CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Jessica A. Richeri

Project Number
S1616

Project Title
Measuring the Speed of Light

Abstract

Objectives/Goals
The objective is to determine if the densities of different materials change the speed of light. Also to determine if changing the incidence angles or the materials temperatures, would change the velocity of the light through the material.

Methods/Materials
Seven different solutions, with different densities, were created and three other household materials were obtained. I calculated the density and the index of refraction of each material. I created a control group based on the speed of light in air. The laser beam was shot through the longer side of a container with the material at a 30, 45 and 60 degree angle, parallel to the surface. A picture was taken in order to measure the incidence and refracted angle. I use Snells Law formula to calculate the wave velocity in the material. This procedure was repeated for each material at two temperatures, 10C and 30C. Three trials were done for each incidence angle, temperature and material. I graphed Density vs. Velocity, Density vs. Index and Velocity vs. Index for each test. Also, I did a Statistical Analysis of all experimental velocities and graphed the results.

Results
The results show that, as the material gets denser, it takes the laser a longer time to get through that material. The increase of the materials temperature result on an increase of the velocity. By changing the incidence angles, the experimental velocities had only a 3% error, for the same material.

Conclusions/Discussion
After 180 different tests and thousands of pictures, the data supports my hypothesis because its true that as the density of the material increases, the speed of light through the material decreases.

Summary Statement
Calculating the speed of light through materials with different densities.

Help Received
Father supervised taking the various digital pictures.