SNYDER WORKSHEET 2005 Name:

Frequency/Wavelength/Energy

Equations: Speed = frequency x wavelength Frequency = Speed / Wavelength Wavelength = Speed / Frequency

Units: Speed: m/s Frequency: Hz (1/s) Wavelength: meters

Speed of Light [and all Electromagnetic Spectrum Waves] (c) = 3.0×10^{8} m/s

Energy = h · frequency h (Planck's Constant) = 6.626×10^{-34} J · s
Units: Energy: Joules frequency: Hz (1/s)

Problems:

1. Violet light has a wavelength of 4.10×10^{-12} m. What is the frequency?

2. Green light has a frequency of 6.01×10^{14} Hz. What is the wavelength?

3. What is the wavelength (in meters) of the electromagnetic carrier wave transmitted by **The Sports Fan** radio station
at a frequency of 640 kHz? (Hint: convert kHz into Hz by multiplying by 10^{3}.)

4. Calculate the wavelength of radiation with a frequency of 8.0×10^{14} Hz.

5. What is the wavelength of light with a frequency of 7.66×10^{14} Hz?

6. A helium laser emits light with a wavelength of 633 nm. What is the frequency of the light?
[Hint: First, convert nanometers(nm) into meters by multiplying by 10^{9}]

7. What is the wavelength of X-rays having a frequency of 4.80×10^{17} Hz?

8. An FM radio station broadcasts at a frequency of 107.9 MHz. What is the wavelength of the radio signal?
[Hint: First, convert Mega Hertz (MHz) into Hertz by multiplying by 10^{6}]

9. If the limits of human hearing are 20 Hz. to 20,000 Hz, what are the sound wavelengths that are associated with these
two extremes, assuming the speed of sound is 345 m/s.

10. If a sound is produced at the orchestra standard frequency of 440 Hz. If the speed of sound is
345 m/s, what is the wavelength of the sound that is produced?

11. Calculate the energy of a photon of radiation with a frequency of 8.5×10^{14} Hz.

12. Calculate the energy of a photon of radiation with a wavelength of 6.4×10^{-7} m.