

RAFT IDEAS

Topics: Light, Color, Electromagnetic Spectrum

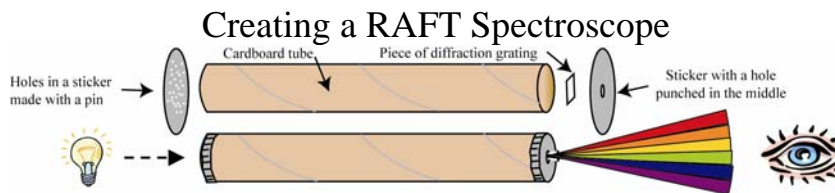
Materials List

- ✓ Cardboard tube
- ✓ Diffraction grating
- ✓ “Sticky dots” (adhesive-backed circles)
- ✓ Hole punch

This activity can be used to teach:
(CA Science Standards)

- Observations and data collection in all grades
- Color of light (Grade 3, 2.c)
- Energy carried by light (Grade 6, 3.a)
- Vision and the electromagnetic spectrum (Grade 7, 6.a)
- Electromagnetic waves (HS Physics, 4.e)

The Colors of Light



White light is actually a combination of different colors. This easily built spectroscope allows students to separate the incoming light into its component colors, forming a light spectrum (rainbow). Besides creating interesting color patterns it can be used to identify different sources of light.

Assembly

1. Cut the piece of diffraction grating provided into squares slightly larger than the hole made by the hole punch.
2. Use the punch to make a hole in the center of a sticky dot.
3. Place one of the small squares of diffraction grating on the sticky side over the hole you just made.
4. Place the sticky dot over one end of a cardboard tube and fold the edges down to hold it in place.
5. Cover the other second end of the tube where light will enter:

Method 1: Place a sticky dot over the end of the tube. Use a pin to create a few small holes.

Method 2: (preferable for more careful observations): Cut a sticky dot in half; carefully lay each half of the dot over the end, producing a very narrow slit.

To Do and Notice

Safety Note: **NEVER LOOK AT THE SUN DIRECTLY**

1. Point the spectroscope at a light source (room lights or a window) and look through the end that has the diffraction grating. Notice the colorful patterns that you see. Choose one rainbow to focus on. What colors do you see? Try and name them in the order that you see them (violet/blue will be closest to the dot/slit for each of the rainbows, red will be furthest).
2. Challenge the students to find at least one difference between the rainbow produced by an incandescent light compared to that produced by a florescent bulb. Some may notice that a florescent bulb spectrum may have more pronounced lines of color within the rainbow, while the incandescent bulb produces a more continuous rainbow.

The Science Behind the Activity

White light is a mixture of many different colors (ROYGBIV). Each color has a specific frequency and wavelength. Red light has a lower frequency (longer wavelength) than blue light. Diffraction gratings contain thousands of microscopic grooves, which cause light waves to bend; longer wavelengths bend more. Different types of light sources emit different combinations of colors; these differences are revealed when the white light “mix” is “sorted” into a spectrum.

Web Resources (Visit www.raft.net/more for how-to videos and more ideas!)

For an expanded series of guided explorations using a spectroscope, visit http://isaac.exploratorium.edu/~pauld/summer_institute/summer_day9spectra/spectra_exploration.html.