WS 4.0 *Name:*_____ *p.*____

1. Consider two photons of light energy:
Photon #1 has a frequency of 4.38×10^{14} Hz. Photon #2 has a frequency of 7.43×10^{14} Hz.

a. Calculate the wavelength of each photon, in meters:

Photon #1 Photon #2

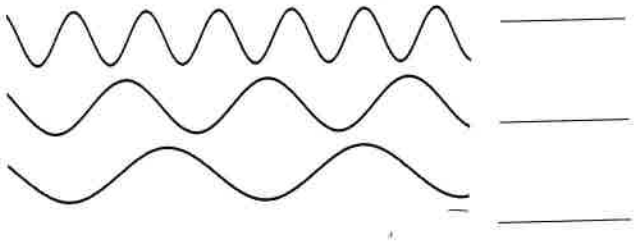
b. Convert your answers to nanometers, and then identify the part of the EM spectrum/types of light.

Photon #1 Photon #2

c. Which photon had a higher frequency?_____
Which photon had a longer wavelength?_____
Which photon had a higher energy?_____

d. A third photon (photon #3!) has a wavelength of 582 nm.
What color/part of the spectrum is this photon?_____
Calculate the frequency of this photon.

2. Consider the three electromagnetic waves shown below. If the three waves correspond to the three photons in problem 1, which wave is which? Label each one with the number and the color.



3a. Energy and frequency are directly related variables.
This means that as frequency increases, energy _____

b. Energy and wavelength are inversely related.
This means that as wavelength increases, energy _____

c. Frequency and wavelength are _____ related.
This means that as wavelength increases, frequency _____

4. For each problem, fill in the missing wavelength and frequency, and determine which part of the EM spectrum the wave belongs to. (If it is in the visible spectrum, also say what color it is). Show work!

a. EM radiation with a wavelength of 2200 nm.

part of spectrum_____

λ = _____ m

λ = _____ nm

ν = _____

b. EM radiation with a frequency of 4.76×10^{14} Hz

part of spectrum_____

λ = _____ m

λ = _____ nm

ν = _____

c. EM radiation with a wavelength of 242 nm.

part of spectrum_____

λ = _____ m

λ = _____ nm

ν = _____

d. EM radiation with a frequency of 6.8×10^{16} Hz.

part of spectrum_____

λ = _____ m

λ = _____ nm

ν = _____

e. EM radiation with a wavelength of 0.0191 meters.

part of spectrum_____

λ = _____ m

λ = _____ nm

ν = _____