



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Lucas E. Swyden	Project Number J1034
Project Title Solar Energy Output Lab	
Objectives/Goals Conventional solar energy usually means dozens of expensive solar panels pointed at the sun. A alternative form of solar energy is to use mirrors to focus more light onto a solar cell; another is to use large lenses to focus the light. Which of these methods is most cost effective to use on a large scale? HYPOTHESIS: The method of mirrors will be the cheapest to produce solar energy because it is cheaper to polish pieces of glass than to shape plastic or glass into lenses.	
Abstract Methods/Materials One: Ordered solar cells from Edmund; bought mirrors from Michael's; bought a Fresnel lens from Office Depot. Two: Received the solar cells and had to find out how to assemble them. Three: With the solar cells assembled, I need to set up the mirrors and lens. Will use parts from a Vex Robotics Kit. Four: With the mirrors and lens set up, I need a method of measuring the output of the solar cells. I found a way on the internet, but need a load resistor and two multi-meters (borrowed from my father). Five: On a sunny day, I took 10 readings each of: 1) Solar Cell alone; 2) Solar Cell with Lens; 3) Solar Cell with 8 mirrors. Had to use a Neutral Density Filter to keep the solar cells from overloading. Materials: Fresnel lens, 2 solar cells, 8 mirrors, a wooden pole, 8 clamps, 16 small nuts and bolts, 2 multi-meters, 4 bendable pieces of metal, wire, a 4.8 ohm resistor, and a 1.0 ND Filter.	
Results In Power/Dollar my results were: 160 microwatts/\$ for the solar cell alone; 733 microwatts/\$ for the solar cell with lens; 951 microwatts/\$ for the solar cell with mirrors.	
Conclusions/Discussion My experimentation confirmed my hypothesis that a solar cell with mirrors would put out the most energy per dollar. Even though the lens system put out a higher average of 10,265.74 microwatts compared to the mirror system's 6657.8743 microwatts, because mirrors are cheaper than lenses, the mirror system was more cost effective.	
Summary Statement I am studying the cost effectiveness of using mirrors and lenses with solar cells versus using solar cells alone.	
Help Received Mother proof read report and display text; Father helped assemble the solar cells and build the test circuit; Father lent me his multimeters and camera tripod.	