

# Light: The Astronomer's Friend!

Geology

Mr. Traeger

Name: \_\_\_\_\_

Period: \_\_\_\_\_

Date: \_\_\_\_\_

## Purpose

The purpose of the following activities is to acquaint the student with the aspects of light that are necessary for studying stellar astronomy.

## Materials

▪ 3+Adding Machine Tape	▪ Colored Pencils	▪ Spectroscopes
▪ Prism	▪ Projector	▪ Light Boxes (unknown elements)

## Part 1: Visible Light

1. The teacher will shine white light through a prism using a slide projector.
2. Draw what you see. Include the light source, the prism, and the resulting colors in their correct order. State the ordering of colors.

3. Light has dual properties. What are these properties?

4. Draw a light wave. Label the crest, the trough, the wave height, and the wave length.

5. What are some other ways that visible light can be divided into its separate colors?

6. Can light travel through empty space? Why or why not?

7. Look at the graph on page 613 of your textbook. Which color has the shortest wavelength? The longest?

Shortest Wavelength?	Longest Wavelength?

8. Does light only exist in the visible wavelengths (ie. what we can see)? Why or why not?

9. Mr. Traeger has a good friend named ROYGBIV. Who is ROYGBIV and what does each letter in his name signify in terms of color?

**Part 2: Infrared Radiation Video**

1. What is infrared radiation?
2. What kinds of things give off infrared radiation?
3. Do **you** give off infrared radiation?
4. How might we use infrared radiation to see things in the universe?
5. What are some other items that you know of that are used to sense infrared radiation?

**Part 3: Ultraviolet Radiation Lab**

For this part, you will do a separate lab comparing different sunscreens and the types of Ultraviolet Radiation given off by the Sun. See the lab called Soaking up the Sun: An Investigation of Sunscreens and Ultraviolet Intensity. You will also need a copy of Vernier Lab #21 Comparing Sunscreens. Staple your lab to this lab when you are finished.

**Part 4: The Electromagnetic Spectrum**

1. Sketch the diagram of the Electromagnetic Spectrum as seen on page 613 of your textbook. Make sure to include the wavelengths of each type of radiation and also give an example of something that you use in every day life that uses each part of the spectrum. (ex. Your eyes use visible wavelengths.)

**Part 5: Spectra of Stars**

1. Using your spectroscope, look at each one of the light boxes. **Do not touch the light boxes! You will get zapped with 5,000 Volts of electricity!** Draw and **color** the spectral lines that you see for each type of light on the attached page. Write in the corresponding wavelengths for each color.
2. Identify the element that each light box tube is and place the name of this element next to the spectra that you drew. Use the following website to help you identify what each element is. <http://phys.educ.ksu.edu/vqm/html/emission.html> It would probably be easier to Google %ksu spectroscopy+and then click on the first link called %emission spectroscopy.+
3. How do your spectra compare? Could you use these differences to determine a star's chemistry?
4. How do daylight and the incandescent bulb compare? Why are these spectra continuous?
5. What chemical element(s) are fluorescent bulbs and compact fluorescent bulbs made out of? Point your spectroscope at a fluorescent bulb to find out and then compare the spectra with the ksu spectroscopy website.

6. What color star would be very hot?	What color star would be cool?

7. How do astronomers know what chemical elements are in a star?

8. Define the following:

Continuous Spectrum	Emission Spectrum	Absorption Spectrum

9. Describe the Doppler Effect. How would astronomers use it to know whether a star is moving towards us or away from us?

J-7, Spectroscopes and Spectrometers

### Drawing Spectra

Red	Orange	Yellow	Green	Blue	Violet
<b>Element 1:</b> _____					

Red	Orange	Yellow	Green	Blue	Violet
<b>Element 2:</b> _____					

Red	Orange	Yellow	Green	Blue	Violet
<b>Element 3:</b> _____					

Red	Orange	Yellow	Green	Blue	Violet
<b>Element 4:</b> _____					

Red	Orange	Yellow	Green	Blue	Violet
<b>Element 5:</b> <u>Fluorescent Light Bulb</u>					

Red	Orange	Yellow	Green	Blue	Violet
<b>Element 6:</b> <u>Daylight or Incandescent Light Bulb</u> (Do not point directly at sun!)					

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