

# RAFT IDEAS

**Topics:** Color, Light, Filters, Vision

## Materials List

- ✓ Red filter, ~6 cm x 6 cm (2½" x 2½")
- ✓ 1 piece of cardstock ~8 cm x 13 cm (3" x 5")
- ✓ Tape
- ✓ Crayons and/or markers

This activity can be used to teach:

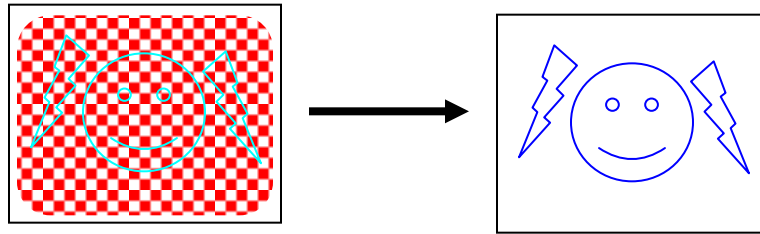
Next Generation Science Standards:

- Light and vision (Grade 1, Physical Science 4-3, Grade 4, Physical Science 4-2)
- Waves: Amplitude, wavelength, energy (Grade 4, Physical Science 4-1)
- Waves are reflected, absorbed, or transmitted (Middle School, Physical Science 4-2)
- Body structures and systems (Grade 4, Life Science 1-1; Middle School, Life Science 1-3)



# Spy Writing

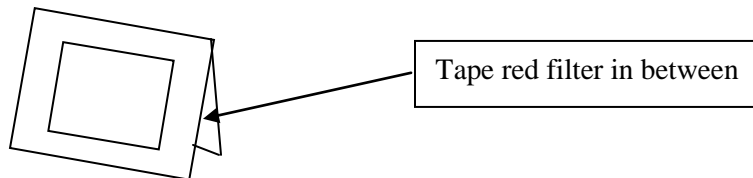
Using Filters to Send Hidden Messages



Students can create, send, receive, and decode hidden messages in this fun activity that teaches about color and filters.

## Assembly

1. Fold the cardstock in half.
2. Cut a rectangle in the folded card, creating a hole ~5 cm x 5cm (~2" x 2") in the cardstock.
3. Create a viewer by taping the piece of red filter in between the cardstock and then taping the cardstock together.



## To Do and Notice

1. Using crayons and/or markers, investigate how each color appears with and without the red viewer. Draw a line or simple shape onto white paper and then look at it through the viewer. (Students should notice that red colors seem to “disappear” when viewed through the red filter, while blue and green appear dark, or even black.)
2. After investigating how colors will appear through the filter, create a picture with a “hidden” image or message that can be seen easily only when viewed through the red filter.

## The Science Behind the Activity

Our eyes and brains interpret visible light waves as colors, depending on their wavelengths and frequencies. “Red light” has the longest wavelength (700 nm) while “Violet light” has the shortest wavelength (400 nm). An object appears green because that object reflects “green light” but absorbs other colors. White light (such as sunlight or light from a standard light bulb) is a mixture of all colors.

Filters can be thought of as sieves. Just like a pool filter lets water through, but blocks leaves and other debris, a red filter allows “red light” through, but blocks other colors. Remembering that white light is a mixture of all colors (including red), if a red line written in crayon is viewed on a white background, red light from the whole page is let through the filter, and the red line seems to disappear. The red filter, however, blocks blue light; thus the blue line appears dark, or black.

**Web Resources** - (Visit [www.raft.net/raft-idea?isid=402](http://www.raft.net/raft-idea?isid=402) for more resources!)