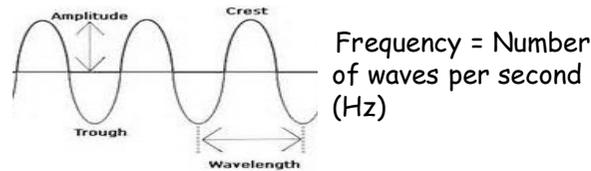


**Wave types**

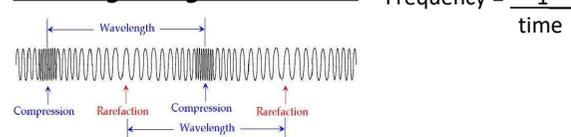
**Transverse:** The particles move perpendicular to the direction of travel of the wave.  
Examples: All EM spectrum eg radio, UV. S-wave

**Longitudinal:** The particles move parallel to the direction of travel of the wave.  
Examples: Sound, P-waves

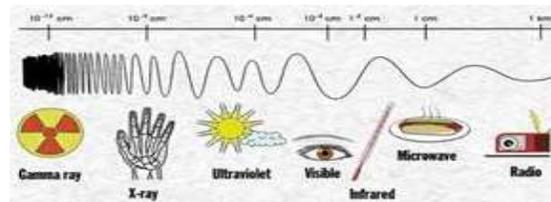
**Labelling a transverse wave**



**Labelling a longitudinal wave**



**Electromagnetic Spectrum**



- \* They travel at the speed of light ( $3 \times 10^8$  m/s)
- \* They are all transverse waves
- \* They can all be reflected
- \* They can all be refracted

Gamma rays have the most energy and highest frequency, radio the lowest. Radio has the longest wavelength.

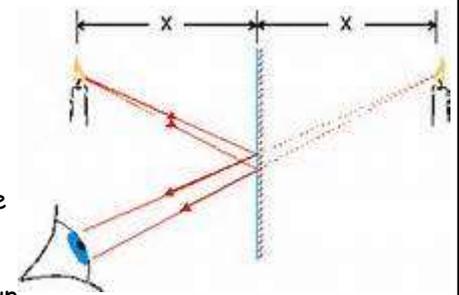
**Uses**

- Radio - TV and Radio
- Microwaves - Satellite communication
- Infrared - Cooking food, remote controls
- Visible - To see, fibre optics
- x-rays and gamma - Medical imaging and treatments

**Reflection**

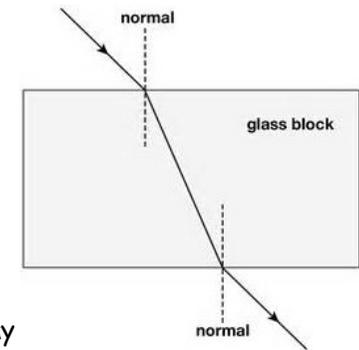
The image created by a mirror is:

- \* Virtual
- \* Equal in size
- \* Equal in distance
- \* Right way up



**Refraction**

- \* Light slows as it enters a denser medium (glass).
- \* It bends towards the normal
- \* Light speeds back up as it leaves the glass and bends away

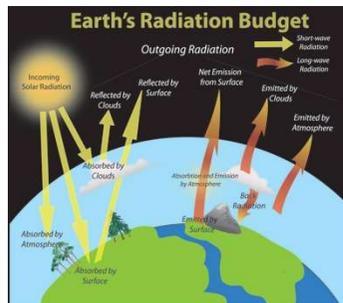


**Black body radiation (Triple Only)**

All objects emit and absorb infrared radiation. If it absorbs more than it emits the object's temperature will increase. A perfect black body will emit and absorb all wavelengths of radiation. The hotter a body the higher frequency of radiation it will emit - hotter object appear white/blue cooler ones red.

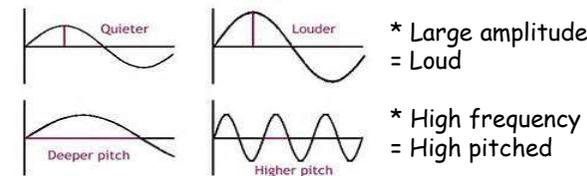
**The Earth**

If the radiation absorbed by the Earth is greater than the radiation emitted, the Earth's temperature will increase, this is global warming.



**Sound (Triple Only)**

- \* Sound is a longitudinal wave.
- \* It travels MUCH slower than light
- \* Sound travels faster in solids, slowest in gases.
- \* It needs a medium (particles) to travel through, it will not pass through a vacuum.
- \* Reflected sound is called an echo.
- \* The range of human hearing is 20-20000Hz



**Uses of sound**

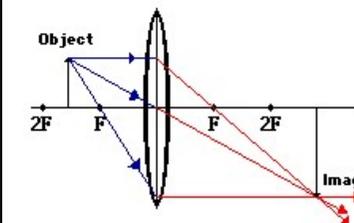
Ultra sound (sound above the range of human hearing) can be used to produce images of the body.

**Seismic Waves (Triple Only)**

P-waves pass through solids and liquids, S-waves only pass through solids. This allows us to build up a picture of the Earth's inner structure

**Lenses (Triple Only)**

Convex lenses bring parallel rays of light to a focus. The image produced can be real or virtual. Concave lenses always produce a virtual image.



The image produced is real (the rays meet), upside down and magnified (The image arrow is bigger than the object)

**Visible Light (Triple Only)**

A red object absorbs all wavelengths of light except red which is reflected. If all wavelengths are reflected the object will appear white, if all wavelengths are absorbed the object will appear black.

A red filter will absorb all wavelengths of light except red which is transmitted. If a red filter is placed next to a green one no light will pass through, it will look black.