



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

Name(s) Todd G. Porter	Project Number J0911
Project Title Solar Charging Your iPhone or iTouch for Dummies	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals For my experiment, I asked myself this question: Can one or more solar panels be connected to produce enough energy to charge an iPhone in the same amount of time it would take to charge an iPhone from a USB port or an Apple Power Adapter? I predicted that if enough solar panels are configured in parallel, then the amount of energy generated should be equivalent to, or exceed the amount of energy produced by a USB port or an Apple Power Adapter.</p> <p>Methods/Materials To test my hypothesis, I created a solar panel iPhone charging circuit that allowed me to measure charge current for three parallel solar panel configurations. For each configuration, the theoretical charge time and the measured charge times were obtained. The theoretical measurements were taken to verify the validity of the calculated charge time derived from the measured charge current. The calculated charge times were then plotted against the USB port and Apple Power Adapter theoretical charge times to verify that the one or more of the solar panel configurations would produce enough energy to be equivalent or better than that produced by the a USB port or an Apple Power Adapter.</p> <p>Results My hypothesis proved to be correct. The triple solar panel experiment parallel configuration charged the iPhone in comparable time to the USB port and Apple Power Adapter energy sources. Although the experiment verified my hypothesis, the test results were not completely expected for the iPhone charging from an Apple USB Power Adapter. The power adapter should have produced twice the amount of charge current as the USB port, but did not, given the internal regulation in the iPhone charge circuit that limits the charge current to approximately 500 mA. Therefore, the USB port, the Apple Power Adapter, and the triple solar panel configuration, all charged the iPhone in roughly the same amount of time, because of the maximum charge current limitation. Given this limitation, if more solar panels were configured in parallel, the iPhone charging time would not decrease significantly.</p> <p>Conclusions/Discussion As result of this experiment, I learned that solar panels can be a very efficient method of charging an iPhone. The small solar panels that I used in the experiment provided an impressive amount of energy, and I was able to show that the triple solar panel configuration charged the iPhone in comparable times to the USB Port and the Apple Power Adapter.</p>	
Summary Statement My science project verifies that if a sufficient number of solar panels are configured in parallel, then the amount of energy generated should charge an iPhone or Itouch in a less time than a USB port or Apple Power Adapter.	
Help Received On this project, I received help from my science teacher and my father. My science teacher provided insight throughout the project and my dad helped me with electrical concepts, taught me how to solder, and how to make a schematic using Microsoft Visio.	