



CALIFORNIA STATE SCIENCE FAIR 2004 PROJECT SUMMARY

Name(s) Alexander M. Craig	Project Number J1203
Project Title Let's Triangulate!	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of my project is to see if the mathematical formula of triangulation can be accurately used in conjunction with the laser rangefinder, and if they stay accurate at different distances.</p> <p>Methods/Materials My materials were a laser pointer, ruler, protractor, 50/50 beamsplitter (microscope slide), mirror, and calculator/trig table. In order to carry out my experiments, I first had to set up my laser rangefinder device. I placed a 50/50 beamsplitter so that the beam is reflected at exactly ninety degrees. Above the beamsplitter I set any object (or a wall), and position it so that the laser hits this object. Next, I put a mirror a few inches away from the other beam which passed directly through the beamsplitter. Then I adjusted this mirror so that the laser was being reflected in such a way that it hit the aforementioned object on the exact same spot that the other beam did. Now we have a right triangle. After doing all of the math-the $\tan(x) = a/b$- I came to the predicted conclusion that triangulation is accurate when used in conjunction with the laser rangefinder, and it may be used at different distances to accurately calculate them.</p> <p>Results After all of my hard data-gathering and analysis, I came to the conclusion which my hypothesis supported. Triangulation is accurate at all distances, and although I was only able to test a very limited number of distances (due to the restrictions of space in a town as crowded as Palo Alto), I am confident that triangulation and the laser rangefinder are accurate at all distances. My data supports this.</p> <p>Conclusions/Discussion Once I had finished all of my data-analysis and conclusion-gathering, I have concluded that my hypothesis is correct. Triangulation is accurate, and it works correctly with the laser rangefinder. My data supports this by having a margin of error at .67 inches at the maximum, minimum .05 inches. This proves that when triangulation and the laser rangefinder are used together, some very accurate results will be achieved. I have proven, through my data, that triangulation and the laser rangefinder are very accurate when used together.</p>	
Summary Statement My project is about using the formula of triangulation and the laser rangefinder and seeing if they can accurately measure distances of varying sizes.	
Help Received My mother helped me to tape/glue down materials onto my display board. A math teacher at my school helped me learn how to do this basic trigonometry, but all the work in my project was done by me.	