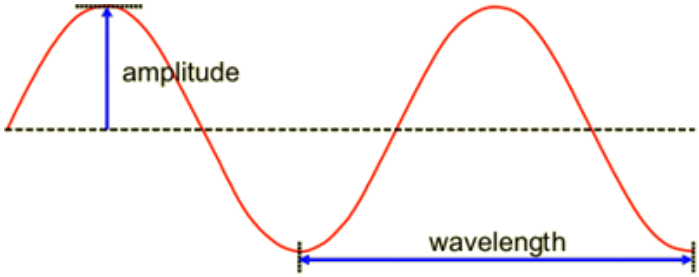
Quick quiz study guide

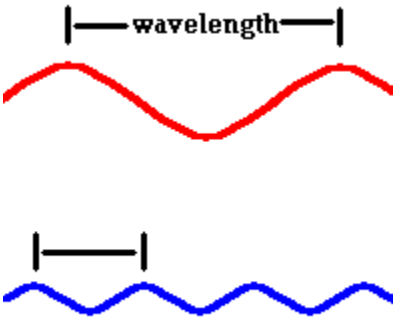
1. Draw a wave and label the: wavelength, and amplitude.



2. Define wavelength & frequency.
   Wavelength is the distance from crest to crest.
   Frequency is how often a wave passes a particular point (usually in one second).

3. What is the relationship between wavelength and frequency?
   The relationship between wavelength and frequency is "inversely proportional" which means when you have a big wavelength you have a low frequency and when you have a small wavelength you have high frequency.

4. Draw a red light wave & a blue light wave. Answer the questions about each wave: 1) which one has a large wavelength and which one has a smaller wavelength? 2) Which one has a high frequency? Which one has a low frequency? 3) Which wave contains the most energy?



   1 – red waves have a larger wavelength, blue have a shorter wavelength
   2 - blue waves have a higher frequency (high energy) , red waves have a lower frequency (low energy)
   3 – Blue waves contain the most energy.

5. Explain why an element gives off light when it is heated or electricity passes through it. (think electrons- read packet p. 8)
   Electrons gain/absorb energy when they are exposed to heat or electricity and they become "excited." When they are excited they are unstable and will "fall back to ground state." When they fall to ground state they will release they energy they gained in the form of light or color (a specific wavelength).

6. Define electromagnetic spectrum. The electromagnetic spectrum is the range of wavelengths over which electromagnetic radiation extends (gamma rays to radio waves).

7. List all of the types of radiation in the electromagnetic spectrum in order of increasing energy
   Radiowaves, Microwaves, Infrared, Visible Light, Ultraviolet, X-Rays, Gamma Rays

You will be given the formulas and the constants: ***Speed of Light, C=3.00 x 10^8 m/s, Planck's constant,*** **h=6.63 x 10^{-34} J x s**

12 a) Define each variable in the formula: **c= λv :** c = speed of light, λ = wavelength, and v = frequency

b) Light from a red light has a wavelength of 6.21 x 10^{-7}m. Find the frequency.

v = c / **λ**

v = (3.00 x 10^8 m/s) / (6.21 x 10^{-7}m) = 0.483 x 10^{15} Hz = ***4.83 x 10^{14} Hz***

13. NPR operates at a frequency of 8.95 x 10^6 Hz). All Electromagnetic waves travel at the speed of light, 3.00 x 10^8 m/sec. Determine the wavelength.

λ = c / v

λ = (3.00 x 10^8 m/s) / (8.95 x 10^6 Hz) = **0.335 x 10^2 m = 33.5 m**

14. a) Define each variable in the formula: **E=h v** : E = energy, h = Planck's constant, v = frequency

b) What is the energy of a photon of microwave radiation with a frequency of 3.20 x 10^{11} sec^{-1}?

E = h v

E = (6.63 x 10^{-34} J s) (3.20 x 10^{11} sec^{-1}) = 21.22 x 10^{-23} J **= 2.12 x 10^{-22} J**

15. The electron behaves both like a wave and a particle. Describe the 2 experiments that helped lead to this discovery:

(use your notes and re-watch this video for extra help: **https://www.youtube.com/watch?v=MFPKwu5vugg**)

a. The first experiment - the photoelectric effect (questioned wave theory)

b. The second experiment - hot object light emission (defined light as a particle)