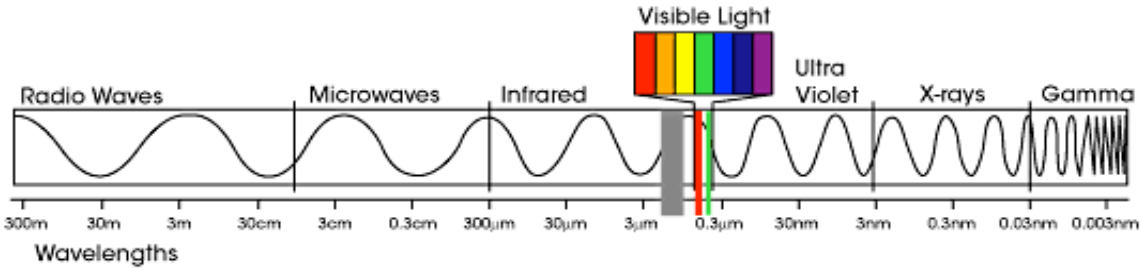
Radiation

"Then the righteous will shine forth as the sun in the kingdom of their Father. He who has ears to hear, let him hear!" Matthew 13:43



- **radiation** is the transfer of heat by electromagnetic waves; remember the electromagnetic spectrum and notice where microwaves lies
- to "radiate" means to send out or spread from a central location
- radiation involves carrying energy from an origin to the space surrounding it
- energy of radiation is carried by electromagnetic waves and does not involve the movement or interaction of matter
  --> thermal radiation can occur through matter or through a region void of matter (like space or a vacuum)
- heat received on Earth from the sun is the result of electromagnetic waves traveling through the *void of space* between the Earth and the sun

Radiation and wavelengths

- the hotter the object, the more it radiates; the sun obviously radiates more energy than the hot mug of coffee
- temperature also affects wavelength and frequency of radiated waves
- objects at room temperatures typically radiate infrared waves, still invisible to the human eye but detected by an infrared camera

- emission spectrum: energy radiated from an object is usually a collection or range of wavelengths
- as temperature increases, wavelength decreases --> hotter objects emit shorter wavelength/higher frequency wavelengths
- some objects emit radiation within visible spectrum (toaster coils, electric range, hot metal pipes)
- tungsten filament of an incandscent lightbulb emits electromagnetic radiation in the visible spectrum; also warms the glass bulb

- thermal radiation is a form of heat transfer because the electromagnetic radiation emitted from the source carries energy away from the source to surrounding (or distant) objects; this energy is absorbed by those objects, causing the average kinetic energy of their particles to increase and causing the temperatures to rise