Waterville Primary School Progression of Skills and Vocabulary in Science – Sound

Year 4

KS1 National Curriculum

Pupils should explore and identify the way sound is made through vibration in a range of different musical instruments from around the world; and find out how the pitch and volume of sounds can be changed in a variety of ways. Pupils might work scientifically by: finding patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses. They might make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. They could make and play their own instruments by using what they have found out about pitch and volume

Pupils should be taught:

- Know how sound is made associating some of them with vibrating.
- Know what happens to a sound as it travels from its source to our ears.
- Know the correlation between the volume of a sound and the strength of the vibrations that produced it.
- Know how sound travels from a source to our ears.
- Know the correlation between pitch and the object producing a sound.

Prior Learning

In KS1:

- May have some understanding that objects make different sounds.
- Some understanding that they use their ears to hear sounds.
- Know about their different senses.

Vocabulary:

Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation

Key skills to be taught

asking relevant questions and using different types of scientific enquiries to answer them

setting up simple practical enquiries, comparative and fair tests

making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers

gathering, recording, classifying and presenting data in a variety of ways to help in answering questions

reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions

using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions

identifying differences, similarities or changes related to simple scientific ideas and processes

using straightforward scientific evidence to answer questions or to support their findings.

Key Ideas	Possible Activities
What is sound?	• Explore how sounds with range of instruments. group into those that are hit, pluck, bang, blow, scrape, etc • Demo: Sand grains on a drum, plucked string on a guitar (folded paper), twanging ruler, balloon / candle held in front of loud high base music from speaker, voice box, tuning fork on ear lobe, non-Newtonian liquid (Corn Flour/water) on a speaker; fingers on throat etc. Observe/feel vibration. • Model using ripples on water/slinky spring. Develop energy transfer model. Link to vibrations / particles. • Fair test – what happens to the sound as we increase the length of the wire (homemade guitar) / width of the drum /volume of the bottle / etc?
How does sound travel to our ears?	• Demo: Tie guitar string to slinky; sounds can be heard if held to the ear; metal can with spring attached (twang spring and listen/feel vibrations); Make a stethoscope (funnel attached to tubing)/ paper banger/ sound gun/ hydrophone/ model ear • Link to ear drum vibrating due to sound energy. • Make a model with hanging beads from a stick to show how particles can transfer sound energy. • Listen for sounds in the classroom/playground. Identify / record sounds. Suggest 'route' that sound takes to get to ear Fair test – How does the length/type of the string (string telephone) effect the volume of sound we hear? Use decibel meter perhaps to create measured variable. • Fair test – what is the best material for muffling sounds? • Explore – Do we hear sounds differently in air and water? Visit a swimming pool to explore. • Explore – stretch plastic bag over large can and secure with elastic band. Put salt on plastic. Tap small can close to the salt and watch salt bounce. Explore making the salt jump higher.
How can we change the volume of sound?	• Link volume to size of vibrations. • Demo: play sounds at different volume. Feel effect on balloon / decibel meter. • Discuss hearing & safety (traffic, alarms, sirens, etc). Loud sounds can be harmful. Why do some animals have big ears? • Fair test – What happens when we get further away (walk backwards with a sound/decibel meter) from a sound source (vary volume, base, etc)? Graph results. • Fair test – What happens to the height of rice bouncing on a speaker when we change the volume? Graph • Explore – how do I make my voice louder? Cones, etc
How can we change the pitch of a sound?	• Link pitch to frequency of vibrations. • Demo: Ruler on desk; Straw reed instrument with hole (pitch depends upon amount of air, hole shortens column) • Make home-made guitar to vary pitch/volume • Vary the volume of water in a pop bottle to change the pitch when you blow across/ bang it. Make music. • Vary pitch of sound from speaker. Note changes in the frequency of vibrations. • Fair test - how does the tension/thickness/length of elastic band (hang weights) effect the pitch of sound?

Next steps In KS3:

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