**Objectives A-F – Planck, Einstein, Photons, and the Photoelectric effect.**

**Objective A: , *c* = 3.00 x 108 m/s**

Problems:

1. What is the wavelength of a 150 kilohertz radio wave? (2000 m)
2. A handheld radio uses 2.1 m radio waves. What is the frequency of the wave? (1.4E8 Hz)
3. What is the frequency of a 410. nm light wave? (7.32E14 Hz)
4. What is the wavelength of a 12.3 x 1014 Hz electromagnetic wave? (244 nm)

Questions:

1. What is the wavelength range of visible light in nm?
2. What is the EM wave Physics cheer????
3. What is a light wave?
4. How does light travel through a vacuum?

**Objective B: Planck and Black Body radiation.**

Questions:

1. What is black body radiation?
2. How does it depend on temperature?
3. Draw a graph of Intensity vs wavelength for two objects, one hot, and one cool.
4. How did Planck get his formula? What did Planck’s formula mean?

**Objective C: , *h* = 6.626 x 10-34 Js**

Problems:

Chapter 27: 10(3.67E-7 eV), 11(1.7 to 3.1 eV), 12(4.14E-3 nm, insignificant diffraction ), 13(2.4E13 Hz, 1.2E-5 m), **68**(2.8E21 photons/s. m2)), **86**(3.33E52 Photons/year)

Questions:

1. How did Einstein arrive at his equation based on Planck’s model for blackbody radiation?
2. Why did few at the time support his particle theory of light?

**Objective D: The difference between wave and photon descriptions of light**

Questions:

1. For both the wave theory and photon theory, describe the difference between blue and red light.
2. For both wave and photon theory, describe the difference between bright and dim light.

**Objective E: The photoelectric effect, and Einstein’s idea.**

Questions:

1. What is the photoelectric effect?
2. How did Einstein’s proposed experiment work, and would you gather data using the apparatus he describes?
3. What are the different predictions about photo-electron energies that wave and photon theory predict?

**Objective F: Photon energy = Work Function + Maximum Kinetic Energy**

Problems:

Chapter 27: 23(2.96 eV), 24(0.90 eV, and none (explain why)), 22(0.93 eV, 5.7E5 m/s), 18(401 nm), 19(Copper and Iron (Wo > 3.11 eV)), 20(2.18 eV, 0.93 eV), 21(0.63 eV), 26(3.76 eV), **81**(1.0 eV, and no current – explain why), 77(0.64 V)