

GOOD VIBRATIONS

INTRODUCTION

In this module children will build on their understanding of hearing, which was covered in Year 1 (Using our senses) during work around the senses. They will develop their vocabulary for describing sounds and identify different sound sources. They will learn that sounds are made by something vibrating and that these vibrations travel through a medium to the ear so that we hear them. They will learn that sounds get fainter as the distance from the sound source increases. They will explore ways to change the pitch and volume of sounds.

When working scientifically children will look for patterns between the volume of a sound and the strength of the vibrations that produced it. They will also explore the pitch of a sound and ways in which it can be changed. They will do this by investigating how to make and change the sounds produced in a range of different ways. They will have the opportunity to set up simple comparative and fair tests, take measurements, including using data loggers, and report on their findings.

Key vocabulary:

sound, loud, quiet, high, low, repeating, continuous, strike, blow, shake, pluck, vibration, vibrate, solid, gas, volume, strength of vibrations, sound source, fainter, distance, pitch, particles, question, investigation, fair test, change, measure, predict, prediction, explanation, observations, draw conclusions

FACT FILE:

Sounds are caused by a material vibrating. For sounds to travel they require a medium to pass through, which can be a solid, liquid or gas. We hear/detect sounds because the vibrations produced by the source pass through the air. When they reach our ears they cause our eardrums to vibrate, stimulating the nerve endings in the ear so we hear the sound. In space no one would be able to hear you scream because there is no air. It is a vacuum.

Unlike light, sounds travel in all directions from a source, including above and below. Sounds travel round corners and through materials, therefore we can hear sounds that are not in view.

Sounds can be **high** or **low**. This is known as the **pitch** of the sound. In music the pitch of the sound is referred to as its note. Some instruments are high pitched and play high notes e.g. violin and flute, some instruments are low pitched and play low notes, e.g. cello and tuba.

The speed of the vibrations is known as their **frequency**. The higher the frequency, i.e. the faster the vibrations, the higher the pitch. This is measured in **Hertz** (Hz). An orchestra tunes to concert A, which has a frequency of 440 Hz. This means that the prongs of a concert A tuning fork will vibrate back and forth 440 times in a second.

Generally larger objects will vibrate more slowly and therefore produced lower notes. This can be seen by looking at a family of instruments in an orchestra or the length of the bars on a xylophone or glockenspiel.

Sounds can also be **loud** or **quiet**. This is known as the **volume** of the sound. In music this is known as the dynamics. Instruments can be played loudly or quietly by changing the way you make the note, e.g. banging the drum harder, blowing a flute harder.

The loudness of a sound is dependent on how strong the vibrations are. The size of these vibrations is known as the **amplitude**. The higher the amplitude, i.e. the stronger the vibrations, the louder the sound. This is measured in **decibels** (dB). Leaves rustling is about 10 dB, a vacuum cleaner is about 80 dB and our pain threshold is about 130 dB.

Loud sounds can damage our ears, which is why some people need to wear ear defenders or earplugs for some types of jobs. A sound of 160 dB can instantly perforate the eardrum.

As the vibrations pass through the air away from the sound source the vibrations become weaker (their amplitude decreased) and therefore the volume (loudness) of the sound decreases. This is why sounds become fainter as you move away from the sound source. We can hear an aeroplane in the sky such a long way away only because it is such a loud sound.

Common misconceptions:

- Children sometimes find it hard to grasp the way sound travels, because they confuse it with light which travels in straight lines, is blocked by opaque materials and does not go round corners. Make sure that they notice that sounds can be heard in all directions from a sound source, including above and below, and that they can hear objects that they cannot see making a sound.
- Children often wrongly conclude that sounds do not travel well through solids. This is because they experience sounds becoming quieter when muffled e.g. closing a door or window and wearing ear defenders. This can be demonstrated to be incorrect using the ear gongs in Lesson 3 or by tapping a table with your ear pressed on the surface. This is not part of the KS2 curriculum but be careful not to embed this misconception further.
- Sounds actually travel more easily through a solid than through a liquid or a gas. This is because the particles in a solid are packed more closely together so it is easier for the vibration to be passed on. The reason why closing the door causes the sound to decrease is that the vibrations get weaker as they move from one medium to another (air, to solid door and to air again).

CROSS-CURRICULAR LINKS:

This module can be linked to Music activities. It can also be linked to designing and making musical instruments as a D&T activity.