

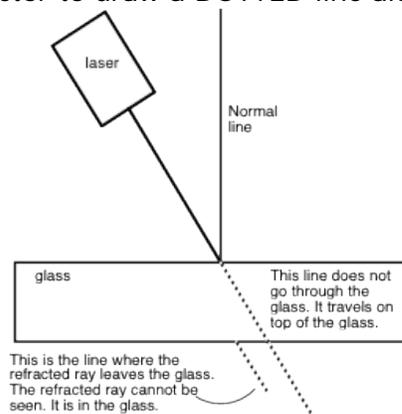
Refraction of Light in Glass Snell's Law

Purpose: To use Snell's Law to determine the index of refraction (n) of a piece of glass and to use it to find the speed of light in that glass.

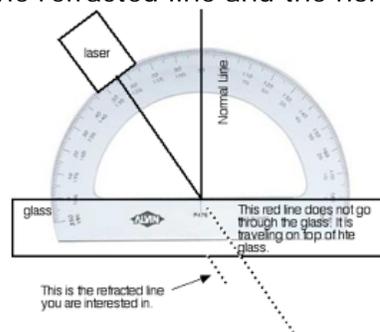
Materials: Laser, protractor, plate glass, plain paper, pencil, data sheet.

The video instructions above can be found here, http://www.youtube.com/watch?v=z0zF9MtF_Z4

1. Place your glass in the middle of a piece of paper and sketch its outline with a pencil. Some glass pieces have chipped edges and may cut you. Be careful!
2. Use a sharp pencil to draw an outline of the glass.
3. Remove the glass from the paper.
4. Use the protractor to draw a line that is normal to the long edge of the rectangle. This line should be near the middle of the long side of the rectangle.
5. Turn the Laser level on. Place it on the paper such that the red line it projects is aimed at the intersection between the normal line you drew and the edge of the rectangle.
6. Place the glass on the rectangle. Carefully line it up so that it is perpendicular to the normal line.
7. Make a dot where the laser's light first hits the paper as it comes from the line level.
8. You should see two red lines on the side of the glass opposite the laser level. One line is projected above the glass. The second line is shorter and not as bright. Only the second line went through the glass. This is the refracted light ray and it the one you are interested in. Use the protractor to draw a DOTTED line along this refracted red line.



9. Remove the glass from the paper. Draw a spline consisting of two lines. The first is the incident ray, the second is the refracted ray as it travels through the glass. Draw the refracted ray about 0.12 cm or longer.
10. Extend the refracted ray about 0.12 m.
11. Measure the angle between the incident line and normal line.
12. Measure the angle between the refracted line and the normal line.



13. Repeat this procedure for 5 different angles between 15 and 70 degrees. Fill out the data table on the handout shown below in the "Data and Questions" section.

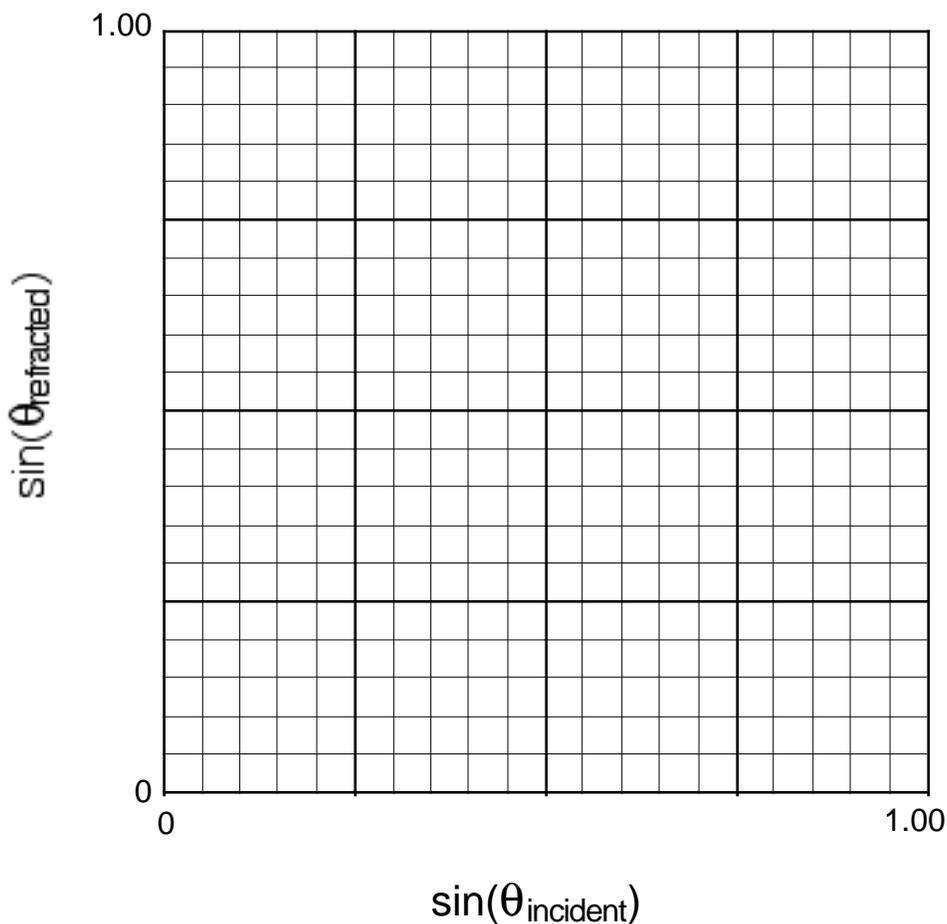
Snell's Law Lab

DATA

Name _____

| θ_{incident} | $\sin(\theta_{\text{incident}})$ | $\theta_{\text{refracted}}$ | $\sin(\theta_{\text{refracted}})$ |
|----------------------------|----------------------------------|-----------------------------|-----------------------------------|
| | | | |
| | | | |
| | | | |
| | | | |
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DRAW A GRAPH of the $\sin(\theta_{\text{incident}})$ vs $\sin(\theta_{\text{refracted}})$ on the grid below.



The slope is the ratio of $\frac{n_{\text{refracted}}}{n_{\text{incident}}}$. The index of for the incident ray is air, $n=1.00$.

Use the graph to determine the index of the glass the light travels through and the average speed of the light through this glass. Show your work.