Visible Spectrum

Light from the sun appears white, but when it travels through the prisms of a chandelier, the facets of a diamond, or the water droplets in the sky, it is separated into its many colors, producing a brilliant display known as the *visible spectrum*. In the 1600s, Sir Isaac Newton demonstrated that the "color" white is merely the sensation our minds generate when we receive the full spectrum of colors found in the rainbow.

Each wavelength (color) of light has its own unique speed when traveling through media such as glass or water, and each will have its own unique angle of refraction upon striking an oblique surface. Violet light refracts (bends) most and comprises one end of the spectrum, while red light refracts least and is found at the other. Newton argued that since it is possible to disperse white light into its constituent colors, it must be possible to recombine these colors to produce white light once again. In this activity, you will test this hypothesis.

Concepts to Investigate: Wavelength, frequency, color, prisms, solar spectrum, polychromatic light dispersion of light, recombination

Materials: Prisms & light source

Procedure:

- 1. Use a single prism to refract your light source into the visible spectrum.
 - a. Does the prism's orientation relative to the light source affect the spectrum produced? If so, how? Which orientation (if any) works best? Which orientation (if any) fails to produce the spectrum?
 - b. Draw your set up, including the light source, incoming light beam, prism, and outgoing spectrum. Label the colors of the spectrum.
 - c. Which color travels fastest in the prism? Explain how you can determine this based upon the spectrum.
- 2. Use a second prism to recombine the spectrum into white light.
 - a. Does the second prism's orientation relative to the first affect the recombination of the spectrum into white light? If so, how? Which orientation (if any) works best? Which orientation (if any) fails to recombine the spectrum?
 - b. Draw your set up, including the light source, incoming light beam, both prisms, the spectrum between them (label colors), and the outgoing light beam.