

Name _____

Period _____

Date _____

STUDENT SHEET 1

Exploring the visible spectrum

Raindrops, diamonds, soap bubbles, oil slicks, and compact disks can turn white light that strikes them into brilliant colors. What do these colors tell us about the light? Do all "rainbows" look the same? We can investigate the colors in light using a diffraction grating.

MATERIALS

For each group of four

- 4 round diffraction gratings
- colored pencils
- light station, with side shield but no top



Avoid getting fingerprints or dirt on the clear part of the diffraction grating. Hold it by the small black frame.

Leave light stations turned off for Questions 1 and 2.

WHAT TO DO

1. Explore diffraction gratings. With the room lights on, hold a diffraction grating very close to your eye and look through it at a variety of things. *Describe what you see.*

2. The color pattern made by a diffraction grating is called a spectrum (plural: spectra). *List three things in a lighted room that have a bright, clear spectrum, and three other things that don't cause a spectrum.*

SAFETY

Do NOT look at the sun. It can damage your eyes. 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.

- 3.
- With the room lights off and your light station turned on, look through the diffraction grating at various lights in the room. Don't look directly at a light, look for its spectrum.
 - Rotate the diffraction grating to different positions to see how its orientation (how it is turned) affects what you see.

How does rotating the diffraction grating tell you which light is making which spectrum? Explain.

4. Journal question: Choose just one light station to look at. In addition to the spectrum of the glowing bulb, there will probably be spectra from many reflecting surfaces around the light such as the socket.
- Use your hand or other object to block some of the reflections so that you can identify which spectrum is coming directly from the lightbulb and not from the reflections.
 - Hold the grating so that the spectrum is horizontal (goes from side to side)

Ignore the spectra made by reflections. Use colored pencils to draw the spectrum of the lightbulb. Include the lightbulb in your sketch.

5. Your teacher has set up a light source that has a different spectrum. It is called a compact fluorescent light source. Hold the grating so that its spectrum is horizontal. *Sketch the spectrum of the compact fluorescent light. Use black to show any areas where there is no light.*

SUMMARY

6. The lightbulbs in the light stations are incandescent. Compare the spectrum of the compact fluorescent bulb to that of an incandescent light source. *Describe how these two spectra are the same and how they are different.*
7. Journal question: *Describe three different things about light and spectra that you learned from your observations through a diffraction grating.*

