



CALIFORNIA STATE SCIENCE FAIR 2008 PROJECT SUMMARY

Name(s) Maya A. Norman	Project Number J1623
Project Title The Shadow Knows Where You Are	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This project tested the accuracy of different ancient tools. These tools, the gnomon, the astrolabe, and Ptolemy's box, were used to find the altitude of the sun. From this information a person can then find their latitude. The gnomon is a long rod, the astrolabe is a circular piece of wood with a sighting stick attached to it, and Ptolemy's box is a stone box with a peg in its upper left corner.</p> <p>Methods/Materials To simulate the original tools a gnomon, an astrolabe, and a Ptolemy's box were built with PVC pipe, a plum bob and wood. The three tools were tested at local noon three to four times each in two different places, Woodside California and Belize.</p> <p>Results After testing three times in Belize and four times in Woodside it was clear that the gnomon and Ptolemy's box were the most accurate tools. In Belize the gnomon's percent error was .42 degrees, Ptolemy's box's percent error was .36 degrees, and the astrolabe's percent error was .34 degrees. In Belize the gnomon's deviation was .02 degrees, Ptolemy's box's deviation was .06 degrees, and the astrolabe's deviation was 1.30 degrees. In Woodside the gnomon's percent error was .28 degrees, Ptolemy's box's percent error was .28 degrees, and the astrolabe's percent error was 1.28 degrees. In Woodside the gnomon's deviation was .22 degrees, Ptolemy's box's deviation was .19 degrees, and the astrolabe's deviation was .47 degrees.</p> <p>Conclusions/Discussion The fundamental hypothesis, that the gnomon and the astrolabe would be the most accurate was unsupported by the results. Ptolemy's box and the Gnomon were the most accurate. This was because they were the least dependent on human intervention. The astrolabe was the least accurate and the most dependent on the skill of the tester. There are a few faults in this project such as that light bends once it enters the hemisphere and the equations used don't take into consideration the observer is not actually in the center of the earth. The bending of light may explain why in Woodside the Results were below the actual latitude and in Belize the Results were above the actual latitude.</p>	
Summary Statement The project tested ancient tools, the gnomon, the astrolabe, and Ptolemy's box, to demonstrate their accuracy in determining latitude.	
Help Received My mother proof read my writing for spelling and grammar only; My dad supervised as I built the tools used in the experiment; my science teacher advised me on how to analyze my results.	