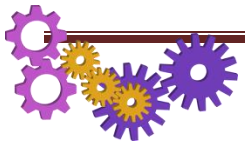


**Name _____**

**Where appropriate – ALWAYS show your formulas and your work!**
**Use the back of your paper if you need to.**

**Energy Levels of Light Colors**

You have some glow-in-the-dark materials in a dark box. Open the box. Hold the RED-capped flashlight a distance of about 5 cm from the material for 15 seconds. Record your observations. Close the box and wait a few seconds for the material to quit glowing. Now repeat the process with a GREEN filtered light and a BLUE filtered light.

Based on your observations, which color light has the highest energy?

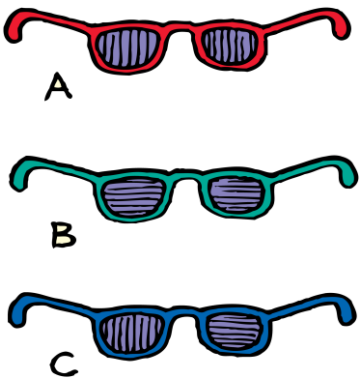
Tell me WHY this occurred.

**Polarization**

Using ONE polarized lens, hold it upright and look at either a computer screen or your cell phone screen (I know… what cell phone?). Now turn the polarized lens 90° to the right and observe what happens to the light intensity coming off the screen. Explain what you observed and WHY it happened.

Now, using two polarized lens, stack them together in the same direction and hold them up to one eye. Look towards a stronger light source (like out the window) then turn <u>one</u> of the lenses 90° perpendicular to the other lens. What happens to the light filtering through to your eye? This time – sketch what's happening with the light rays from the light source, through the two lenses to your eye.

Based on what you know about how light rays travel, which pair of glasses is best suited for automobile drivers? (The polarization axes are shown by the straight lines.) WHY?

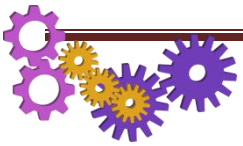


**Calculations – show all your work!**

Calculate the frequency of green light with a wavelength of $530 \times 10^{-9}$ m.

A radio station has a frequency of 90.9 megahertz ($9.09 \times 10^{7}$ Hz). What is the wavelength of the radio waves the station emits from its radio tower?

An x-ray has a wavelength of 5 nanometers ($5.0 \times 10^{-9}$m). What is the frequency of x-rays?



**Diffraction**

Using a laser light and the 13,500 lines/inch diffraction gratings, do the following and record your observations.

1) Shine the laser light on the wall – what do you see?

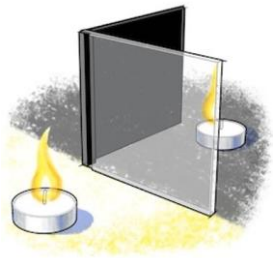
2) Shine the laser light through one of the diffraction gratings. Now what do you see? Note the brightness of each point of light.

3) Holding two diffraction gratings approximately 5 cm apart, shine the light through them both. What do you see?

Explain what happened to the light rays in each of the above scenarios. **Be detailed – include sketches showing the direction of the light rays.**

**A Little Light Action Review**

Set up a pane of glass and two tea candles as demonstrated, but only light one of the candles. Then look through the glass from the side with the lighted candle. Line up your line of sight until it looks like both candles are lit. Sketch a ray diagram below showing what happened with the light rays coming off of the lit and unlit candles and how they reached your eyes.



**Electromagnetic Waves**

Rank these parts of the electromagnetic spectrum from lowest **frequency** (1) to highest **frequency** (7).

_____ Gamma

_____ Infrared

_____ Microwave

_____ Radio

_____ Visible

_____ Ultraviolet

_____ X-ray