Electrons & light

The dual nature of electrons

Book reference:

Chapter 13 pages 372 - 375

Question 11 & 12

Electromagnetic Energy

- Energy transferred in the form of waves
- All electromagnetic radiation -- from radio waves to x-rays -- travel at the speed of light. In empty space this speed is approximately 300,000 kilometers per second! 3.0×10^8 m
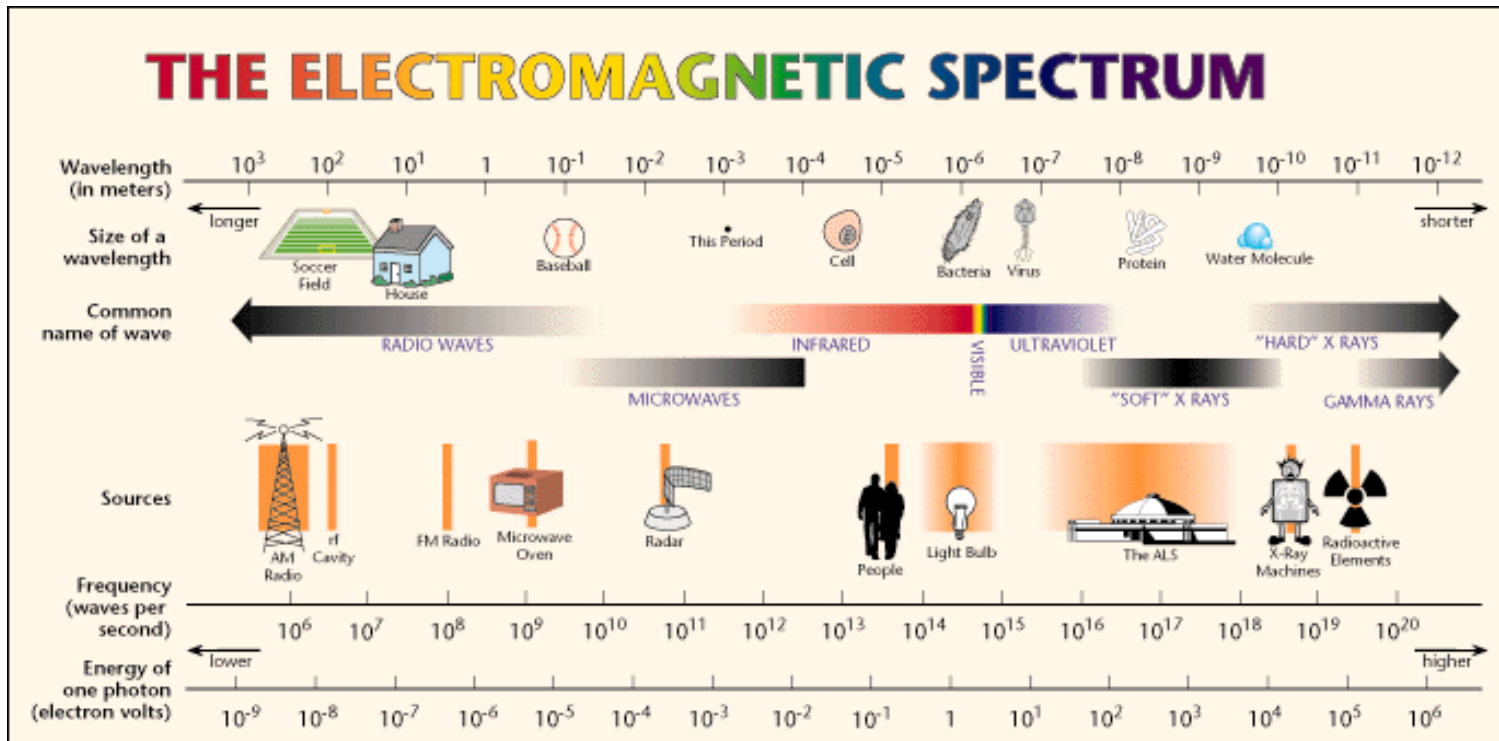- Wave shape and mechanics

  http://id.mind.net/~zona/mstm/physics/waves/partsOfAWave/waveParts.htm

sine wave
wavelength
frequency
amplitude

Waves

THE ELECTROMAGNETIC SPECTRUM

Frequency & wavelength

- The relationship between frequency and wavelength define the type of energy
- These two variables are inversely proportional
  - High frequency (n): small wavelength (l)
  - The constant is light speed (C), so
    - C = n x l

Units

- Frequency = cycles per second
  - Cycles/second = 1/sec = sec^{-1} = hz (most used)
- Wavelength in meters or nanometers
- Light speed m/sec , cm/sec
- Be careful and watchful of units make sure they match

Sample Problems

- C = n x l

  3.0×10^{8} m/sec $/ 2.4 \times 10^{14}$ hz

- Find the wavelength of energy if the frequency is 2.4×10^{14} hz

  1.3×10^{-6} m

- Find the wavelength of the radio wave, FM 102

  3.0×10^{8} m/sec $/ 1.02 \times 10^{8}$ hz

  2.94 m