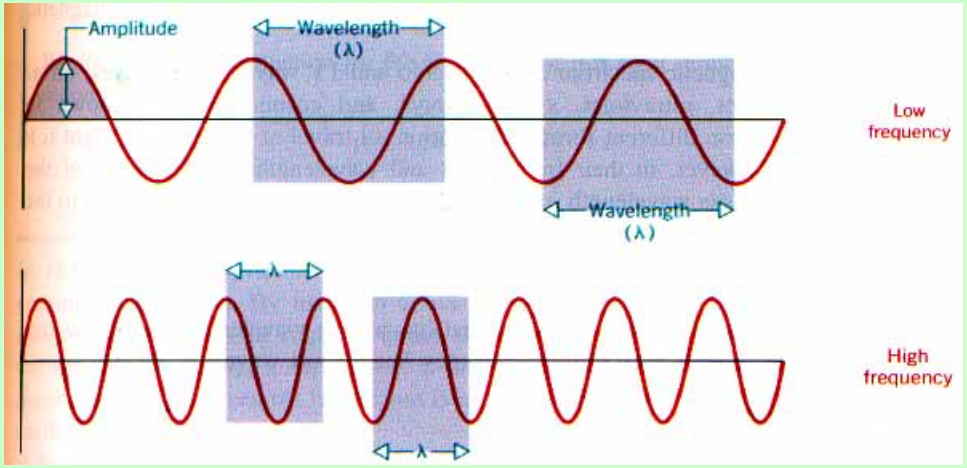
Atomic Structure and Periodicity

Waves & Math

Electromagnetic radiation propagates through space as a wave moving at the speed of light.



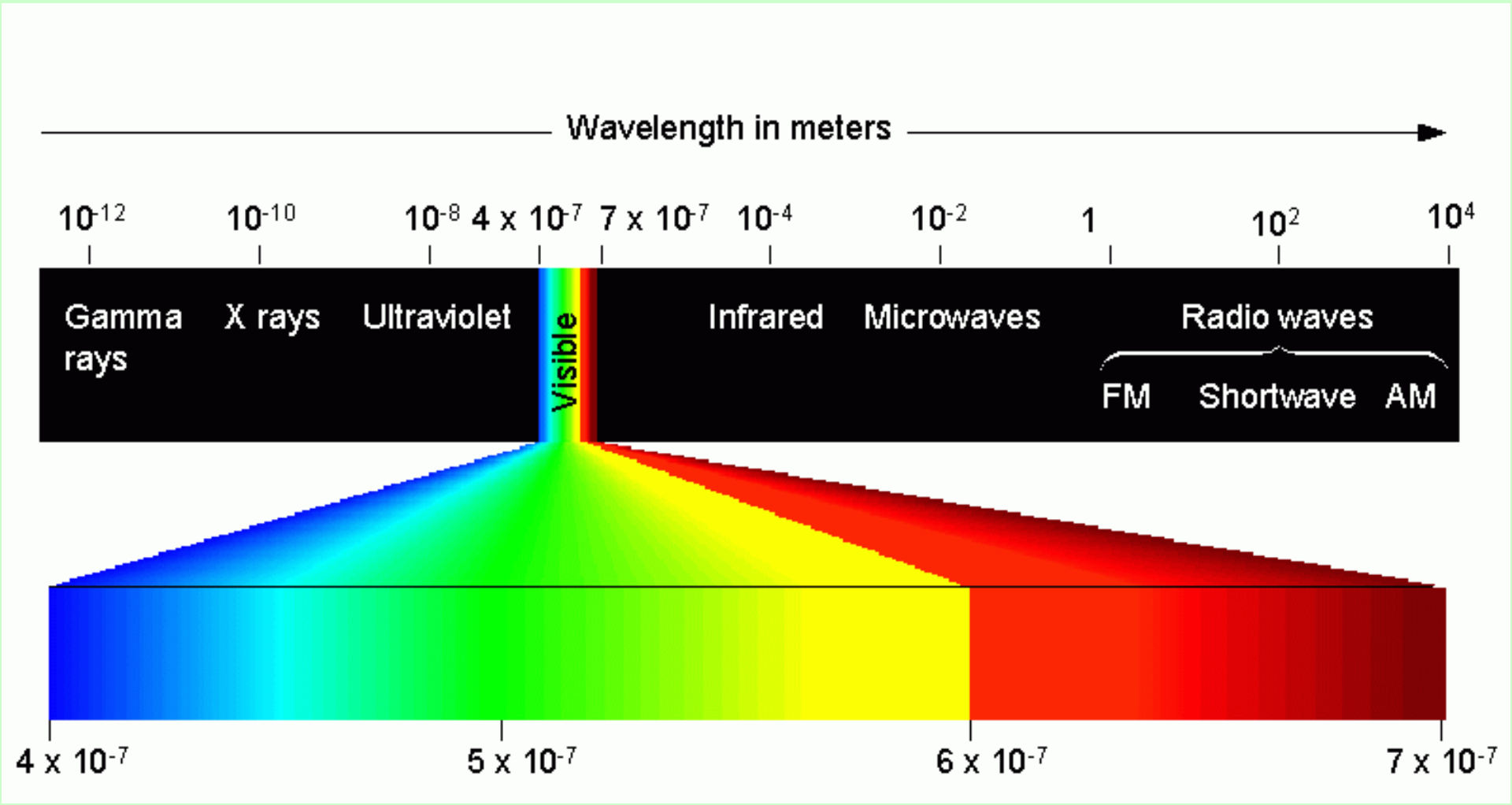
$$c = \nu\lambda$$

C = speed of light, a constant (3.00×10^8 m/s)

ν = frequency, in units of hertz (hz, sec^{-1})

λ = wavelength, in meters

Types of electromagnetic radiation:



The energy (E) of electromagnetic radiation is directly proportional to the frequency (ν) of the radiation.

$$E = h\nu$$

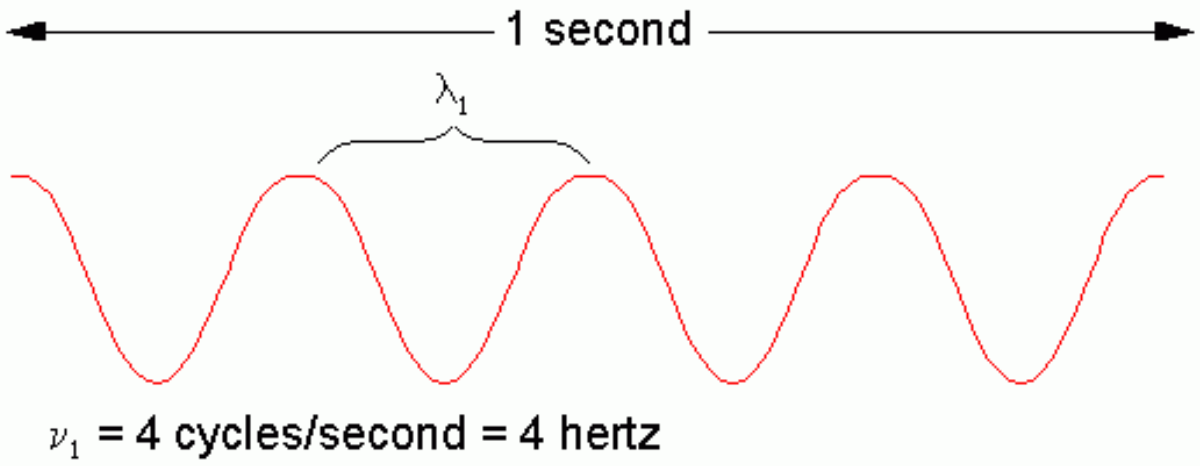
E = Energy, in units of Joules ($kg \cdot m^2/s^2$)

h = Planck's constant (6.626×10^{-34} $J \cdot s$)

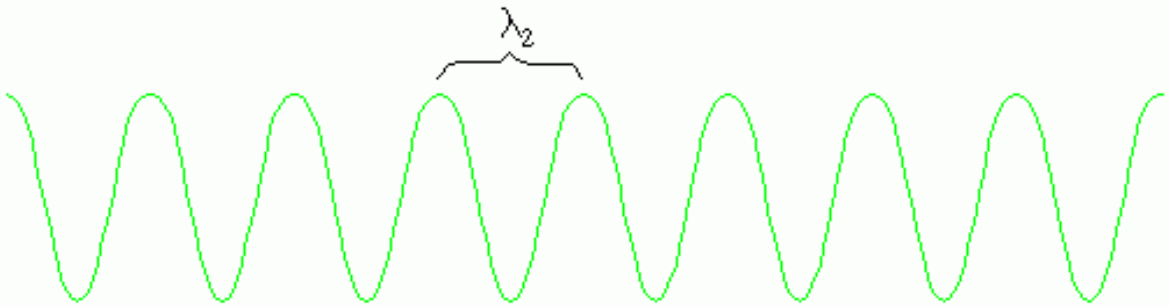
ν = frequency, in units of hertz (hz, sec^{-1})

Long Wavelength = Low Frequency = Low ENERGY

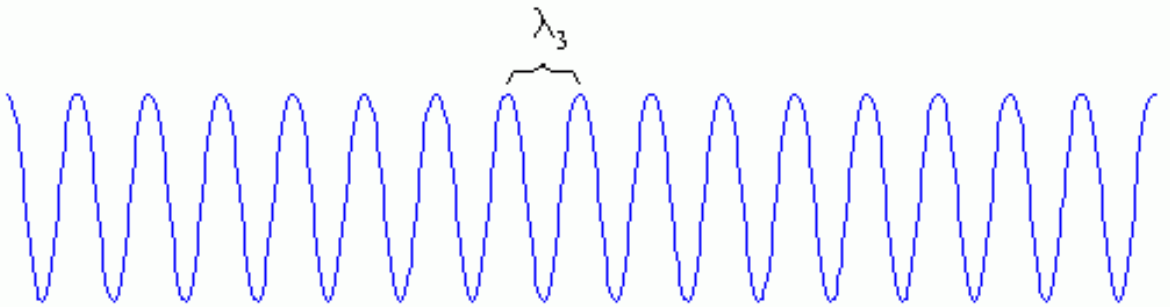
Short Wavelength = High Frequency = High ENERGY



ν_1 = 4 cycles/second = 4 hertz

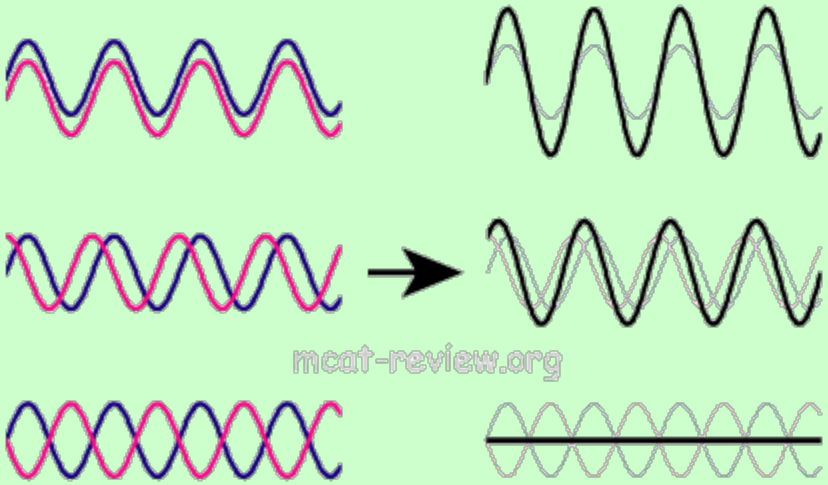


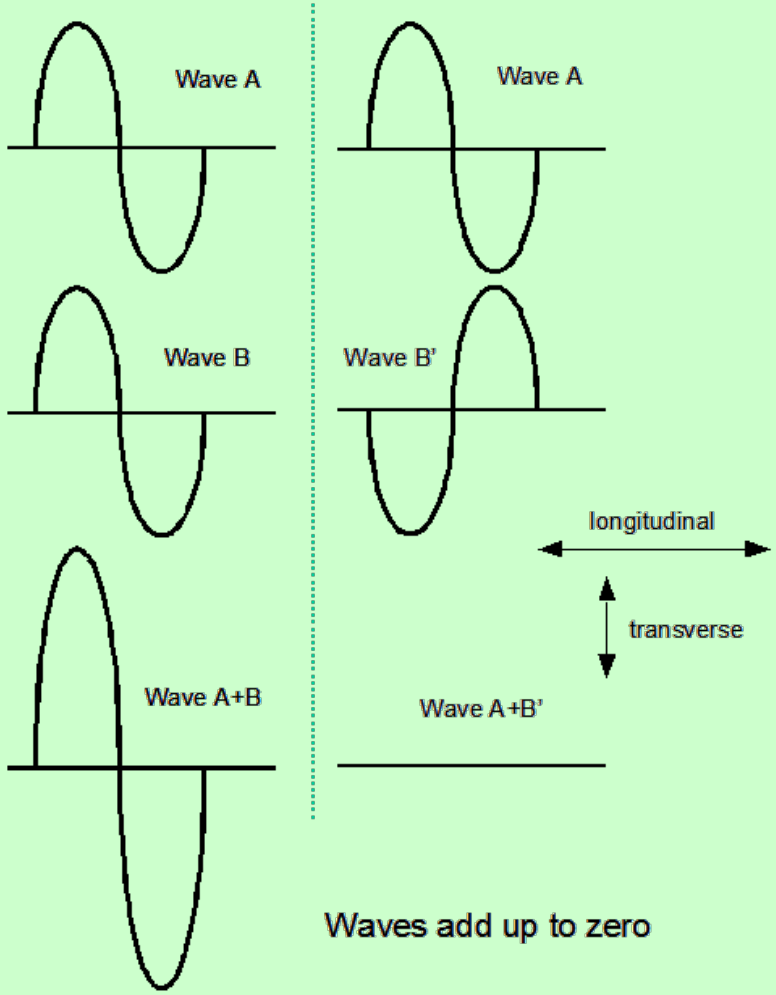
ν_2 = 8 cycles/second = 8 hertz



ν_3 = 16 cycles/second = 16 hertz

Wave properties





Relating Frequency, Wavelength and Energy

$$c = \nu\lambda \qquad E = h\nu$$

Common re-arrangements:

$$E = \frac{hc}{\lambda} \qquad \lambda = \frac{hc}{E}$$