	Science	Year 4
	Term 6	Topic Title: Sound

Key Question: What is sound and how do we experience it?

National Curriculum Objectives:

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.

Vocabulary: (Plus some KS1 properties of materials vocab)
Sound, source, waves, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation
Comparative, fair, datalogger, decibel, survey.

National Curriculum requirement: Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge. Children will need further opportunities to explore and embed key scientific vocabulary outside of Science lessons through the wider curriculum and spelling lessons/homework activities.

Prior Learning:

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)

Common misconceptions:

Pitch and volume are frequently confused, as both can be described as high or low.
Sound is only heard by the listener
Sound only travels in one direction from the source
Sound can't travel through solids and liquids
High sounds are loud and low sounds are quiet.

Knowledge: A sound produces vibrations which travel through a medium from the source to our ears.
Different mediums such as solids, liquids and gases can carry sound, but sound cannot travel through a vacuum (an area empty of matter). The vibrations cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound.
The loudness (volume) of the sound depends on the strength (size) of vibrations which decreases as they travel through the medium. Therefore, sounds decrease in volume as you move away from the source.
A sound insulator is a material which blocks sound effectively.
Pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds.

Investigative skills

Fair/comparative testing	Identifying and classifying	Observations over time	Pattern seeking	Research
How does the length of a guitar string/tuning fork affect the pitch of the sound? *Which material is best to use for muffling sound in ear defenders?* Set up simple, practical enquiries, comparative and fair tests. Report on findings from enquiries including oral and written explanations or displays. *How can different materials affect a force? (Y5 forces)*	*Which material is best to use for muffling sound in ear defenders?* *What sounds are in our school?* *Which sounds are made by vibrations travelling through air etc?* Gather, record, classify and present data in a variety of ways to help in answering questions. Identify differences, similarities or changes relating to processes *Compare/ group everyday materials on the basis of their properties.* *(Y5 properties and changes of materials)*	*How does the volume of a drum change as you move further away?* Make systematic observations and take accurate measurements using dataloggers Close first-hand observation of vibrations in instruments and through water. Use straightforward scientific evidence ti answer own and others' questions based on observations made.	*When is our classroom the quietest?* *Is there a link between how loud it is in school and the time of day?* Make systematic nd careful observations. Take accurate measurements using standard units and a range of equipment, including dataloggers. *What patterns can you notice in different reactions? (Y5 properties and changes of materials.)*	*Do all animals have the same hearing range?* *Conduct a school sound survey. (What sounds are in our school?)* Recognise when and how secondary sources might help to answer questions that cannot be answered through practical investigations.

Significant Scientists: **Alexander Graham Bell**- telephone **Aristotle**- sound waves	**End point:** Name sound sources and state that sounds are produced by the vibration of the object. Know sounds travel through different mediums (air, water, metal.) Give examples to demonstrate how the pitch of a sound is linked to the features of the object that produced it. Give examples of how to change the volume of a sound e.g. increase size of vibrations by hitting or blowing harder. Give examples to demonstrate that sounds get fainter as the distance from the sound source increases.
Science stories: **Horrid Henry Rocks-** Francesca Simon	
Cross Curricular Links: **English:** present findings in written explanations using scientific language. Information texts. **Maths:** Measuring, construct and interpret data in tables, charts and graphs. **ICT:** Use search engines to research. Record oral presentations of Sound knowledge using ipads. Generate QR codes to store and refer back to video links.	**Oracy:** Jumpstart Science vocabulary warm up games. Explorify discussion activities. "I wonder"- opportunities to discuss and raise own questions. Oral presentations summarising their learning across the unit.
Wider Reading	**Enrichment**
Active assessment (in Science education)- Naylor, Keogh and Goldsworthy. Jumpstart Science- Feasey and Fulton A creative approach to teaching Science- Nicky Waller Let's sign Science-Cath Smith and Clare Ingle	"Sound museum" Use of own instruments or body percussion to explore. "I wonder"- opportunities to raise own questions. Relate experiences to local environment and school grounds. British Sign Language- learning to sign Science terms. Independent investigation opportunities.

Sequence of Learning		
Lesson	Key Question	Key learning/notes
1	What are our experiences of sound?	• Use pg 98 Active assessment (in Science education) for children to recap what they know about light (from year 3) and sound (initial assessment). Chn complete the table as best they can. Can children suggest a relationship between light and sound? (They may make several suggestions of links but could even be able to relate to their understanding of weather- storms) • Let's get musical! Encourage children to either use their own instruments or provide with school tuned/untuned percussion and do some creative play with different sounds. • Now give them a copy of pg 121 (Active assessment) "Sound and music." Chn use the same question words/sentence starters to create a list of their own wonders (questions) about sound. (Activities revisited at end of unit)
2	How are sounds created? You could use ideas from "vibration stations" pg 119 in "A creative approach to teaching Science" for this lesson.	• Explain that all sounds are made by objects vibrating and that sound can travel through gases, liquids and solids. (Show owl "sound of silence" clip) • Introduce key scientist Alexander Graham Bell and explain his invention. • Children carry out some mini practical investigations about vibrations e.g using rice and drums, tuning forks in water and a string telephone. **Take photos for the WS floor book** and add post its with child comments, adult notes/observations as you observe the children working scientifically. • Can they find other ways of making sound? What is causing it? • **Children record their understanding** by creating a "sound museum" where they make information cards to accompany pictures of their favourite examples they explored in this lesson. Explain that explanations much be scientific to explain as much about sound and how

		vibrations travel. Their work will be sent to the Science museum for their next sound exhibit so it must be beautifully presented and use the correct scientific vocabulary. **(Record in books/display practically then take photos to stick in books. Work must be completed individually rather than whole class WS book.)** • Compare light and sound waves
3	How do we hear sounds and what sounds are in our school environment? N.B: chn should discover that sounds can be measured in standard units and that measurements of sound are in decibels. Encourage chn to think about whether it is possible to achieve a reading of 0 decibels with the dataloggers and why they think this is.	• Briefly examine structure of ears and how vibrations are heard as sounds. • Discuss sounds in nature and why animals prick up their ears/why some animals are adapted to have very large ears. Do all animals have the same hearing range? Discuss echoes and how bats or dolphins use echolocation. • **Complete a school sound survey**. Use dataloggers and record results using standard measurements in a table. Provide children with a template of a graph for children to transfer their results. • Children analyse the data. Produce a class table of data. Ask children to respond to questions relating to the data you have all collected. Can children think of their own questions to ask about the data? Encourage them to write them in their books. • Would this information change over the course of the day? Why/why not? Ask chn to predict quietest/noisiest time of day and set up a data logger with the sound meter linked to an interactive whiteboard/download a free sound meter app to an ipad to record this over the course of a few days. • Talk about deafness and introduce children to British Sign Language using the **BSL Let's Sign Science book**, have a go at some key vocabulary.
4	How can we change the pitch and volume of a sound?	• ***Starter: Challenge misconceptions through Always/sometimes/never- "High sounds are loud and low sounds are quiet." Discuss.*** • Demonstrate how to make high, low, soft and loud sounds with drums, string instruments and wind instruments. If possible, in particular model tuning a guitar or playing an instrument in different keys. How is this achieved? • Can children find patterns between the pitch of a sound and the object that produced it? Discuss how far the vibrations are having to travel. • Children investigate changes of pitch and volume of instruments including body percussion (create rainstorms to show crescendo and diminuendo dynamics in music) • ***The further away from the sound source, the quieter the sound. How could we prove/disprove this theory? Explain/use term pattern seeking.*** • Outside, use a loud and constant source of sound such as an alarm or sound effects app. Groups of chn can measure the volume of sound using data loggers/apps on ipads when they are immediately next to the sound source then move equal distances further and further away and record results. Chn should plot their findings on a line graph to show patterns between the sound level and the distance at which is was recorded. Chn use their graph to write quick bullet point observations **under I see, I notice (patterns), I wonder.**
5	How can we reduce the volume of sounds? Use Explorify "protect your ears" to support this lesson. Investigation: Which materials would be best to muffle sounds?	• When and where might sound become a problem? Discuss real life scenarios that relate to chn's experiences. Encourage them to think of some first then lead the discussion to sound pollution and sound safety e.g for musicians performing at concerts/ builders on construction sites. • Discuss why it is important to prevent some sounds travelling or at least reduce the level to protect our ears. **Introduce a scenario to investigate. (**musician needs protective ear plugs/ builder needs protective ear defenders) Depending on class ability, challenge children to think about the main needs (to protect from damage but will still need to hear to play!) • Revisit children's prior knowledge of materials from ks1 and their wider

		understanding of the world. What sorts of things are used to protect our ears? Can you tell me what they are mostly made of? • Plan and carry out an investigation to find out which materials would be best to muffle sounds. Revisit using data loggers and allow children to independently select and use a range of equipment to set up their investigation. How will they keep the test fair? • Reflect on and discuss the investigation using **I see, I notice, I wonder** as a class in the WS floor book or on a flipchart (take photo for WS book later) or in individual books.(Always display sentence stems and word banks of key vocabulary to support Science literacy.) • Where there any problems? How could you improve or change the investigation to help get a better product? • Do we need to use any secondary sources to investigate things we couldn't test today?
6	How can we find out more from our investigations? **Independent investigation:** Question to be created by chn themselves from "wonders" (May require a longer/double lesson to allow children to reflect, discuss, share and write up.)	• Explain to children the two types of investigation: ➢ A comparative test is performed by changing a variable that is qualitative e.g. type of material, shape of the parachute. This leads to a ranked outcome. ➢ A fair test is performed by changing a variable that is quantitative e.g. the thickness of the material or the area of the canopy. This leads to establishing a causative relationship. • What did they learn from their last investigation? What type of investigation was it? (comparative) • What wonders did they have/what else did they want or need to find out from the results of their last investigation? • Group chn according to similar wonders and they agree on a question to investigate further about soundproofing. What type of investigation might they need to use now? (A fair test should be most likely to focus on the best material and how to test it further.) • Chn complete a full, written, independent investigation by selecting their own materials, equipment, ways of recording and displaying results with facilitation from the teacher. (Children may write as they go but could find this difficult so provide scaffolds/main investigation template for yr3/4/ sentence stems and various chart/graph examples for children to work from- where possible children should now be drawing their own tables and graphs)
7	**What is sound and how do we experience it?** Assessment lesson	• Children to complete the end of unit "Quiz" on sound. • Give children fresh copies of the activities completed in lesson 1. How have their answers/ideas and knowledge changed? Chn to prepare an oral presentation summarising what they have learned about sound using given question stems and their own notes/activities from across the unit. Chn create their own "youtube clips" in partners to summarise their learning (no more than 5 minutes each and recorded by their partner using ipads.) If possible, create QR codes with links to their presentations stuck into their books for others to view the clip. • Do they have new wonders or can they now answer any of the wonders they had at the start of the unit?