

Bending Light to Make a Rainbow

White light is really made of all the colors of the rainbow mixed together. Light can be bent when it passes through different materials. A wedge-shaped prism not only bends the light, but also bends each color a different amount, revealing red, orange, yellow, green, blue, indigo and violet.

Objective

Observe how white light bends as it moves through a prism, producing a spectrum, and then discover how primary colors of light (red, blue and green) combine to make white light.

Materials

- a prism
- a piece of white poster board
- tape
- three flashlights
- some rubber bands to attach the cellophane to the flashlight
- sheets of red, blue, and green colored plastic gel or cellophane

Safety Notice: All applicable laboratory safety rules must be followed. Students should not perform any experimental activity without the teacher's supervision and express permission. Students must follow safety guidelines and wear appropriate protective gear.

Procedure

Experiment 1: Prism

1. Tape the poster board to the wall.
2. Stand the prism on the table near the poster board.
3. Make the room as dark as possible.
4. With the room darkened, stand back from the prism and aim the beam of a flashlight directly at it. Turn the prism a bit, and redirect the light from the flashlight through the prism until you can see a rainbow of colors on the poster board.
5. Record all the colors you can see in the order that they appear on the poster board.

Experiment 2: Combining Colors

1. Take all three flashlights, and cover each one with a different color of plastic cellophane. This will make each flashlight shine with a different color light—red, blue, and green. Do you think you can make white light by combining other colors of light?

2. Choose three students to hold the flashlights. Hold the flashlights directly in front of the poster board and shine them on the board so you can see all three colors.
3. Now, move the lights together so that they are all shining on the same spot. What happens?

Conclusions

- Describe the prism. Tell about its shape and what it did in the experiment.

- Light is energy that travels in waves, and it's the length of the waves that determines the energy and color of light. Violet has the most energy with about 70,000 waves to the inch and red light has the least with about 40,000 waves to the inch. Place the other colors in the spectrum in order in the diagram below.

Red

Violet
