

Infrared Radiation

Visible light represents only one portion of the electromagnetic spectrum. Radiation more energetic than violet is known as *ultraviolet* (ultra-, meaning “above”), while radiation less energetic than red is known as *infrared* (infra-, meaning “below”). Although we cannot see infrared light, we can feel it. If you have ever stood next to a campfire on a cold night, you may have noticed that one side of your body was heated while the other side remained quite cold. The fire heats primarily by emitting infrared radiation — heating of the air is minimal. When your body and clothes absorb infrared radiation, they become warmer. Sunlight, like firelight, has an infrared component.

Concepts to Investigate: Electromagnetic radiation spectrum, infrared light

Materials: Prisms, thermometer, cardboard or dark construction paper to create slit for sunlight, white paper for background

Procedure:

Find sunlight and arrange your cardboard or dark construction paper so the light passes through the slit (slit should be approximately 5 mm x 15 mm).

Place a prism in front of the beam to refract the light into the spectrum.

Record the external temperature around you by placing the thermometer far away from the spectrum.

Place the thermometer in each of the colors in spectrum and record the temperature of each after 3 minutes

Place the thermometer in the region just beyond red and record the temperature after 3 minutes.

Temperature (°C)	
External	
Violet	
Indigo	
Blue	
Green	

Temperature (°C)	
Yellow	
Orange	
Red	
Infrared	

Questions:

1. How does the temperature of each color compare to the external temperature and to each other? What trends did you notice?
2. Generate a hypothesis as to why the colors correspond to the temperature trends you observed.
3. How did the temperature measured in the region beyond red light compare to the temperature measured in the rest of the spectrum? Why might that be?
4. Certain types of photographic film are sensitive to infrared radiation. When infrared film is developed, it allows you to “see” infrared radiation. What would an infrared picture of a recently driven automobile look like? (Describe key features)
5. Fluorescent light fixtures are more efficient than incandescent light bulbs because they emit less infrared radiation. Explain.