**Waves Rules & Definitions**

Rules in italics are essential to know - there is a high likelihood of you needing these in the exam.

* Reflection: Angle of incidence = angle of reflection
* Concave mirrors and convex lenses: *Parallel rays converge at the focal point.*
* Convex mirror and concave lenses: *Parallel rays diverge and look like they come from the focal point.*
* A real image occurs when actual light rays converge at a point. The position is either in front of the mirror or behind the lens.
* A virtual image occurs when there are no actual light rays converging. The diverging rays appear to come from the position of the virtual image. The position is either behind a mirror or in front of a lens.
* Refraction is the bending of light as it goes from one medium to another medium with a different light speed.
* Light bends away from the normal if it is going from a slow medium to a fast medium.
* Light bends towards the normal if it is going from a fast medium to a slow medium.
* The refractive index of a medium is the speed of light in vacuum divided by the speed of light in that medium. A larger refractive index means the light travels slower.
* *Total internal reflection is when light is only reflected, and none of the light is transmitted. This only occurs when the light is going from a slower medium towards a faster medium and when the angle of incidence is greater than the critical angle.*
* *The critical angle is the largest angle where some light will be refracted. The refracted light ray is along the boundary of the two media.*
* Transverse waves are waves where the particle motion is at right angles to the wave velocity. Longitudinal waves are waves where the particle motion is in the same direction as the wave velocity.
* A pulse does not change phase when it is transmitted into another medium. A peak remains a peak. A reflected pulse changes phase when it bounces off a slower medium (peak becomes a trough). A reflected pulse doesn’t change phase it bounces off a faster medium.
* The frequency of a refracted wave stays the same. The wavelength increases if the wave moves into a faster medium, the wavelength decreases if the wave moves into a slower medium.
* *Diffraction is the bending of waves around barriers and through gaps. A smaller gap produced more bending. A larger wavelength produces more bending.*
* *Constructive interference occurs when a crest and a crest or a trough and a trough meet, producing a wave of large amplitude. Destructive interference occurs when a crest meets a trough producing a wave of low, or no amplitude.*
* *Two sources of circular waves produce an interference pattern with area of high amplitude waves (antinodes) and low or no amplitude waves (nodes)*
* *Increasing the wavelength causes the antinodes to move further apart. Increasing the distance between the sources causes the antinodes to move closer together.*