



Curiosity Guide #705

Color Science

Accompanies Curious Crew, Season 7, Episode 5 (#705)

Separating Light

Investigation #6

Description

Prisms are a lot of fun, and you can make one yourself!

Materials

- 9 by 13-inch glass dish
- Water
- Mirror
- Sunny day
- Prism
- Incandescent lamp, cadmium lamp, fluorescent lamp

Procedure

- 1) Hold a prism so that the point is at the top and the prism is a few inches in front of your eye.
- 2) Turn the lamps on. Look through the prism at the lighted lamps.
- 3) What do you notice?
- 4) Place the dish on a flat surface near a window so that the dish receives direct sunlight.
- 5) Fill the dish with water nearly to the top.
- 6) Place the mirror at one end of the dish. The mirror should lean against the top lip of the dish, be partly submerged in the water, and at a 45-degree angle. You may need to carefully rotate the dish so that any reflected light shines on an interior wall.
- 7) What do you notice?

My Results

Explanation

The prism and the mirror in water are both examples of prisms that can separate white light into the colors of the rainbow. Unlike the subtractive color system, light is in the additive color system. When the colors are all combined, the colors make white light and not a black result as in the subtractive system. When light travels through the prism or water, the speed of the wavelengths is affected. Light travels a similar speed in a vacuum, but red light travels faster than violet light when red or violet wavelengths pass through water, glass, or plastic. As a result, the light's direction changes, and the violet light bends or refracts more than the light does at the red end of the spectrum. Newton was the first to use a prism to observe the spectrum of white light.

Are you wondering about color systems? There are two kinds of color systems, additive and subtractive. We know that light is made up of a rainbow of colors that are added together. Televisions and computers also create additive colors by using exciting, small phosphor dots that turn different intensities of red, green, or blue. The dots are so small that our brains merge the colors together and see different shades. In the subtractive color system, we see colors that get reflected off objects, like the red apple. So, in the subtractive system we need a light source to see those colors. What pretty colors!

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