Unit name	Sound
National Curriculum link	• Year 4 Sound
Prior knowledge (EYFS, Key Stage 1)	• Explore how things work. • Explore the natural world around them. • Describe what they see, hear and feel whilst outside. • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.
Upcoming knowledge (Key Stage 3)	• Waves on water as undulations which travel through water with transverse motion; these waves can be reflected and add or cancelled – superposition. • Frequencies of sound waves, measured in Hertz; 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.
When	• Year B, Spring 2
INTENT (What will be taught)	
Substantive knowledge (Knowledge that…)	• Sounds are made when something vibrates, creating sound waves. • The sound waves travel out in all directions from the sound source. • Sound waves need matter (solid, liquid or gas) to travel through to reach our ears. • Sound cannot travel through a vacuum (an area empty of matter). • Our ears detect sounds so that we can hear. • Loud sounds can damage our ears.

	• Some materials are effective at muffling sounds and can protect our ears from loud noises. • There is a link between the strength of the vibrations and the volume of the sound that is produced. • The stronger the vibrations, the louder the sound. (UKS2: The greater the amplitude the louder the sound). • The 'loudness' of a sound is measured in decibels. • Sounds get fainter as the distance from the sound source increases because the sound spreads out. • There is a link between the features of an object and the pitch of sound it produces. • The shorter the vibrations, the higher the pitch of the sound. (UKS2: The shorter the frequency, the higher the pitch). • The pitch of a sound is measure in Hertz. • The pitch of a sound can often be increased by reducing the size of the object making the sound or tightening the object making the sound so it can only make small vibrations rather than large ones.
Vocabulary	Pupils can read, write, spell and define with growing confidence: sound, source, vibrate, vibration, matter, solid, liquid, gas, vacuum, travel, pitch (high, low), frequency, volume, amplitude, strength, faint, loud, decibel, Hertz, pattern-seeking, comparative test, data loggers, reliability, mean, evaluation, bar graph, line graph.
Disciplinary knowledge (Knowledge how…)	• To use scientific methods to find patterns between the pitch of a sound and features of the object that produced it. • To use scientific methods to find patterns between the volume of a sound and the strength of the vibrations that produced it. • To use a comparative test to assess the ability of materials to muffle sounds. • To use electronic devices to accurately measure pitch and volume. • To use data loggers to record measurements. • To repeat experiments to test and increase reliability. • To find the mean. • To present results graphically.

	• To evaluate science enquiries.
Common misconceptions (These will be specifically discussed and corrected)	• Confusion between pitch and volume. • Sound is only heard by the listener. • Sound only travels in one direction from the source. • Sounds can't travel through solids and liquids. • High sounds are loud and low sounds are quiet. • Sound is slowed down by physical obstructions. • Sounds gets fainter as the distance from the sound increases because it has faded out or run out of energy.
IMPLEMENTATION (How this will be taught)	
Pedagogy	**At the start of the unit (Lesson 1):** All children will receive a child-friendly version of this document to stick into their science books which will be discussed and explained at the beginning of the unit. The purpose of this is to ensure that they are clear: - What substantive knowledge they will be learning. - What disciplinary knowledge they will be learning. - What vocabulary they will be learning. We will refer back to this at the beginning of each lesson and throughout the unit so children can see how their learning is progressing and recap their knowledge. We will complete a KWL style group activity at the beginning of the unit to assess existing knowledge. This information will be used to level teaching correctly throughout the unit and to guide additional support. Children will also have the opportunity to discuss any special interests relevant to the unit. **All lessons:** • **Vocabulary:** All lessons will begin with a fifteen minute vocabulary section, involving writing and spelling, discussing and defining the vocabulary for this unit. It is the expectation that this vocabulary be learnt by the end of year 6, but as this unit will be taught twice within KS2, the more complex vocabulary will receive more focus in upper key stage 2.

	• **Substantive knowledge:** Each lesson will then move onto a fifteen minute discussion-based session, which may include some PowerPoint presentation, videos or quizzes (either to recap and recall or as new learning), plus a class discussion activity based on a question or visual stimulus such as Explorify activities or the Primary Science Teaching Trust Pictures for Talk, Odd one Out or Big Questions stimulus. All pupils will be expected to contribute using teaching methods based on collaborative learning and methods such as cold questions. This unit is particularly practical and it is likely that many of the discussions will begin with a short demonstration or group practical task. • **Disciplinary knowledge:** The lesson will then move onto an 'enquiry' session of approximately forty-five minutes, looking at teaching the disciplinary knowledge in this unit based on the 'I do, we do, you do' principle to encourage pupils to be confident and independent scientists. The end of each piece of 'enquiry' work will involve peer assessment discussions and next steps. Where possible, the work will be split into two parts so that there is an opportunity for pupils to act on the feedback they have been given. • **Recall and retention:** Following the principles of cognitive science and the definition of learning as *knowing more and remembering more*, each lesson will finish with a fifteen minute recall and retention activity. This may take the form of a low-stakes quiz (either computer- or paper-based), a mind-mapping or 'drawing' exercise, a story and discussion, or an internet-based activity.
IMPACT (How we will know if teaching has been successful)	
Assessment	• **Formative assessment:** questioning, discussion and observation will be used throughout teaching. Pupils will also be encouraged to identify 'what a good one looks like' prior to beginning a task. • **Evidence:** evidence of learning will be in the form of work in their science exercise books, photographs and videos/audio recordings where appropriate. Vocabulary and recall and retention work will also be recorded in exercise books to allow pupils and teachers to monitor progress and give feedback of how to improve. • **Feedback:** This will be mainly within lessons and verbal due to the nature of science and evidence that feedback is most useful when it is immediate. Pupils may be given written feedback such as written next steps where appropriate and useful. In addition, pupils will receive a coloured stamp in their books at the end of each lesson. A red stamp will indicate that they have worked hard and participated well throughout the lesson and that they have made steps forward in their substantive and disciplinary knowledge for this

unit. A green stamp will indicate that they have not participated to their full ability and have not provided enough evidence that their knowledge has moved forward.

- **Summative assessment:** This will involve a written unit test (this will be supported where appropriate so that pupil's literacy skills are not a barrier to demonstrating their science knowledge). This will be given at the end of each unit to assess progress. The TAPS focussed assessment of science used during the 'enquiry' parts of the lessons will also go towards the summative assessment of the unit.
- Science levels will be based on all of this evidence and recorded in Pupil Asset every half term. Information will also be passed to the class teacher for use in parents meetings and end of year reports. Working at expected level in Lower KS2 would indicate that a pupil has 40-60% of the required substantive and disciplinary knowledge. For Upper KS2, this would be 50-70%. See table below:

Level:	Lower Key Stage 2 (percentage of substantive and disciplinary knowledge acquired)	Lower Key Stage 2 (percentage of substantive and disciplinary knowledge acquired)
Well below	0-20%	0-30%
Below	21-30%	31-40%
Just below	31-40%	41-50%
Expected	41-60%	51-70%
Just above	61-70%	71%-80%
Above	71-80%	81-90%
Well above	81-100%	91-100+%

- If the summative assessment is over more than one unit (for example end of key stage results or levels in end of year reports), the results of all units would be averaged to give the final level.