



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Rachel J. Martin	Project Number S0921
Project Title Temperature Efficiency of Voltaic Cells	
Abstract	
Objectives/Goals The goal was to see what brand of battery/voltaic cell is most efficient over a range of temperatures, and what brand lasts the longest.	
Methods/Materials I used five different brands of batteries and four batteries of each brand. I used a voltmeter to measure current and voltage and a refrigerator, freezer, and toaster oven to reach the desired temperatures. I recorded and compared the prices of the batteries. I tested the current and voltage of each battery at four different temperatures. I then put the batteries in Rayovac Value Bright LED flashlights and left them in a dark room and let them run until they died out. I took pictures of the progress at regular intervals and recorded the data.	
Results The Duracell batteries had the highest power in all temperatures over the 60 second testing period. The batteries at room temperature performed the best. The test results indicate the Sony batteries performed the best in the flashlight, but this was questionable. As expected, the most expensive battery had the greatest power; however, the least expensive battery lasted the longest in the flashlight. (Questionable results)	
Conclusions/Discussion The Duracell batteries, the most expensive brand, performed the best, having the highest currents and voltages, so my hypothesis was rejected. The batteries at room temperature (80 degrees Fahrenheit) performed better than batteries at increased or decreased temperatures, so this part of my hypothesis was rejected. The Sony Platinum batteries lasted the longest when tested with flashlights. They were usually one of the worst performing brands as assumed by their power, and they were the least expensive brand, but this might not be reliable because the flashlight died but later turned back on and lasted for a long time on very dim light.	
Summary Statement My project is about testing different brands of batteries to see which is the most powerful and lasts the longest and at what optimal temperature.	
Help Received My dad helped me purchase the correct materials needed for the experiment, set up spread sheets, and answer my questions about my experiment. My biology teacher helped me research information on the topic.	