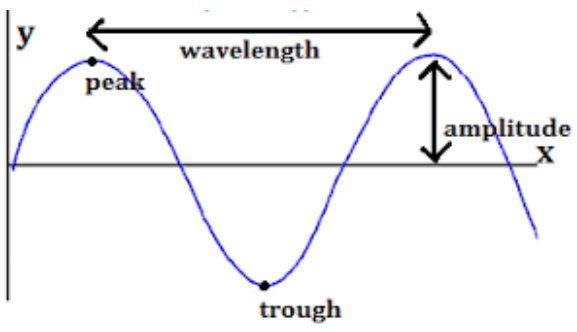


Section 1 - Waves

A wave is a vibration that transfers energy or information. It is described as an oscillation.

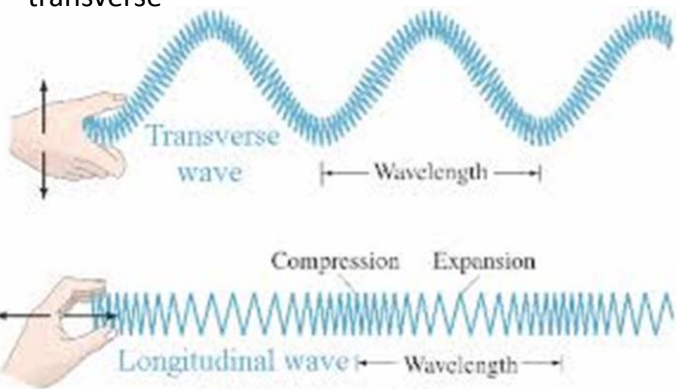


Section 2 - Types of wave

There are two types of wave: Longitudinal and Transverse.

In a **longitudinal wave** the oscillations are **parallel** with the direction of the wave. **Sound waves** are longitudinal

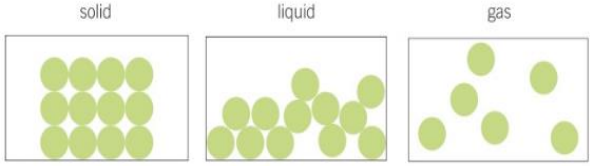
In a **transverse wave** the oscillations are **at 90°** to the direction of the wave. **Light waves** are transverse



Section 3 - Speed of Sound

Sound travels as a vibration through a medium. The closer (more densely packed) the particles the faster the vibration can travel.

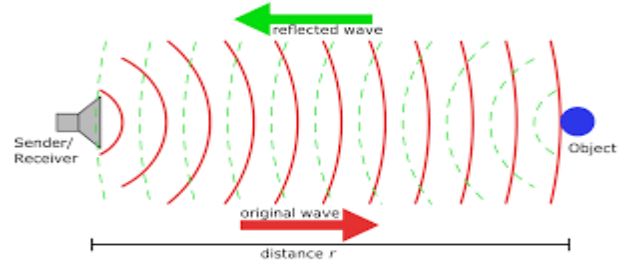
The speed of sound in air is 340m/s
The speed of sound in water is 1500m/s



▲ The arrangement of particles explains the speed of sound in different materials.

Section 5 - Echoes

When sound reflects off a surface it produces an echo. Marine animals and fishing boats use echolocation to locate prey.

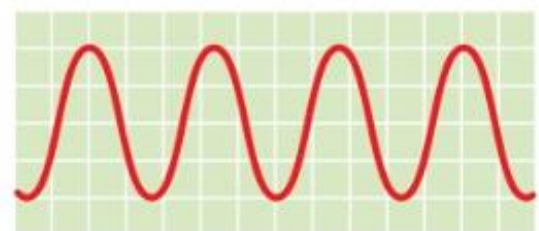


Ultrasonic sounds are above the 20 000 Hz; limit of human hearing. Ultrasound is used by bats to find their food and by doctors to make an image of a foetus.

The speed of sound can be calculated by measuring how far sound travels in a given time period and using the equation

$$\text{Speed (m/s)} = \frac{\text{distance travelled (m)}}{\text{time taken (s)}}$$

Section 4 - Changing sounds

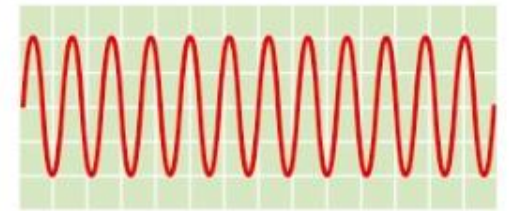


loud

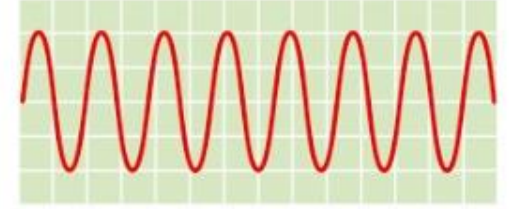


soft

▲ A loud sound has a bigger amplitude than a soft sound.



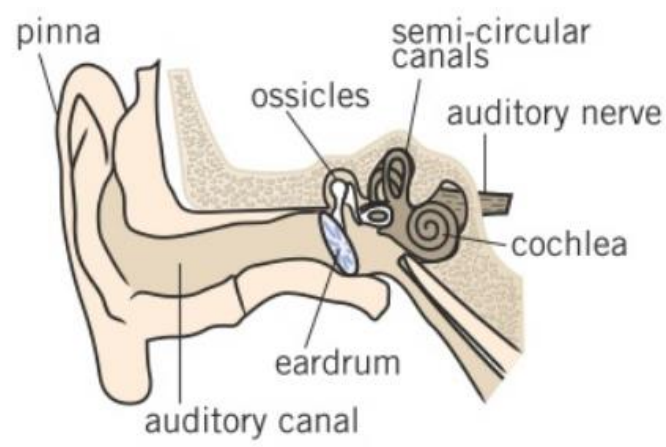
high



low

▲ A high sound has a higher frequency than a low sound.

Section 6 - Detecting sound



▲ Structure of the ear.

Sound intensity is measured in decibels (dB).

120 dB is the pain threshold.

Hearing can be damaged by listening to loud sounds for long periods of time.

Hearing can also be damaged if sharp objects damage the ear drum or ear wax builds up.