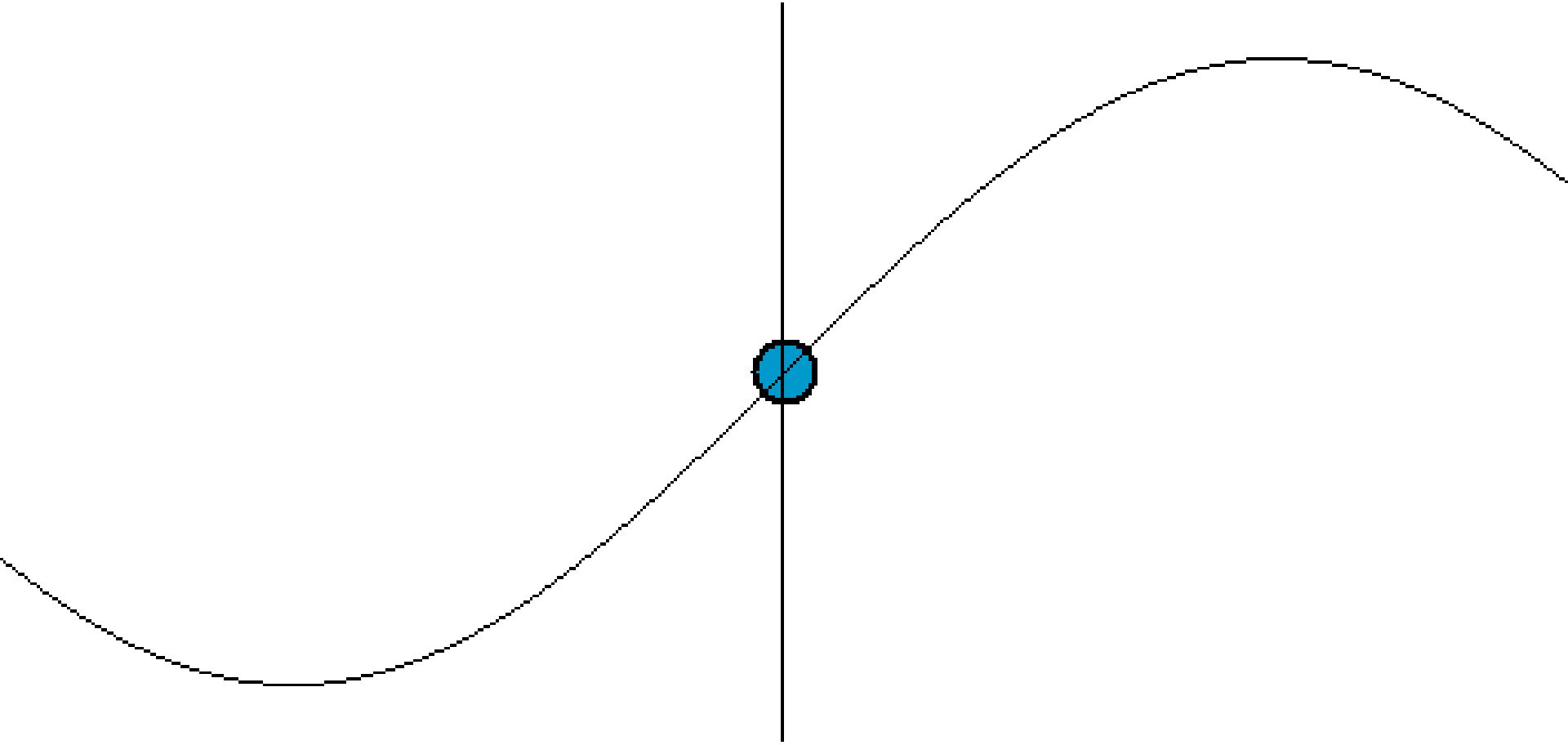
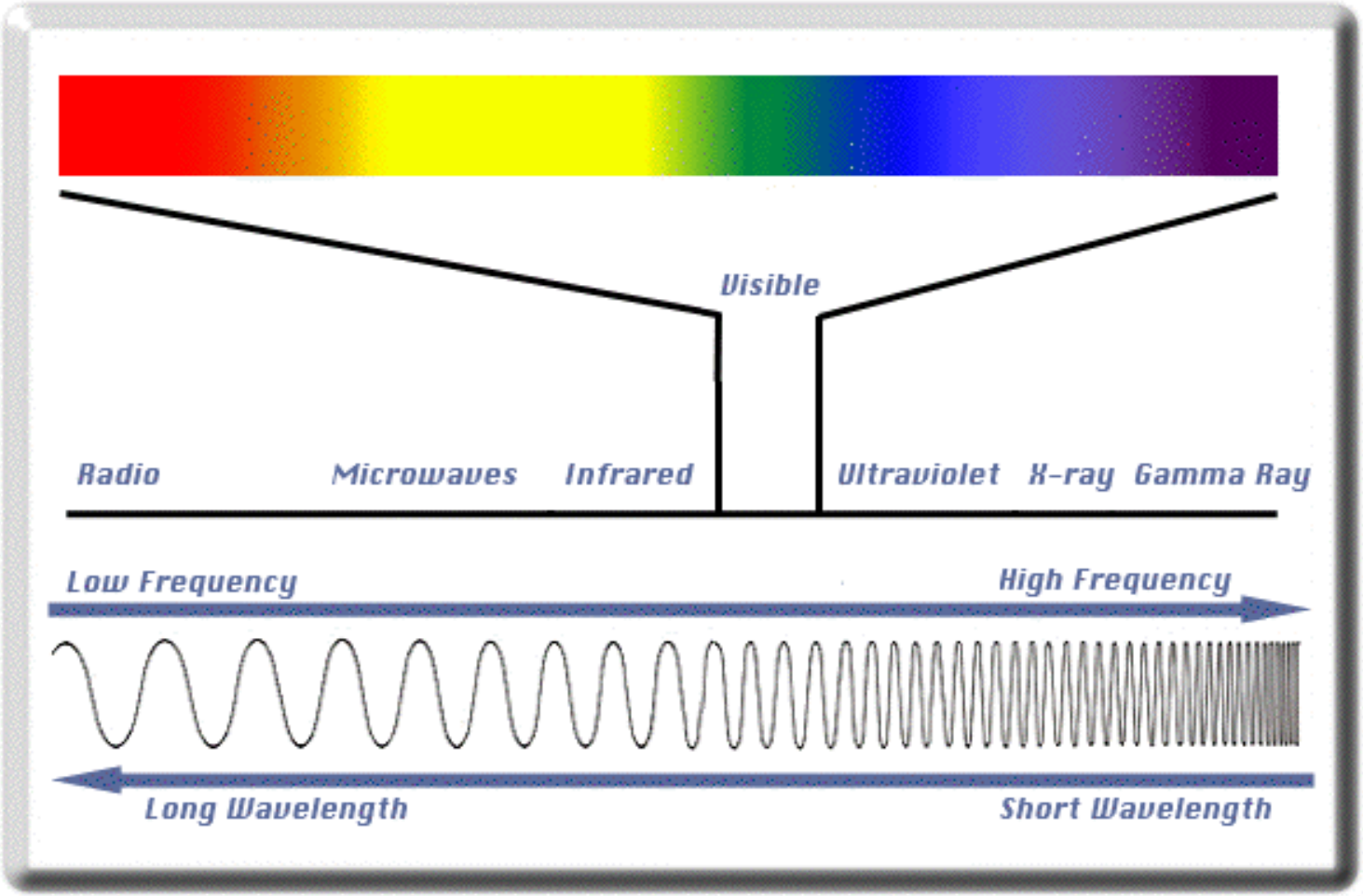
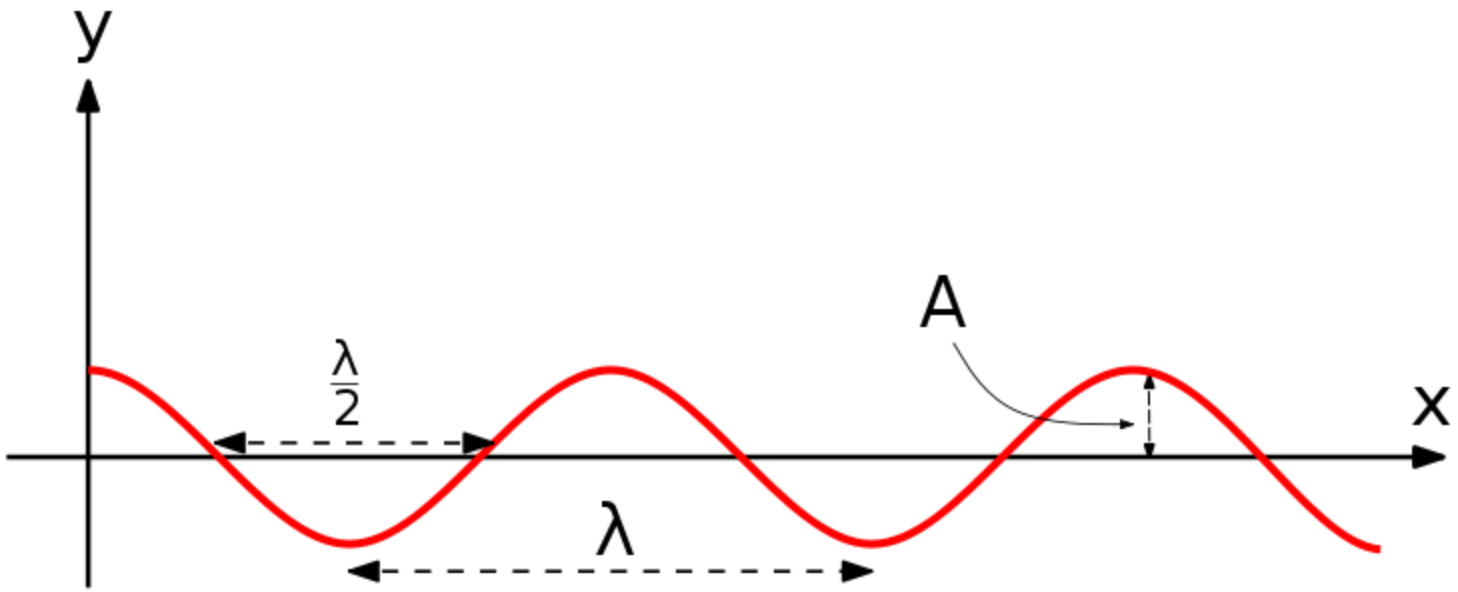
Waves



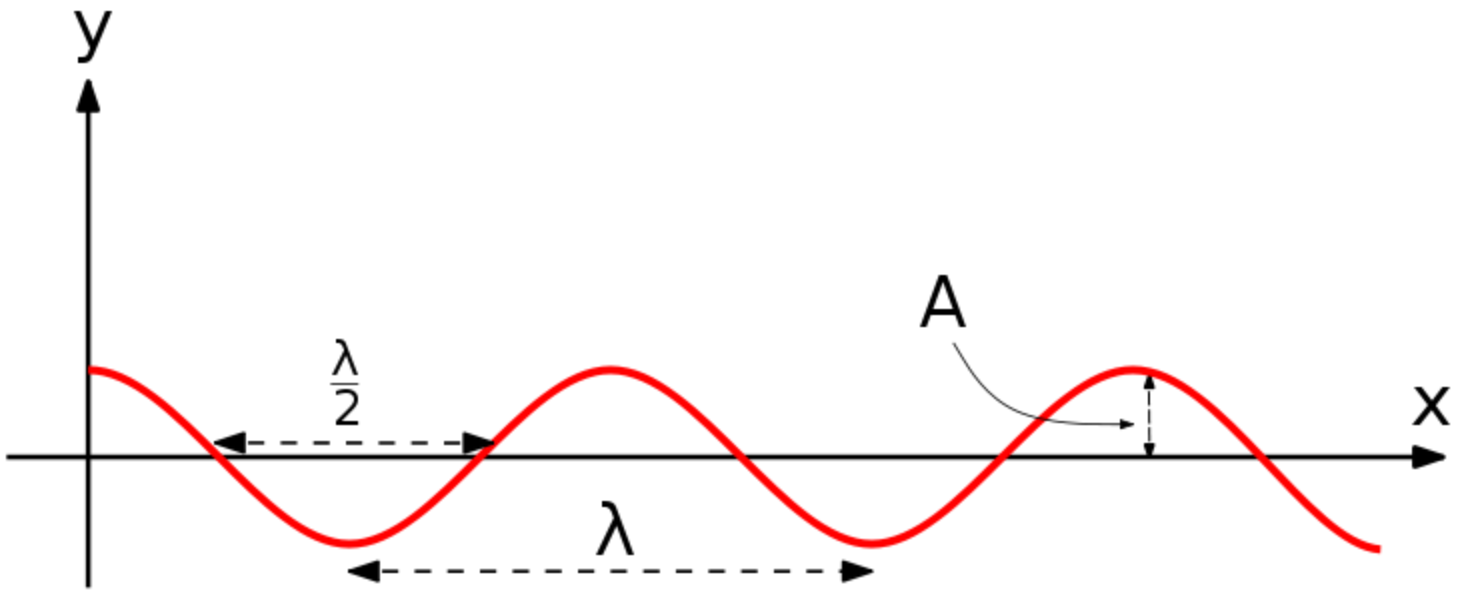

Visible
Radio
Microwaves
Infrared
Ultraviolet
X-ray
Gamma Ray
Low Frequency
High Frequency
Long Wavelength
Short Wavelength

Electromagnetic Radiation



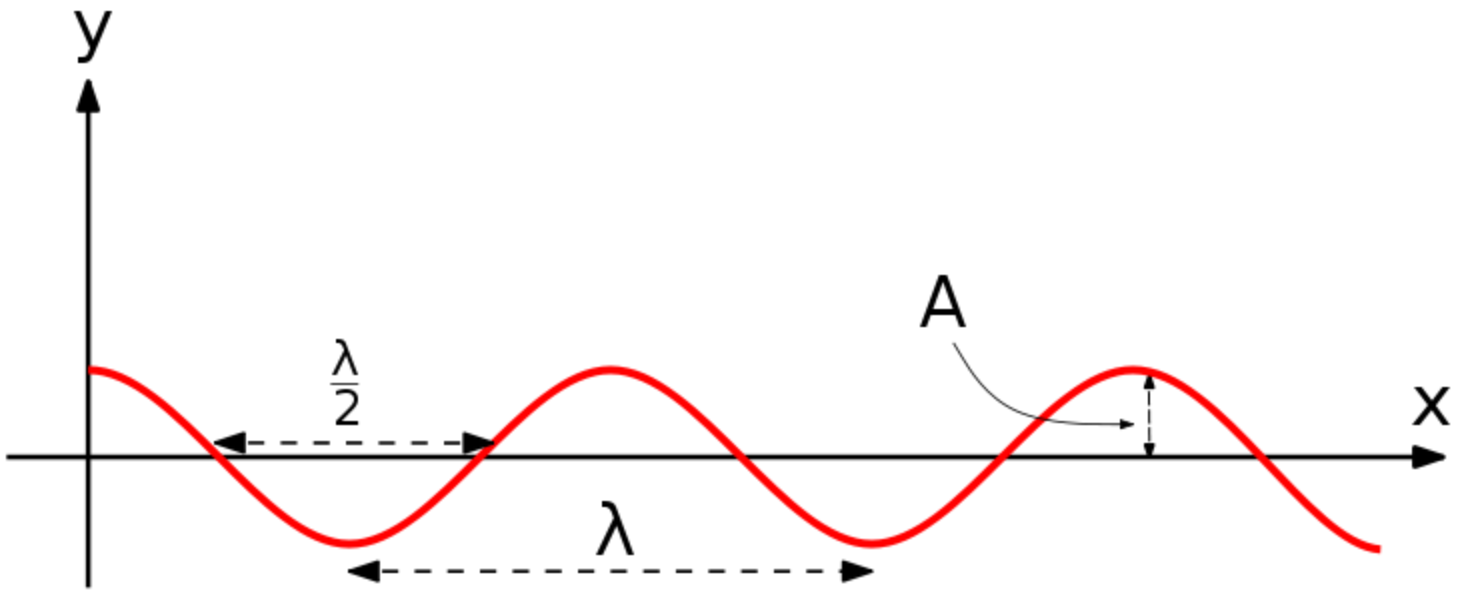
<u>wavelength</u>: (λ) the distance between two consecutive peaks or troughs on a wave (meters)

Electromagnetic Radiation



<u>frequency</u>: (v) the number of waves that pass a stationary point in one second (Hertz)

Electromagnetic Radiation



<u>amplitude</u>: half the vertical distance between peak and trough

Wave Equations

$$c = \lambda \nu$$

$$E = h \nu$$

c = speed of light = 3.00×10^8 m/s

λ = must be in meters

ν = must be in Hertz

E = energy = must be in Joules

h = Planck's constant = 6.63×10^{-34} J·s

Example 1

If the frequency of a wave is 6.20×10^{9} Hz, what is the wavelength?

$c = \lambda v$

3.00×10^{8} m/s $= \lambda (6.20 \times 10^{9}$ Hz)

$\lambda = 4.84 \times 10^{-2}$ m

Example 2

If the wavelength of a wave is 1.84×10^{-1} m, how much energy does the wave have?

$c = \lambda \nu$

3.00×10^{8} m/s $= (1.84 \times 10^{-1}$ m$)\ \nu$

$\nu = 1.630\ldots \times 10^{9}$ Hz

$E = h \nu$

$E = (6.63 \times 10^{-34}$ J·s$)(\ 1.630\ldots \times 10^{9}$ Hz$)$

$E = 1.08 \times 10^{-24}$ J