.</p> <p>Results The linear barcodes could not be read when they were damaged in the horizontal direction however when damaged in the vertical direction, only 10% of the barcode needed to exist in order to be successfully read.. Two dimensional barcodes were able to sustain damage in both horizontal and vertical directions and still be read. The best two dimensional barcode could sustain damage in both horizontal and vertical directions and still be readable. It could also be read when a hole was torn in the middle as well as when it was wrinkled. This barcode was the PDF417.</p> <p>Conclusions/Discussion My hypothesis was incorrect. The Data Matrix barcode was not the best symbology for readability when damaged. Through experimentation, I found that the PDF417 was the best barcode symbology for readability when damaged. It was readable through every type of barcode damage tested.</p>	
Summary Statement This project tests various barcode symbologies for readability when damaged.	
Help Received My father helped install te barcode creation software and loaned me the barcode reader equipment for the project.	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Erik M. Alkire	Project Number J2202
Project Title Are Your Lights Harming You?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to determine whether different man-made light sources emit potentially harmful invisible rays or particles. To test this I built a cloud chamber and exposed it to various commercially available lights. I hypothesized that all of the light sources tested would be harmless. I thought that if any light source was likely to emit invisible rays or particles it would be the laser because of the way it produces light.</p> <p>Methods/Materials To test my hypothesis, I built a cloud chamber using a sealed glass fish tank, an aluminum plate, one liter of Methyl alcohol, five square feet of felt, three blocks of dry ice, and an electric blanket. I exposed the chamber to each of the light sources for two consecutive minutes and recorded the tests with a Samsung HMX-U10 high definition camcorder. Using a computer program, Adobe After Effects, I reviewed the video footage frame by frame to count the number of events that occurred in the cloud chamber. I used fluorescent lighting as my control and kept it on throughout all of my tests in order to be able to see the tracks left in the cloud chamber by ionizing radiation.</p> <p>Results In my results, the light sources went from a baseline of 7 events per minute with the fluorescent control to the most active test: the LCD Display at 101 events per minute, suggesting throughout three trials that it could be radioactive. My other tests include: A 600 watt halogen disco light at 5 events per minute, an incandescent flashlight at 6 events per minute, a 4.9 mW green laser scanner at 16 events per minute, an LED spotlight at 18.5 events per minute, a 150W halogen flood light at 21 events per minute, a 5mW green laser pointer at 46 events per minute, and a UV Light at 60.5 events per minute.</p> <p>Conclusions/Discussion It appears as though LCD (Liquid Crystal Display) Screens are radioactive, but to thoroughly prove this, tests with more sensitive equipment, such as a Geiger counter, are necessary.</p>	
Summary Statement My project is about building a cloud chamber to determine whether man-made light sources emit potentially harmful invisible rays or particles.	
Help Received Father acquired and supervised use of methyl alcohol and dry ice	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Samantha Jean Beckett	Project Number J2203
Project Title The Effect of Reusable Bag Type on Tensile Strength, Liquid Retention, Stability, Washability, Compactness, and Capacity	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this investigation was to deduce which reusable grocery bag was the most suitable replacement for a standard paper bag. This was determined through a series of six tests, which took place over the course of two months.</p> <p>Methods/Materials Seventeen reusable grocery bags were collected, which varied in fabric, make, and design. These bags were tested to determine if they would withstand the maximum 30 lb. weight given in tensile strength (machine used), retain liquid without leaking, be stable in a moving automobile, wash without wear to the bag, compact into a small form, and have a great capacity. These aspects were individually investigated through six in-depth tests. Tensile Strength: 100 lifts each, with varying weight loads, 5 trials. Liquid Retention: 57 grams of liquid in each bag, 15 minute duration, 5 total trials. Stability: 10 defined maneuvers in a moving vehicle, avg. 1:12 min each. Washability: wash and dry per instructions, 5 trials. Compactness: 8 different size drink cups, bags compacted to fit with lid secured. Capacity: 6 distinct trials, different grocery item groupings.</p> <p>Results The results of the data collected showed that bags A-O consistently tested predominately over the standard paper bag. Although one single bag did not prevail in every test, the majority proved to be efficient, and consumer friendly. The three leading reusable grocery bags were the iTySE Ripstop Bag, the OBOE Pongee Poly Bag, and the ACME Bag Earthtote. These bags all prevailed in four out of the six tests.</p> <p>Conclusions/Discussion Much was learned from this experiment. It is evident that single-use grocery bags have a terrible effect on the environment. Not only are they a large danger to the natural world, but also destroy many valuable resources. If shoppers convert to using any one of these bags tested (except the paper and plastic bags), millions of paper and plastic sacks will be kept out of landfills. Therefore, it is very important that consumers adopt a new habit, and make the switch from single-use shopping bags, to reusable ones. They are not only a smarter choice for the environment, but also prove a more efficient one.</p>	
Summary Statement The purpose of this investigation was to determine which reusable grocery bag was the most suitable replacement for a standard paper bag.	
Help Received Father photographed the experiments. Mother drove the Stability Test car and let me borrow her food scale, luggage scale, and digital frame.	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Madina E. Berens	Project Number J2204
Project Title Tough Tests on Tough Stains	
Abstract Objectives/Goals The objective was to determine which stain removers worked best on different types of stains commonly encountered in a typical family's laundry. Also, since most stain removers claim to be effective on all stain types, the goal was to determine if any one outperformed the others. Methods/Materials Five popular stain removers were tested on 12 different stain types on two different types of fabrics. The stains were set, treated, and then machine washed. An image scanner was used to digitize the washed fabric and a computer program was used to measure the effectiveness of the stain remover by subtracting the fabrics unstained color value from the stained area's color values. Results The results indicated that different stain removers had substantial differences in effectiveness on different stain types. However, no one stain remover effectively removed all of the different stain types as claimed by the manufacturers. Conclusions/Discussion While most stain removers worked well across different stain classes (tannin, dye, oil, protein, and combination stains), each stain remover was not effective in at least one stain class. This is probably due to the fact that each stain remover uses a different chemical processes to try to remove the stain (enzyme, surfactants, or bleaching). Most of the stain removers got out a majority of the stains, but none of them worked best for every kind of stain.	
Summary Statement This project measured quantitatively the effectiveness of five different laundry stain removers on twelve common stains.	
Help Received Mother, Father, Teacher	



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

Name(s) Gautam C. Bose	Project Number J2205
Project Title Microwave Emissions of Cellular Phones	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals There is much debate about whether cell phones emit harmful radiation. The electromagnetic wavelengths cell phones use to communicate are called microwaves. Microwaves are non-ionizing radiation between 3kHz and 300GHz. Although microwave communication has been used since 1934, its widespread use in cell phones and the close proximity to the brain make the study of the effects on humans important. I recently received my first cell phone. I wanted to find out how much radiation cell phones emitted and if it was harmful. I hypothesized the amount of radiation emitted by cell phones would be within the FCC standard.</p> <p>Methods/Materials I constructed an apparatus to test phones at distances of 2.0, 5.0, and 15.0 centimeters. I used two microwave leakage detectors that measure electromagnetic emissions at 2.45 GHz. I measured emissions from each phone's front, back, left, and right sides during calls and text messages. Each test was repeated five times, and averaged. I performed 1680 tests on 14 different cell phones. The call tests were important because people usually hold the phone to their ear during a call, so the head is absorbing the radiation.</p> <p>Results All the phones tested emitted more radiation during a call than when sending a text message. This is because cell phones need more power and better signal strength to make a call than a text message. The phone that emitted the greatest amount of radiation while making a call was the Blackberry 8100, emitting an average of 9.39mW/cm² at 2 cm. The phone that emitted the least radiation during a call was the Motorola Razr with an average emission of 0.21 mW/cm² at 2cm. This may be because the blackberry 8100 runs on a faster 3G network, while the Motorola Razr runs on a slower EDGE network.</p> <p>Conclusions/Discussion My results showed that while some phones emitted more radiation than others, all of them were within the FCC standard. Radiation emission from cell phones is non-ionizing, but still may have some thermal effects. The cell phone cases could not be tested since they are designed to protect against radiation at 1.9 GHz. My device tested emissions at 2.45 GHz. My device could not test emissions at the 1.88 to 1.95 GHz frequencies, which also contribute to exposure and may have been emitted by the cell phones.</p>	
Summary Statement My project tested 2.45 GHz emissions from various cellular phones at three different distances in four different positions while calling or sending text messages.	
Help Received I would like to thank my father for supervising me while performing some of my procedures. I would also like to thank my science teacher for her guidance and help obtaining the testing devices.	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Kevin M. Casillas	Project Number J2206
Project Title Sticky Situation?	
Abstract Objectives/Goals The purpose of my project is to test whether the cost of tape affects its adhesiveness. My hypothesis is that the more expensive tape will be more adhesive because the manufacturers claim to have stickier compounds in their tapes. Methods/Materials In this experiment, I used six different rolls of tape, a metric tape measure, a ramp with a magnetic release, a sheet of polished aluminum, a digital thermometer and humidity measuring device, and a metal pinball machine ball. For a single trial, I set the metal pinball on the top of the ramp. I then put a piece of the tape (sticky side up) on the aluminum surface. Using another magnet, I released the ball down the ramp, measured the distance in millimeters, and recorded the results. Results After conducting five trials for each of the six tapes, I averaged the results. The cheap office tape (Dollar Tree Crystal Clear Tape) averaged 134.6mm, while the expensive office tape (Scotch Magic tape) averaged 377.6mm. So, the cheaper of the two office tapes was the best of the two. In the packaging tape trials, the cheap one (Dollar Tree Packaging Tape) averaged a stunning 1236.2mm while the expensive packaging (Office Depot Heavy Packaging Tape) averaged 290.4mm. In the duct tape trials, the cheap one (Dollar Tree Duct Tape) averaged 139.8mm, and the expensive one (Gorilla Tape) averaged 160mm. Conclusions/Discussion My hypothesis was incorrect. In only one case, the expensive one beat the cheap one and that was because the cheaper one had an unusual makeup with many bubbles in the surface. Surprisingly, the Dollar Tree Office Tape was the best adherer. If I had to do this experiment over again, I would most likely try testing something other than adhesiveness, like sheer strength or a weight holding test.	
Summary Statement Whether the cost of tape affects its adhesiveness?	
Help Received My Father helped me assemble the ramp	



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

Name(s) Julian Chow	Project Number J2207
Project Title Laundry List: Check Washing	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My science fair project is to test which type of ink(dye versus pigment based) in common pens works best to prevent check washing.</p> <p>Methods/Materials Six different bank checks were written out with a variety of pens that are commonly used in daily life. Each bank check was labelled accordingly to the type of pen used. All checks were washed with acetone for three minutes and let dry. The rate of ink disappearance was recorded and compared.</p> <p>Results The Bic pen immediately started to lose ink in the first 15 seconds, by 30 seconds it has lost a lot of ink. At 120 sec the ink was almost completely gone but never fully disappeared. The Papermate also immediately started to lose ink in the first 15 seconds to 30 seconds. At 45 seconds, it had lost a lot of ink. It stayed at this rating until the end of the experiment. Both Papermate and Bic continued to fade throughout the whole experiment, except the Papermate had a little more ink left on the check at the end.</p> <p>The two pigment based pens performed a lot better. The Zebra#s Sarasa lost very little ink when it was first dipped in the acetone and then it stayed the same afterwards. The Uni-ball 207 did not lose any ink throughout the entire 3 minutes. The writings stayed on the check as it has never been altered or washed. One interesting fact to note is that, after washing the checks, the acetone from the dye based checks came out light blue. The acetone that came from the pigment ink came out clear just like it was before washing.</p> <p>Conclusions/Discussion In conclusion, the checks written with the pigment based pens, Zebra#s Sarasa and Uni-ball 207 did not wash off, while most of the words written in the dye based ink pens, Papermate and Bic was washed away within the first minute of washing in acetone. The reason why Sarasa and Uni-ball 207 worked so well was because of its pigmented ink. Once these inks are inscribed onto the paper, the pigment particles from the ink were trapped within the fibers of the paper which caused the writing to stay on the check. In another word, the ink actually goes into the paper. The dye based inks do not adhere to the paper at all, so the ink comes off easily. The ink of the dye comes off and leaves the check blank.</p>	
Summary Statement Pigment based inks work the best to prevent check washing.	
Help Received My mom helped supervise the experiment.	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) L. Alexis Coon	Project Number J2208
Project Title Hot! Hot! Hot! A Study of Factors Affecting the Flame Resistance of Children's Sleepwear	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to determine how easily flame retardants can be maintained or worn down and to determine which type of fabric (cotton, cotton treated with flame retardants or polyester) is the safest to wear.</p> <p>Methods/Materials Three types of pajamas were tested: cotton, cotton treated with flame retardants and polyester fabric. Each piece of the pajamas (top and bottom) was cut up and put into a group of three samples of the same kind of fabric. Then each group of samples was washed with fabric softener or one of a variety of cleaning agents, or they were left unwashed. After drying, the pajamas were exposed to flame for thirty seconds with a lighter.</p> <p>Results Except for the chlorine bleach, all of the products used affected the pajamas in the way I predicted. Cotton ignited quickly, polyester did not ignite at all and cotton treated with flame retardants had varying results. Most of the time, the flame retardants could be worn down after just one washing with a non-recommended product.</p> <p>Conclusions/Discussion My conclusion is that polyester is the safest material to wear when around an open flame. Fabric softeners fluff fabrics up, allowing more oxygen for combustion. Polyester's fibers are already tightly knit, and this is why polyester was unaffected. Plain cotton pajamas ignited too easily and pajamas treated with flame retardants are just too unpredictable and difficult to maintain.</p>	
Summary Statement My project tested the effect of the washings and cleaning agents on flame retardant chemicals in children's sleepwear, naturally flame resistant fabric and flammable fabric.	
Help Received My father (Derek Coon) operated the lighter since I could not turn it on; my mother (Kristine Coon) helped align and glue down the background fire paper and main title letters. She also taught me how to operate a Cricket machine to cut letters.	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Kalee L. DeHamer	Project Number J2209
Project Title Paper Towels, Cloths, or Chamois: Which One Is More Absorbent?	
Objectives/Goals I chose this experiment because I wanted to find a re-usable, more absorbent alternative to paper towels. I wanted to conduct an experiment that would help the environment while also saving people money. Using paper towels is not good for the environment because they are made from trees and fill up many land dumps. Because they are disposable, people spend a lot of money buying new paper towels whenever they run out. I hypothesized that the synthetic chamois would absorb the most. My independent variable was the type of material and my dependent variable was how much the material absorbed. The variables that I controlled were the size of the material, how much water was in the syringe, and the set up was identical, dry and free of water for each trial.	
Abstract The four different types of materials I used were leather chamois, synthetic chamois, kitchen cloths, and paper towels. I tested the materials by suspending them above a measuring cup used to catch excess water. Then, I filled the syringe up to the three milliliter mark, held it above the center of the material, and dropped water onto it one tenth of a milliliter at a time, allowing time for each drop to soak in. I continued doing this until I saw a drop fall through the material. I then recorded the amount of water it was able to hold.	
Methods/Materials The average amount of water held for each material was 1.8 ml for the paper towel, 3.9 ml for the synthetic chamois, 2.9 ml for the leather chamois, and 5.7 ml for the kitchen cloth.	
Results My conclusion was that a kitchen cloth is the best re-usable alternative to paper towels.	
Conclusions/Discussion	
Summary Statement My project is about capillary action, surface tension, and absorption in common household materials.	
Help Received My parents helped me keep the articles straight while gluing them onto my board and proof read my writing to help me find mistakes.	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Grant F. Goodstein	Project Number J2210
Project Title Which Type of Cell Phone Emits the Most Radiation?	
Abstract Objectives/Goals In my experiment I tested four cell phones. I tested an LG env3, a Pantec Matrix, a Blackberry Curve and a Blackberry Pearl. My hypothesis was that the Blackberry Curve would emit the most RF Radiation. Methods/Materials LG env3, a Pantec Matrix, a Blackberry Curve and a Blackberry Pearl. I put one phone at a time on a table and waved the probe over it. Then I used my house phone to call that phone and waved the probe over it again. I repeated this with the other three phones and recorded all the data. Results The phone with the highest radiation was the Blackberry Curve, at 1.9mW/cm ² . Then was the Blackberry Pearl at 1.3mW/cm ² , then the Pantec Matrix at 1.26mW/cm ² . The phone with the lowest RF radiation emissions was the LGenV3 at 1.16mW/cm ² . These were the average of four separate trials. Conclusions/Discussion My testing proved my experiment correct. The Blackberry Curve had the most emissions.	
Summary Statement the amount of harmful, non ionizing radiation emitted by cell phones.	
Help Received Mother helped glue items on board.	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Blake A. Huxell	Project Number J2211
Project Title Light Fight	
Objectives/Goals The objective of my project was to see if four different types of equivalent watt bulbs would give off the same amount of thermal energy.	
Abstract	
Methods/Materials I used a 100 watt incandescent bulb, a 100 watt halogen bulb, a 100 watt mercury bulb, a 100 fluorescent bulb, a copper plate, a ring stand, a thermometer, a light source, wire, and a stopwatch. I set up my experiment by hanging the copper plate from the ring stand. I then faced the light bulb at the copper plate, which heated it up. A thermometer probe behind the copper plate read the temperature, and I recorded it every minute for 15 minutes.	
Results The halogen bulb gave off the most heat, while the fluorescent bulb gave off the least. The average temperature raised by the halogen bulb was 11.7 degrees celsius, while the average temperature raised from the incandescent bulb was 10.1 degrees celsius. Also, the average temperature raised by the mercury bulb was 3.8 degrees celsius. The lowest average temperature raised was by the fluorescent bulb, which was 3.1 degrees celsius.	
Conclusions/Discussion My conclusion is that the halogen bulb gives off the most heat, which is wasted energy. On the other hand, the fluorescent bulb gave off the least heat, making it the most energy efficient bulb. This could help save energy because light bulbs could heat up rooms, causing the air conditioner to turn on. This would waste electricity and money.	
Summary Statement My project is about comparing four different types of 100 watt bulbs to see if they would give off the same amount of thermal energy.	
Help Received Teacher let me borrow some materials and make graphs, brother helped me type things and make graphs, and parents bought materials	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Nicholas K. Ida	Project Number J2212
Project Title Ready, Aim, Geyser!	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to determine if there is a maximum explosion size of the Mentos and Diet Coke reaction where adding more Mentos will no longer increase the size of the explosion.</p> <p>Methods/Materials 60 packs of Mentos Mints and 66 2-liter bottles of Diet Coke were used with Steve Spangler Science Geyser Tubes to create explosions which were measured for both maximum geyser height and expelled weight loss. Three trials were performed for each of 1-20, 25&30 Mentos added for a total of 66 trials. An HD video camera was used to measure explosion height. A digital weight scale was used to record before and after explosion weight.</p> <p>Results The height of the geyser increased slowly between 1-10 Mentos. A significantly higher explosion was seen with the addition of 11-30 Mentos compared to 10 Mentos. The average height of the explosion plateaued off between Mentos 11-30 at approximately 142 inches. An unusual spike in height was seen with 17 Mentos. The average weight of expelled Diet Coke increased slowly between 2-10 Mentos. For trials of 11 Mentos or greater, the expelled weight appeared to plateau.</p> <p>Conclusions/Discussion My conclusion is that there is a maximum explosion size of the Diet Coke and Mentos reaction where adding more Mentos does not increase the size of the explosion. From 11-30 Mentos, the effect of increasing the number of Mentos had little effect on increasing the height of the explosion and little effect on the amount of Diet Coke and Mentos expelled from the bottle. This plateau means that the Mentos and Diet Coke reaction only works to a certain point and does not increase forever when more Mentos are added.</p>	
Summary Statement The maximum explosion size of the Diet Coke and Mentos reaction is reached by adding eleven or more Mentos.	
Help Received Mr. Hobbs helped me organize and review data. Dad helped me design and perform the project.	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Grant M. Kohne	Project Number J2213
Project Title Is There Iron in Cereal?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Does the percent daily value of iron stated on the cereal box correspond with the amount that is extracted?</p> <p>Methods/Materials Five cups of five different cereals (Total, Froot Loops, Rice Krispies, Wheat Chex, and Special K) Super strong ceramic magnet 25 Ziploc bags 50 cups of water 25 dinner plates Balance scale</p> <p>Results Total (PDV=100%) has a lot of iron, Wheat Chex (PDV= 80 %) has some iron, Rice Krispies (PDV=50%) has none, Froot loops (PDV=25%) has a lot of iron, and Special K Bar (PDV=0) has none.</p> <p>Conclusions/Discussion Does cereal really have iron in it as it says on the box? Yes and no, because all of the cereals that said they had iron in them really did except Rice Krispies said it had 50 PDV in it yet I was not able to extract any iron from it.</p> <p>the percent daily value of iron stated on the cereal box corresponded for Total Wheat Chex and special K bar but not for Rice Krispies and Froot Loops.</p>	
Summary Statement iron in cereal	
Help Received mom helped extract the iron, dad went out and bought all the cereals grandma and grandpa because they helped me come up with ideas for my investigative questions and hypothesis Mrs. Schmidt for lending me the balance scale.	



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

Name(s) Robin G. Lillie	Project Number J2214
Project Title How Hot Do Cars Get in Summer?	
Abstract Objectives/Goals My project was conducted to see how hot vehicles got in summer under different conditions such as with the windows rolled up, the front windows cracked an inch, with a sunshade, and parked in the shade. I also tested the exterior color and to see if the size of the airspace of the vehicle mattered. Methods/Materials The van was tested under different conditions: parked in the sun with the windows up, front windows cracked, sunshade, and parked in the shade. All tests were done on days over 100°F with digital thermometers. Every hour, from 7am to 10pm, inside and outside temperatures were recorded. To test the size of airspace the same method was used on a van, a car, and a truck. To test color, temperatures in five Honda Pilots, with different exterior colors, were taken simultaneously for 15 minutes all in the sun with the windows up. Results Results showed that the inside temperature was much hotter than the outside temperature in all cases in the direct sun. I graphed temperatures versus time using Microsoft Excel. The graphs showed there wasn't much difference in highest temperature readings for the van under all conditions in the sun. All the experiments passed 110°F inside the vehicle by noon and stayed above that until about 8pm. The different air space sizes of the truck, car and van did matter but not that much. The van, which had the largest air space, heated up slower but got just as hot overall. The exterior color of the vehicle did matter. Black was the hottest, while white was the coolest by about 12°F. Conclusions/Discussion Vehicles easily reach 130°F in the summer sun. Sunshades don't help to reduce the overall inside temperature, just how hot the dashboard gets. Cracking the windows didn't help keep the vehicle cool either. Parking in the shade made the biggest difference of all. A larger interior air space only slowed the heating process down. Results did confirm that exterior color made a difference, the black paint absorbs more heat than the white paint.	
Summary Statement I looked at how hot vehicles got in summer under various conditions and if exterior color or interior airspace made a difference.	
Help Received Dave Carr, Butte College Chemistry Department, let me borrow thermometers. Mr. Wittmeier, Wittmeier Auto Center, let me test different color Honda Pilots. Mom proofread my report, helped with designing the experiment, took a couple of readings when I was unavailable, and moved the vehicles.	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Jessica W. Luo	Project Number J2215
Project Title Metal Candy: Detection of Lead in Domestic and Imported Candies	
Abstract Objectives/Goals My science project's goal was to use colorimetric detection methods to determine if there was any significant difference between the lead levels in domestic and imported candies. After learning about America's strict policy regarding acceptable amounts of lead in candies, and histories of lead contamination in foreign candies, I formed the hypothesis: If you compare the amounts of lead in domestic and imported candies, the amount of lead in imported candies will be higher than the amount of lead in domestic candies. Methods/Materials I created a special indicator (thioacetamide-glycerin base TS) to make 5 different lead standard solutions. Each standard solution had a different controlled amount of lead, ranging from blank, to 15 ppm (increasing in increments of 5ppm). I used white vinegar to leach out the lead from solid candies, and collected the leached vinegar solution to create a sample solution. I then added the indicator into each individual sample solutions. If the sample had lead, the solution would change to a light brown color. Depending on the intensity of the color, I used my own judgment to match its color with one from the standard samples to find an approximate concentration of lead in that candy. Results The results of my experiment were that the average amount of lead in imported candies were <25 ppm, and the amount in domestic were <32 ppm. Conclusions/Discussion Though my hypothesis was proved wrong because the average amount of lead in domestic candies was higher, I concluded that there was not a significant difference in the amount of lead in domestic and imported candies. The average lead contents in the different types of candies are not greatly different, so I believe that there is no huge difference in lead contents. Limitations of my project included background color interferences with the indicator's effect. My research will mostly benefit children, aiding them in the choices they make in choosing which candies to consume.	
Summary Statement I used colorimetric detection methods to determine if there was a significant difference between the lead levels in domestic and imported candies.	
Help Received Chemicals were provided by VWR Science Education Division and EMS Laboratories Inc. Parents gave guidance and suggestions for my project.	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Alastair C. Macmillan	Project Number J2216
Project Title Where Are My Sunglasses? I Can't Stand the Glare!	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To discover which type and color of sunglass lens, out of brown and grey, polarized and non-polarized, reduced glare the most.</p> <p>Methods/Materials Photos were taken through the four lens types, at six locations, using a digital Nikon D200 SLR camera. The photos were analyzed using a histogram in Photoshop, to show the spread and the average of the brightness of the pixels, in the photos. The mean and the standard deviation from each photo was used to calculate the amount of glare and average light present in comparison to the control photo.</p> <p>Results The brown polarized sunglass lens consistently gave the lowest mean and standard deviation when compared against the control photos. The non-polarized lenses let through the most glare in all situations.</p> <p>Conclusions/Discussion My conclusion is that color and polarization are important factors in reducing glare, especially in high glare situations like reflections from water. The brown color was also effective in reducing light levels in very bright situations. The experiment also came up with a way to quantify glare by evaluating the histograms, which analyzed the mean and standard deviation of the luminosity of each photo. Comparing these results against the control gave us the reduction in light levels.</p>	
Summary Statement My project seeks to discover which type and color of sunglass lens, out of brown and grey, polarized and non-polarized, reduces glare the most and how to quantify glare.	
Help Received My Dad taught me how to use the camera and taught me the math and my Mom helped me do the display board.	



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

Name(s) Peter S. Manohar	Project Number J2217
Project Title Impact of Interference on Wireless Networks	
Abstract Objectives/Goals The purpose of my project was to measure the signal strength and data transfer rate for a household wireless computer network set up with an Apple WiFi (Airport) router. I wanted to determine how the wireless signal was affected by obstacles such as walls, and by interference from devices such as a conventional oven or microwave oven. Methods/Materials For this project I used a PowerBook Laptop , an Airport Express WiFi router, an Airport Extreme WiFi router, and an Airport 802.11n WiFi router. I measured the signal strength of the WiFi signal for each router at different distances with no obstacles between the computer and WiFi router. I repeated each measurement several times to get a more accurate result. I then repeated the measurements with one, two, or three walls between the computer and WiFi router as well as with one or two doors. I compared the measurements with other ones at the same distance, but without any obstacles. I also took measurements near a conventional oven and a microwave oven, and compared the results with the appliances off and on, keeping everything else the same. I took a total of 216 different measurements. Results The Airport Express WiFi router had a higher Signal to Noise ratio on average than the Airport Extreme, but it was also affected more by interfering devices and by the presence of walls. I found that one or two walls did not change the data transfer rate, but that the data transfer rate dropped from 54 Mb/s to 11 Mb/s if there were three walls between the WiFi router and computer. Adding two doors between the computer and the WiFi router did not affect the signal strength or the data transfer rate. I found that a conventional oven did not affect the data transfer rate, but turning on a microwave oven caused the transfer rate to drop from 54 Mb/s to 24 Mb/s. The new 802.11n WiFi router provided a much higher transfer rate than the older WiFi routers which used 802.11g, and was not affected by the microwave oven. Conclusions/Discussion According to my findings, the Airport Express works well in an open area, but the Airport Extreme (which is more expensive) is more effective in an area with more interference. I also found that a microwave oven sharply decreases the WiFi network data transfer rate. The newer 802.11n routers provide a better signal and higher transfer rate than the older 802.11g routers.	
Summary Statement The purpose of my project was to determine how wireless signals of wifi routers were affected by obstacles such as walls and interference from a microwave oven.	
Help Received None	



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

Name(s) Collin McNicholl-Carter	Project Number J2218
Project Title The Effect of the "Crank-Neck" on Golf Putter Accuracy	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To compare the accuracy of golf putters with different size hosels. The hypothesis of this project is that the putter with the larger crank-neck will provide more accuracy than the putter without the crank-neck.</p> <p>Methods/Materials Select blade golf putter clubs with and without crank-necks. Interview golf professionals. Build a putter testing apparatus using PVC pipe adding a rotating bar to accommodate 3 different test clubs so that the putters swing consistently with the same back swing and the same force. Make a bulls-eye target to measure accuracy to hole. Test each club 50 times, with identical back swing, measure the results of the distance ball travels and the distance to the bulls-eye target-hole. Calculate average distance and accuracy to the hole for each club.</p> <p>Results I tested and compared 3 different blade putters with different size crank-necks on their hosels. The hosel is the part of the club that connects the shaft to the head. After testing and averaging the test calculations I discovered that club #B# produced the most accurate results after testing. Club #B# was 28% more accurate than club #A#, and was 16% more accurate than club #C#. Club B with the 1.65 medium size crank-neck was the most accurate.</p> <p>Conclusions/Discussion The resulted conclusion showed that putter B, the club with the 1.65 centimeter off-set crank-neck was the most accurate. This putter produced the ball to lye an average of 8 centimeters away from the bulls-eye. Club B was found to be 28% more accurate than club A and 16% more accurate than club C. How a golfer stands over the ball makes a difference in which putter they would select to purchase. Some golfers hold the putter on a slant out in front of them. It seems club C is best suited for this type of golfer. It allows the head of the club to be behind the ball with an off-set. Club A is more of a straight neck hosel therefore best for golfers that stand over the ball, looking directly down onto the top of the ball. The putting apparatus does not allow the club to be slanted. It was designed to securely hold each club horizontally in the straightest position possible. The apparatus did not account for these various ways a golfer would hold a club. When golfers buy putters, its about personal preference and how the putters feels in the golfers hands during his swing. After this experiment I realized that the bigger crank-neck putters do not ensure more accuracy.</p>	
Summary Statement To compare the accuracy of golf putters with different size hosels	
Help Received My science teacher Gretchen Taylor was my mentor and my school is Our Lady of Grace	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Sonya A. Mital	Project Number J2219
Project Title Saving Energy: Measuring True Efficiency of CFLs vs. Incandescents in "Real Life" Conditions Using a Homemade Photometer	
Abstract Objectives/Goals To determine if CFL bulbs are as efficient as generally proclaimed when subjected to real life conditions. The hypothesis was that CFL bulbs are NOT as efficient as claimed under real life conditions by factoring human perception of light, use of shades and measuring illuminance at various angles. Methods/Materials Materials: 2x1 lb blocks of paraffin wax, aluminum foil, cardboard box, CFL bulbs (40, 60, 75, 100 equivalent Watts), incandescent bulbs (40, 60, 75, 100 Watts), 3 lamp shades (cloth, paper, brown parchment), 2 light fixtures (110-130v), multi-meter/voltmeter, the Joly photometer, electronic photometer Method: Measured relative illuminance of bulbs using Joly Photometer for CFLs and incandescents each of same labeled wattage. Recorded results and applied inverse square law then verified results using digital photometer. Measured light of different wattages, under different shades and at different angles for both types of bulbs. Results 1. CFLs of the same wattage generally had a higher relative illuminance. 2. CFLs emitted the most light at 45 degrees. 3. Incandescents emitted the most light at 0 degrees. 5. Paper shades transmitted the most light. Cloth shades were second best. Brown parchment shades transmitted the least. 6. CFL bulb manufacturers emphasize wattage and not brightness in lumens in their labeling. 7. The homemade Joly Photometer readings were accurate and extremely close to the digital photometer throughout the experiment. Conclusions/Discussion A. CFLs EMITTED more light: When tested at various angles, CFLs of the same labeled wattage emitted on average 49% more light than incandescents. B. CFLs TRANSMITTED more light: CFLs transmitted 18% more light than CFLs through shades. Thus, inside a shade, a consumer can replace a 75 watt incandescent with a 40 watt CFL instead of a 75 watt CFL and actual power consumption would go from 75 watts to 9 watts - a whopping savings of 88%. C. The homemade Joly Photometer was as accurate as the digital photometer. D. Initial hypothesis was proven false.	
Summary Statement Testing the efficiency of CFLs under real life conditions showed that they are actually much more efficient than believed and their widespread use would result in a dramatic reduction in use of fossil fuels and emission of greenhouse gases.	
Help Received Mother helped with board and father helped with Excel and apparatus setup.	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Clayton M. Nadeau	Project Number J2220
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Project Title
The Big, the Bad, and the Brawny: Paper Towel Absorbency

Abstract

Objectives/Goals

The objective of this experiment is to find the most absorbent paper towel product amongst four top brands. Each of the four brands will be subject to three tests, each designed to provide the clearest results. The results of the experiment will clearly establish one brand of paper towel to be superior to the other three brands, for reasons based in product design and materials used. I also considered the cost of the paper towel brands, and if the more expensive paper towel is more absorbent, or if the less expensive paper towel is more absorbent.

Methods/Materials

Four brands of paper towels were selected at the grocery store for the experiment: Brawny, Bounty, Viva and Scott. The four brands were subject to three different tests. Each test was conducted five times in order to compile and compare data. Paper towel squares of equal size were cut, and the tests were conducted. Once the tests were concluded, the data was compiled and the results were calculated.

Materials used:

1 role each of Viva, Bounty, Scott and Brawny paper towels; 2 glass pyrex bowls; 1 measuring cup; 1 syringe; 1 container blue food coloring; 1 container red food coloring; tap water; 1 ruler; pens and pencils.

Results

As a result of the experiment, certain patterns became very clear. The difference between single-ply and two-ply consistently showed that two-ply paper towels, by design, are better products. After the experiment was complete for this assignment, it was decided to do the dip test for a longer period, just for fun. Instead of 10 seconds, the dip time was increased to 30 seconds. The overall results remained the same, with Brawny being the most absorbent of the four. The results of the experiment completely support the hypothesis. Brawny paper towels performed better in each of the three tests.

Conclusions/Discussion

Even though all the tests were performed multiple times, for varying lengths of time, the results did not change. It was surprising to note that Viva responded so poorly in the drip test, with red water dripping directly through the surface of the paper towel. The design and the thickness of the paper towel did make a difference in the absorbency. I also learned that cost did have some bearing in the final results. In conclusion, I would not buy Viva, sometimes buy Scott, often buy Bounty, and always... buy Brawny!

Summary Statement

The project is a comparison of four different brands of paper towels, to learn which of the four brands is the most absorbent, and to what degree.

Help Received

Mother helped type report, father helped hold paper towel in the drip test



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Christy H. Park	Project Number J2221
Project Title What You Should Know about Sunscreen	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective is to find out which sunscreen brand blocks the most UV rays. The objective for the second part of my experiment is to find out how much of a variation there is between different SPF's of sunscreen.</p> <p>Methods/Materials Materials: saran wrap; 4 UV ray detectors; 6 different brands of sunscreen [Aveeno, Neutrogena, Bull Frog, CVS Brand, Banana Boat, and Coppertone]; 6 Neutrogena sunscreens with the SPF's 15, 30, 45, 70, 85, and 100; tanning salon [so that the number of rays stays consistent].</p> <p>Procedure: Experiment 1- 1. Place saran wrap over UV ray detector. 2. Place UV ray detector in tanning bed. Record the number of UV rays being emitted. Use this number as the base line. 3. Place one fingertip of sunscreen Brand A over the saran wrap where the sensor is on the UV ray detector. 4. Place the UV ray detector in tanning bed and record the UV rays being detected immediately, after 10 minutes, after 20 minutes, and after 30 minutes. 5. Repeat steps 3-5 for different brands of sunscreen.</p> <p>Experiment 2- 1. Place saran wrap over UV ray detector. [assuming you already have the baseline.] 2. Place one fingertip of sunscreen SPF A over the saran wrap where the sensor is on the UV ray detector. 3. Record the number of UV rays being detected. 4. Repeat steps 1-3 for the rest of the SPF's.</p> <p>Results Bull Frog blocked all of the UV rays being emitted from the tanning bed (25+ rays). Neutrogena and Aveeno blocked the second most. CVS brand blocked the least. For the 2nd part of the experiment, there is a big jump in the amount of protection between SPF 30 and SPF 45. SPF 45 and above blocked significantly more rays than SPF 30 and below.</p> <p>Conclusions/Discussion Every brand of sunscreen blocked at least 10 UV rays, and my experiment definitely shows that no matter which brand you use, it will still be effective and will block UV rays. Bull Frog, Neutrogena, and Aveeno blocked the most UV rays overall. CVS Brand blocked the least and I thought this was interesting because generic brands always say that they work just as well as brand-names, for a lower price. However, my</p>	
Summary Statement My project tests which sunscreen brand blocks the most UV rays and how much of a variation there is between different SPF's.	
Help Received Dad drove me to and from tanning salon; Mom helped with my board; Science teacher helped me make tables on Microsoft Excel.	



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

Name(s) Mike M. Pilegard	Project Number J2222
Project Title Out of Sight! Testing Car Color Visibility in Fog	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of my project is to determine which car color is best seen in fog. I tested these eleven different car colors: key lime, yellow, white, silver, orange, tan, red, brown, blue, green, and black. My hypothesis stated that red would be the most visible car color in fog.</p> <p>Methods/Materials I will test the car colors three ways: in real Tule fog for visibility, in dry ice fog for visibility, and in milk fog for reflectivity. My experiments were designed to include an outdoor test in real Tule fog. I did this by hanging eleven pieces of sheet metal each painted with a different car color outdoors. I then ranked the colors as they became visible in foggy conditions at different distances. I tested the car colors indoors by creating a fog simulation chamber. I placed small model cars, painted with the eleven colors, inside this chamber and poured the dry ice fog into it, and then ranked the colors for visibility as the fog sublimed. The third test was a reflection test in a milk colloid fog chamber where each color had light reflected off of it onto a light meter that gave me a numerical reading of reflectivity while being in a constant fog environment created by milk and water. Each test was performed up to 20 times.</p> <p>Results In the Tule fog test, key lime, yellow, silver, and white all tied for first place ranking. In the dry ice test, orange was the most visible. In the reflection test, white did the best. On an overall average key lime was the most visible, because it placed in the top three rankings in every experiment.</p> <p>Conclusions/Discussion In conclusion, the car color, key lime, performed the best in an averaged overall ranking, involving real-world fog, very dense fog, and reflection tests in fog, making it the most visible car color in my investigation. Also lighter colors such as: key lime, yellow, white silver, orange, tan, and red, performed better in my investigation than the darker colors: brown, blue, green, and black. This was confirmed by a 69% correlation between the brightness of colors and my investigation results. Since many crashes happen in fog, it is important to know which car color is best seen in fog. If something as simple as choosing a different car color could reduce automobile accidents in fog, many lives, limbs, and vehicles could be saved. According to my study, lighter car colors could be considered a safety feature, especially the color key lime.</p>	
Summary Statement I'm testing eleven different car colors for their visibility in fog using outdoor Tule fog, a dry ice fog chamber and a milk colloid fog chamber.	
Help Received Mother and father provided assistance when an extra hand was needed and mother helped tape and father punched holes in board for security cord.	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Katherine R. Premo	Project Number J2223
Project Title Chips, Cookies, and Seeds, Oh My!	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Can you rely on food labels to accurately report fat content? The purpose of my project was to test the actual fat content in a number of popular snack foods and compare the results with their respective nutritional label. My hypothesis is that if the food labels are correct, then the snack foods with the highest fat content should have a higher percentage lipid extraction than the snack foods with a lower fat content.</p> <p>Methods/Materials I used milk and semi sweet chocolate chips, regular and baked potato chips, regular and reduced fat Oreo cookies and sunflower seeds, measured five grams of each and smashed or broke into pieces depending on the food. I first weighed the empty beaker then added the snack food and weighed it again. Next, I added 10mL of acetone and stirred with a glass rod for one minute. I then decanted the acetone into a Petri dish making sure the snack food remained in the beaker. I repeated this step twice and left the beakers with the snack food to dry overnight. The next day I weighed the beakers again and recorded my results. I tested each snack food three times.</p> <p>Results My results for test 1 from greatest lipid extraction to the least: Semi Sweet chocolate chips (35.4%), Milk chocolate chips (29.2%), Regular Oreo cookie (25.0%), Regular potato chips (24.0%), Sunflower Seeds (20%), Reduced Fat Oreo Cookie (6.25%) and Baked Potato Chips (1.7%). Test 2: Tie between Semi sweet and Milk chocolate chips (42.9%), Sunflower Seeds (35.3%), Regular Oreo Cookie (26 %), Regular potato chips (17..3%), Baked Potato chips (15.1%), Reduced Fat Oreo cookie (9.6 %). Test 3: Regular Potato Chips 32.1%, Semi Sweet chocolate chips 32%, Sunflower Seeds 28.9 %, a tie between milk Chocolate chips and Regular Oreo cookie 24.5%, reduced fat Oreo cookie 16 %, and baked Potato Chips 9.4 %.</p> <p>Conclusions/Discussion My hypothesis was partially correct. The items with the most grams of fat per serving did have a higher percentage lipid extraction, but the exact rankings expected were incorrect. Either the food labels do have hidden fats that are unreported or there was a breakdown in the procedure. However, there was a consistency in the overall results that demonstrates that using nutritional labels can be a part of maintaining a healthy diet.</p>	
Summary Statement The purpose of my project was to determine if food labels accurately report fat content.	
Help Received Mother helped put board together and did some typing. Dad helped me research the idea and design the experiment.	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Emma F. Sheedy	Project Number J2224
Project Title The Battle Against Chlorine	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to figure out which brand of swimsuit--Nike, Speedo, or Dolfin--held up best to chlorine.</p> <p>Methods/Materials I purchased a Nike swimsuit, a Dolfin swimsuit, and a Speedo swimsuit. I also needed chlorine, 3 buckets, and eye droppers. Water was needed as well to make the chlorine-water solution. I used 3 five-pound weights to stretch the swimsuits. I also needed a broomstick handle to hang the swimsuits on. Finally, a chlorine testing kit was necessary to maintain the proper chlorine level throughout the 2 weeks of chlorine exposure. I soaked the swimsuits in chlorine for 2 weeks, and I measured how much the swimsuits stretched by hanging a weight at the bottom of each swimsuit. I measured the amount of stretch from no chlorine exposure to 1 week of chlorine exposure and from no chlorine exposure to 2 weeks of chlorine exposure.</p> <p>Results After 1 week of chlorine exposure, Speedo had stretched .5 inches, Nike had stretched 1.25 inches, and Dolfin had stretched 1 inch. After 2 weeks of chlorine exposure, Nike and Dolfin swimsuits had 2.25 inches of stretch, while Speedo had 3 inches of stretch.</p> <p>Conclusions/Discussion I conclude that, when buying swimsuits from the many choices, purchase the Nike or Dolfin brand of swimsuit. They stretch out the least after prolonged chlorine exposure, therefore giving a swimmer better quality for their money. By having less stretch, a swimsuit creates less drag and helps a swimmer move quicker through the water.</p>	
Summary Statement My project tested which brand of swimsuit (Speedo, Nike, or Dolfin) stretched the least after two weeks of chlorine exposure.	
Help Received Parents bought supplies; father helped with some math; mother helped handle chlorine; mother took pictures	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Katherine A. Shewfelt	Project Number J2225
Project Title Oops, I Made a Mistake! Which Eraser Works Best?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my experiment was to determine by test which eraser performs the best.</p> <p>Methods/Materials I chose eight independent variables (erasers). I tested each ten times by erasing a pencil-filled 2.5 square cm. area. I filled in my squares by making 50 hard strokes. I tested the erasers over a three day period. I then compared my results to a computer generated gray-scale using PowerPoint.</p> <p>Results My results were that the standard pink eraser performed the best, and the cartoon eraser was the worst. The Japanese eraser was second best, close to the standard pink. There were few apparent trends in my erasing. For example, the erasers with rectangular shapes did well. This is probably because they have good grip.</p> <p>Conclusions/Discussion My hypothesis was if I test eraser types to see which erases best, then the Staedtler brand will provide the best results because its material grips well and does not smudge. My conclusion is that the pink standard eraser is best because it is easily gripped and is slightly abrasive. My other main conclusion is that sticky erasers work well. This is because they are high in rubber and pumice. I observed older erasers are of lower value because of their hard texture. My results will benefit society by revealing which erasers to buy. People will buy better erasers. Due to this, work quality and productivity will improve.</p>	
Summary Statement The purpose of my experiment was to test eight common pencil erasers to determine which performs best and why.	
Help Received Mother helped with stopwatch timing.	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Nareg K. Shirajian	Project Number J2226
Project Title Estes Reliability	
Abstract Objectives/Goals The objective of this project is to verify the manufacturers specifications on maximum thrust, minimum thrust, and impulse. Methods/Materials Using a GLX Explorer I measured the maximum thrust, minimum thrust, and impulse. The set up I used, included, mounting a rocket engine onto a bracket connected to the force sensor which is connected to the GLX Explorer. Results The results were not exact with the manufacturers specifications because of error due to the equipment used. Conclusions/Discussion My results were within the margin or range of the manufacturers given specifications.	
Summary Statement To verify manufacturers model rocket specifications on minimum thrust, maximum thrust, and impulse.	
Help Received Worked at Ribet Academy Seebach Physics and Chemistry Lab.	



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

Name(s) Aleesha M. Somani	Project Number J2227
Project Title The Comparison and Design of Golf Balls	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This study compares hexagonal dimples versus spherical dimples on golf balls to see if the shape of the dimple makes a difference in the distance that the golf ball travels. The Hypothesis was that Callaway HX Hot Plus golf balls engineered with unique hexagonal dimples would go farther than Nike Power Distance Soft with conventional spherical dimples.</p> <p>Methods/Materials Two players, a professional and an amateur, used 2 types of golf balls: Callaway HX Hot Plus and Nike Power Distance Soft. Using 2 types of clubs, a 7 Iron and a Driver, each player hit 3 golf balls from each brand. This procedure was conducted 3 times and labelled Experiment 1, 2, and 3.</p> <p>Results In all 3 trials, when the professional hit the balls with a 7 Iron, Nike went farther, whereas Callaway had greater distance when hit by the amateur. When both the professional and the amateur player hit the golf balls with a Driver, Callaway went farther in all three trials. A significant lift was noted when the professional hit Callaway golf balls with the Driver.</p> <p>Conclusions/Discussion My hypothesis was proven mostly correct, except when the professional hit the golf ball using a 7 Iron. Nike may have gone farther since it is specially created for players with fast swing speeds. The amateur player had a slower swing speed decreasing the distance traveled by the Nike ball. Callaway's core is specially engineered to give great distance to a wide variety of swing speeds. When players use their Driver, they tend to have a slower swing speed, so when the professional hit the golf balls with his Driver, Nike's distance decreased, whereas Callaway gave great distance. But the huge difference that was seen in the distance that the two balls traveled cannot be attributed to only these reasons as both the balls have specialized cores. Callaway's unique hexagonal dimples which remove flat spots from the balls surface, reducing drag and increasing lift for more distance could be the main reason for the difference. Hexagonal dimples cover 100% of the surface of the ball as compared to spherical dimples which only cover 86% of the golf ball. These unique dimples give you a more symmetrical golf ball that goes farther. To conclude, there are golf balls for every type of person, one's that give you distance, one's for precision, and one's that give you spin to varying degrees, but if your looking for distance, then I recommend Callaway HX Hot Plus.</p>	
Summary Statement My project compares the shapes of dimples (hexagonal versus spherical) on golf balls to see if their shape makes a difference in the distance that the golf ball travels.	
Help Received Joe Haggardy helped conduct the experiment, and Mother helped me with the display board.	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Quang-Van T. Tran	Project Number J2228
Project Title Double Paned and Triple Paned Windows	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To find out either the single, double or triple paned; clear glass or tinted glass windows would be the best to keep the house at room temperature under the hot sun. If double or triple paned windows could keep the house cooler in the summer or warmer in the winter, they would help to save energy by requiring minimal air conditioning or heating to keep the house at room temperature.</p> <p>Methods/Materials</p> <ul style="list-style-type: none">- Build a box which consists of five walls: a single clear glass window, a double clear glass window, a triple clear glass window, a single tinted glass window, and a double tinted glass window.- Install a light bulb (representing the sun) in the center of the chamber to generate heat. It was placed at the center to ensure the same amount of heat go to each window for comparison.- Use 48W, 200W, 300W light bulbs to represent warm, hot, and very hot day. Temperatures of the window surface away from the bulb were recorded and compared.- Next experiment was to see the effects of glass layer distance in the double paned windows.- Next experiment was to see the effects of glass layer thickness- Last experiment was to see the effects of layer materials such as mica and flexi glass on temperatures. <p>Results</p> <ul style="list-style-type: none">- The order of the best to the worst performers in keeping the temperature down was triple, double, and single clear glass windows. However, a single tinted glass window was warmer than the single clear glass. And a double tinted glass window was better than a single tinted glass window, but not as good as the double clear glass window. It was different than common thinking that the tinted glass should be cooler than the clear one.- In double glass window, the larger the distance between the layers, the cooler the window was.- Also, the thicker the glass layer, the better it kept the temperature down.- Different window materials had different cooling characteristics. <p>Conclusions/Discussion</p> <p>The experiment was done to understand the performances of single, double and triple paned windows in keeping the house at room temperature and saving energy. We should use double or triple paned windows to save energy.</p> <p>FURTHER RESEARCH:What differences would it make if the double paned windows were made of different materials, or tinted glasses were in different colors? What results we would obtain if the picture frames were made out of metals as in real life rather than plastics as in this project?</p>	
Summary Statement The experiment was done to understand the performances of single, double and triple paned windows in keeping the house at room temperature and saving energy.	
Help Received Father helped to cut wood using power saw and install light socket with wires.	



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

Name(s) Brendan L. Walsh	Project Number J2229
Project Title Microwave Oven Leakage: A Radiation Hazard?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this project was to determine whether older microwave ovens emit (leak) more radiation than newer microwave ovens. This is an important question because today microwave ovens are often used on a daily basis. I hypothesized that newer microwave models would have less microwave leakage than older models.</p> <p>Methods/Materials For each test I placed a raw potato in the microwave, moved the setting to High and took readings after 30 seconds while the microwave was in use. I located 30 microwave ovens in different households in order to perform my tests. I used a Microwave Leakage Detector to measure 2.45 GHz radiation leakage at 3cm, 5cm, 15cm, and from 30cm. For each test unit, I had the owner complete a questionnaire regarding the make and model and approximate age of the microwave oven.</p> <p>Results The federal government sets microwave emission limits at 5mW/cm² at 5.0cm. The highest intensity of 2.45GHz microwave radiation detected from a distance of 3cm in my experiment was 9.40 mW/cm² from a 6-year-old Kitchen Aid microwave oven. The lowest amount of microwave leakage at 3cm was 0.67mW/cm² from a 12-year-old Whirlpool microwave oven. The highest microwave leakage at 5.0cm was 4.33 mW/cm² and came from a 6 year old Panasonic microwave oven. The lowest microwave leakage from a distance of 5.0cm was 0.45 mW/cm² from a 2 year old Sharp microwave. The highest emission at 15.0 cm was 1.52 mW/cm² from the same 6 year old Panasonic, and the lowest was 0.24 mW/cm² from a 2 year old Sharp microwave oven. At 30.0cm, the highest microwave emission intensity was 2.31 mW/cm² from a 7.5 year old General Electric, and the lowest emission was 0.14 mW/cm² from a 2 year old Sharp Carousel.</p> <p>Conclusions/Discussion According to my tests, there was no correlation between the age of the microwave and the amount of radiation emitted. Some newer microwaves had low leakage and some had higher leakage. Older microwaves also varied in their results. All microwave ovens tested fell within the federal guidelines for emissions set at 5mW/cm² or less from a distance of 5cm. The highest emissions from a distance of 30cm were 2.31mW/cm² or less, which suggests people would have little exposure if they remained one foot (30 cm) or more from a microwave oven while it is use.</p>	
Summary Statement The purpose of this project was to determine whether older microwave ovens emit (leak) more radiation than newer microwave ovens.	
Help Received Thanks to my parents and grandmother who supervised me during my testing. Thanks to all who allowed me to test their microwave ovens. Thanks to my science teacher who helped me find a 2.45 GHz detector.	



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Reid C. Winchester	Project Number J2230
Project Title What Type of Glue Is the Strongest?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this project was to determine which brand of glue was the strongest: Gorilla Glue, Liquid Nails, Elmer's White Glue or Elmer's Wood Glue.</p> <p>Methods/Materials The four different types of glue were each tested five times by gluing pieces of wood together and pouring water into a bucket (weight) that stressed the glue. Each glue had twenty-four hours to dry.</p> <p>Results I thought that Gorilla Glue would do the best. However, Elmer's Wood Glue did the best, Elmer's White Glue was second, Gorilla Glue was third and Liquid Nails was last.</p> <p>Conclusions/Discussion If this project were to be repeated, I would test more glues. I would also use more animal-based glues, rather than chemical-based glues.</p>	
Summary Statement My project was about testing different glues to find out which one is could withstand the most weight stress.	
Help Received Father helped with the board layout.	