



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Aaron J. Schroeder	Project Number J1929
Project Title Lithium, Titanium, Alkaline, Oh My	
Objectives/Goals The objective of my experiment was to see what was the energy efficiency of each type of battery.	
Abstract Methods/Materials My materials were 1 Energizer AA lithium battery, 1 Energizer AA titanium battery, 1 Duracell AA batteries (Pile Alkaline), 3 Screw-Base Lamp light bulb (1.44 watt), 2 Single AA battery holders (With Wires attached to them) (Any number of battery holders is fine), a Journal, and 2 Screw-Base Lamp light bulb holders (Any number of light bulb holders is fine). First, I label each battery holder (#power source#) by the type of battery. Next, I put that type of battery into each of the battery holders. I screwed on the wires to the screw on the light bulb holder. Screw on the Screw-Base Lamp light bulb to the light bulb holder. I made sure that the light bulb is lit (glowing). In the journal, I recorded the time that each light bulb went on (#beginning time#). In the journal, I recorded the time that each light bulb went off (#ending time#). Subtract the ending time with the beginning time for each to see how long the battery lasted. I used James Watt's equation $Power(Watts) = Energy(Joules) / Times(Seconds)$. Then I divided how many joules were used to how many joules were set out which came out as a decimal. I made the decimal into a percentage. That percentage showed how efficient the battery was.	
Results What new information was provided as a result from my testing was that I now know that Duracell Alkaline is more energy efficient than Energizer Lithium and Titanium. I also know that Energizer Titanium is more cost efficient, because the amount of joules per dollar of the Energizer Titanium is 35,175, while Duracell Alkaline is 28,222 and Energizer Lithium is 20,108.	
Conclusions/Discussion What I have learned that just because a battery is longer lasting, does not mean it is more energy efficient. Also just because it costs more does not mean that the battery is better. I did not prove my hypothesis and Duracell was more energy efficient than Energizer Lithium.	
Summary Statement To determine the energy efficiency of various types of common batteries.	
Help Received My Dad helped collect some of the data, buying the materials, and bouncing off ideas.	