3M

Young Scientist Lab

in partnership with: Discovery EDUCATION

WHELMERS

Gelatin Optic Fibers

Strips of gelatin dessert and a laser pointer demonstrate total internal reflection.

WHAT YOU NEED

- an inexpensive laser pointer
- package of unflavored or light-colored
- gelatin dessert
- shallow cake pan
- spatula
- mixing bowl
- ruler

WHAT YOU DO

1. Follow the package directions for mixing the gelatin, but use only **half** the suggested amount of water. The resulting thicker-than-normal gelatin is necessary for this experiment.
2. Pour the gelatin mixture about 1 inch deep into a shallow pan and refrigerate.
3. After the gelatin has set, use a ruler and cut it into 1-inch-wide strips, creating strips as long as possible.
4. Use a spatula to remove a gelatin strip and place it on a tabletop.
5. Dim the room lights. Point the laser beam through one end of the gelatin strip. Position the laser so the beam will reflect several times off of the interior sidewalls of the gelatin.

WHAT HAPPENS

The boundary surface between the gelatin walls and air acts like a mirrored surface because the gelatin has a higher index of *refraction*, or tendency to bend the path of light. If light should strike the sidewalls above what's called the *critical angle*, light will pass through the sidewalls. Below the critical angle, light is reflected as if it were bouncing off a mirrored surface. The critical angle for internal reflection can be observed by adjusting the position of the laser. More efficiently than gelatin, pure glass used in the manufacture of fiber optic cable allows light to pass through undisturbed for long distances. Many cable TV, telephone, advertising signboard, and data transmission systems use fiber optic cables.