Y4 – Sound

Key Question: What is sound?

Overview Of Learning

During this unit of work, children will learn how vibrations cause sounds and how sounds travel through different mediums at different speeds. They will explore how sounds can change in pitch and loudness and be able to explain this using scientific language. They will develop their scientific skills by planning two fair test investigations to answer the questions: which material is the best at muffling sounds and does the size of the pinnae affect the volume of the sound? Children will also learn what happens to sound vibrations when they reach the ear.

Previous Learning

KSI – sound is not taught as a separate topic in KSI science however children may have some knowledge of pitch and volume through their music lessons.
KS2 – children continue to explore sound through music (in their music lessons) and in the topic on light, children may compare how fast sound travels compared to light.

Knowledge And Understanding Objectives

Pupils should be taught to:

- identify how sounds are made, associating some of them with something vibrating
- recognise that vibrations from sounds travel through a medium to the ear
- find patterns between the pitch of a sound and features of the object that produced it
- find patterns between the volume of a sound and the strength of the vibrations that produced it
- recognise that sounds get fainter as the distance from the sound source increases.

Future Learning

KS3 – children will extend their understanding of sound by exploring frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound. They will build upon knowledge of how sound travels through a medium and explore the auditory range of humans and animals.

Key Vocabulary To Explain

Vibrate/vibrations – forward and backward movement of an object (usually rapidly).
volume – how loud or quiet a sound is.
pitch – how high or low a sound is.
pinna – the outer portion of the ear (ear flap).
cochlea – the sound reception part of the inner ear.
eardrum – the membrane which collects sound from the pinna and passes it to the inner ear.

Working Scientifically Objectives

Pupils in Lower Key stage two should be taught to:

- set up simple practical enquiries, comparative and fair tests
- report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers

Misconceptions

Children will often confuse volume with pitch. The vocabulary needs to be exemplified carefully (and frequently) to ensure correct usage.
You can see and hear a distant event at the same moment – this in not true. Light travels faster than sound (hence you see lightning then hear thunder even though they have occurred at the same time). Hitting an object harder gives a higher pitch – this is not true; hitting an object harder will produce a louder sound as the vibrations created are stronger but won't affect the pitch. Sound moves faster in air than in solids (air is "thinner" and forms less of a barrier) – this is not true. Sound moves faster through solids as the particles are closer to one another. As sound waves move, the air moves along with them. This is not true. The vibration is passed from air particle to the next air particle.

Unit Overview

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6	Lesson 7
Key question: How are sounds made?	**Key question:** What is a sound vibration?	**Key question:** What is inside your ear?	**Key question:** Does the size of the pinna affect the volume of the sound?	**Key question:** What is pitch?	**Key question:** What is volume?	**Key question:** Which material is best at muffling sound?
Learning objective: I can identify how sounds are made, associating some of them with something vibrating.	**Learning objective:** I can recognise that vibrations from sounds travel through a medium to the ear.	**Learning objective:** I can recognise that vibrations from sounds travel to the ear.	**Learning objective:** I can investigate if the size of the pinna affects the volume of the sound. I can report my findings from enquires.	**Learning objective:** I can find patterns between the pitch of a sound and features of the object that produced it	**Learning objective:** I can find patterns between the volume of a sound and the strength of the vibrations that produced it.	**Learning objective:** I can set up simple fair tests.
Success criteria: By the end of this lesson, children will be able to explain how sound is made and identify what is vibrating when sounds are made.	**Success criteria:** By the end of this lesson, children will be able to explain how vibrations from sounds travel through either solids, liquids or gases to the ear. They will use their knowledge of particle structure to explain why sound travels more quickly through solids when compared to gases.	**Success criteria:** By the end of this lesson, children will be able to describe the parts and functions of the outer, middle and inner ear.	**Success criteria:** By the end of this lesson, children will have planned a fair test investigation to answer the question: does the size of the pinna affect the volume of the sound. They will draw conclusions from the data collected and communicate the findings from their enquires.	**Success criteria:** By the end of this lesson, children will be able to explain what pitch is. They will have created a set of pan pipes and be able to describe the relationship between the length of the pipe and the pitch of the note.	**Success criteria:** By the end of this lesson, children have used a variety of instruments to explore how they can alter the volume. They may have used a data logger to record volume in decibels and be able to describe the relationship between the volume of a sound and the strength of the vibration.	**Success criteria:** After planning and conducting an investigation in response to the question – which material is the best at muffling sound, children communicate their findings by writing a letter.
Cumulative Quiz: Q1 – Q3	**Cumulative Quiz:** Q4 – Q6	**Cumulative Quiz:** Q7 – Q9	**Cumulative Quiz:** Q10 – Q12	**Cumulative Quiz:** Q13 – Q15	**Cumulative Quiz:** Q16 – Q18	**Cumulative Quiz:** Q19 – Q21

Stretch and Challenge ideas across the unit

Children could:

- identify what vibrates to make a sound in the picture of an orchestra.
- write and explain why it would be a problem if objects didn't vibrate.
- match the part of the ear with its description (easy) or write a description for each part of the ear (medium).
- use the 'communicate' sheet to draw conclusions from their investigation.
- describe how to change the pitch of the sounds produced on a violin
- complete a cloze passage with the correct scientific vocabulary to explain the relationship between energy and volume.
- design a pair of ear muffs that would effectively muffle sound. Label the design and explain why the material chosen would be effective at muffling sound using scientific vocabulary.

Assessment

- The pre-unit assessment should be given before the unit to see where gaps are and what the children know. This will provide insight of the children who already know about the topic and give an opportunity for the teacher to plan activities that stretch these children and develop higher order thinking skills.
- The knowledge organisers can be used to support children. These can be on display, on the tables, sent home or used for pre-teaching key vocabulary or concepts.
- The post-unit test can be used to assess the knowledge and understanding objectives that have been taught throughout the unit. This can be done independently or in small groups with a teacher.
- There is a cumulative quiz with questions that can be used to assess children throughout the topic. The quiz questions will link directly to each objective. They can also be used at the end of each lesson to give immediate feedback to inform future planning and give the opportunity to identify children who do not understand.