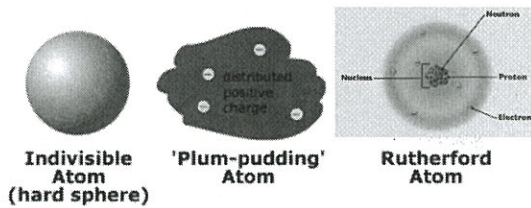
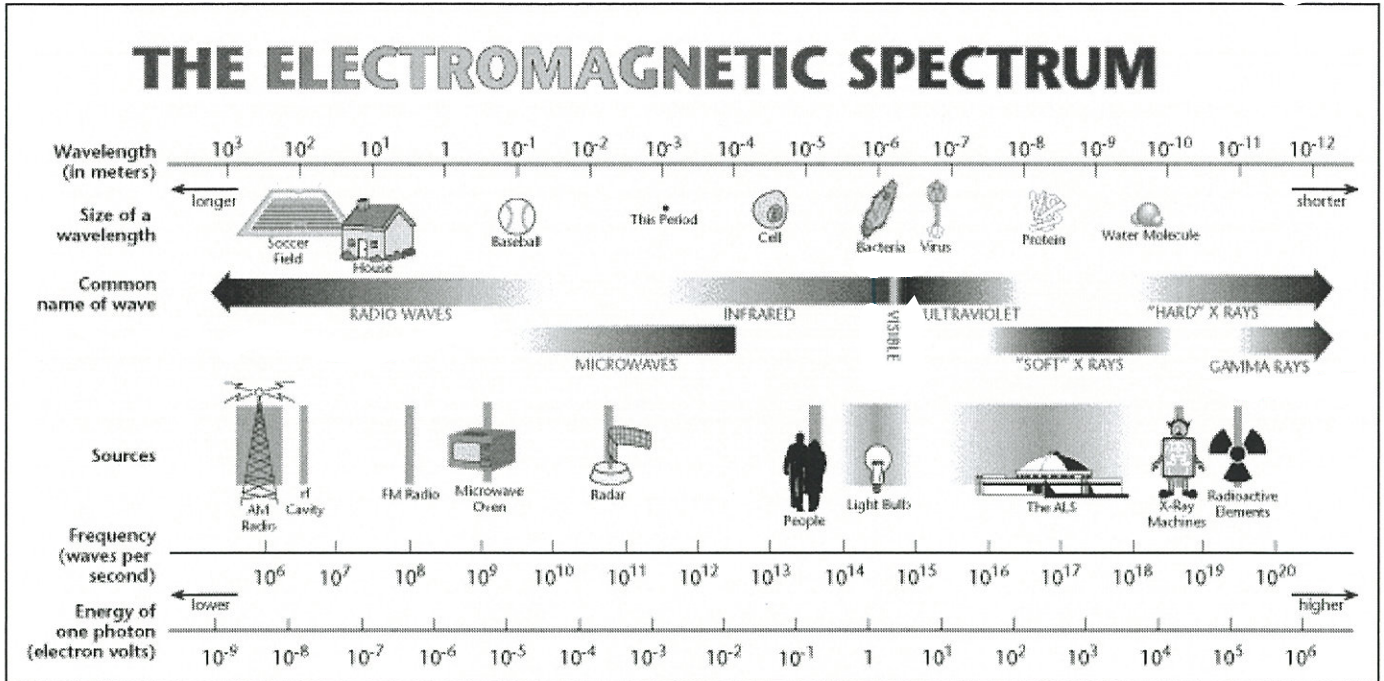


Properties of Light

- Visible light is a form of _____ - energy that exhibits _____ behavior as it travels through space.
 - different wavelengths of visible light are interpreted by your eye as different colors
 - other forms of EM radiation include _____
- Together, all forms of EM radiation form the _____



- Rutherford's model of the atom was pretty good, but it didn't explain exactly _____ the electrons were or _____.
- The arrangement of electrons became clearer when experiments revealed the close relationship between _____.

Dual Nature of Light: light has properties of both _____ and _____.

Particle Properties of Light

- **1900: Max Planck** looked at the emission of light from hot objects, & explained that:
 - a hot object does not emit radiation _____ [like a wave]
 - it instead emitted energy in _____
 - He called this _____
- **quantum** (*plural = quanta*) – _____ amount of energy gained or lost by an atom

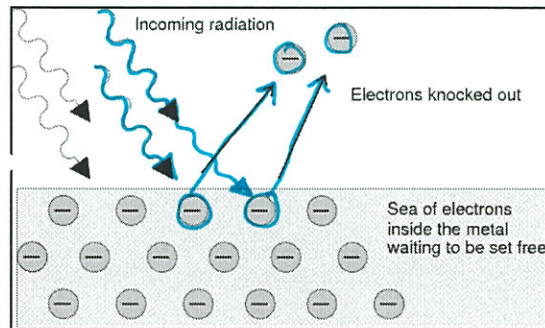
Relationship between energy of light and its frequency:

$$E = h \times \nu$$

h is a constant (called Planck's constant) = $6.626 \times 10^{-34} \text{ J x s}$

Example: Microwave ovens emit microwave energy with a wavelength of 0.129 m. What is the energy of microwave radiation?

- Wave theory could not explain the _____:
 - the emission of _____ [electricity] when _____ of a specific frequency shines on a metal
 - light with specific amount of _____ was capable of knocking the _____ loose from metals



- **1905: Albert Einstein** explained this & described light as a stream of particles called _____
 - **Photon** – _____ of EM radiation with no mass carrying 1 quantum of energy.
- **Photoelectric Effect Explained:**
 - Different metals required different _____ to _____
 - Since now we know that different wavelengths of light carry different _____, the frequency tells us how much _____ is needed to knock an _____ loose from the metal.
 - Therefore, we know how tightly bonded the _____ is to the _____.