



CALIFORNIA STATE SCIENCE FAIR 2013 PROJECT SUMMARY

Name(s) Schafer M. Kraemer	Project Number J2114
Project Title Battle of the Bulbs	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this project is to find out how different types of light bulbs perform and to answer the question, "which type of light bulb has the best practical value based on cost, brightness and thermal properties?"</p> <p>Methods/Materials There are four basic types of light bulbs available today: the incandescent bulb, the halogen bulb, the fluorescent bulb and the LED (light-emitting diode) bulb. In this experiment, all four types of common light bulbs were tested. An insulated box with a light fixture and a grease-spot photometer were constructed to test temperature and relative brightness. A voltmeter, ammeter, thermometer and tape measure were used to collect power consumption, temperature and relative brightness data. Each test trial was repeated three times. Cost information was collected from the Internet. The data was analyzed and observations were recorded.</p> <p>Results There was a 24 degree Celsius increase in temperature in the light box for the incandescent bulb and only a 16 degree Celsius change in temperature for the Halogen bulb. There was very little heat created for the LED and fluorescent bulbs, about 4 degrees Celsius. The greatest changes in temperature were observed within the first 5 minutes for all the different bulb types. The LED was the brightest followed by the fluorescent bulb. The incandescent and halogen bulbs were about 60% as bright as the LED and fluorescent bulbs. All of the light bulbs pulled the same amount of power over time, except the fluorescent, which drew about 75 Watts during the first few minutes, even though it is rated at only 15 Watts. Once it warmed up, it worked normally and pulled less than 15 Watts.</p> <p>Conclusions/Discussion The fluorescent light bulb was shown to be the most cost efficient option. It costs a lot less than the LED bulb, about 80% less, and is similar in brightness and energy consumption. It has a long life and uses much less energy and creates less heat than the incandescent and halogens bulbs.</p>	
Summary Statement This project compares the performance of the most common 60 Watt equivalent light bulb types, by measuring brightness, temperature and power consumption, and ranks them accordingly based on their benefits and trade-offs, including cost.	
Help Received Father helped with electrical wiring and box construction	