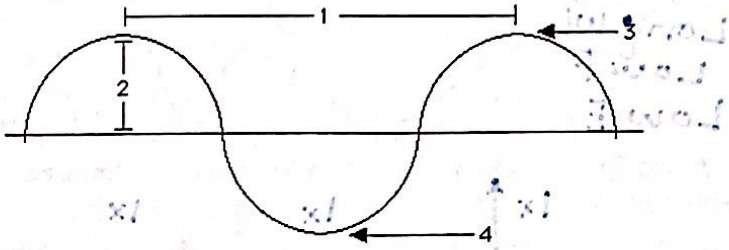
Name: Date: Pd:

Unit 2, Section 2 - Light Energy - Electromagnetic Radiation

As a form of energy, light (electromagnetic radiation) travels in waves through the environment. Below are the parts of a wave:

1 - Wavelength
2 - Amplitude
3 - Crest
4 - Trough



Energy of a wave can be identified in two easy ways: wavelength and frequency of the wave. Wavelength is a measurement of the distance from crest to crest; on two consecutive waves and is often measured in meters or nanometers. Frequency refers to the number of waves that pass a point per second, measured in Hertz (Hz). ↘ speed (107.5 MHz)

Let's practice some metric conversions!

- Convert from 34 cm to meters:

$$\frac{34 \text{ centimeters (cm)}}{1 \text{ centimeters (cm)}} \left| \frac{0.01 \text{ meters (m)}}{} \right. = 0.34 \text{ m}$$

Multiplication Factor	Prefix	Symbol
1,000,000,000 = 10^9	giga	G
1,000,000 = 10^6	mega	M
1,000 = 10^3	kilo	k
100 = 10^2	hecto	h
1 = 1 (Base)		
0.01 = 10^{-2}	centi	c
0.001 = 10^{-3}	milli	m
0.000001 = 10^{-6}	micro	μ
0.000000001 = 10^{-9}	nano	n

↳ This many base in 1↑

- Convert from 1,340 km to millimeters:

$$\frac{1340 \text{ Km}}{1 \text{ Km}} \left| \frac{1000 \text{ m}}{0.001 \text{ m}} \right| \frac{1 \text{ mm}}{} = 1.34 \times 10^9 \text{ mm}$$

← 1340000000

Base: meters, grams, Liter, Hertz, etc.

Ex: 1,000 m = 1 Km
1,000,000 m = 1 Mm
0.001 m = 1 mm
] 9 L Hz

- Convert from 1.23×10^{14} nanometers (nm) to meters:

123,000 m

- Convert from 2.3 Megahertz (MHz) to Hertz (Hz):

2.3×10^6 Hz

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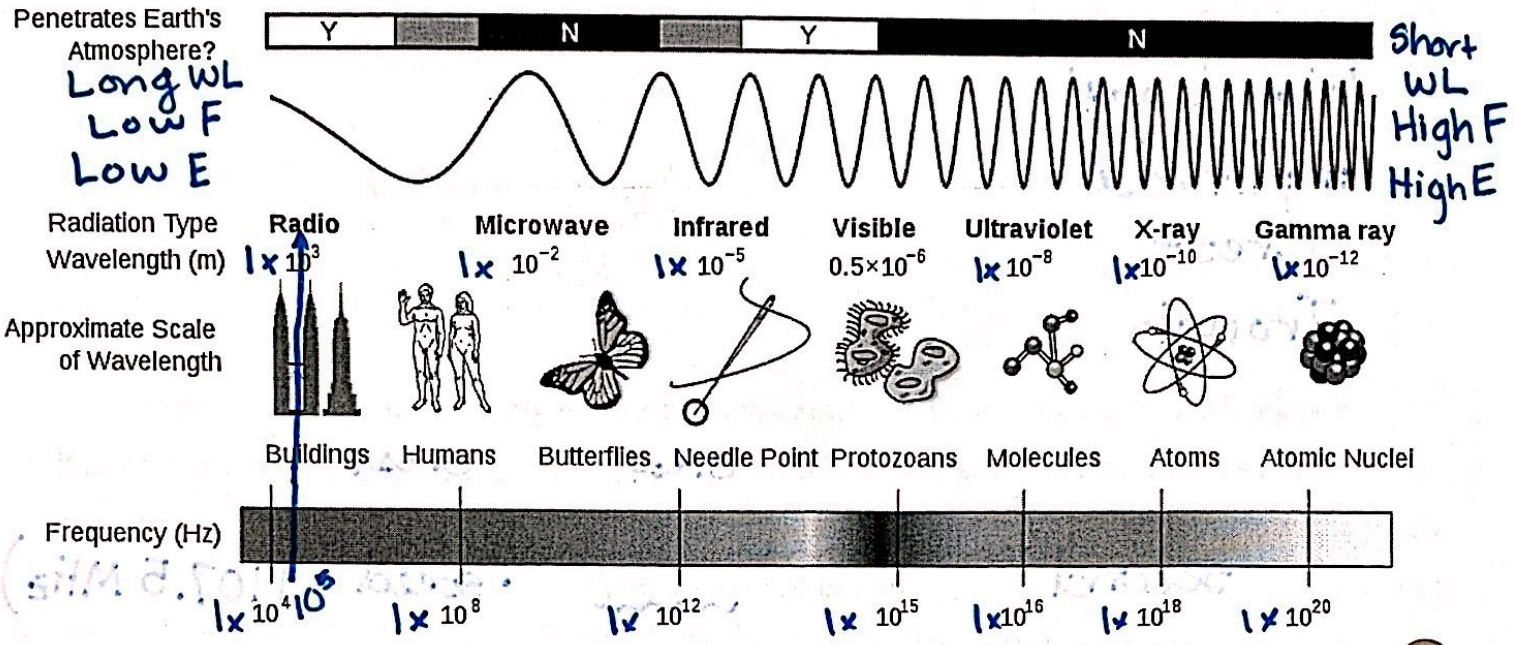
Electromagnetic Spectrum:

The electromagnetic spectrum is the full spectrum of all light energy. The spectrum is designed based on decreasing wavelength and increasing frequency. The shorter the wavelength, the greater the energy of the wave.



Circle the correct answer for the statements/questions below:

1. The waves to the RIGHT on the spectrum are at a (**higher energy** / **lower energy**) than the waves to the left.
2. Which of the following energies has the LONGER wavelength? **Radio** or **Infrared**
3. Which of the following energies has the SHORTER wavelength? **X-Ray** or **Microwave**

Match the following wavelengths/frequencies of light with their correct type of radiation:

1. Wavelength of 1.0 x 10^{-5} meters (m) = Infrared
2. Wavelength of 9.43 x 10^{-10} meters (m) = X-ray
3. Frequency of 1.22 x 10^{5} meters (m) = Radio
4. Frequency of 5.4 x 10^{15} meters (m) = Visible

Now, let's put it all together. Convert the following, then identify the correct type of radiation:

1. 49 nanometers (nm) = 4.9×10^{-8} meters (m) - UV

$$\frac{49\text{nm}}{1\text{nm}} \left| \frac{10^{-9}\text{m}}{} \right. = 4.9 \times 10^{-8}\text{m}$$

2. 0.0032 nanometers (nm) = 3.2×10^{-12} meters (m) - Gamma