



**CALIFORNIA STATE SCIENCE FAIR  
2012 PROJECT SUMMARY**

<b>Name(s)</b> <b>Emily R. Manabe</b>	<b>Project Number</b> <b>J0924</b>
<b>Project Title</b> <b>Best Battery Temperature for Maximum Performance</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of my experiment was to determine how temperature will affect the power output of batteries.</p> <p><b>Methods/Materials</b> Pairs of AA batteries were brought to different temperatures ranging from 0 F to 170 F and were then attached to a circuit that used a calorimeter to heat water. The calorimeter was made by putting ten 10 Ohm resistors together, five on each side. The resistors were connected in a parallel circuit. The power of batteries were determined by measuring the change in temperature of the water that was heated by the resistors in the calorimeter. The water temperature from the calorimeter was measured after the batteries discharged for 10 minutes. This was repeated four more times, for a total of five water temperature readings for each battery temperature.</p> <p><b>Results</b> The first set of data included seven battery temperatures that ranged from 0 F to 170 F and the second set of data included five battery temperatures that ranged from 0 F to 170 F. Batteries at higher temperatures consistently heated the calorimeter water to higher temperatures than the batteries at lower temperatures.</p> <p><b>Conclusions/Discussion</b> The power output of batteries increased as the battery temperature increased. This is an important environmental factor for battery performance.</p>	
<b>Summary Statement</b> How temperature affects the power output of batteries.	
<b>Help Received</b> Father helped design project and mother helped write report.	