# Sound

**Prior Knowledge**

Explore how things work. (Nursery - Sound)

Describe what they see, hear and feel whilst outside. (Reception - Sound)

Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)

**Year: 4**

**Term: Autumn**

**Key Knowledge**

**What is sound and how is it made?**

Sound is a type of energy.
Sounds are created by vibrations. The louder the sound, the bigger the vibration.
Sound can travel through solids, liquids and gases.
Sound travels as a wave, vibrating the particles in the medium it is travelling in.
Sound cannot travel through a vacuum.
Sound energy can travel from particle to particle far easier in a solid because vibrating particles are closer together than other states of matter.

**How to spot each type of material**

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| What is amplitude? | The size of the vibration (the movement backwards and forwards) is called the amplitude. Louder and sounds have a larger amplitude and quieter sounds have a smaller amplitude. |
| What is pitch? | Pitch is the measure of how high or low a sound is. A whistle being blown creates a high pitched sound. A rumble of thunder is an example of a low pitched sound.<br>You can change the pitch of a sound in different ways deepening upon the instrument you are playing. For example, if you are playing a xylophone, striking the smaller bars with the beater causes faster vibrations and so a higher pitched note. Striking the larger bars cause slower vibrations and produces a lower note.<br>Children should find the patterns between the pitch of a sound and features of the object that produced it. |
| Changes in volume | If you throw a stone into a pond, it will produce ripple. As ripple spread out across the pond, they become smaller. When sound vibrations spread out over a distance, the sound becomes quieter, like ripples in a pond.<br>Children should find patterns between the volume of a sound and the strength of the vibrations that produced it. |

**How do we hear?**

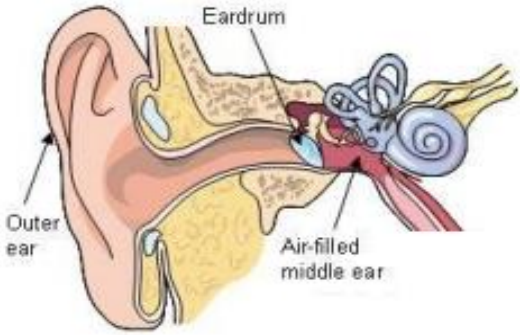
When you hit a drum, the drum skin vibrates. This makes the air particles closest to the drum start to vibrate as well.

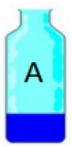
The vibrations then pass to the next air particle, then the next, then the next. This carries on until the air particles closest to your ear vibrate, passing the vibrations in to your ear.

Inside your ear, the vibrations hit the eardrum and then are passed to the middle and then the inner ear. They are changed into electrical signals and sent to your brain. Your brain tells you that you are hearing a sound.

Recognise that a sound becomes fainter as the distance from the sound source increases.

**Diagrams and symbols**



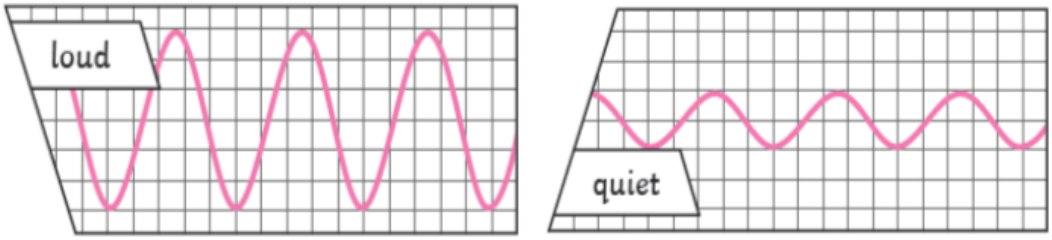




Lowest pitched


Highest pitched

**The shorter the vibrating column of air, the higher the pitch so bottle B will give a higher pitch sound**

**Amplitude:**




**Pitch:**


**Key skills**

- **Use** my results to draw a conclusion and make predictions or suggest improvements for answering a different question or repeating my test.
- **Identify** differences, similarities or changes when making comparisons in my experiments or scientific learning.
- **Support** my answers or conclusions by pointing out the scientific evidence.
- **Report** my conclusion from the data I have measured.
- **Gather** the data I need to answer a scientific question and then present them in an appropriate way
- **Record** my findings in labelled diagrams, keys, bar charts or tables.
- **Set up** a practical fair test experiment to answer a scientific question.
- **Make** careful observations and record accurate measurements using equipment or a data logger.
- **Ask** relevant questions and use different types of scientific enquiries to answer them.

**Vocabulary**

Working scientifically key vocabulary – observe, test, object, record, equipment, prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis

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|---|---|
| Amplitude – the distance between the top and the bottom of a sound wave | Ear – the two organs on the side of our head that helps humans and animals hear sounds |
| Eardrum – a thin piece of skin inside the ear that moves backwards and forwards very quickly when a sound wave reaches it | Pitch – The number of waves that a sound has within it. |
| Sound wave – The form that a sound takes when it passes through air or water | Vibration – A continuous quick, slight shaking movement |
| Volume – the level of sound produced | |

Additional vocabulary to discuss across the unit – absorb, decrease, distance, higher, increase, lower, particles, vacuum, energy, percussion instrument, wind instrument, string instrument, frequency, transverse wave, longitudinal wave, medium

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|---|---|
| **Future Learning:** | Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition. (KS3)<br><br>Frequencies of sound waves, measured in Hertz (Hz); echoes, reflection and absorption of sound. (KS3)<br><br>Sound needs a medium to travel, the speed of sound in air, in water, in solids. (KS3)<br><br>Sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal. (KS3)<br><br>Auditory range of humans and animals. (KS3)<br><br>Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound. (KS3)<br><br>Waves transferring information for conversion to electrical signals by microphone. (KS3) |

**Deepening and broadening the knowledge and understanding for GDS learners:**

- demonstrates and explains how sound is made, using scientific vocabulary including vibration, conduct, sound wave and material
- explains that without air, we would not hear any sound, *e.g. in outer space*
- knows that we hear because the outer ear collects the sounds and carries them to the eardrum
- explains the relationship between pitch and the feature of the object, *e.g. the thinner the guitar string the higher the pitch of the note*
- explains the relationship between volume and the strength of the action used to make a sound, *e.g. the harder the drum is beaten, the louder the sound*
- knows that as volume increases, the size of the vibrations increases
- explains why the volume of the sound heard changes depending on the distance from the sound source

**1. What causes sound?**
*Children learn that sounds are caused by vibrations. They learn that sounds travel from an object, through a medium (usually the air), travel into the ear where they are carried down the ear canal and processed by the brain. Children complete an explanation text explaining how we hear things, by cutting and pasting or writing their own descriptions.*

**2: How does sound travel?**
*Children complete six "mini-experiments" to observe how sound travels in solids liquids and gases. They will record their findings and explain their conclusions and understand that sound waves travel slower than light.*

**3. What affects the volume of a sound?**
*Working on the school yard, children investigate the height a ball needs to be dropped from in order to be heard at different distances. Children predict and then measure the minimum height required, recording their results in a table. They create a line graph (if they have already learnt how to do this in maths, or a bar chart) and explore the link between the distance and the minimum height (and therefore volume) required.*

**4. How can I change the pitch of a sound?**
*Children learn about the difference between pitch and volume. They carry out an investigation where they place 5 different water containers in order, depending on the pitch made when air is gently blown across the top of each. They attempt to find a pattern and explain their results.*

**5. Can I investigate pitch and volume?**
*Children learn that pitch and volume are two different properties of sounds. Children investigate the pitch and volume of the sound made when 5 different balls are dropped. Recognising the difficulty of measuring pitch and volume without equipment, children make 5 measurements and then choose the modal value.*

**5: What material makes the best ear defenders?**
*Children will predict, plan and investigate the effectiveness of different materials as sound insulators and results in a bar chart and place the materials in order of effectiveness as sound insulators. Children will explain conclusions relating back to the scientific enquiry.*