Science and Technology unit: What's that sound?	
Stage 1	Duration: 10 weeks
Term 1	Booragul Public School

Unit context
Students design a quiet place/space, using their knowledge of sound and the properties of relevant materials.

Target outcomes

Stage 1   A student:

ST1-4WS investigates questions and predictions by collecting and recording data, sharing and reflecting on their experiences and comparing what they and others know.

ST1-6PW describes some sources of light and sound that they sense in their daily lives.

ST1-5WT uses a structured design process, everyday tools, materials, equipment and techniques to produce solutions that respond to identified needs and wants.

ST1-3VA develops informed attitudes about the current and future use of science and technology based on reason.

ST1-13MW relates the properties of common materials to their use for particular reason.

ST1-14BE Describes a range of places and spaces in their local environment and how their purpose influence their design.

Unit overview

At the centre of this unit of work is the collaborative group project in which students will use the results of investigations to inform and refine their design ideas. Throughout the unit, students use skills in Working Scientifically and Working Technologically to develop ideas about the properties of sound and materials. They use their findings to develop a proposal for choices of materials that contribute to creating a quiet place/space, such as a quiet corner in a classroom. Groups present their findings to the class using a range of representations and digital technologies as appropriate.

Content	Teaching and learning	Eval/Reg
ST1-4WS ST1-3VA *Students question and predict by:* *-responding to and posing questions* *Students conduct investigations by:* *-working cooperatively and individually when participating in different types of guided investigations.* ST1-6PW *Students:* *-share their observations and ideas about different sources of light and sound encountered in their daily lives and their senses that detect them* *-produce different sounds from familiar objects using actions, eg striking, blowing, scraping or shaking* *-explore how the loudness and range of types of sounds are related to the action used to produce them* *-compare the range of types of sounds produced by musical instruments used by people from different cultures.*	**CONDUCTING INVESTIGATIONS- FINDING OUT ABOUT SOUND** **1 Lesson** **Learning Objective-** *Students conduct a variety of investigations to identify different ways sounds are made such as by familiar objects, eg musical instruments.* - The teacher allocates students to collaborative groups. Students recall their responsibilities when working collaboratively and in some team roles. - Students are provided with a range of musical instruments to investigate how they make sound. These can include instruments form different cultures or everyday materials such as kitchen utensils. - For each instrument, students observe what type of sound it makes and add these words to a theme-related word bank. Students place the instruments into one of four large hoops to group the instruments based on the way they produce the sound, eg striking, blowing, scraping and shaking. They record their grouping findings using drawings or digital images. - Ask students to make the loudest and quietest sound on their instrument. - Using the word bank, introduce the term onomatopoeia, eg boom, bang, rip, clap, clink. Investigate onomatopoeia sounds by watching onomatopoeia YouTube videos.	

Content	Teaching and learning	Eval/Reg

ST1-4WS ST1-3VA *Students plan investigations by:* *-identifying the purpose of the investigation* *Students process and analyse data and information by:* *-describing changes in objects and events observed in investigations* *Students communicate by:* *-representing and communicating observations and ideas using oral and written language, drawing and role-play* ST1-6PW *Students:* *-share their observations and ideas about different sources of light and sound encountered in their daily lives and their senses that detect them* *-use their sense of touch to feel vibrations from familiar objects and infer that sound is made when an object vibrates, eg vocal cords, a stringed instrument or a rubber band*	**PLANNING INVESTIGATIONS: SENSING SOUNDS** **1 Lesson** **Learning Objective:** *Students participate in guided investigations and follow a planned method to describe some sources of sound that they sense in their surroundings.* - Class activity: How are we able to detect sounds? - The teacher asks the students to think about and share what they know about sound, including: • different sources of sound • different types of sound • how sounds can be made • how sounds are detected. - The teacher demonstrates sensing sound by seeing and feeling its effects, eg by connecting an audio player to a speaker (such as a computer speaker or MP3 dock with the cover removed) and observing the speaker cone vibrating. The music being played should include a range of sounds that are loud, soft, high and low. Students should watch and take turns to feel the speaker as the sounds are played. (Alternatively, students watch Questacon video.) - Through teacher questioning, students are introduced to the word 'vibrate' when describing sound. - Pair activity: Observing vibrations - Students make model musical instruments such as a drum and guitar. They follow a planned procedure at workstations, recording their observations in their science journal using words and pictures. - Students share their observations and add to the visual display, their findings and ideas about sources and types of sound, and how sound is detected.	
ST1-4WS ST1-3VA *Students question and predict by:* *-responding to and posing questions* *Students conduct investigations by:*	**CONDUCTING INVESTIGATIONS- SEARCHING FOR SOUND** **1 Lesson** **Learning Objective-** *Students will learn to describe sounds.* - Class activity: How would I describe that sound? - The students sit quietly in the classroom for 1 minute and listen for any sounds they observe (sense by hearing or	

-working cooperatively and individually when participating in different types of guided investigations to explore and answer questions. -using a range of methods to gather data and/or information. *Students process and analyse data and information by:* -describing changes in objects and events observed in investigations -comparing observations with those of others to identify similarities and differences in the findings of their investigations	feeling). During the listening activity the teacher makes a recording of the sounds in the room, eg using a smartphone or a microphone and computer software such as sound buttons. - In a class discussion, the students share and compare their observations. They listen to the audio recording made by the teacher, and pose, respond to and suggest answers to questions such as: • What sounds did I hear? • What do I think made that sound? • Where did the sound come from? • How would I describe that sound? • How do different sounds make you feel? - The teacher demonstrates a way the loudness of the recorded sounds can be displayed and compared using, for example, a VU meter on a smartphone or a computer software sound file. The students use words from the prompt list to describe some features of the observed sound, eg high, squeaky and soft. - A range of words that students have selected to describe sounds could be included in the visual display.	
ST1-4WS *ST1-3VA* *Students communicate by:* -displaying data and information in a variety of ways, including drawings, simple texts, provided tables and graphs, using digital technologies as appropriate *ST1-14BE* *Students:* -observe ways people use a range of places and spaces in their local environment. *Students:* -describe how the different purposes of places and spaces in the local environment influence their design. -examine some familiar places and spaces in the	**PLANNING GUIDED INVESTIAGTIONS: How can we sense and record sounds in our environment?** **1-2 Lessons** **Learning Objective:** *The students conduct fieldwork to identify sounds and explore some materials used in places and spaces in their environment.* - Group activity: School sound search - With teacher guidance, students describe the method used by the teacher to record sounds in the listening activity. - In their collaborative groups, students plan how they will use the method to collect sounds when they conduct the searching for sound activity at several locations around the school, eg in the playground, near the school gate, in the library, in the school office or in other locations selected by the students. - At each site, students use their senses to make observations (hear, feel, see) of the sounds and materials or structures in their surroundings (internal or external). With teacher guidance, they respond to and pose questions, eg Can I sense the same types of sounds I heard in the classroom? Is it quieter or noisier here than in the classroom? What might be making it quieter? - In their groups, students take turns to record sounds and use	

local environment and suggest modifications to their design	a camera to record images of a range of materials at each site. - On returning to the classroom, the students share and compare their observations by: • listening to the recordings to compare the differences in the type and loudness of the sounds • viewing the sound files to make simple comparisons of the loudness of sounds • talking about the texture and features of some materials used in the spaces they observed • identifying the materials used in the spaces where the sounds are quiet or noisy • using a scaffold to record their investigation and findings and including it in their portfolios to refer to when developing their design ideas. - Students add to the visual display, new ideas and information from the sound search around the school weather conditions. Provide students with images of healthy and unhealthy plants and discuss what plants need to survive. Prompt students to discuss what happens to a plant when left in the heat, without water and what happens to out grass and gardens after rain. Have students draw pictures of healthy and unhealthy plants and include what weather elements contributed to their condition (rain, heat, snow etc).	
ST1-4WS *ST1-3VA* *Students question and predict by:* *-responding to and posing questions (ACSIS024, ACSIS037)* *ST1-5WT* *Students explore and define a task by:* *-identifying needs and wants of users/audiences, eg using interviews, observations and surveys* *Students generate and develop ideas by:* *-researching and exploring different sources of information, including the internet* *-exploring different materials by observing and*	**GENERATING AND DEVELOPING IDEAS: Investigating materials that reduce noise.** **1-2 Lessons** **Learning Objective:** *Students working collaboratively in groups investigate and gather information about the effect of a range of materials on the loudness of sound. They use the findings of their investigation to develop and present a plan for materials that could be used to reduce the noise in a quiet space.* - The teacher and students discuss the noise problem at the school. The teacher introduces how they will contribute to the school project by posing and responding to questions about the task such as: • What is making the noise? • Why is the noise a problem? • Why do we need a quiet space? • Is there anything we know or could learn about sound that might help us understand what is happening? • How might we find out more about the problem? **Class activity** - Teacher background - The students review their investigation of different places around the school and how the findings from their investigation about sound can be used to find solutions which will reduce the problem of noise in the quiet space. - Students observe a variety of teacher-provided images of	

manipulating them and using trial-and-error *ST1-13MW* *Students:* *-use their senses to identify the similarities and differences in the properties of materials, eg the textures of different fabrics, the difference in hardness of solid materials and the runniness of different liquids* *-identify the properties of some common materials and why they are used for particular purposes.*	building interiors or structures that improve sound quality or reduce noise, eg library, concert halls, cinemas, roadside barriers. - The teacher engages the students in thinking about why particular materials are used and poses questions such as: What are some ways that the built environment is designed to reduce/minimise sound? Are there materials and/or other methods (eg trees) that can be used to reduce noise? **Group activity** - In their groups, the students review their images and findings about materials that they observed being used in the quieter internal spaces of the school. - The teacher conferences with each group and through guided questions encourages students to identify a number of familiar materials that are used to make internal spaces quieter. - The students record and share their predictions about suitable types of everyday materials that could be used for reducing noise. - The students' ideas and suggestions could form the basis of the class investigation to explore and collect data/information about different materials that could be used to reduce noise in the quiet space.	
ST1-4WS *ST1-3VA* *Students plan investigations by:* *-identifying the purpose of the investigation* *-suggesting some types of activities that need to be undertaken during the processes of Working Scientifically* *Students conduct investigations by:* *-working cooperatively and individually when participating in different types of guided investigations to explore and answer questions.* *-using a range of methods to gather data and/or information, including using*	**PRODUCING SOLUTIONS: How is the loudness of sound changed by materials?** **1 Lesson** **Learning Objective:** *The students think about the materials they have identified and how they could find out which materials might be best for making a space quieter.* - The sample assessment for Learning activity addresses this task. - The teacher describes and demonstrates a method to test the materials: ✓ place an alarm clock under a cardboard box ✓ use a sound recording device placed at a fixed distance from the cardboard box, to record the sound as it rings ✓ if necessary, use computer software to convert the recording to a sound file. - With teacher guidance the students use this method to plan a test to answer the question 'How is the loudness of sound changed by different materials?' - In their groups, students allocate team roles and follow the planned method to set up at one workstation a cardboard box covered with a sample of the teacher-prepared material and the alarm clock under the box.	

their senses to make observations safely and carefully, using simple tools and equipment *-using informal measurements in the collection and recording of observations.* *Students process and analyse data and information by:* *-describing changes in objects and events* *-comparing observations with those of others to identify similarities and differences in the findings of their investigations* *-comparing observations with predictions through discussion, as to whether observations were expected and related to their questions and/or predictions* *Students communicate by:* *-displaying data and information in a variety of ways, including drawings, simple texts, provided tables and graphs, using digital technologies as appropriate* *ST1-5WT* *Students produce solutions by:* *-using a range of everyday tools, equipment, materials and techniques* *-working cooperatively and safely*	- Students record in their science journals each material to be tested and make predictions about which materials they think will be the most effective in reducing sound. - At each workstation, students: ✓ identify the material covering the box ✓ make a recording of the sound of the alarm clock under the material-covered box ✓ view the sound files to compare the loudness of the sound ✓ on a teacher-provided worksheet, for each material tested, record their observations about the loudness of the sound ✓ review their predictions and suggest whether their findings were expected. - With teacher-guided questions, students: ✓ relate the loudness of the recorded sound to the properties of the material covering the box ✓ rank the materials used in the tests for effectiveness in reducing the noise of the alarm clock ✓ use results of their investigation of the effect of materials on the loudness of sound, to refine the ideas for the materials to be included in their plan for reducing noise in the quiet space.	

ST1-5WT *Students generate and develop ideas by:* *-describing the features of design ideas and the materials they select* *-using feedback from others to refine design ideas* *-using the results of investigations to refine design ideas* *Students evaluate by:* *-identifying how their solution meets the needs and wants of users/audiences* ST1-4WS *Students communicate by:* *-representing and communicating observations and ideas using oral and written language, drawing and role-play (ACSIS029,*	**COMMUNICATING Preparing and presenting ideas to reduce or muffle sound** **1 Lesson** **Learning Objective:** *Students communicate with others the information they have gathered about the effects of materials on sound.* - Each group discusses and records in their individual journals how the information about the materials that reduce noise could be used in their plan to produce a quiet space in the school, eg create a quiet corner of the classroom. The teacher conferences with students in their groups and using questioning, guides the students to use their observations to explain their choice of the best materials for reducing the loudness of the sounds. - Groups share and compare their results and use the feedback to refine their ideas for materials that could be used for noise reduction in the design of the quiet area. - In groups, students present their ideas for the most suitable materials that could be used to reduce noise in designing the quiet space, including: ✓ identify the problem ✓ identify the needs and wants of the users/audience ✓ list the best materials for the task ✓ provide a reason for their choice, based on the evidence collected in their investigation. - Using negotiated criteria, students provide feedback about the presentation to their peers.	
ST1-3VA ST1-4WS *-responding to and posing questions* *-representing and communicating observations and ideas using oral and written language*	**EVALUATION AND REFLECTION** 1 LESSON *Students reflect on their learning by:* • participating in a teacher-led discussion about the information recorded in the class display, identifying new learning arising from the ideas they were curious about • comparing the similarities and differences in the class presentations • peer assessment of the oral presentations, identifying what they liked about them, and why • individually reflecting on their learning by identifying one thing they already knew, one thing they learned and one question they would like to ask • identifying what they learned from working with others in a group.	

Resources	Assessment overview
Materials and equipment required for hands-on practical investigations, including: **Lesson 1:** - A range of musical instruments. - Word bank **Lesson 2:** - computer/MP3 speakers (with removable covers) or a loudspeaker - Science journal - Equipment to make musical instruments **Lesson 3:** - sound/audio recorders **Lesson 4:** - Canera - Sound/audio recorders - Class visual display **Lesson 5:** - Images of interiors or structures that improve sound quality. - Science journals. **Lesson 6:** - Alarm clock - Cardboard box - Pieces of different materials, eg carpet, egg cartons, cloth, foam pre-cut to size to cover the cardboard boxes - Glue **Lesson 7:** - Science journals **Additional:** - The Magic School Bus Explores the Senses by Joanna Cole - Video: Onomatopoeia by Mindy Bauer - sound buttons: a free application that enables recorded audio from a microphone to be saved into MP3 format sound. **Websites** http://canberra.questacon.edu.au/sciencetime/#toggler_music www.reachoutmichigan.org/funexperiments/agesubject/lessons/other/una4.html http://en.kioskea.net/download/download-7281-flash-sound-buttons www.edsoft.com.au/rm-talking-points www.bbc.co.uk/schools/scienceclips/ages/5_6/sound_hearing.shtml www.crickweb.co.uk/ks1science.html#sound1f www.ngfl-cymru.org.uk/vtc/16022007/sound_loudness/lesson.html www.ngfl-cymru.org.uk/vtc/16022007/sound_sources/lesson.html	**Lesson 1**: Diagnostic Assessment- Find out what students already know and understand about the weather. **Lesson 2,3 & 4:** Formative Assessment- Monitor students' developing understanding and give feedback that extends their learning. **Lesson 5:** Summative Assessment- Look for evidence of the extent to which students have achieved the unit outcomes of observing, exploring and questioning different weather conditions.