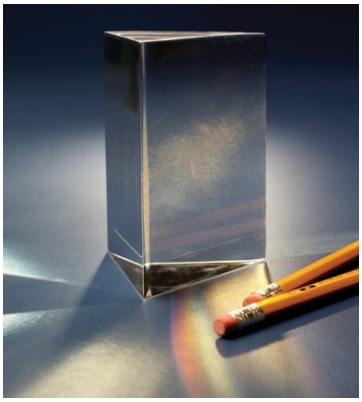


Giant Prism

33-0230

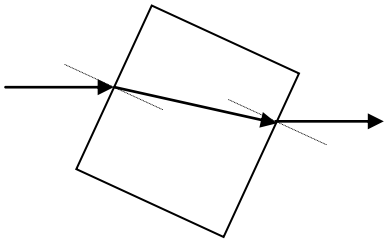
DESCRIPTION:

The Giant Prism is made of solid acrylic. It can be cleaned with glass cleaner and a soft cloth.

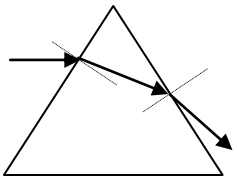
HOW PRISMS WORK:

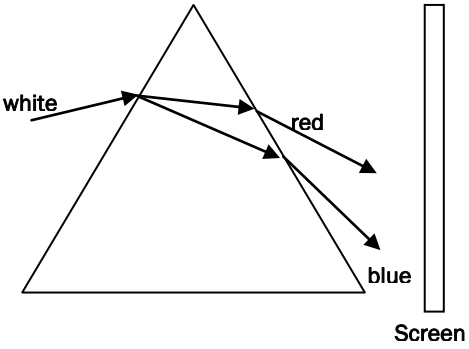
Waves, including light waves, change speed when they enter a new medium. If the waves enter the medium at an angle, the change in speed results in a change in direction or *refraction*. Consider the case of monochromatic light entering a transparent rectangular solid.

According to Snell's Law, as light enters a medium with a higher index of refraction (for example, passing from air into glass), it bends (refracts) toward the normal (an imaginary line perpendicular to the surface). When the light passes into a medium with a lower index of refraction (such as from glass into air), it bends away from the normal. (See diagram.) Note that the resulting beam is parallel to the original incident beam.



If the solid is triangular instead of rectangular, the two refractions result in non-parallel beams. (See diagram right)





The amount of refraction depends on the wavelength, since waves of longer lengths slow down more when entering a medium with a higher refractive index. Blue light bends more than red light. This separation by wavelength is what causes the spectrum to form.

DESCRIPTION:

The Giant Prism is made of solid acrylic. It can be cleaned with glass cleaner and a soft cloth.

ACTIVITIES:

1. Place the prism on its end on a flat surface. Use a laser pointer (a monochromatic light source) to see how the prism causes light to refract.
2. Use two different colored laser pointers (red and green) to see how different colors of light refract differently.
3. Place the Giant Prism in a source of bright white light, such as a sunny window or on the stage of an overhead projector. Observe the spectrum produced.
4. Observe which colors bend the most, and which bend the least. Discuss how wavelength is related to the angle of refraction.
5. Mark the positions of each color in the spectrum. Then use color filters to color the light that enters the prism. What happens? Does the color bend the same amount, or does it spread into a new spectrum? (It should bend the same amount. For example, if you use a red filter, only a portion of the spectrum will be observed on the wall, with red in the same place as before.)
6. Place a second prism in front of the first, so that it sits in the spectrum, but facing the opposite way (see diagram). Move the second prism back and forth in the spectrum and observe the results on a screen. Look for the remnants of the spectrum from the first prism as well as a new beam of light from the second prism. Isaac Newton was the first to do this experiment. What did he learn about the nature of light and color?