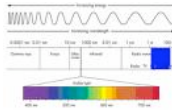


Student Activity:  
Measuring Wavelength  
(by diffraction of light)



Name \_\_\_\_\_  
Date \_\_\_\_\_  
Period \_\_\_\_\_ Table \_\_\_\_

**INTRODUCTION** - Everyone agrees that light travels in a straight line. Our everyday experiences support this accepted fact.

Yet there are instances when light does seem to bend. Shadows from objects do not have sharp edges. Light bends around a corner into light and dark bands or into colored bands of the spectrum. The amount of bending depends on the wavelength of the light. By measuring the amount of bending the wavelength of light may be learned.

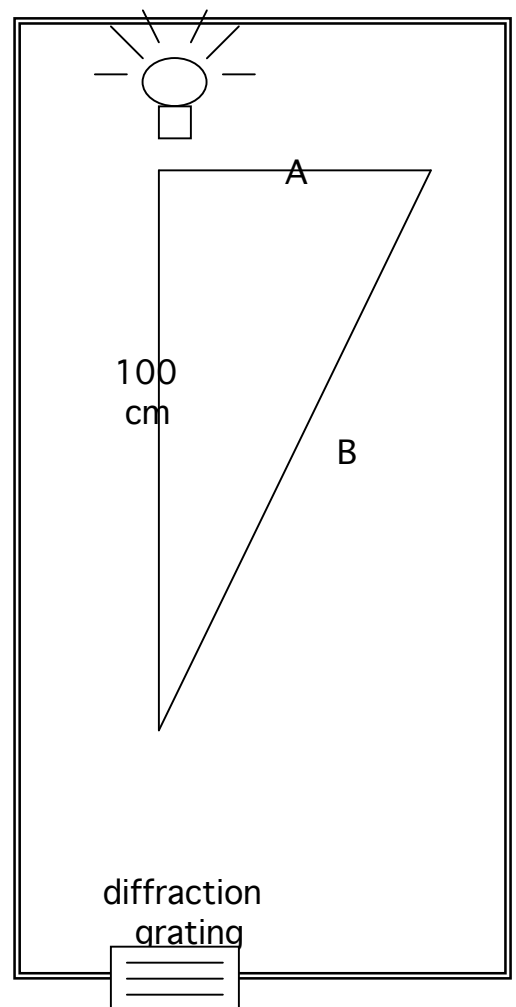
**PROBLEM** - What are the wavelengths of the various colors of light? How do the various colors of light compare?

**MATERIALS** - light source (pin light)  
diffraction grating  
2 meter sticks

metric ruler  
ring stand  
Buret clamp

**PROCEDURE**

- Set up the materials as shown in the drawing.
- Carefully measure in centimeters the distances from the light to each of the colors. Record this data on the chart under Distance A.
- Measure the distance in centimeters from the diffraction grating to each of the colors. Record this data on the chart under Distance B.
- The wavelength of a color of light in centimeters is equal to:  
$$A/B \times .00019$$
Determine the wavelength of light in centimeters. Record this in the chart.
- The wavelength of light is usually measured in a unit of length called an angstrom which is abbreviated Å. An angstrom unit is 1/100,000,000 of a centimeter. To convert the wavelengths calculated in centimeters to angstrom units move the decimal point eight places to the right.



COLOR	DISTANCE A	DISTANCE B	$\lambda$ in cm	$\lambda$ in Å
RED				
ORANGE				
YELLOW				
GREEN				
BLUE				
VIOLET				

### CONCLUSIONS

1. What color has the longest wavelength? \_\_\_\_\_
2. What color has the shortest wavelength? \_\_\_\_\_
3. Define diffraction:
4. Define electromagnetic spectrum:
5. Using a drawing of the electromagnetic spectrum, what would you expect the wavelength of infrared light to be? \_\_\_\_\_  
Of ultraviolet light? \_\_\_\_\_
6. Using the data found above, explain the difference between a Blue Shift and a Red Shift when referring to the motion of stars related to the Earth.