

## Electromagnetic Spectrum Practice – Level 3

### Rules for using significant figures in calculations with multiple operations (addition and multiplication)

1. The answer is same as the number with the fewest significant figures
2. Do not round any numbers for significant figures until the end of the problem

**How to convert nanometers (nm) to meters:** It's just stoichiometry with metrics!!!!

$$\frac{nm}{1} \times \frac{1 m}{1 E 9 nm} \text{ (this will convert from nm to m)}$$

$$\frac{m}{1} \times \frac{1 E 9 nm}{1 m} \text{ (this converts m to nm)}$$

**Please calculate the wavelength, frequency, and energy of light using Planck's constant and the speed of light for the following problems. You must show all of your work to get credit and answers must be in correct significant figures!**

A.  $c = \lambda f$

B.  $E = h f$

C.  $E = \frac{h c}{\lambda}$

Constants: Planck's constant =  $6.63 \times 10^{-34} \text{ J} \cdot \text{s}$

Speed of light (c) =  $3.00 \times 10^8 \text{ m/s}$

1. A certain substance strongly absorbs infrared light having a wavelength of 6,500 nm. Calculate the frequency in Hz of this light?
2. Calculate the energy of a photon of radiation with a frequency of  $8.5 \times 10^{14} \text{ Hz}$ .
3. Calculate the energy of a gamma ray photon whose frequency is  $5.02 \times 10^{20} \text{ Hz}$ ?
4. Calculate the energy of a photon of radiation with a wavelength of  $6.4 \times 10^{-7} \text{ nm}$ .
5. Calculate the energy of light whose wavelength is  $4.06 \times 10^{-11} \text{ nm}$ ?
6. If the energy of a photon of light is  $5.35 \times 10^{-13} \text{ J}$  calculate the wavelength of the particle of light?
7. Calculate the frequency of a beam of light if the energy level is  $4.32 \times 10^{-4} \text{ J}$ .