

Keyword	Definition
Angle of Incidence	Angle between the normal and incident ray.
Angle of reflection	The angle between the reflected ray and the normal.
Diffuse Scattering	When light is reflected off a surface in all directions.
Dispersion	Spreading out of the different wavelengths of light, caused by refraction of light as it passes through a prism.
Frequency	The number of waves produced each second. The unit of frequency is hertz (Hz).
Amplitude	The maximum height of a wave from the middle of the wave to its peak or trough.
Wavelength	The length of a single wave, measured from one wave peak to the next.
Pitch	The frequency of a sound. Sounds with a high pitch have a high frequency.
Incident Ray	Light ray moving towards a surface or boundary.
Reflected Ray	Light ray leaving a surface or boundary.
Law of reflection	In reflection at a surface, the angle of incidence equals the angle of reflection.
Spectrum	A series of similar waves arranged in order of wavelength or frequency.
Echo	A sound caused by the reflection of a sound wave from a smooth surface back to the listener.

Further Reading:
<https://www.bbc.com/bitesize/guides/zq7thyc/revision/1>
<https://www.bbc.com/bitesize/guides/z8d2mp3/revision/1>

Longitudinal Waves

In longitudinal waves, the vibrations are parallel to the direction of wave travel. Examples are: Sound Waves, Ultrasound Waves, Seismic P-Waves.

The diagram shows a longitudinal wave moving to the right. It consists of alternating regions of high particle density (compressions) and low particle density (rarefactions). The wavelength is the distance between two consecutive compressions. The amplitude is the maximum displacement of particles from their equilibrium position. A double-headed arrow indicates the direction of displacement of air molecules, which is parallel to the wave's direction.

Transverse Waves

In transverse waves, the vibrations are at right angles to the direction of wave travel. Examples include: Ripples on water, vibrations on a guitar string and a Mexican Wave. Electromagnetic waves such as light waves, micro waves and radio waves.

The diagram shows a transverse wave moving to the right. The particles vibrate perpendicular to the wave's direction. Key features labeled include the crest (highest point), trough (lowest point), equilibrium (rest position), amplitude (height from equilibrium to crest or trough), and wavelength (distance between two consecutive crests).

Speed of Light
300,000km/s

Speed of Sound (air)
343m/s

Light can travel through a vacuum but sound cannot. Sound needs a medium to travel through either a solid, liquid or gas. Sound travels fastest in a solid because the particles are closer together.

The diagrams illustrate the particle arrangement in different states of matter: Solid (particles are tightly packed in a regular grid), Liquid (particles are close together but disordered), and Gas (particles are widely spaced and moving randomly).

Calculating Wave Speed

$$v = f\lambda$$

v = velocity
 f = frequency
 λ = wavelength

Calculating Speed

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

This diagram compares sound waves. On the left, a bird is shown next to a wave with a large amplitude, labeled 'Louder Sound'. On the right, an ear is shown next to a wave with a large amplitude and high frequency, labeled 'Higher Pitch Sound'. Below, a wave with a large amplitude and low frequency is labeled 'Quieter Sound', and a wave with a small amplitude and high frequency is labeled 'Lower Pitch Sound'.

Reflection

The diagram shows an incident ray hitting a horizontal plane mirror. A vertical red line represents the normal. The angle between the incident ray and the normal is the 'Angle of Incidence'. The angle between the reflected ray and the normal is the 'Angle of Reflection'. The text states that these two angles are equal.

Refraction

The diagram shows a light ray passing from Substance 1 (top) to Substance 2 (bottom) at a boundary. A vertical dashed line is the normal. The angle between the incident ray and the normal is the 'Angle of incidence'. The angle between the refracted ray and the normal is the 'Angle of refraction'. The ray bends towards the normal as it enters Substance 2.

