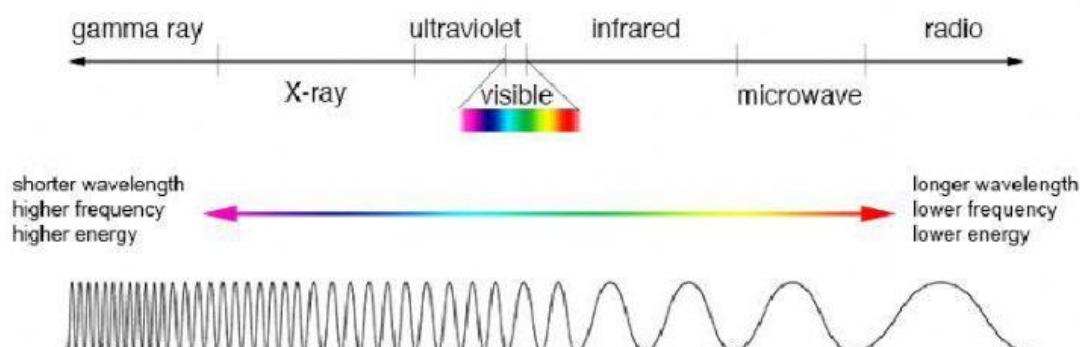


Name: _____ Date: _____

PHYSICS: Light and Optics

Activity: PHET Measuring Wavelength & Frequency of Visible Light

Electromagnetic radiation (EMR) is light, and there are seven classes of electromagnetic radiation in the electromagnetic spectrum. Visible light is the most narrow band of electromagnetic radiation. The human eye can only detect light between wavelengths of 380 nm (limit of violet) to 760 nm (limit of red). nm is the unit nanometers. $1 \text{ nm} = 1.00 \times 10^{-9}$ meters, or, there are 1 billion (1,000,000,000) nanometers in 1 meter.



INSTRUCTIONS

Open a web browser and go to: PHET Waves Intro

https://phet.colorado.edu/sims/html/waves-intro/latest/waves-intro_en.html

Choose the WAVES INTRO LIGHT

1. In the upper right gray menu, choose the options
 - Choose the laser source (device on the right). The visible spectrum should appear.
 - Move the yellow tape measure from the gray menu to the wave field.
2. In the lower left corner, choose continuous waves (button with many transverse waves).
3. Under the wave field, choose TOP VIEW.
4. Press the PLAY button. Press the round green button on the laser. Light waves should begin to come out of the laser.

5. Toggle the slide pointer to the far left side of the visible spectrum to the near infrared. The color of the laser light should change from its original color to a deep brownish red.
6. Allow for the near infrared light waves to fill the entire wave field, then press PAUSE.
7. Use the yellow tape measure to measure the distance covered by five consecutive light waves. Place the tape measure's tape box on the center of a wave, then drag the telescoping end across five waves, placing the tip of the telescoping end in the center of the fifth wave. Measure the length of five waves in nm.
8. Press PLAY.
9. Repeat steps 5-8 with the other color light of the visible spectrum.

Data Table

Color Light	5 wavelengths (5λ , nm)	1 Wavelength (λ , nm)	1 Wavelength (λ , m)	Frequency (Hz)
Near Infrared				
Red				
Orange				
Yellow				
Green				
Blue				
Indigo				
Violet				

- Determine 1 wavelength 1λ , divide the distance of 5 wavelengths by 5.
- Calculate the wavelength in meters, divide the wavelength by 1.00×10^9 .
There are 1,000,000,000 nm in 1 meter.

$$m = nm \cdot \frac{1 m}{1.00 \times 10^9 nm}$$

- Calculate the frequency of the color light. Frequency is the speed of light divided by the wavelength. Wavelength is in meters. The speed of light = 3.00×10^8 m/s

$$f = \frac{c}{\lambda} = \frac{3.00 \times 10^8 m/s}{\lambda}$$

