KS3 Physics – Sound – Learning Objectives

	Beginning	Developing	Secure	Embedding	Extending	Excelling
Sounds and Waves	Explain that sounds travel by particles vibrating.	Recall that sounds must have a medium to travel through; sounds travel faster when the particles are closer together.	Describe the differences between transverse and longitudinal waves, and name the features of each type of wave (eg. peak, trough, compression, rarefaction, wavelength, amplitude). Recall that all sound waves are longitudinal waves, due to compressions and rarefactions between neighbouring particles. Recall the principle of superposition.		Demonstrate how the principle of superposition can lead to the constructive and destructive interference of two waves.	-
Comparing Sounds	Give examples of loud and quiet sounds, and high and low pitched sounds.	Recall the definition of frequency, and give the unit.	Link frequency and wavelength. Compare sound waves (as represented by an oscilloscope trace) in terms of pitch and loudness, including sketching new waves that have somehow changed from the original sound. Link pitch to frequency, and loudness to amplitude.		-	-
Musical Instruments	-	Suggest ways in which the loudness and pitch of a sound may be changed on a selection of musical instruments.	Explain how some musical instruments work: describe what is vibrating, and how the amplitude and frequency of a sound may be changed.		Link the playing of a musical instrument to the wavelength of the sound wave being produced.	
The Ear and Hearing Loss	Name some parts of the ear. Appreciate that for most people, the range of their hearing will deteriorate as they get older, and suggest how our ears can be damaged.	Name all main parts of the ear, and explain how a sound passes through the ear; identify the parts that can be damaged when exposed to loud sounds. Recall that humans can hear sounds in the frequency range 20-20000Hz, and how and why the range may decrease. Show an understanding of the decibel scale.		Explain how soundproofing materials work.	-	-
Echoes	With assistance, use the equation for calculating speed. Recognise that an echo is formed when a sound wave reflects off a surface.	Be able to use the speed equation, and give appropriate units. Describe what happens when a sound echoes. Describe a simple experiment to measure the speed of sound, and discuss the limitations of the experiment. Complete simple calculations involving echoes (eg. measuring distances, time delays).		Solve complex problems involving speed and echoes, unaided. Show an understanding of how sonar and radar systems work (including how animals may use echolocation).		-
Ultrasound	-	Define 'ultrasound' as a sound that is above the frequency range of human hearing.	Describe some medical and non-medical applications of ultrasound (including an overview of how it works, and the advantages of using such a system over other methods). *This may involve further use of the calculations described above.*			-

** Objectives covering more than one grade are assessed based on the level of scientific detail and language used by the learner.*