

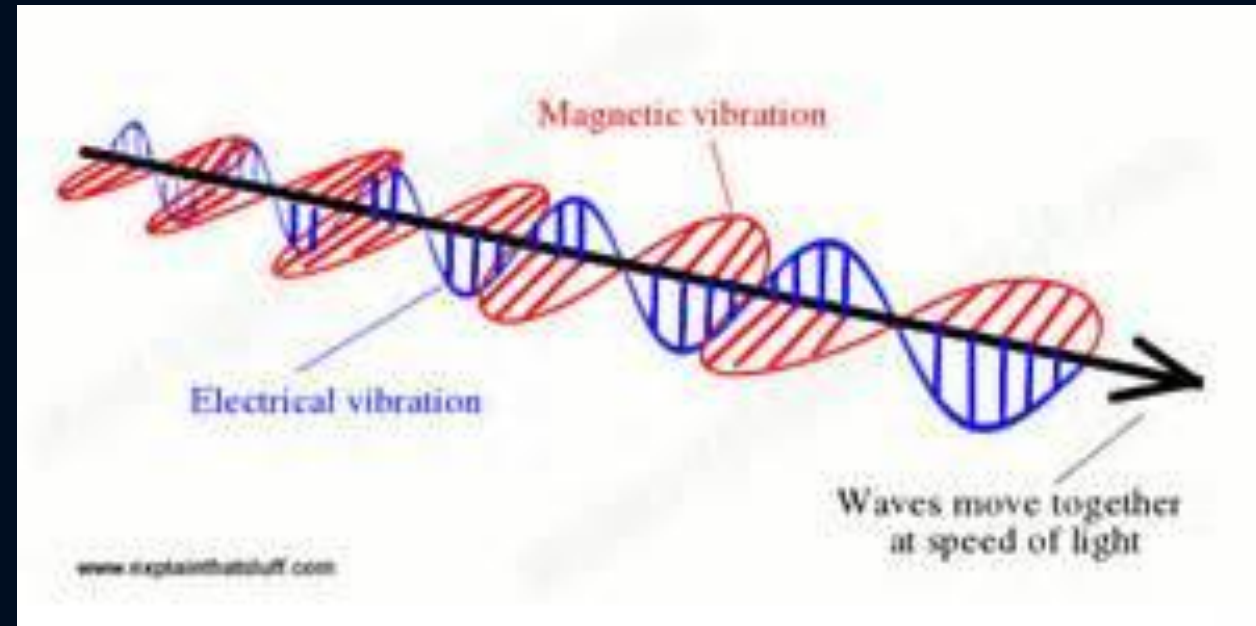
The background features a dark blue gradient with a glowing, grid-like pattern that curves and recedes into the distance, creating a sense of depth and movement, reminiscent of a tunnel or a wave.

ELECTROMAGNETIC WAVES

CHAPTER 17

17.1 The Nature of Electromagnetic Waves

- An electromagnetic wave consists of vibrating electric and magnetic fields that move through space at the speed of light.



17.1 The Nature of Electromagnetic waves

- Electromagnetic waves do not require a medium, so they can travel through a vacuum or through empty space!



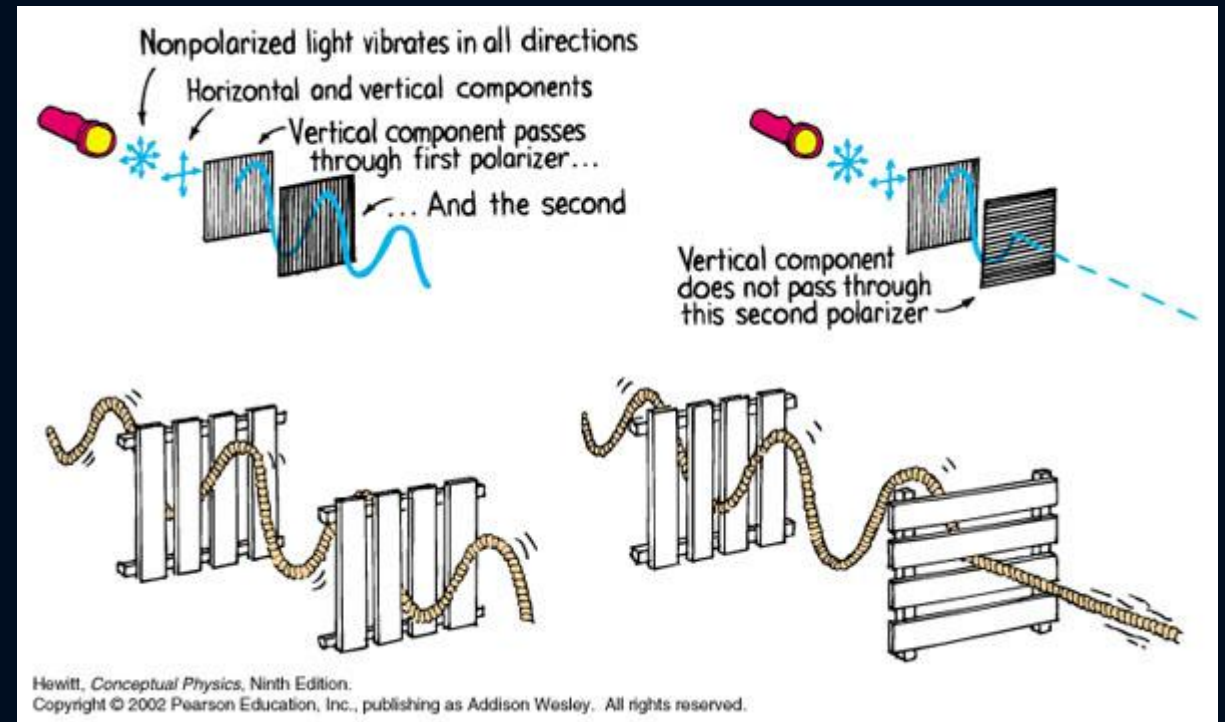
17.1 The Nature of Electromagnetic Waves



- All electromagnetic waves travel at the same speed...THE SPEED OF LIGHT!
- (ABOUT 300,000 KM PER SECOND!)

17.1 The Nature of Electromagnetic Waves

- Many properties of electromagnetic waves can be explained by a wave model. Think of light waves as being transverse waves on a rope. This explains polarization!



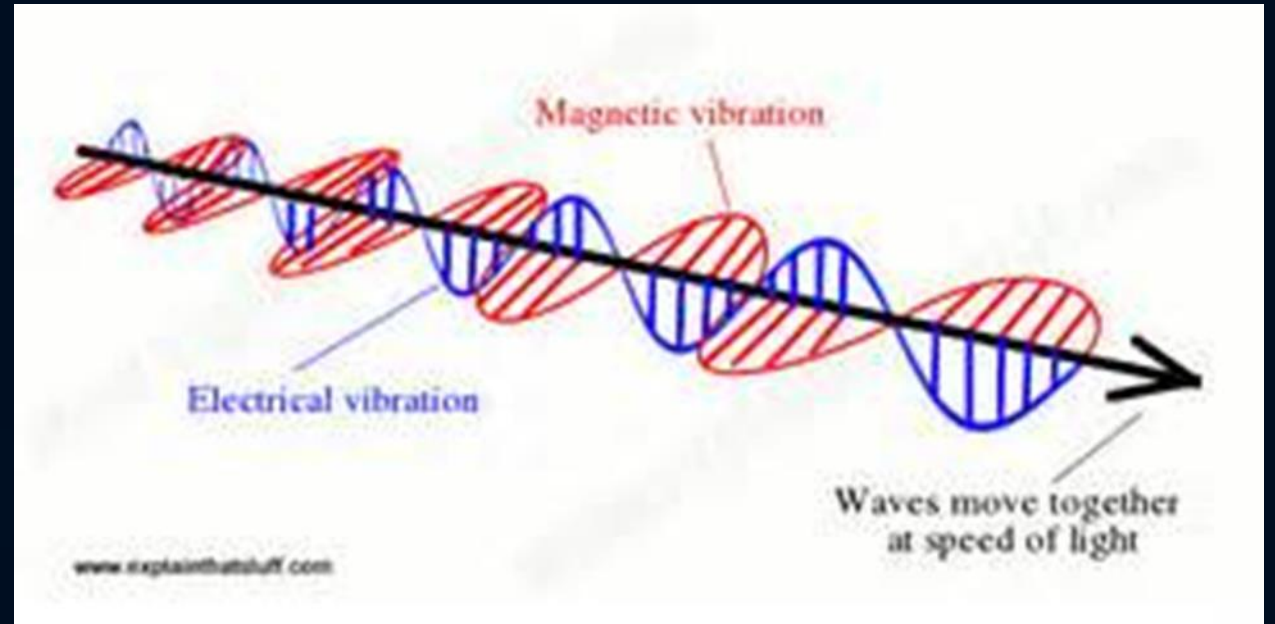
17.1 The Nature of Electromagnetic Waves

- However, some properties are best explained by a particle model. In fact, sometimes light behaves like a stream of particles!



electromagnetic wave

- Transverse waves that transfer electrical and magnetic energy.



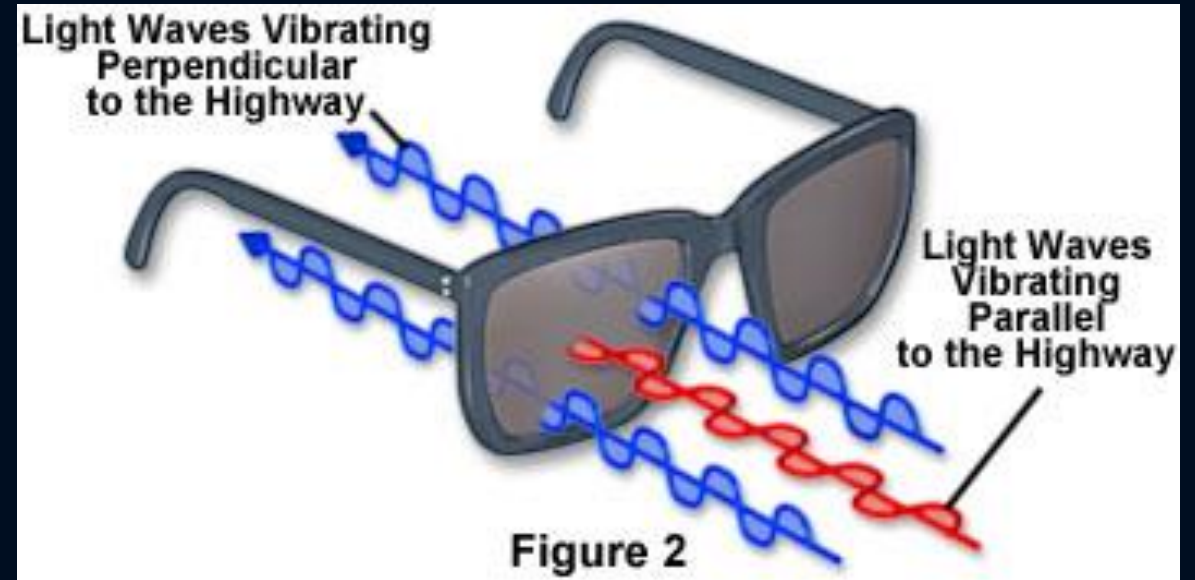
electromagnetic radiation



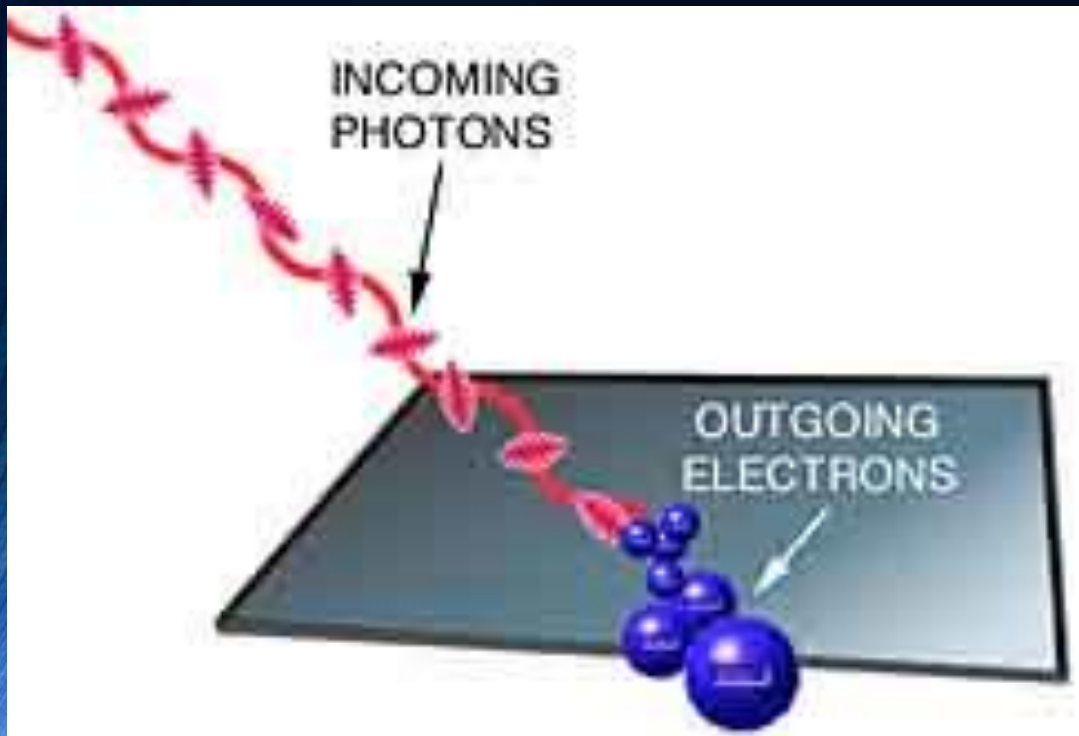
- The energy transferred through space by electromagnetic waves.

polarized light

- Light that vibrates in only one direction



photoelectric effect



- The ejection of electrons from a substance when light is shined on it.

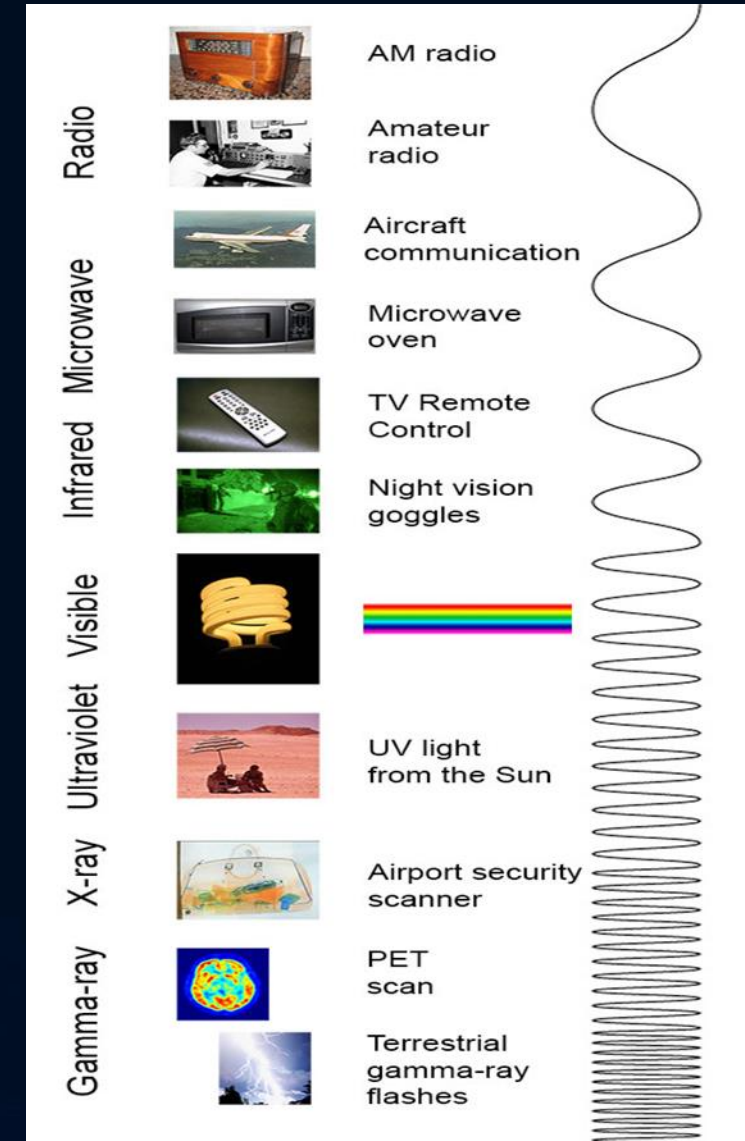
photon

- A tiny particle or packet of light energy

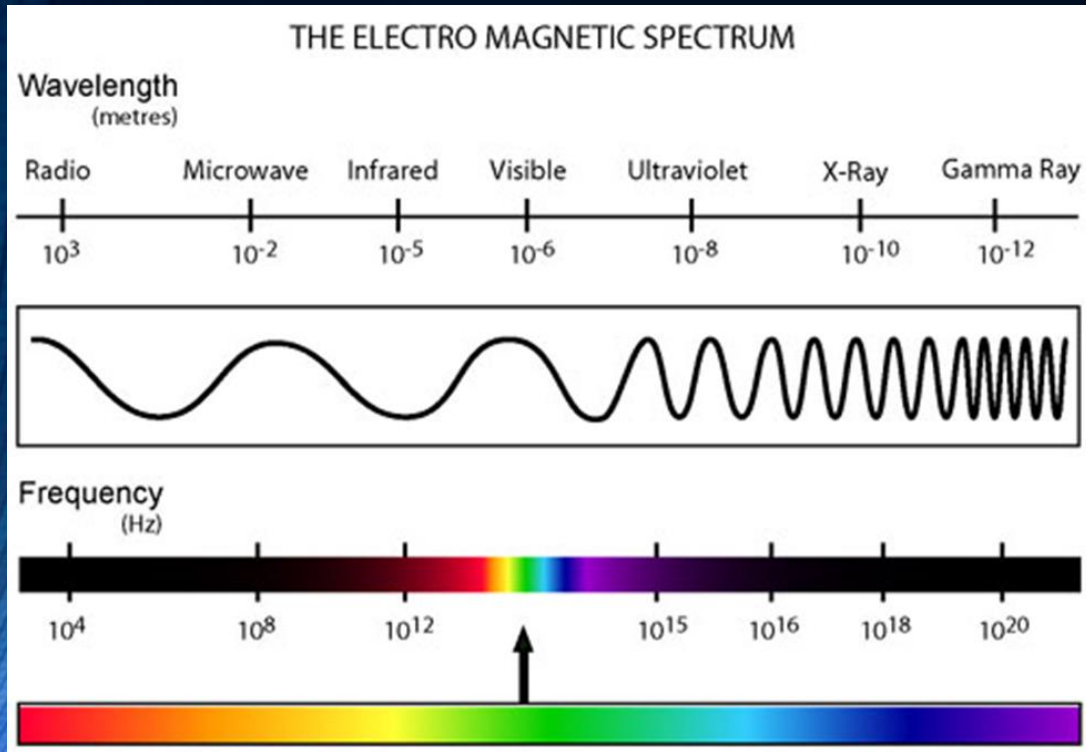


17.2 Waves of the Electromagnetic Spectrum

- All electromagnetic waves travel at the same speed in a vacuum, but they have different wavelengths and different frequencies.



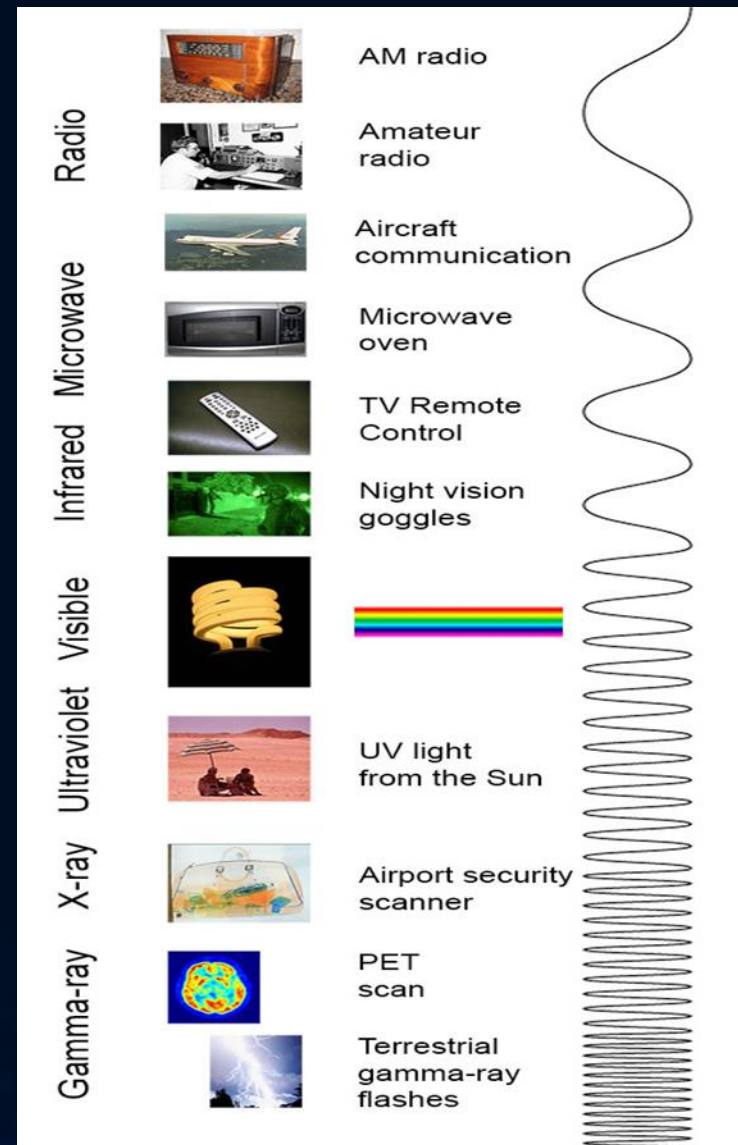
17.2 Waves of the Electromagnetic spectrum



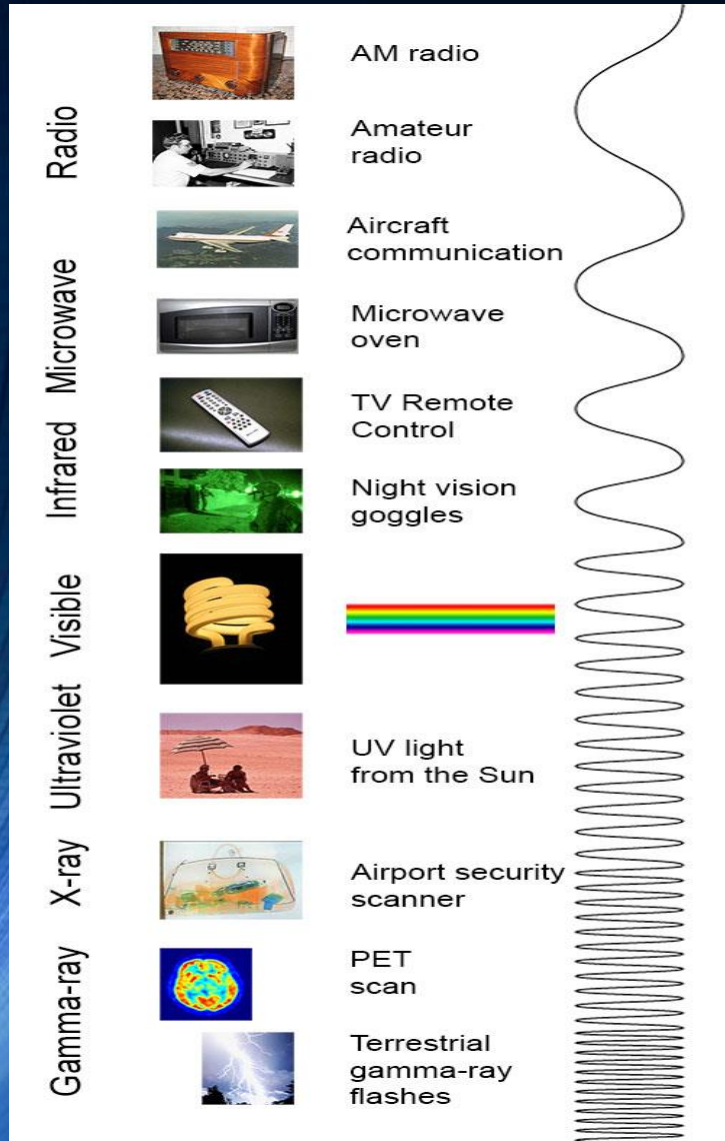
- Speed = wavelength x frequency
- Because the speed is a constant... as wavelength increases, frequency decreases!

17.2 Waves of the Electromagnetic Spectrum

- The electromagnetic spectrum is made up of radio waves, infrared rays, visible light, ultraviolet rays, X-rays, and gamma rays.



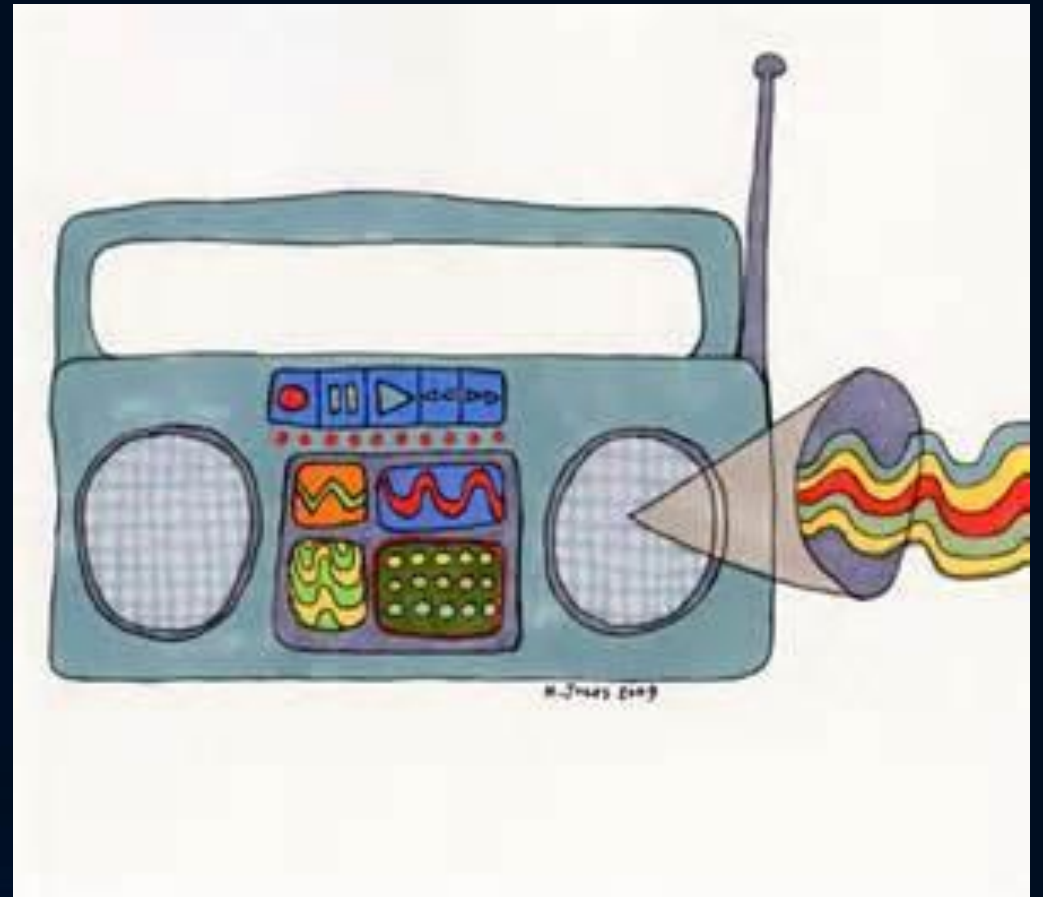
electromagnetic spectrum



- The complete range of electromagnetic waves placed in order of increasing frequency.

radio waves

- Electromagnetic waves with the longest wavelengths and lowest frequencies.



microwaves



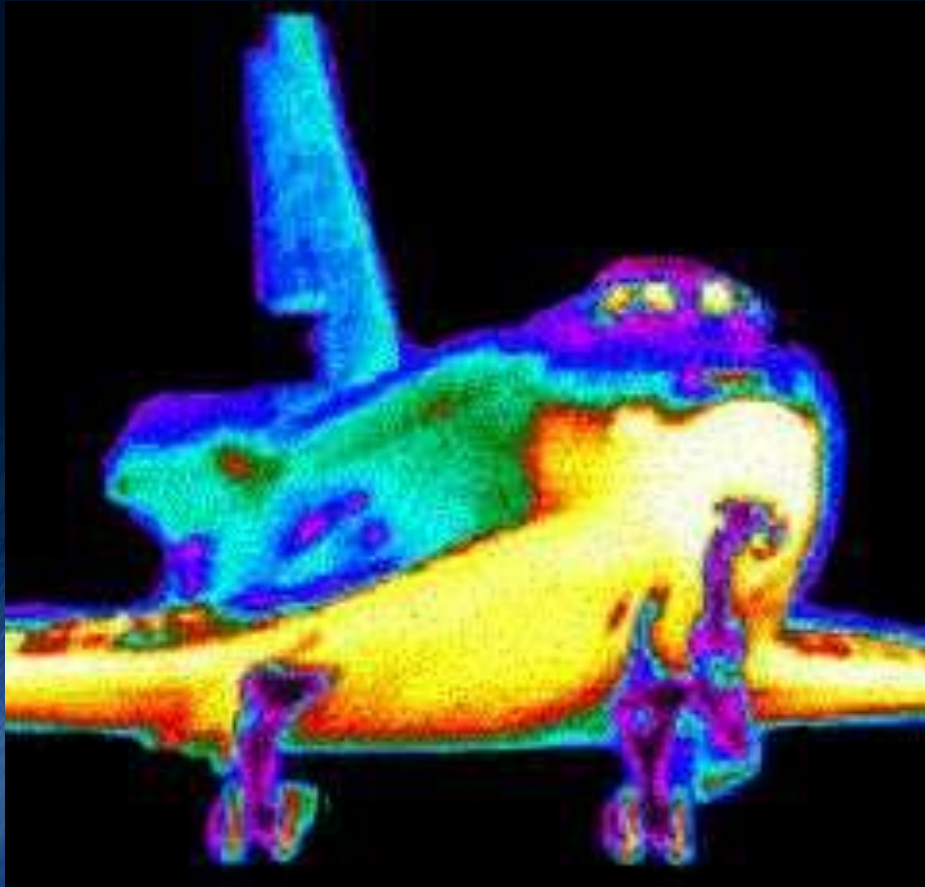
- Radio waves with the shortest wavelengths and the highest frequencies.

radar

- A system that uses reflected radio waves to detect objects and measure their distance.



infrared rays



- Electromagnetic waves with wavelengths shorter than radio waves, but longer than visible light.

thermogram

- An image that shows regions of different temperatures in different colors.



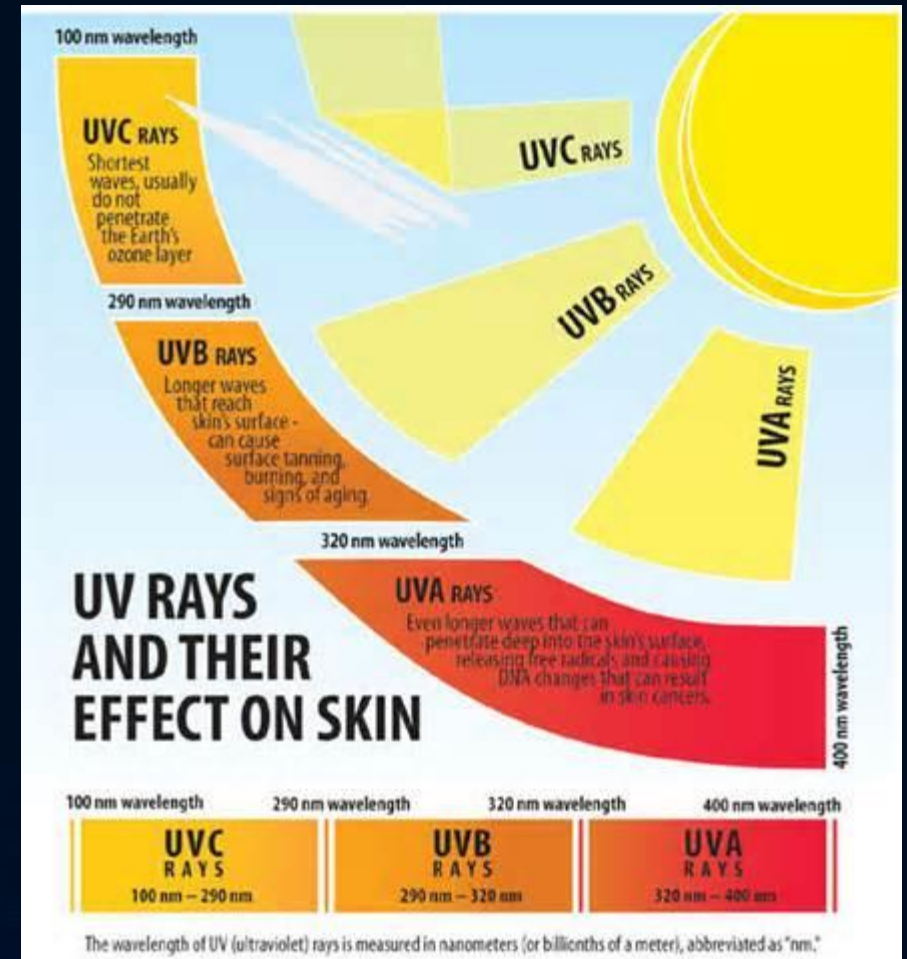
visible light



- Electromagnetic waves that are visible to the human eye

ultraviolet rays

- Electromagnetic waves with wavelengths shorter than visible light but longer than x-rays.



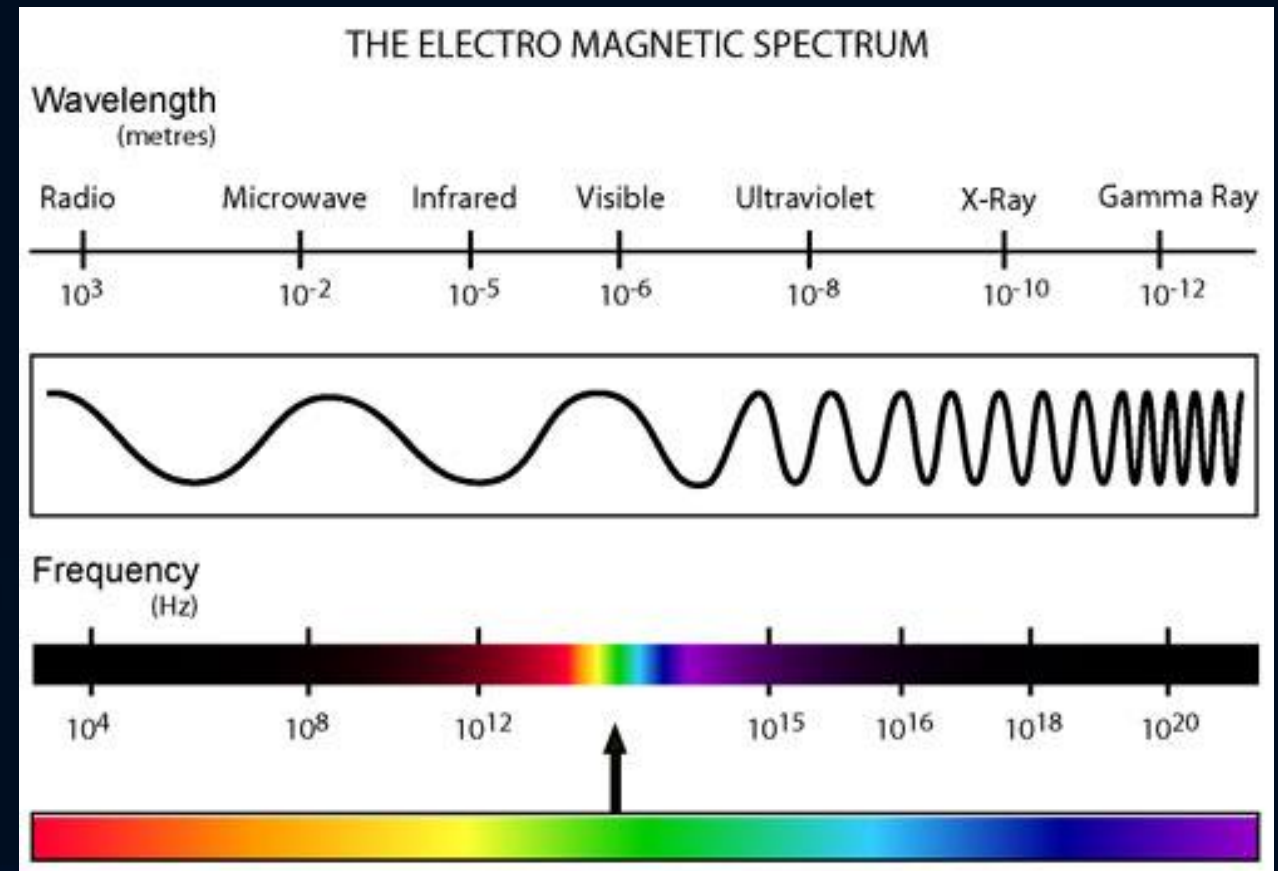
X-ray



- Electromagnetic waves with wavelengths shorter than ultraviolet rays but longer than gamma rays

gamma rays

- Electromagnetic waves with the shortest wavelengths and highest frequencies.



17.3 Producing Visible Light

- Common types of light bulbs include incandescent, tungsten-halogen, fluorescent, vapor, and neon lights.



illuminated

- Word used to describe an object that can be seen because it reflects light.



luminous



- Word used to describe an object that can be seen because it emits light

spectroscope

- An instrument used to view the different colors of light produced by different light sources.



incandescent light



- Light bulb that glows when a filament inside it gets white hot.

tungsten-halogen bulb

- Incandescent light bulb containing a tungsten filament and a halogen gas.



fluorescent light



- Light bulb that glows when electric current causes ultraviolet rays to strike a coating inside a tube.

vapor light

- Light bulb containing neon or argon gas along with a small amount of solid sodium or mercury.



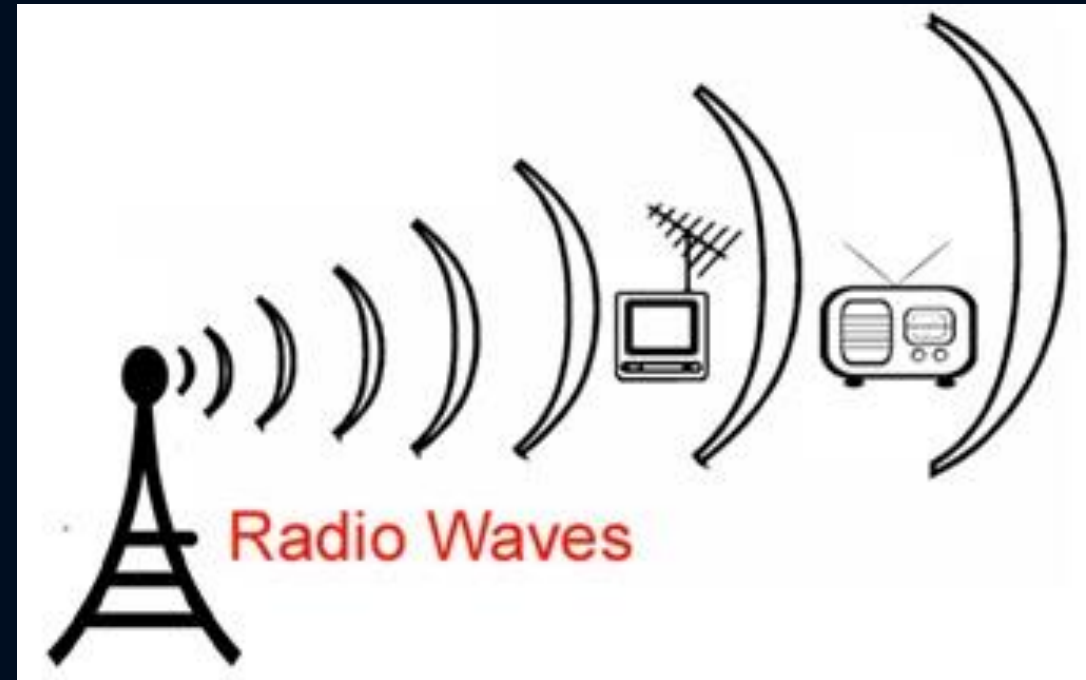
neon light



- Glass tube containing neon gas that produces light.

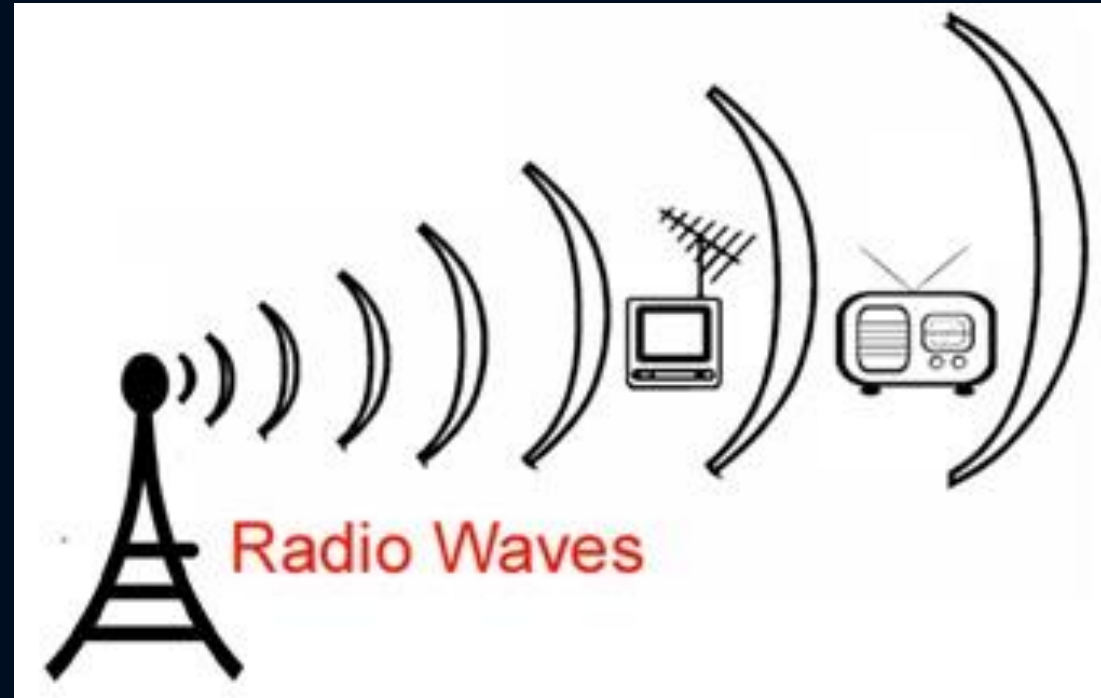
17.4 Wireless Communication

- Transmission antennas send out, or broadcast, radio waves in all directions.



17.4 Wireless Communication

- Radio waves carry information from the antenna of a broadcasting station to the receiving antenna of your radio or television.



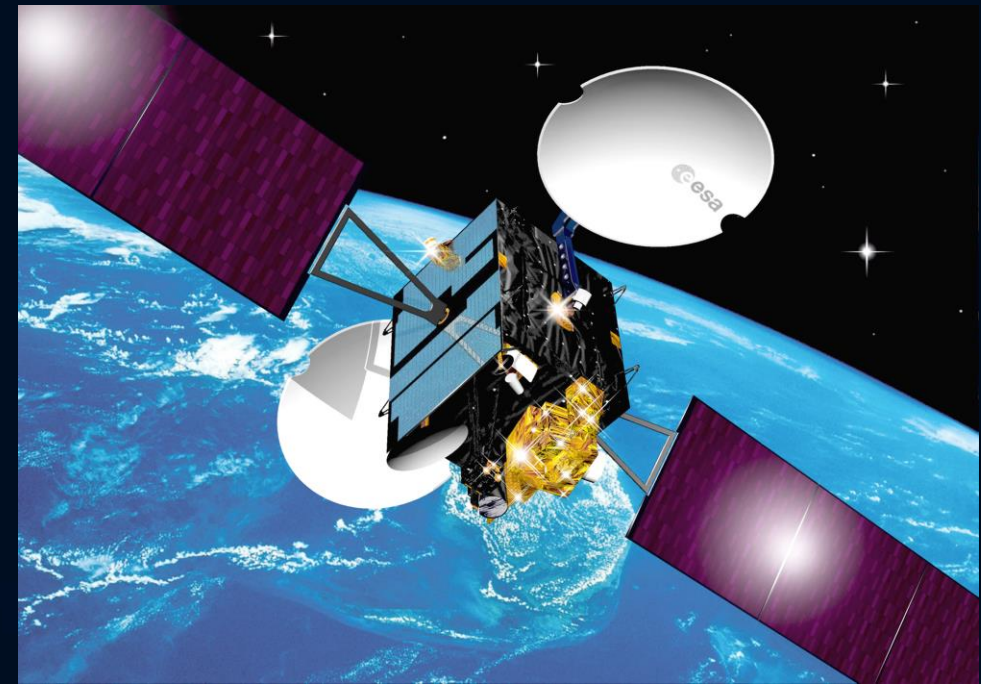
17.4 WIRELESS COMMUNICATION

- Cellular phones transmit and receive signals using high-frequency microwaves.

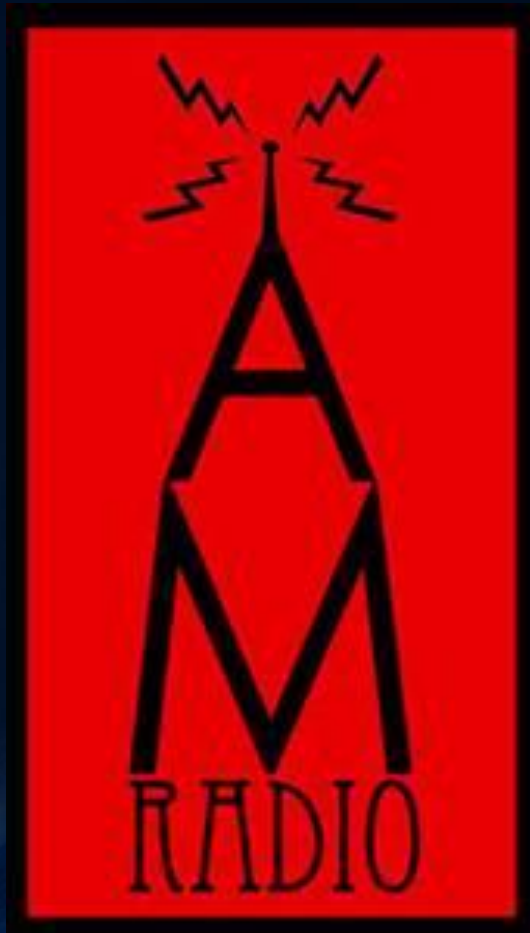


17.4 WIRELESS COMMUNICATION

- Communications satellites receive radio, television, and telephone signals, and relay the signals back to receivers on Earth.



amplitude modulation



- A method of transmitting signals by changing the amplitude of a wave.

frequency modulation

- A method of transmitting signals by changing the frequency of a wave.

