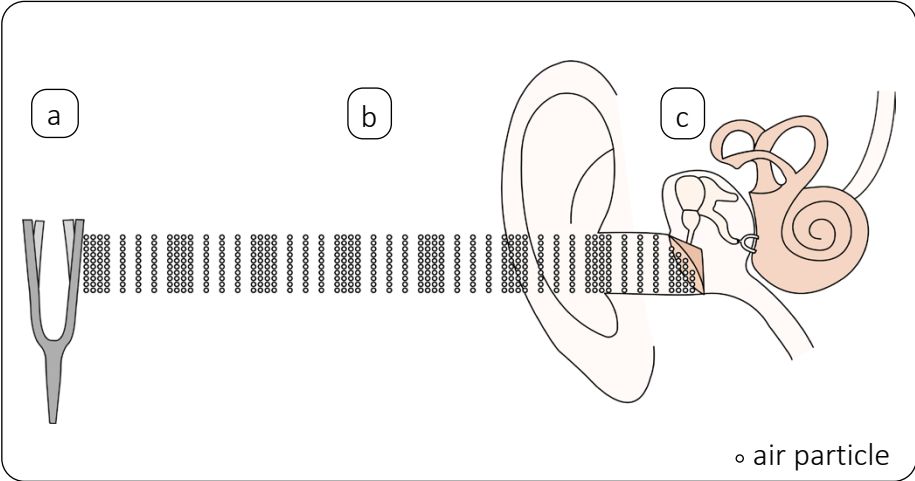


# Sound

## What is sound?

Sound is energy produced by vibrations from a sound source. Sound travels in waves through a medium, such as a solid, liquid or gas, to our ears. Most of the sound waves we hear travel through air, which is a gas. Where there is no medium for sound waves to travel through, such as in space, there is no sound.

## How we hear sound



- a. When energy is put into a sound source, it starts to vibrate, quickly moving back and forth repeatedly in a regular pattern.
- b. These vibrations disturb the tiny particles of the medium that is close by, such as air, and they start to vibrate. They collide with the air particles next to them and pass the vibration energy along in sound waves.
- c. When the sound waves enter the ear, they make the eardrum vibrate. These vibrations pass through small bones called ossicles and are turned into electrical signals in the spiral-shaped cochlea. These signals travel through the cochlear nerve to the brain and are interpreted as sounds.

## Volume

The volume of a sound is how loud it is. It is measured in units called decibels (dB). Energy affects volume. The larger the force of energy put into the sound source, the louder the volume; the smaller the force, the quieter the volume. Distance also affects volume. The nearer the sound source, the louder the volume. The further away the sound source, the quieter the volume.

## Pitch

The pitch of a sound is how high or low it is. Pitch is measured in units called hertz (Hz). Humans can hear between 20 and 20,000 Hz but dogs can hear higher-pitched sounds. Fast vibrations produce high-pitched sounds, such as the sound of a whistle. Slow vibrations produce low-pitched sounds, such as the sound of a bass drum.

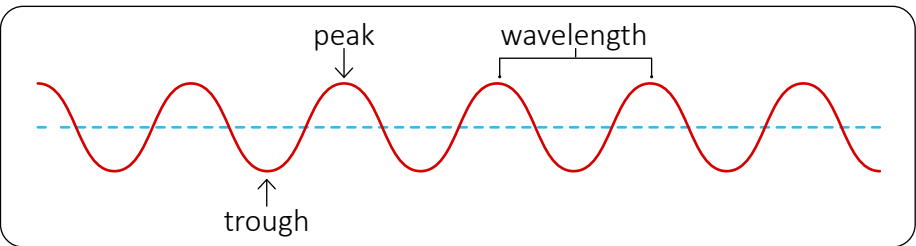


## Representing sound waves

Sound waves can be represented by a wavy line in a sound wave diagram.

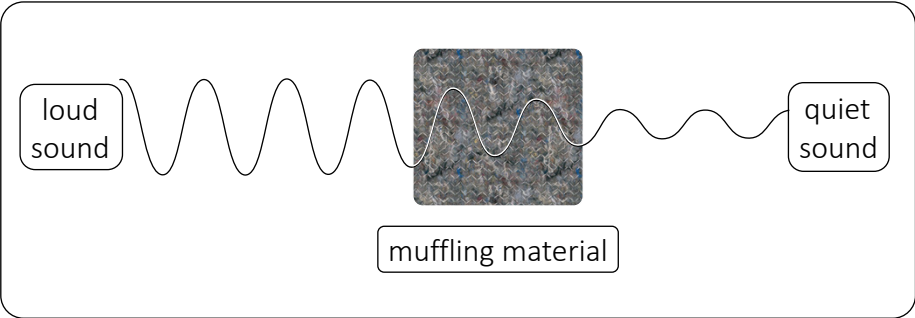
Volume is represented by the size of the peaks and troughs; large peaks and troughs represent a loud volume and small peaks and troughs represent a quiet volume.

Pitch is represented by the distance between each peak, called the wavelength. A long wavelength represents a low-pitched sound, and a short wavelength represents a high-pitched sound.



## Muffling sound

Being exposed to very loud or continuous sounds can damage hearing. It can also lead to increased stress, tiredness and health problems. Materials that muffle sound absorb a lot of sound energy and reduce the volume of sound reaching our ears. Earplugs, ear defenders and soundproofing materials all muffle sound.



## Glossary

|                 |                                                                                              |
|-----------------|----------------------------------------------------------------------------------------------|
| <b>cochlea</b>  | The spiral-shaped part inside the inner ear that turns vibrations into electrical signals.   |
| <b>eardrum</b>  | A thin layer of tissue inside the ear through which vibrations pass.                         |
| <b>medium</b>   | A material, such as a solid, liquid or gas, that transfers energy from one place to another. |
| <b>ossicles</b> | Three tiny, linked bones inside the ear through which vibrations pass.                       |
| <b>particle</b> | A single piece of matter that is too small to be seen.                                       |
| <b>vibrate</b>  | To quickly move back and forth repeatedly.                                                   |

