## Unit 2, Section 2 - Light Energy - Electromagnetic Radiation

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

1	
2	
3	
4	

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 \_\_\_\_\_\_ to \_\_\_\_\_ on two consecutive waves and is often measured in meters or nanometers. Frequency refers to the number of waves that pass a point per \_\_\_\_\_\_, measured in Hertz (Hz).

Let's practice some metric conversions!

- Convert from 34 cm to meters:

34 centimeters (cm) 0.01 meters (m) 1 centimeters (cm)

- Convert from 1,340 km to millimeters:

Multiplication Factor	Prefix	Symbol
1,000,000,000 = 10 <sup>9</sup>	giga	G
$1,000,000 = 10^{6}$	mega	M
1.000 = 10 <sup>-3</sup>	kilo	k
$100 = 10^2$	hecto	h
1 = 1		
$0.01 = 10^{-2}$	centi	C
$0.001 = 10^{-3}$	milli	m
$0.000001 = 10^{-6}$	micro	µ
0.00000001 = 10 <sup>-9</sup>	nano	n

- Convert from 1.23x10<sup>14</sup> nanometers (nm) to meters:

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

Electromagnetic Spectrum:									
The electromagnetic spectrum is the full spectrum of all light energy. The spectrum is designed									
based on decreas		and increasing							
shorter the wavelength, the			the energy of the wave.						
Penetrates Earth's	Y		N	Y	,		N		
Atmosphere?			$\sim$						
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				$\langle \rangle \langle \rangle$	$\mathbf{V} \mathbf{V} \mathbf{V}$	V V V V I	/		
Dadiation Type	Radio	Mic	rowave	Infrared	Visible	Ultraviolet	V ray	Commo rov	
Radiation Type Wavelength (m)	10 <sup>3</sup>		.0 <sup>-2</sup>	10 <sup>-5</sup>	$0.5 \times 10^{-6}$	10 <sup>-8</sup>	<b>X-ray</b> 10 <sup>-10</sup>	Gamma ray 10 <sup>-12</sup>	
		RR Q	Δ.	The second secon	3777 10		$\wedge$	10	
Approximate Scale		TANG)	12				A R		
of Wavelength		FA M		1	Time	• •	$\alpha$		
	Desilation and		Dutterflier		Ductorson	Malaaulaa		Atomio Nuclei	
	Buildings	Humans	Butterflies	Needle Poin	Protozoans	Molecules	Atoms	Atomic Nuclei	
Frequency (Hz)									
r requertey (r iz)									
	10 <sup>4</sup>	10 <sup>8</sup>		10 <sup>12</sup>	10 <sup>15</sup>	10 <sup>16</sup>	10 <sup>18</sup>	10 <sup>20</sup>	

Date:

Pd:

## *Circle the correct answer for the statements/questions below:*

Name:

- 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<sup>-5</sup> meters (m) = \_\_\_\_\_
- 2. Wavelength of 9.43 x  $10^{-10}$  meters (m) =
- 3. Frequency of 1.22 x 10<sup>5</sup> meters (m) = \_\_\_\_\_
- 4. Frequency of 5.4 x 10<sup>15</sup> meters (m) = \_\_\_\_\_

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

- 1. 49 nanometers (nm) = \_\_\_\_\_ meters (m) \_\_\_\_\_
- 2. 0.0032 nanometers (nm) = \_\_\_\_\_ meters (m) \_\_\_\_\_