

YEAR 4 UNIT 1: Sound (What's that sound?)

Enquiry Question: How are sounds made and how can they be heard?

Related units: Year 1 Unit 1: Animals including humans - Can you name the parts of the body? Year 5 unit 4: What are forces and how do they work?

Unit overview

National Curriculum Link Year 4: Sound

Children will identify how sounds are made, associating some of them with something vibrating. Children will recognise that vibrations from sounds travel through a medium to the ear. Children will find patterns between the pitch of a sound and features of the object that produced it. Children will find patterns between the volume of a sound and the strength of the vibrations that produced it. Children will recognise that sounds get fainter as the distance from the sound source increases. Children will already know many things about sound, even without any formal teaching. They will have encountered how sounds are made on a variety of instruments and how they can be changed in volume, pitch and over distance. They will explore making sounds on a range of objects that aren't instruments in order to investigate how sounds are created to make music. Children know that we hear with our ears and how to make loud noises.

Scientific vocabulary

- Pitch
- volume
- vibration
- source
- medium
- distance
- rhythm
- volume
- sound wave
- Eardrum
- pinna (outer ear)
- hammer
- anvil
- eustachian tube
- nerve
- cochlea
- audible
- inaudible

Working Scientifically

- Find patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses
- Investigate which materials provides the best insulation against sound
- Make and play their own instruments by using what they have found about pitch and volume
- To observe and name a variety of sources of sound

Assessment

- 1) Explain, with reference to vibrations, how an object makes a sound.
- 2) List the mediums sound can travel through
- 3) Explain with reference to an instrument, how the pitch and of the sound can be changed
- 4) Explain how volume changes when you move further away from the sound source.

Cross-curricular links

Investigations:

- Test which materials allow sound to travel through
- Devise an experiment to measure loudness

Writing opportunities:

- Describe how sounds are made and received by an ear

Maths opportunities:

- Measuring sound (increase, decrease in pitch)

Teacher knowledge

Sound is produced by vibrations, even when it is hard to see them. The vibrations travel through the air and are detected by our ears. Within the ear is an ear drum which vibrates and turns the vibrations into signals to the brain, which then ‘hears’ the sounds. The speed of sound in air is approximately 340 m/s (metres per second). The denser the medium, the faster sound travels: for example, it travels faster through liquids than air, and even faster through solids. Sound does not travel through a vacuum, because sound needs particles to make the vibrations. No one can hear anything in space. There is often a misconception regarding the terms ‘sound’ and ‘noise’. Noise can be defined as unwanted sound.

The loudness of a sound depends on the size of the vibration: the bigger the vibration, the louder the sound. The greater the volume of air vibrating, the louder the sound will be. A large drum struck with the same force as a small drum will sound louder because the bigger drum can make more of the air move, simply by have a bigger ‘skin’ to vibrate. A vibrating tuning fork cannot be heard until the stem is placed on a table. This causes the table to vibrate very slightly, but there is a large volume of air in contact with it compared to the small volume of air in contact with the prongs of the tuning fork.

Sound waves spread out in all directions from the source of the sound. The front of the wave is in the shape of a sphere, which gets larger as the wave moves through the air. The energy from the source is spread out over the surface of the sphere. As the sphere gets larger, the intensity of the sound over its surface decreases. Exposure to loud sounds can lead to serious hearing problems and deafness. Ear defenders help by blocking all or some of the sound from reaching the ears. They are made of two cups, lined with acoustic foam, that surround the ears. There is a difference between sound absorption and sound blocking. Sound absorption reduces the sound bouncing around inside a room, causing echoes and reverberations. The source of sound is in the same room as the listener. Materials used for sound absorption are soft and have large surface area, such as fabrics, carpets and acoustic tiles. Cinemas, theatres and restaurants often have soft materials on the walls for this reason. Sound blocking prevents sound from entering or leaving a room or a building. This is normally what is meant by ‘soundproofing’. Materials used for sound blocking are often dense, heavy materials. Secondary or double-glazing also reduces sound transmission. In ear defenders, however, they will be lighter, soft materials. Examples of when ear defenders might be worn include: using electric drill, strimming verge, driving tractor, airside workers at airport, disc jockeys, workers in noisy factories. Use the opportunity to emphasize the damage that can be caused by listening to personal music players if the volume is too loud.

Pitch refers to how high or low a sound is. A high-pitched sound has a high frequency. A low-pitched sound has a low frequency. Frequency is the number of vibrations per second. The pitch of a vibrating string depends on: the length of the string – the longer the string, the lower the pitch; the tension of the string – the tighter the string, the higher the pitch; the weight of the string: the heavier the string, the lower the pitch. The pitch of a vibrating air column (e.g. a bottle) depends on: the length of the column – the longer the air column, the lower the pitch; whether the air column is open at one end or both ends; the temperature of the air. Other vibrations related to pitch: For striking a length of tubing, the shorter the tubing, the higher the note. For striking a glass bottle with different amounts of water in: more water in the bottle, the more glass that can vibrate, so the lower the note. You will need some preparation time the first time you teach this lesson, but if you retain the instruments, it can be quickly reassembled for future lessons. Water levels can be marked on the side of bottles, for example.

Did you know?

- You can’t hear anything in space because there is nothing there for the sound to travel through!
- Dogs can hear higher sounds than humans, allowing them to hear noises that we can’t.
- Sound is used by many animals to detect danger, warning them of possible attacks before they happen.

Misconceptions: Children might think:

- that noise and sound are the same (noise is unwanted sound)
- that volume means how much liquid (volume mean loud or quiet)
- that only workmen need to use ear defenders (many people use ear defenders)
- that pitch is related to a football playing field, or even a road covering (pitch is about high and lowness)
- that volume and pitch are the same thing (they are different, one is loud and quiet, the other is high and low)

Resources

www.sciencekids.co.nz/sound.html

www.kidsbuilder.com/FunFactsForKids/sound.html.

www.bbc.co.uk/schools/scienceclips/ages/9_10/changing_sounds_fs.shtml

www.tes.co.uk/teaching-resource/Teachers-TV-Primary-Science-Light-and-Sound-6044056

Instruments, cans with balloons and rice

