Name _____ period _____

$c = \lambda\nu$
$E_{photon} = h\nu$

c = speed of light = 3.0×10^{8} m/s
h = Planck's constant = 6.626×10^{-34} J
λ = wavelength
ν = frequency

1. Draw a wave and label it using the following terms: crest, trough, amplitude, wavelength, origin.

2. What is electromagnetic radiation? Give examples.

3. What are the colors of light in the visible spectrum in order of increasing frequency. Which color would exhibit the greatest energy?

4. How are wavelength and frequency related to each other? What the relationship between energy and frequency?

5. What is the wavelength, in meters, of a radio wave with a frequency of 5.40×10^{5} sec^{-1}?

6. The electromagnetic waves used in FM broadcasting by radio or television have frequencies of approximately 100 megahertz (remember mega = 10^{6}). Calculate the wavelength used in FM broadcasting.

7. For each of the following wavelengths, determine the frequency and identify the region of the electromagnetic spectrum to which it belongs. (figure 4-1 pg 92 in text)

   a. 4.0×10^{-9} m

   b. 4.2 m

   c. 2.0×10^{-14} m

8. Explain what it means for an atom to be in an excited state and what it means to be in the ground state.

9. What happens when an atom returns to a lower energy level from an excited state.

10. What is the energy of a photon of red light having a frequency of 4.48×10^{14} Hz?

11. What is the energy of an ultraviolet photon having a wavelength of 1.18×10^{-8} m?

12. How does Heisenberg's uncertainty principle disprove Bohr's model of an atom?

13. What is the difference between an orbit and an orbital?