General Chemistry
Mr. MacGillivray
Worksheet:
Light and Quantum Theory

1. Arrange the seven types of electromagnetic radiation that we discussed in class in order of **DECREASING** energy:

    a. _____ (highest E)
    b. _____
    c. _____
    d. _____
    e. _____
    f. _____
    g. _____ (lowest E)

2. In the list above, use words and arrows to indicate how the wavelength and frequency are changing.

3. Repeat #1 and #2 with the colors of the visible spectrum.

    a. _____ (highest E)
    b. _____
    c. _____
    d. _____
    e. _____
    f. _____
    g. _____ (lowest E)

4. "If the wavelength of light is very short, then the energy is very _____ and the frequency is very _____."

5. "If the wavelength of light is very long, then the energy is very _____ and the frequency is very _____."

6. Wavelength and frequency are _____ly related. Energy and frequency are _____ly related.

7. Energy is measured in these units: _____.
8. Wavelength is measured in these units: _____.
9. Frequency is measured in these units: _____, also written as _____ or _____.
10. Convert the following wavelengths to nm:
    a. $\lambda = 513$ m

    b. $\lambda = 8.03 \times 10^{-6}$ m

11. Convert the following wavelengths to m:
    a. λ = 755 nm

    b. λ = 0.272 nm

12. Find the energy of a photon of light with a frequency of 5.22×10^{21} 1/s.

13. Find the energy of a photon of light with a wavelength of 425 nm.

14. Find the wavelength of light with a frequency of 5.28×10^{15} s^{-1}.

15. Using p. 299, answer these questions:
    a. Is the light in question #9 visible?
    b. How did you know?
    c. Is it too high in energy or too low in energy to be seen?
    d. What type of light is it (what region of the electromagnetic spectrum)?