



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> <b>Chloe Brandon</b>	<b>Project Number</b> <b>J1703</b>
<b>Project Title</b> <b>What Is the Effect of Color on Solar Water Heating?</b>	
<div><div><b>Objectives/Goals</b><p>The main goal of my experiment was to answer the question: How can color affect solar water heating? A second goal was to develop a practical demonstration in the form of a solar shower. Color should influence water temperature by changing the amount of light energy that is absorbed versus reflected. Light striking the container is converted to thermal energy. My hypothesis is that there will be a difference in temperature between the varying colors of the bottles that contain the water. Once I determine the best color, I will use it to build a shower using solar water heating.</p></div><div><b>Abstract</b></div><div><b>Methods/Materials</b><p>1. 10 500 mL polyethylene terephthalate plastic bottles coated with red, orange, yellow, green, blue, purple, black, silver, white acrylic paints 2. 5,000 mL of tap water 3. Glass thermometers 4. Electronic timer 5. Self-designed and assembled solar shower</p></div><div><b>Results</b><p>The data were plotted as water temperature vs. time. At a point where the air temperatures were stable, the order and temperatures of the bottle#s water was compiled. This was done for both of the two different days that data were collected. Results of the data analysis include: 1. All water temperatures inside the bottles were higher than the air temperature after 30 minutes. 2. The water in the black bottle stayed the hottest for the whole testing period. 3. Green and blue bottles became the 2nd and 3rd warmest after the black bottle. 4. The other colors were within 3-6 degrees Celsius of the control bottle. 5. The white bottle either stayed the same temperature or was slightly cooler than the control.</p></div><div><b>Conclusions/Discussion</b><p>The hypothesis was proven correct. Some of my conclusions are: 1. The darker the bottle, the warmer the water inside. 2. The black bottle became the hottest because it absorbs all of the colors of light. 3. The lighter colored bottles reflected more light and were less hot or were very similar to each other. 4. The best choice of color for the solar shower is black. A good second choice of color would be blue or green as they were very similar in temperature to black. 5. The solar shower using a black container lasted 6 minutes and was a very comfortable showering temperature.</p></div></div>	
<b>Summary Statement</b> <p>Color has a strong effect on the amount of solar water heating, which can be used to lower household energy use.</p>	
<b>Help Received</b> <p>Parents helped purchase supplies, drill parts and use long arm cutter for poster</p>	