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Color and Light

Spectrum Demonstrations

Publication No. 10410

Introduction

Why is a red apple red? Does a green filter change white light into green light? What color of light is observed when red and green lights are mixed? The answers to these questions may surprise your students. This demonstration uses a holographic diffraction grating and an overhead projector to produce a very large, very sharp rainbow of color. The large spectrum allows you to demonstrate the true nature of color and light and address common misconceptions related to the perception of color.

Science Concepts

- Visible light spectrum
- White light
- Color
- Reflection and absorbance

Materials (for each demonstration)

Construction paper*:
  Blue, green, red and white, 9″ × 12″, 1 sheet of each
  Black, 12″ × 18″, 2 sheets
Diffraction grating, holographic, 14 cm × 14 cm*
Flat-sided plastic bottle*
Food dye, green, dropping bottle, 30 mL*
Hand mirrors, glass, 3*
Petri dish*
Pipet, Beral-type*
Beaker, 50-mL
Gloves, latex, nitrile, or polyethylene
Highlighter pen, yellow
Marker, black
Overhead projector
Paper, notebook, white, 8½″ × 11″
Projection screen, or blank, white wall
Tape

**Materials included in kit.*

The *Color and Light—Spectrum Demonstrations* is available from Flinn Scientific, Inc.

Catalog No.	Description	Price/Each
AP6172	Color and Light— Spectrum Demonstrations	Consult Your Current *Flinn Catalog/Reference Manual.*

Preparation

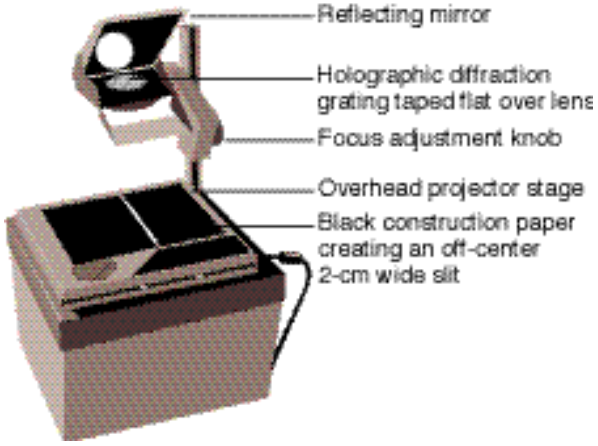

Figure 1. Overhead Projector

1. Obtain an overhead projector and place it 10–15 feet from a projection screen (or blank, white wall).
2. Turn on the overhead projector and aim the light at the desired screen or wall. Turn off the lights in the room and eliminate other extraneous light by closing the blinds or curtains.
3. Obtain the two black sheets of construction paper.
4. Form a 2-cm wide slit in the center of the stage of the overhead projector with the two sheets of black construction paper. Position the slit on the stage so that the image of the slit projected onto the projection screen is vertical (refer to Figures 1 and 2).
5. Place the holographic diffraction grating film above the lens of the overhead projector (see Figure 1). Be sure to wear gloves when handling the diffraction grating. If the spectra are not projected to the left and right of the screen, rotate the diffraction grating 90 degrees (the alignment of the grating is important). Once two bright spectra (mirror images of each other) are displayed horizontally to the left and right of the film screen (Figure 2), the diffraction grating should be secured to the lens with tape. Tape only on the outside edges of the diffraction grating and make sure the diffraction grating is taped flat.

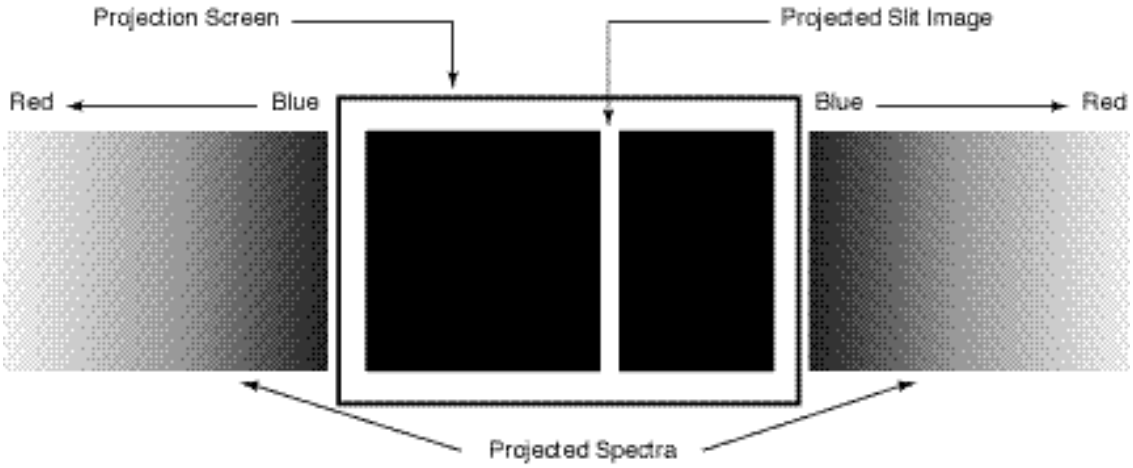

Figure 2. Projected Spectra

6. Adjust the focus of the overhead projector so that the image of the slit is in sharp focus on the screen. The two spectra should also come into focus.
7. Once the slit is aligned so the “selected” spectrum is in the proper location to be viewed by the students, the construction paper should be secured to the overhead projector with tape.
8. Several activities can be performed to demonstrate that white light is composed of all colors, and many other properties of light.

Acknowledgment

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