

1.1 Wave Characteristics

Waves

N4

A **wave** transfers energy from one place to another. Waves are made from particles vibrating. In this unit we will consider two types of waves, **transverse** waves and **longitudinal** waves.

A **transverse** wave is one in which the vibrations making up the waves are at right angles to the direction of the wave.



Direction of wave →

Direction of vibration of particles.

Waves on a rope, water waves, light waves and all members of the electromagnetic spectrum are transverse waves.

A **longitudinal** wave is one in which the vibrations are in the same direction as the wave travels.



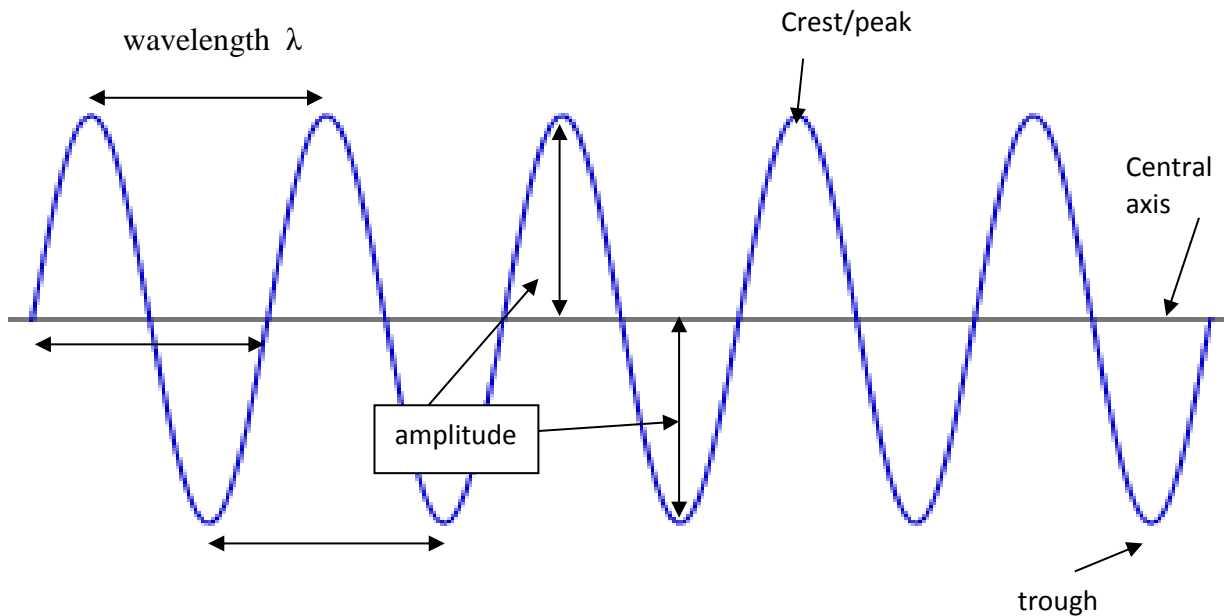
Direction of wave →

Direction of vibration of particles

Sound is a longitudinal wave.

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Wave Properties



Frequency, f – the number of waves produced (passing a point) each second, unit: Hertz (Hz)

$$f = \frac{N}{t}$$

Wavespeed, v – distance travelled by a wave in one second, unit: metres per second (m/s)

$$v = \frac{d}{t}$$

amplitude – size of the maximum disturbance from the central axis (distance from central axis to crest/trough), unit: metres (m)

Wavelength, λ – distance from one point on a wave to the same point on the next wave, unit: metres (m)

Period, T – time taken to produce a wave, unit: seconds (s)

$$T = \frac{1}{f} \quad \text{OR} \quad T = \frac{t}{N} \text{ where } N \text{ is the number of waves and } t \text{ is the time.}$$

Loud notes have more energy than quiet notes and therefore have a larger amplitude. High pitch notes produce more waves per second and therefore have a higher frequency.

