

Measuring the Index of Refraction Activity

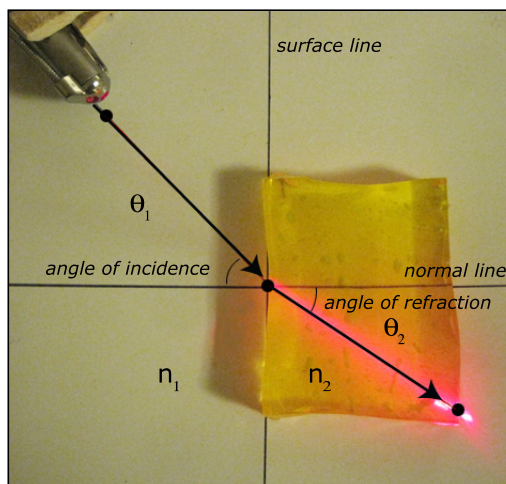
Objective: Determine the index of refraction of a piece of a material.

Materials needed:

Science notebook
Gelatin or plastic refraction kit
Pencil or pen
Paper
Laser pointer
Ruler
Protractor
Calculator

Procedure:

1. Draw two perpendicular lines on a sheet of paper. One line will represent the surface of the gelatin (or plastic) and the other line will represent the normal line.
2. Cut a piece of gelatin about 8 cm long by 6 cm wide. Be sure the sides are straight and even.
3. Place one of the long sides of the gelatin along the line on the paper that represents its surface. The normal line should roughly bisect the rectangle of gelatin.
4. Hold the laser pointer on the table and direct it so that the beam strikes the gelatin block where the surface and normal lines intersect.
5. Make a small mark on the paper where the beam enters the tip of the laser pointer. Make a second mark where the beam exits the gelatin block. (See photo.)
6. Remove the gelatin and use a ruler to draw the incident and refracted rays.
7. Use a protractor to measure the angles of incidence and refraction. Note that the angle of refraction will be smaller than the angle of incidence because light travels more slowly in gelatin than in air.
8. Repeat this process at least three times.
9. Use Snell's law ($n_1 \sin \theta_1 = n_2 \sin \theta_2$) to calculate the index of refraction of the gelatin for each set of measurements.
10. Calculate the average index of refraction.



*Image courtesy of Photon Projects.
Note: Line was added to photo to show location of laser beam in air. Laser beam only actually visible in gelatin.*