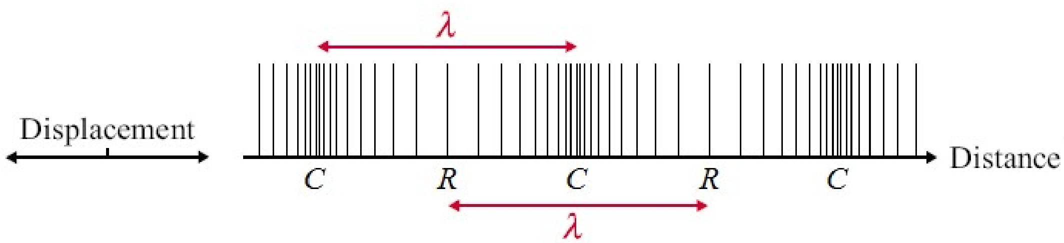
Travelling Waves

Longitudinal Waves

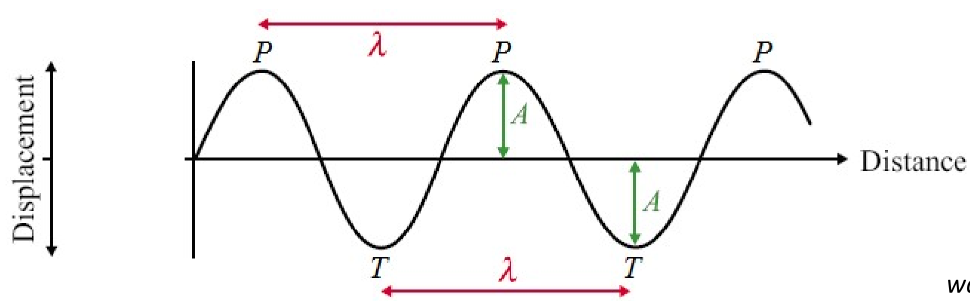
Here is a longitudinal wave; the oscillations are parallel to the direction of propagation (travel).
Where the particles are close together, we call a compression and where they are spread, we call a rarefaction.
The wavelength is the distance from one compression or rarefaction to the next.
The amplitude is the maximum distance the particle moves from its equilibrium position to the right of left.



Example: *sound waves*

Transverse Waves

Here is a transverse wave; the oscillations are perpendicular to the direction of propagation.
Where the particles are displaced above the equilibrium position, we call a peak and below we call a trough.
The wavelength, λ, is the distance from one peak or trough to the next.
The amplitude is the maximum distance the particle moves from its equilibrium position up or down.

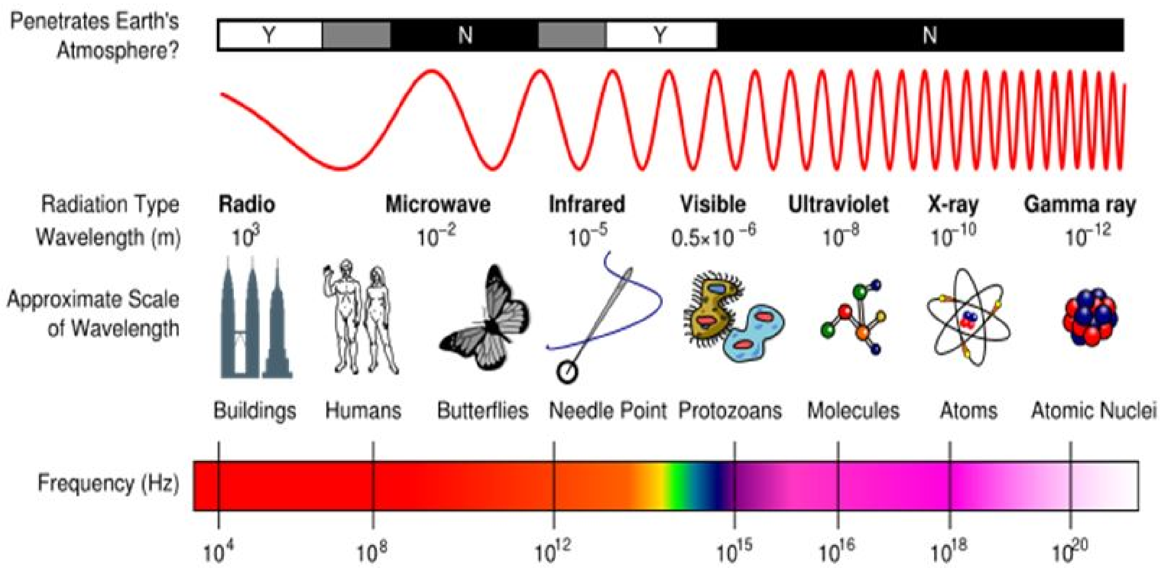


Examples: water waves, Mexican waves and waves of the EM spectrum

Electromagnetic Spectrum

EM waves are transverse waves produced by oscillating electric and magnetic fields.
The EM spectrum in order of decreasing wavelength:

radio, microwave, infra-red, visible, ultraviolet, X-ray, gamma rays



Wave Equation

The wave speed of a wave v, it's frequency f and it's wavelength λ, are related by the equation:

$$\boxed{V=f\lambda}$$

Where v is wave speed in ms^{-1}, frequency is in Hertz, Hz, and wavelength is in metres, m.
For EM waves in a vacuum, wave speed $c= 3.0 \times 10^8\ m\ s^{-1}$