

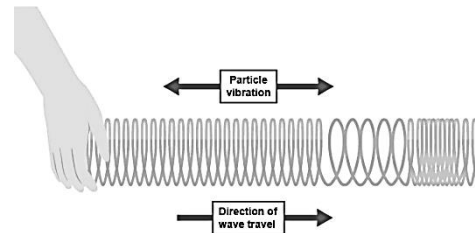
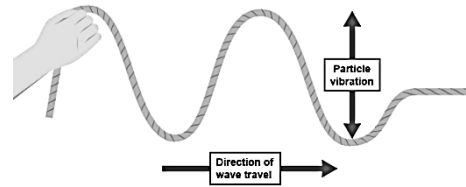
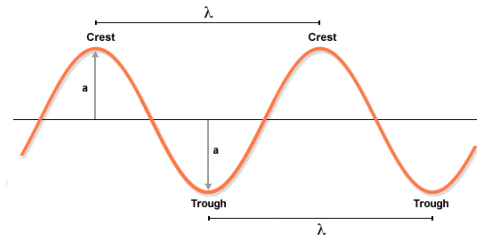
P4: Waves Knowledge Organiser

Lesson sequence

1. Waves
2. Wave speed
3. Core practical – investigating waves (CP13)
4. Refraction

1. Waves

*Waves	Transfer energy without transferring matter.
*Oscillate	When particles vibrate backwards and forwards or up and down.
*Transverse waves	Waves in which particles oscillate at right angles to the direction of energy movement. E.g. water waves and light waves.
*Longitudinal waves	Waves in which particles oscillate parallel to the direction of energy movement. E.g. sound waves.
*Medium	The material that waves travel through. Light waves are the only waves that have no medium.
*Seismic waves	Waves of vibrating rock caused by earthquakes.
*Frequency	The number of waves that pass a point every second.
*Hertz	The unit of frequency. 1 Hz = 1 wave per second.
*Period	The length of time it takes for a single wave to pass.
*Wavelength	The distance in m from the top of one wave to the top of the next.
*Amplitude	The maximum distance a particle vibrates away from its resting point,
*Velocity	The speed of a wave in m/s.



2. Wave speed

*Speed, distance and time	$\text{wave speed (m/s)} = \frac{\text{distance (m)}}{\text{time (s)}}$
*Speed, frequency and wavelength	$\text{wave speed (m/s)} = \text{frequency (Hz)} \times \text{wavelength (m)}$
**Measuring wave speed	Time how long they take to travel a certain distance.
***Changing speed	Waves travel at a different speed in a different medium. Light is slower in water than air.

3. Core practical – investigating waves (CP13)

*CP13 - Aim	To measure the speed of waves in a liquid and a solid.
*CP13 – Water waves 1	<ol style="list-style-type: none"> 1. Count the number of waves in 10 s and use this to find the frequency. 2. Measure the wavelength with a ruler 3. Wave speed = frequency x wavelength
*CP13 – Water waves 2	<ol style="list-style-type: none"> 1. Time how long a wave takes to pass two points, 0.3 m apart. 2. Wave speed = dist / time
*CP13 - Waves in a solid	<ol style="list-style-type: none"> 1. Hit suspended metal bar with hammer and measure the frequency using an app. 2. Measure the metal bar – double the length gives the wavelength

4. Refraction

Refraction	Bending of waves when they enter a new medium at an angle.
Interface	The boundary between two media (mediums) such as air and water.
Normal	An imaginary line drawn at 90° to where light hits an interface (boundary).
Travelling from air to glass or water	Light bends towards the normal
Travelling from glass or air to water	Light bends away from the normal.
Explaining refraction	Light waves slow down as they go from air to water. The 'bottom' of the wave hits the water and slows down first, causing refraction.

