

Name _____

Period _____

Date _____

STUDENT SHEET 4

Making colored light from white light

Color filters and diffraction gratings reveal the many colors that make up white light. These devices make colored light out of white light in different ways. How are they different?

MATERIALS

For each group of four

- light station with single-slot mask
- 1 square-frame diffraction grating
- 3 small color filters in frames—1 red, 1 green, and 1 blue
- 2 white holders for filters and gratings
- colored pencils
- white paper
- tape

WHAT TO DO

Working with the room lights on

1. Explore color filters. Hold a filter up to your eye and look at objects throughout the room. Describe how each filter affects the colors of things in the room.

Red filter:

Blue filter:

Green filter:

2. What do you observe when you look at classroom objects through two (or more) different color filters stacked together? *Describe two of your observations.*



FIGURE 4.1
*Single-slot mask
 for light station*

SAFETY

Improper use of the light station can result in burns from the hot bulb or electric shock from the wiring. Follow your teacher's instructions at all times.

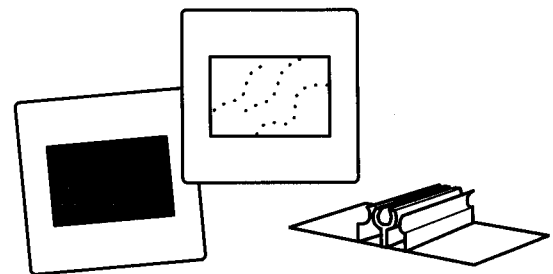


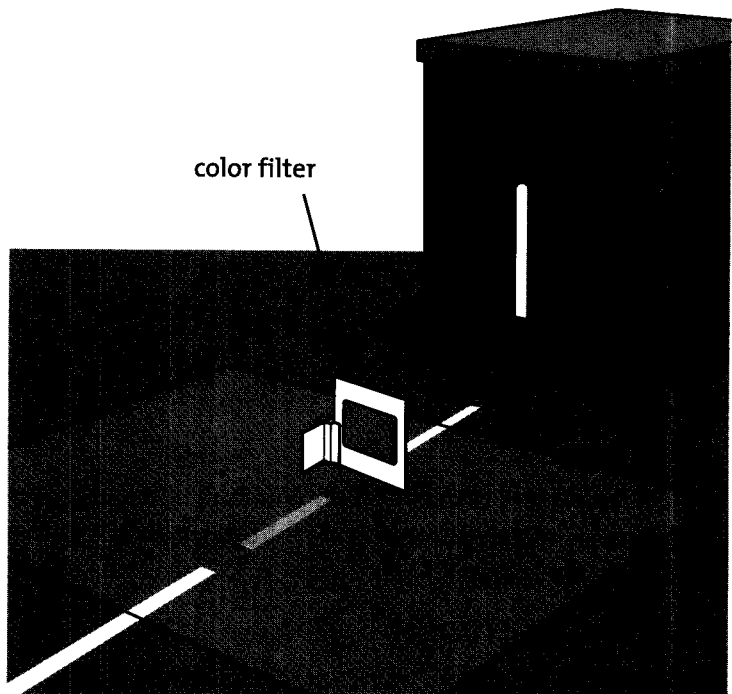
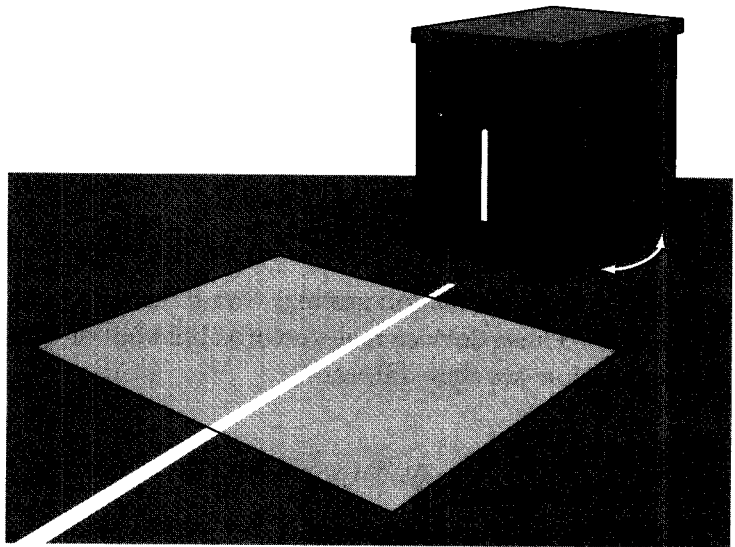
FIGURE 4.2
*Color filter, diffraction
 grating, holder*

Working with the room lights off

Making a light beam:

- Lay the white paper flat on the table close to the light station.
- Slide the single-slot mask over the light station opening to make a beam across the paper.
- Turn the wheel through its full range of motion, to find the best setting to make a narrow, sharp beam.

3. What happens to white light when it goes through a colored filter? Find out by putting each filter (one at a time) in the beam. *Generalize: how does a colored filter affect a beam of white light?*

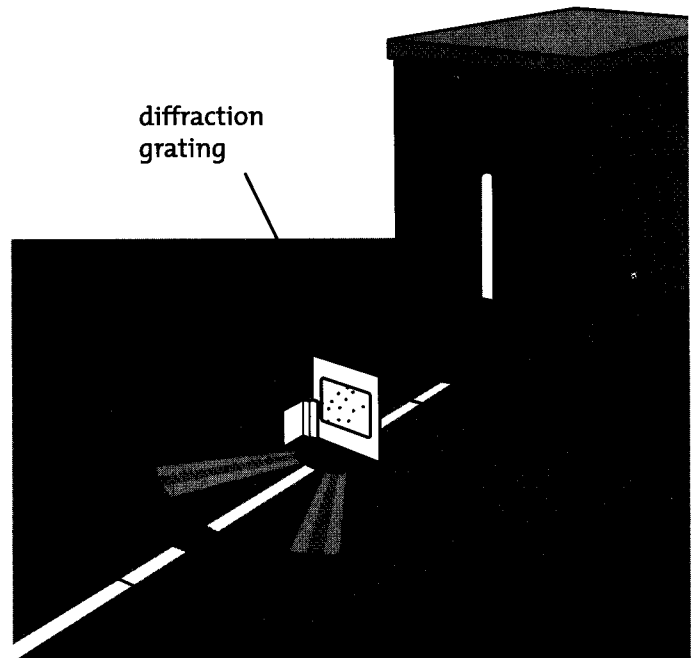


4. What happens to the light beam when you put two or more filters into the beam at once?

5. Making a spectrum.

- Tape the paper to the table lightly in two places.
- Stand a diffraction grating upright in the beam. Rotate it if necessary to make a bright spectrum on the white paper on each side of the main beam.
- Attach a white holder on one side of its frame as shown.

Use colored pencils to draw on the paper where the spectra appear, showing all of the spectrum colors, and their correct placements.



6. Journal question: *Describe three different things that you observe when the diffraction grating is in the light beam.*

SUMMARY QUESTION

7. Journal question: Colored filters and diffraction gratings both reveal the many colors that make up white light. *How are filters and diffraction gratings different?*