

Radiation : Notes/W.S.-10

Radiation is the transfer of energy.

Energy is the ability to do work.

One type of radiation is electromagnetic radiation. It is emitted by charges that are moving back and forth, or from the unstable nuclei of atoms that radiate energy in order to become stable.

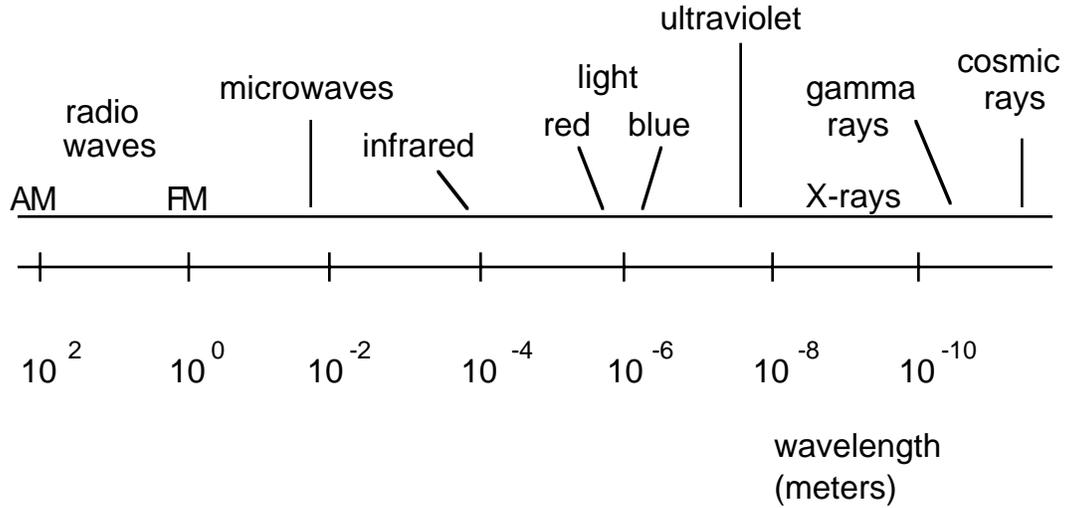
Electromagnetic Radiation

When an electric charge (or a magnet) is moved back and forth, electromagnetic waves are radiated outwards. All electromagnetic waves travel at the speed of light, which is 3.0×10^8 m/s. Light is also an electromagnetic wave.

In an antenna, electrons move back and forth very quickly. The frequency of the electrons, equals the frequency of the waves emitted. Charges in an atom's nucleus can also vibrate emitting electromagnetic radiation such as gamma radiation. Other electromagnetic waves are: radio-waves, microwaves, infrared rays, visible light, ultraviolet rays, x-rays, and gamma rays.

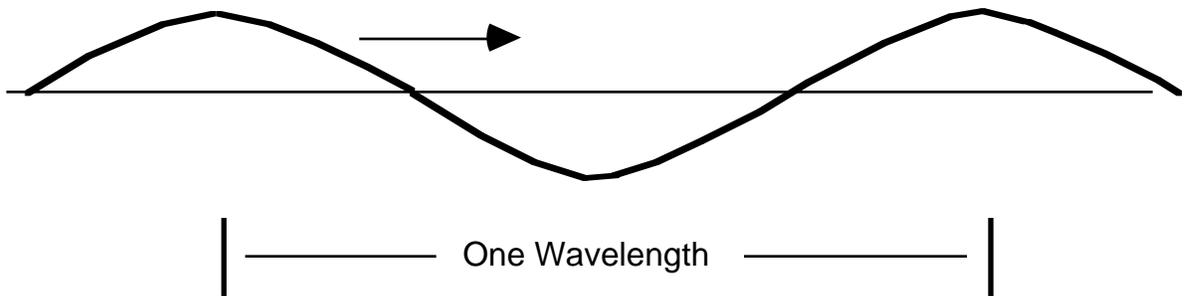
The electromagnetic spectrum is shown below.

The Electromagnetic Spectrum



decreasing wavelength \longrightarrow
 increasing energy \longrightarrow

An Electromagnetic Wave



Electromagnetic waves have many uses.

radio waves

communication

microwaves

heating food

light

we need it to see things!

infrared

these are used to heat food

ultraviolet

these can cause sunburn

x-rays	doctors can look at broken bones using them
gamma	these are used to treat cancer
cosmic rays	scientists study these to learn about space

Answer the following questions.

- 1) What is radiation?
- 2) How is electromagnetic radiation created?
- 3) What is the speed of electromagnetic radiation?
- 4) Name eight types of electromagnetic radiations
- 5) Give the wavelength in meters for:
 - a) FM radio waves
 - b) visible light
- 6)a) Which has a smaller wavelength; blue light or red light?
b) Which has a higher energy; blue light or red light?
- 7) Name the electromagnetic radiation.
 - a) it is used to heat food (two answers)
 - b) it is used in lasers
 - c) used to see if bones are broken
 - d) these can cause sunburn (or sometimes cancer)

Answers: 1) It is the transfer of energy., 2) It is created when charges move back and forth., 3) 3.0×10^8 m/s, 4) radio, microwaves, infrared, light, ultraviolet, x-rays, gamma, cosmic., 5)a) about 1.0 meter, b) about 0.000001 meters, 6)a) blue, b) blue, 7)a) microwaves, or infrared, b) visible light, c) x-rays, d) ultraviolet.