Waves Rules & Definitions

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

- *The Doppler effect is caused when the source of the wave is traveling towards or away from the observer. The wave fronts get bunched up /separated out causing a change in the wavelength of the wave making the wave sound higher/lower / change colour.*
- *A standing wave occurs when a wave is reflected and the reflected wave interferes with the wave coming in. This creates regions of zero amplitude (nodes) and high amplitude waves (antinodes).*
- *An instrument will create all the harmonics, resulting in a sound wave that is not a sine curve. Different instruments have different harmonics, and different amplitudes of each harmonic, resulting in every instrument sounding different.*
- *Beating occurs when two waves with slightly different frequencies overlap*. At times the waves are in phase causing constructive interference with peaks meeting peaks and troughs meeting troughs. This produces a large amplitude wave and a loud sound. A short time later the waves are out of phase causing destructive interference with peaks meeting troughs. This produces a small amplitude wave and a quiet sound. *The waves alternate from being in phase and out of phase creating a loud-soft-loud-soft pattern.*
- *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.*
- A diffraction grating is a sheet of plastic or glass with a large number of slits. *It produces a similar interference pattern to the double slit pattern. The bright spots are sharper and brighter* because there are more rays of light constructively interfering. *The dark areas are larger* because there are more rays of light so more angles that can produce destructive interference. Usually a diffraction grating has smaller gaps between slits than a double slit so the bright spots are usually further apart.
- White light contains a range of wavelengths. When white light is shone on a diffraction grating each wavelength will form antinodes (bright spots) at different positions. As a result *a diffraction grating separates the light out into its different wavelengths.*