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Sound studio • Lesson 1 • Sounds are all around

**Lesson 1**

**Launch**

**Year 2**

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| To read the most recent version of this task, download associated resources, and view embedded professional learning including classroom videos and work samples, visit:  [https://primaryconnections.org.au/teaching-sequences/year-2/sound-studio/lesson-1-sounds-are-all-around](https://primaryconnections.org.au/teaching-sequences/year-2/sound-studio/lesson-1-sounds-are-all-around?utm_source=docx&utm_medium=lesson1&utm_campaign=SS) |

# Lesson overview

Students are introduced to the core concept and context—sound, and creating sound effects for others to hear.

## Learning Goals

Students will:

* create sound using readily available items.
* observe movie/television sounds and the process for making them.
* demonstrate curiosity and ask questions about sounds and how we hear sounds.

Students will represent their understanding as they:

* contribute to discussions and a class mind-map about common sounds, background sounds, how sounds are made and how we hear sound.

## Assessment advice

In the Launch phase, assessment is diagnostic.

Take note of:

* students’ descriptions and explanations about how sound is made.
* any explanations students offer about *how* we hear sounds.
* any connections students make between sounds being similar or different.

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)
* Optional: Large piece of fabric, approx. 2m x 1m
* An audio recording of students from your school in a noisy environment—see the [Preparing for this sequence tab on the Sequence overview page](https://primaryconnections.org.au/teaching-sequences/year-2/sound-studio?tabIndex=3#toc-recording-students-in-conversation) for more information
* [Kelloggs LCMs 2010 Ad](https://www.youtube.com/watch?v=VZNrj971g8Q) (0:30)
* [Old Disney Sound Effects | Side By Side Comparison (Jimmy MacDonald)](https://www.youtube.com/watch?v=20UISl1e81U) (3:24)

**Each group**

* Optional: Sound recording device e.g. iPad/phone/voice recorder
* Readily available classroom or schoolyard items that can be used to make sounds such as textas, paper, leaves, twigs, ball, zips, etc.

**Each student**

* Individual science journal (digital or hard-copy)

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Experience and empathise | 20 minutes | Collaborative teams, Whole class |
| Elicit | 15 minutes | Whole class |
| Anchor | 20 minutes | Whole class |
| Connect | 10 minutes | Whole class |

# Launch

## Experience and empathise • Secret sound

Discuss with students their previous experiences with using their senses to make scientific observations—how do we use our senses of sight, smell, touch taste ad hearing to make observations about the world around us?

Next, focus on the sense of hearing, asking students to close their eyes and focus on the sounds they can hear around them. As students name the sounds they think they hear, ask them how far away they think the sound is/was, where it may come from, and why they think that.

Explain that, in this sequence, students will be focused on sounds: actually working like scientists to 'observe' sound itself, including how sounds are made, how they travel so that we can hear them, and how we can 'control' them.

Students work in pairs to create a sound to present to the class. They might use any of the following to help make that sound:

* items found in the classroom
* items collected from the school grounds
* their own bodies, to make body percussion sounds such as stomping and clicking etc.
* items they can collect from the schoolyard such as leaves, stones, sticks etc.
* any combination of the above.

Allow pairs time to devise a sound.

Pairs take turns to make their sound while the rest of the class close their eyes and attempt to guess what the sound is and how it is being made. Consider asking the sound makers to stand behind a screen to ensure their peers can’t see how the sound is being made.

**High Tech:** Students use a digital device (iPad/phone/voice recorder) to record sounds before playing them for their peers. This allows a greater variety of sounds to be made, because they can be made/recorded anywhere in the school grounds, rather than relying on objects that can be used in the classroom. It also removes the need for a screen.

## Elicit • Surround sound

Elicit students’ prior knowledge of sounds by creating a mind map in the class science journal, using the students’ actual vocabulary.

Encourage all students to share their ideas. Take note of any alternative conceptions to address during the inquire phase.

**Potential discussion prompts**

* *What sounds did you hear today? What sounds can you hear at home? At the beach?*
* *At what other locations might you hear lots of interesting sounds? What sounds might you hear?*
* *Is our world ever completely silent?*
* *If you close your eyes and sit perfectly still, what can you hear?*
  + Breathing, someone wriggling, chair creaking etc.
* *How is sound made?*
* *Sticks tapping together and our feet running over stones both make sound, what happens in both of these situations to create sound?*
* *How do we hear sound?*
* *Can everyone hear sounds? Why/Why not?*
  + Some people have hearing loss which means they are not able to hear as well as someone with normal hearing—this can be mild through to severe. Hearing loss can occur before birth or after, due to severe infection, very noisy environments, age etc.
* *Why are sounds important to us?*

## Anchor • Movie magic

View the advertisement for [Kelloggs LCM bars](https://www.youtube.com/watch?v=VZNrj971g8Q) (0:30) and encourage students to count the number of different sounds they can hear.

Play the clip again and ask students to describe the sounds they can hear, for example students playing in the background, students talking, the sounds that happen when the students open their ‘designer’ lunchboxes.

Record students’ responses in the class science journal.

Next listen to the pre-recorded clip of students from the school. If you have recorded the discussion in video format, it may distract from the focus on the sounds that can be heard by sharing the visual images. Playing the audio only will support students to maintain their focus on what can be heard.

Discuss what can be heard in this clip, and how it differs from the LCMs ad that also showed students in a school environment. Particularly note any background noise that makes the students difficult to hear, how it is difficult to pick out specific sounds unless they are really loud, and how the ‘special sounds’ that were in the ad are not in this recorded clip.

Ask students what they think ‘sound effects’ are. Discuss and define the term as required: any sound, other than music or speech, artificially made to create an effect, used in TV, radio, cinema, video games and theatre.

Identify the two ‘special sounds’ heard when the students opened their ‘designer’ lunchboxes in the LCMs ad as sound effects. Ask students how they think the two sounds might have been made. Watch the ad again if required.

Explain that sound effects are recorded and added to films and advertisements after the acting scenes have been recorded. Ask students why they think this is done, referring to the comparison between the LCMs ad and the clip recorded at school as a starting point for the discussion.

**Potential discussion prompts**

* *Which was clearer/louder/easier to hear: the LCMs ad, or the clip of the students from school talking?*
* *Why do you think that is?*
* *Did the clip I recorded have lots of background noise?*
* *Did it have any special sound effects?*
* *Why not?*
* *Did the LCMs ad have any special sound effects? What were they? Why do you think they included them?*
  + *They added a special 'magic' sound that can be heard when the girl opens her lunchbox, and a car door sound when the boy opens his.*
* *When TV shows, ads, movies etc. are made, they often use special microphones to record the actors’ voices separately to the video, and then add the audio to the video later. Why do you think they might do that? What did you notice when listening to the recording made at our school that might help you to think about why?*
  + *The special microphones mean they can record voices more clearly. They can help to make sure the sounds of people talking are louder than the background noise, so that they, and any sound effects or background music, are clearly heard by the viewer.*

As a class watch the video [Old Disney Sound Effects | Side By Side Comparison (Jimmy MacDonald)](https://www.youtube.com/watch?v=20UISl1e81U) (3:24). Explain that the video is split into two frames: one frame shows clips from cartoons, and the other frame shows people recording the sound effects to go with the cartoon clip. Ask students to take notice of the objects being used to make the sound effects, and if they are the same or different to what is happening in the cartoon.

You might like to watch the clip once in its entirety, then watch it again, pausing at strategic intervals to discuss specific sounds with students. For example, note that when Donald Duck can be seen attending to a fire, an actual bell and siren are used to make the bell and siren sound effects seen in the cartoon. However, when the seven dwarves fall down the stairs the sound effect is made by wooden crates being knocked over, and frog croaks are represented by playing a string stretched between a coffee can and a wooden frame.

**Potential discussion prompts**

* *What sounds did you hear in the clips?*
* *What objects did you see making those sounds?*
* *Do they always use the actual object you would expect to make the sound we hear? Did they use a real frog for the frog sound?*
* *What did they use to make the frog sound?*
* *Why don’t they use a real frog, or a real train?*
  + To be kind to animals, it’s difficult to make a frog croak at the exact right moment, the sounds are recorded in a studio where large items like trains can’t be taken etc.
* *Why do they record in a studio/special room?*
  + In the studio they can control the sounds and ensure there are no background noises like cars and aeroplanes etc.
* *Why do you think they add sound effects to movies and advertisements? How did the 'magic' sound effect make the LCMs ad more interesting?*

**Optional:** Watch more ads with interesting sound effects and discuss them with students. For example, [this ad for Specsavers](https://www.youtube.com/watch?v=9xX1Mq0Q1EE) (0:30) or [this ad for Cadbury chocolate](https://www.youtube.com/watch?v=i5c6o386r44) (0:14).

## Connect • How can we use our learning?

Link the context and content of the teaching sequence by introducing the term ‘foley’: the word used to describe the creation of sounds especially for movie and television. The process is named after Jack Foley who was a sound-effect pioneer in the 1930s. The methods he devised are still used today.

Explain that, at the end of the sequence, students will apply what they have learned about sound to make sound effects that fit a ‘scene’ based on a prompt. This is a good time to introduce this prompt, so that students can reflect on how they might make sounds for it over the course of the sequence. See the[*Preparing for this sequence* tab in the Sequence overview](https://primaryconnections.org.au/teaching-sequences/year-2/sound-studio?tabIndex=3#toc-selecting-the-prompt-for-the-act-phase) for more information about selecting a prompt.

If appropriate, discuss how you will share the sound effects students create will an audience. You might like to share the special effects during a class or school event, such as a school concert or assembly. Inform students of the selected mode for sharing their special effects.

Support students to generate any questions they have about sound, how sounds are made, how we hear them and what that might mean for creating sound effects.

In the class science journal, record student questions (and group similar questions) to refer back to during the course of the unit.

**Reflect on the lesson**

You might:

* begin a [word wall](https://primaryconnections.org.au/pedagogical-tools/learning-through-inquiry-tools/using-word-wall) related to sound.
* begin building a sound table and encourage students to bring along items to add to the table that make interesting sounds, such as dry leaves to crackle, sticks to tap together, bubble wrap that can be popped etc.

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**Year 2**

Sound studio • Lesson 2 • Vibrations to my ears

**lesson 2**

**inquirE**

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| To read the most recent version of this task, download associated resources, and view embedded professional learning including classroom videos and work samples, visit:  [https://primaryconnections.org.au/teaching-sequences/year-2/sound-studio/lesson-2-vibrations-my-ears](https://primaryconnections.org.au/teaching-sequences/year-2/sound-studio/lesson-2-vibrations-my-ears?utm_source=docx&utm_medium=lesson2&utm_campaign=SS) |

# Lesson overview

## Students explore vibrations coming from sound sources, and how these vibrations travel through the air and other materials to our ears.

## Key learning goals

Students will:

* make observations about how sound causes vibrations.
* explain how vibrations travel to a listener’s ear.

Students will represent their understanding as they:

* share their observations (verbally) with the class.

## Assessment advice

In this lesson, assessment is formative.

Feedback might focus on:

* students’ descriptions/explanations of their experiences. Are they able to explain that all sounds come from a vibration source and that vibrations travel from the source to a person’s ear?
* students’ observations. Are they able to link their observations to the evidence they collected during their investigations (different sounds heard when they touched their ear and tapped their elbow, louder bell sound when the vibration travelled through the string directly to their ear)?
* students’ representations. How have they represented the sound wave? How have they represented the direction the sound moved?
  + This is just for noting, as there will be opportunities to develop this more explicitly later in this sequence.

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)
* An item to demonstrate sound as a vibration, for example a guitar/ukelele, a ruler, a xylophone/glockenspiel, or an elastic band

**Each group**

* 1 x inflated balloon
* A swinger with a wire on it

  Description automatically generated1 x wire coat hanger
* 2 x 60cm lengths of string, with a loop tied in one end, large enough to fit over students’ ears. The other end will be tied to the wire coat hanger by students during the lesson. You might prefer to tie the strings to either end of the coat hanger prior to the lesson if students do not have the time or motor skills to do so.
* 1 x 'striker'—something firm and long enough for students to hold, whilst still having a good length of the item protruding from their hands. For example a pen, pencil or texta, ruler or paintbrush.

Optional: 2 x plastic/paper cups with a hole punched in the base

**Safety note—balloons**

Some students may be allergic to rubber.   
Do not blow the balloons up too much, as they could burst.

**Each student**

* Individual science journal (digital or hard-copy)

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Re-orient | 5 minutes | Whole class |
| Question | 5 minutes | Whole class |
| Investigate | 15 minutes | Collaborative teams, Whole class |
| Integrate | 15 minutes | Whole class |
| Question and Investigate | 20 minutes | Collaborative teams, Whole class |
| Integrate | 30 minutes | Whole class, Individual |

# Inquire

## Re-orient

Recall the previous lesson, focusing on the sounds students made and the discussion about Disney sound effects.

Review the meaning of the terms:

* sound effect—any sound, other than music or speech, added separately to a video, song, or other recording, for effect.
* Foley—the process/methods for making sound effects, named after Jack Foley.

## Question • What is sound?

If students have asked questions during the question generation task in Lesson 1 in relation to what sound is, how it moves or how we can hear, use these questions as a starting point for the investigation.   
  
Otherwise, or additionally, **pose the question**: *What is sound and how does it get to our ears?*

## Investigate • Vibrating vocal cords

Ask students to place their hand gently on the front of their neck/throat and invite them to make some sounds—you might sing a favourite school or community song, rehearse a schoolyard chant, or simply hum.

Students describe what they can feel and explain what they think might be happening.

Students should feel the ‘buzzing’ sensation produced by the larynx when talking, singing, humming etc. They might also feel the larynx move up and down if they swallow. Students do not need to use the term ‘larynx’, and ‘voice box’ will suffice at this level. Determine which vocabulary is most suitable for your students' needs and context.

If students have not offered it themselves, introduce the term ‘vibrate’ to describe the buzzing feeling they felt in their throat. Define the term ‘vibrate’: to move continuously and rapidly back and forth. Write it on a card or in the class science journal. You might also use drawings to support students' understanding.

If required, distinguish between the vibration they feel while making sounds and the movement of the larynx when swallowing, making it clear that the up and down movement does not produce sound, and is caused because other muscles in the throat move in the act of swallowing. Students might note that they can ‘hear’ themselves swallowing, but this is an ‘internal’ sound and cannot be projected to others without specialist equipment, such as they might have experienced at a doctor’s office.

In pairs, have students investigate vibrations further with a balloon. Students take turns speaking with their mouths close to the inflated balloon while their partner holds the balloon to feel the vibrations. Advise students that they are not to scream or shout at the balloon or near anybody’s ear, as this can cause damage to a person's hearing.

## Integrate • Discussing students’ observations

Discuss what students observed as they spoke close to the balloon.

**Potential discussion prompts**

* *What could you feel as you spoke into the balloon?*
* *What happened when your partner spoke into the balloon?*
* *What could you feel when you and/or your partner stopped talking into the balloon?*

Demonstrate some other ways sound is made using vibration, for example plucking the strings of a guitar/ukelele, twanging a ruler held tightly, with some of it overhanging the edge of a desk, hitting a xylophone/glockenspiel, or plucking stretched rubber bands.

Discuss with students what is making all of these sounds, including the sounds made with their throats and with the balloons, and what all the sounds have in common: they all involve vibration.

Through discussion and questioning determine that sound is created when something vibrates. For example, the vocal cords of the throat vibrate when air from your lungs pushes on the vocal cords. And, when we spoke into the balloon, we could also feel the vibrations on the balloon.

Add any questions the students have about vibrations to the list created in the class science journal during Lesson 1.

## Question and Investigate • Sound travels to the ear

**Pose the question:** *If sound is created when something vibrates, how do we hear the sound with our ears?*

Students will conduct an investigation to answer this question.

Model raising one arm with elbow bent so that your index finger is pointing into the air, then holding your elbow with your other hand. Ask students to do the same. Students tap on their elbow with one finger (using the hand holding the elbow) and listen carefully to the sound that they are making.

**Potential discussion prompts**

* *What sound can you hear?*
* *Where is the sound coming from?*
* *How is the sound getting from your elbow to your ear?*
  + I can hear the tapping on my elbow through the air.

Model placing your raised index finger on the fleshy part in the front of your ear (not inside the ear), and pushing gently to 'close' your ear. Invite students to do the same, then to tap on their elbow again.

**Potential discussion prompts**

* *What sound can you hear?*
* *Where is the sound coming from?*
* *How is the sound getting from your elbow to your ear?*
  + I can hear the tapping on my elbow through the air, but I can also hear it inside my ear, like it's travelled up through my arm.

Repeat the steps so students can hear the difference between the sounds created and discuss these differences.

**Potential discussion prompts**

* *Did the sound change?*
* *How did it change?*
  + It was louder the second time. It was like I could hear it directly inside my ear. The first sound I could hear was coming from further away, where my elbow was. But the second sound was inside my arm and ear.
* *Why were the sounds different?*
  + The first sound I could only hear once. It was not very loud. The second sound was much louder because I could hear it twice—once as it came from my elbow into the air, and again because it was coming through my arm/finger and directly into my ear.
* *Did anyone have difficulty hearing the slightly different sounds?*

Students then work in collaborative teams to further explore the way sound travels to their ears, using a wire coat hanger to make sounds.

A person holding a string and a hook

Description automatically generatedIf not already done, students tie the two lengths of string to either side of the coat hanger.

A young child standing in a playground

Description automatically generatedOne student holds the strings so that the wire coat hanger is dangling freely, away from the body (see image below). Their partner strikes the coat hanger with the striker (a pencil, ruler etc.).

Next, students will take it in turns to hang the end of each string, using the loops, over their ears. The other student taps the coat hanger, and the student with the strings describes the sound to their partner. Note that the string hangs over the students' ears and does not touch their neck or throat.

Allow time for students to investigate the sounds that they can hear through the air and through the string. Circulate among the groups encouraging students’ thinking by asking questions, such as:

* *Did you try tapping the coat hanger hard against the table and listening through the air? What did you hear?*
* *Is it the same as when you listen through the string?*
  + The sound was louder through the string and sounded like metal.

**Optional:** Provide equipment for students to explore a string telephone. Encourage students to explore the telephone by using longer pieces of string, wetting the string, varying the tension in the string, using materials other than string, or by whispering into the cup.

**Optional:** Students might also listen to the sound of tapping a pencil on a desk, and compare what they hear sitting normally to what they hear with an ear pressed flat on the desk.

## Integrate • Sound source role-play

Teams share their observations with the class.

**Potential discussion prompts**

* *When was the sound louder?*
* *Did it sound the same?*
* *When and how did it sound different?*
* *Did you feel anything in the strings when you were holding them in your hands and hitting the coat hanger?*
* *Did you feel the same thing once the string was touching your ears?*
* *Was the amount of time you could hear the sound different when the strings were touching your ears, as compared to when it was touching your partner’s ears?*
  + You might demonstrate this again with the whole class. Ask one student to stand in front of the class with the strings connected to their ears. Ask students, including the student at the front, to raise their hand when they hear the sound, and lower it when they can't hear it any more. The person with the strings connected to their ears will hear the sound for significantly longer than the students spectating- say 30 seconds, as compared to 1 or 2 seconds.
* *Do sounds travel best through air or through string? How do you know this?*
* *How does the sound travel through the hanger/string/air?*
  + The vibrations travel through the hanger/string/air to our ear.

Record students’ answers in the class science journal.

Next, students will participate in a role-play to experientially model how sound travels from its source to their ears.

Form students into one line and ask them to hold hands with the person behind and in front of them. Designate the student at one end of the line the ‘sound source’, and the student at the other end of the line as the ‘ear’, with all the students in between representing ‘air’.

A group of people holding hands

Description automatically generated

Instruct the ‘sound source’ to begin to hum, and to vibrate the hand they are holding to represent this humming. Instruct the students representing the air to vibrate when the hand of the person next to them begins to vibrate. In this way humming sets off a chain reaction, sending the sound from student to student ‘through the air’ to the ‘ear’ at the other end of the line.

Advise the sound source to stop humming and stop vibrating the hand they are holding, thus setting off another chain reaction stopping the sound.

Revise the definition of vibrate discussed earlier in the lesson and then discuss the sorts of body movements students made to represent it.

Introduce the term ‘sound wave’ and explain that the travelling vibration that moves the sound from the source to the ear is called a sound wave. Discuss the various definitions of the term ‘wave’, and ask students to make body movements to represent what they look like.

Support your students to draw a correlation between the movements of ‘vibration’ and ‘wave’: they both involve back and forth movements.

Discuss how the sound wave travelled in the coat hanger investigation: from the coat hanger sound source through the air to the ear, and sometimes through the string to the ear.

Ask students if they have any questions about how vibrations travel and record their ideas in the class science journal.

Students create an annotated or labelled drawing in their science journal to show their understanding of what they have experienced in the lesson about sound causing vibrations and these vibrations moving as sound waves from the source to their ears. It is not necessary to provide students any specific direction on what/how to represent their current understanding, as this will be addressed later in the sequence.

Undertake a gallery walk to share students’ annotated drawings, taking note of any specific vocabulary used, how students represented vibration, how they identified the sound source, and if arrows were used to indicate the direction of travel.

**Reflect on the lesson**

You might:

* discuss any objects that the students have brought in for the sound collection table.
* update the word wall with words and images. For example, ‘vibration’ and 'sound wave'.
* add a coat hanger (with strings attached) to the sound table.
* relate what students have experienced to the context of creating sound effects by discussing what other sounds the sounds students made during the lesson could represent. For example, hitting the coat hanger with a metal fork could sound like a bell dinging, or the vibrating balloon could sound like a buzzing fly.

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**Year 2**

**lesson 3**

**INQUIRE**

Sound studio • Lesson 3 • “That sounds loud!”

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# Lesson overview

## Students explore and describe the different sounds made by different materials using different amounts of energy. Ordering sounds from soft to loud, they create a noise meter to monitor classroom noise levels.

## Key learning goals

Students will:

* determine if one material can make many different sounds.
* group sounds as ‘soft’ and ‘loud’.
* determine that the more energy they use to make a sound, the louder the sound will be.
* apply their understanding to create a ‘class noise meter’.

Students will represent their understanding as they:

* describe and record sound observations, using everyday objects.
* contribute to class discussions about different sounds, loud and soft sounds and classroom noise limits.

## Assessment advice

In this lesson, assessment is formative.

Feedback might focus on:

* students’ recognition of different vibrations creating different sounds.
* the variety of sounds students make with the same materials. Challenge them to make multiple sounds with the same materials, e.g. by scrunching, ripping, or folding paper.
* are students able to apply their understanding of loud and soft sounds in a teacher-led design challenge?

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)
* ‘Sound stations’ containing everyday items/materials that can be used to make different sounds. For example:
* metal station containing spoons, forks, baking trays, pots, pans, foil, metal musical instruments etc.
* plastic station containing cup, rulers, plastic toys, tubs and containers, plastic musical instruments etc.
* wood station containing blocks, sticks, boxes, wooden musical instruments etc.
* fabric station containing different fabrics and items made of fabric etc.
* paper station containing paper, cardboards, boxes, crepe paper, newspaper, tissue paper etc.
* Demonstration copy of the **Sound makers Resource sheet**
* Sticky notes
* Blu tack
* Demonstration copy of the **Virtual class noise meter Resource sheet** (if making a virtual noise meter) OR noise making items and labels (if making a physical noise meter)
* High Tech option: Sound meter

**Each group**

* A ‘tapper’ for groups to use to tap materials found at the sound stations, for example:
* icy-pole stick
* chopsticks
* rubber mallet/xylophone mallet
* plastic spoon
* metal spoon
* Alternatively students might use their fingers or hands as a tapper.
* Optional: Give each group a different ‘tapper’ to use.
* Optional: Supply each group with multiple ‘tappers’ made of different materials.

**Each student**

* Individual science journal (digital or hard-copy)
* **Sound makers Resource sheet**

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Re-orient | 5 minutes | Whole class |
| Question | 5 minutes | Whole class |
| Investigate | 20 minutes | Collaborative teams |
| Integrate | 15 minutes | Whole class |
| Integrate | 20 minutes | Whole class |

# Inquire

## Re-orient

Recall the previous lesson, focusing on:

* vibrations coming from sound sources and travelling to the ear, through the air and sometimes through solid items such as string.
* the role-play where the vibration passed from the sound source through the particles to the ear of the listener.

Discuss what items were used to make the vibrations (vocal cords, tapping coat hanger).

## Question • Different sounds

If students have asked questions during the question generation task in Lesson 1 in relation to things that can make sounds and the types of sounds things can make, for example, *Why can we hear the cars on the road when they are a long way away?*or *Why are some sounds hard to hear?,* use these questions as a starting point for the investigation.

Otherwise, or additionally, **pose the question:** *Why do things make different sounds?*

## Investigate • Sound stations

Display a range of items available for students at different ‘sound stations’. Explain that students will be working in teams to make different sounds with familiar materials.

Ask students what they might do to the items displayed to make sound from them. For example, they might tap a metal pot with a spoon, scrunch a piece of paper with their hand, crash or rub two items together, shake an item etc.

Demonstrate by tapping an item, for example a metal baking pan. Ask students to describe the sound it makes.

Optional: Discuss onomatopoeia—words that sound like what they are describing, for example swish, thud, clack, clunk, ding, etc.

Look at the other items displayed and ask students if they think they will all make the same sounds. Discuss possible sounds they might make.

Next, tap the first item again, lightly and then with more force. Exaggerate the movements for the tap with more force, as it is important for students to clearly see that this used more ‘energy’ than the light tap.

Students describe the difference between the two taps demonstrated, and the sounds that they produced.

Discuss how much ‘energy’ you used to create each sound, and that tapping lightly used less energy that tapping with more force.

Using a demonstration copy of the Sound makers Resource sheet, model how to record what was just demonstrated and discussed for students.

As you model, discuss why it is important to be specific about how the sound is being made, for example holding the metal pan in the air. Demonstrate by showing how different the sounds are if the pan is tapped whilst being held in the air versus when it is resting on the table.

Discuss why it might be important to try and recreate the sounds in the same way when using less energy and more energy, for example, tapping the pan in the same spot, or rubbing two items together in the same spot. Demonstrate by showing the difference in the sounds if the pan is tapped on the rim, close to where it is being held versus in the middle of the pan.

A close-up of a chart

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Work sample showing an example recording on the Sound makers Resource sheet

Divide students into teams as appropriate and allow time for them to complete the investigation, recording their observations as they go.

You might like to assign groups to a specific station, or give them time to rotate through multiple stations.

## Integrate • Sound sharing

Teams share the different sounds they made using the items found at the sound stations. Use sticky notes to record a summarised version of how the sound was made and the description of the sound. For example, spoon tapping metal pan: “thoung” sound, echo-y.

Discuss what students noticed between the sounds that were made with less force compared to those made with more force. Through discussion determine that the more ‘energy’ they use to make the sound, the louder the sound will be. When they ‘give’ (or transfer) more energy to the object, it has more energy to vibrate.

Next, discuss if all the sounds were as loud as each other, regardless of the ‘energy’ students put into making the sounds. For example, was swiping a cotton ball across a desk as loud as tapping the metal pan?

Order the sounds shared by students and recorded on the sticky notes, from softest to loudest. If necessary, recreate the sounds shared so students can determine where they belong.

Further discuss the results of the investigation, including the types of materials and methods that made the loudest sounds.

**Potential discussion prompts**

* *Which items made a loud sound? Which made a quieter/softer sound?*
* *What types of materials made the loudest/softest sounds? Did you notice any similarities?*
* *What method made the loudest sounds? Did hitting something with a metal spoon make a louder sound than tapping it with your finger?*
* *Why do you think that is?*
* *Could any of the materials be grouped in both ‘loud’ and ‘soft’? Why?*
  + *Rubbing the metal pan with your hand will make a soft sound, but tapping it with a metal spoon will make a loud sound.*
* *How can vibrations make both loud sounds and soft sounds?*
  + *Big vibrations cause louder sounds, small vibrations cause softer sounds.*

**Optional:** Use a sound meter, such as the [Applause Meter](https://classroomscreen.com/templates/applause-meter) to compare the loudness of the different sounds. You will need to allow the applause meter access to your computer’s microphone to do this.

## Integrate • Creating a noise meter

Explain to students that as a class, you will use the findings from the sound stations investigation to create a class noise meter. The class noise meter will show the appropriate level of loudness for different classroom activities.

Using sticky notes, invite students to list a classroom activity and describe how much sound it makes. Place the sticky note on a scale from ‘silent’ to ‘loudest’.

Discuss which activities produce a similar amount of sound and group/rearrange accordingly.

There are two options for creating the class noise meter.

**Option 1: Physical noise meter**

The class will test and select sounds that should be able to be heard (you might like to introduce the term ‘audible’) above the expected noise level of an activity. For example:

* when the class is doing a silent activity, the teacher/student might be able to shake a fabric piece and hear its quiet flapping sound, or stir some cotton balls in a tub and hear the cotton balls move around.
* during group work, two metal straws could be tapped together and still be heard above the classroom noise.

Discuss how the noise meter might be used in the classroom (who will use it, who needs to hear the sounds), any potential issues, and how to make sure the same/similar amounts of energy are used each time the noise meter sound is made (for example, tapping the metal straws with a similar amount of force each time).

**Potential discussion prompts**

* *What sound maker have we decided is suitable for group work?*
* *What sound maker have we decided is suitable for really quiet work?*
* *How might the sound makers help us monitor noise levels in the classroom?*
* *What problems might using the sound makers create?*
* *How will we make sure the same, or at least a similar, amount of energy is used to make the sounds each time?*
* *Are there any situations where using the sound makers won’t be suitable?*
* *What makes a sound loud or soft?*
  + The more energy that’s used to make the sound, the louder the sound will be. For example, when a drum is hit hard it is given more energy, so the vibrations are larger. This makes a more intense sound wave and our ears hear a loud sound.
* *How does our voice make both loud and soft sounds?*
  + When we speak louder, more energy is making the vocal cords vibrate. These large vibrations make a more intense sound wave that we hear as a loud sound. When we speak quietly, less energy makes the vocal cords vibrate, so a less intense sound wave is produced, which our ear interprets as a quieter sound.

Create a class noise meter by listing each of the 'sound makers' and what classroom activities they should be able to be heard above. Display this class noise meter for classroom use.

Optional: Students rank the list of noises they recorded in their individual science journals from softest to loudest.

**Option 2: Virtual noise meter**

Reproduce the common levels of noise in the classroom, for example, the noise level during quiet tasks, partner work, group tasks and games, and observe where the [Applause Meter](https://classroomscreen.com/templates/applause-meter) hovers.

Using the **Virtual class noise meter Resource sheet**, create an analogue version by naming each section of the noise meter as it corresponds to the virtual noise meter. Use sticky notes or Blu-tac labels to allow for easy adjustments to be made after some trial and error.

Discuss how the virtual noise meter might be used in the classroom (when to use the analogue version and when to check in with the digital version), any potential issues, how our voices can make loud and soft sounds, and the energy that goes into this.

**Potential discussion prompts**

* *What colour have we decided is suitable for group work?*
* *What colour have we decided is suitable for silent reading/drawing?*
* *How will the virtual class noise meter help us in the classroom?*
* *What problems might it create?*
* *Are there any situations where it won’t be suitable?*
* *What makes a sound loud or soft?*
  + The more energy the sound source has, the louder the sound will be. For example, a drum that is hit hard has a large amount of energy in the vibration, which makes a more intense sound wave and our ears hear a loud sound.
* *How does our voice make both loud and soft sounds? How do we know?*
  + When we speak louder, more energy is making the vocal cords vibrate. These large vibrations make a more intense sound wave that we hear as a loud sound. When we speak quietly, less energy makes the vocal cords vibrate, so a less intense sound wave is produced, which our ear interprets as a quieter sound. You might feel more tired after cheering on your favourite sports team than you do sitting at home watching a movie, because you used more energy.

**Reflect on the lesson**

You might:

* add to the class word wall of vocabulary related to elastic and inelastic.
* review the questions students asked about materials and add any new questions students have.
* re-examine the intended learning goals for the lesson and consider how they were achieved.
* discuss the safety of undertaking investigations, and why some tests can be undertaken in the classroom but others cannot. For example, we might be able to use a plastic fork to poke a hole in soft plastics like cling wrap, but we would need something sharper to make a hole in hard plastic. However, testing this in the classroom wouldn’t be safe.

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**Year 2**

Sound studio • Lesson 4 • Loudness and pitch

**lesson 4**

**inquire**

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| To read the most recent version of this task, download associated resources, and view embedded professional learning including classroom videos and work samples, visit:  [https://primaryconnections.org.au/teaching-sequences/year-2/sound-studio/lesson-4-loudness-and-pitch](https://primaryconnections.org.au/teaching-sequences/year-2/sound-studio/lesson-4-loudness-and-pitch?utm_source=docx&utm_medium=lesson4&utm_campaign=SS) |

# Lesson overview

## Students investigate how vibration speed affects pitch and explore the direction that sound waves travel.

## Key learning goals

Students will:

* explore the difference between high- and low-pitched sounds.
* compare pitch to loudness.
* identify that pitch is directly related to vibration speed.
* explore the direction and distance sound waves travel.

Students will represent their understanding as they:

* contribute to a class PROE chart to record their predictions, reasoning, observations and explanation.
* develop and draw a labelled diagram of a model showing how sound waves travel outward in all directions.

## Assessment advice

In this lesson, assessment is formative.

Feedback might focus on:

* students’ annotated drawings. How have they represented sound travelling? Have they shown that louder sounds travel further? Are they using reasoning when making predictions and explanations after making observations?
* students’ observations when plucking the rubber band. Have they recognised that different sounds (pitch or loudness) were made when the band was stretched?
* students’ understanding of pitch. Are they able to identify that loudness and pitch are different and distinguish high and low pitch sounds from variations in volume (loud and soft)?

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)
* 1 x story book
* A big space to use for the investigation, such as the school hall, library or oval
* Sound source such as tapping sticks, bell, speaker, popping bubble wrap (optional)
* The video [What does sound look like?](https://www.youtube.com/watch?v=px3oVGXr4mo) (0:13-0:30 seconds)
* 1 x balloon
* 1 x hex nut
* Demonstration copy of the **Playing the band Resource sheet**
* Optional: Xylophone or glockenspiel

**Each group**

* At least 2 elastic bands of the same thickness and (ideally) the same colour, but different lengths (so that one can be stretched further than the other)

**Each student**

* Individual science journal (digital or hard-copy)
* **Playing the band Resource sheet**

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Re-orient | 5 minutes | Whole class |
| Question | 5 minutes | Whole class |
| Investigate | 20 minutes | Whole class |
| Integrate | 20 minutes | Whole class |
| Question | 5 minutes | Whole class |
| Investigate | 15 minutes | Collaborative team |
| Integrate | 15 minutes | Whole class |

# Inquire

## Re-orient

Recall the previous lesson, focusing on:

* the variety of different sounds that can be made with everyday objects.
* how using more energy causes the vibration to have more energy and produce louder sounds, and using less energy causes vibrations with less energy and produces softer/quieter sounds.

Revisit the term ‘vibrate’: something continuously and rapidly moving back and forth.

## Question • How far does sound travel?

If students have asked questions during the question generation task in Lesson 1 in relation to how far sound travels, or what enables it to be heard from a long distance away, use these questions as a starting point for the investigation.   
  
Otherwise, or additionally, **pose the question:***What makes a sound travel further?*

## Investigate • Travelling sound

Explain that we are going to investigate which direction sound waves travel, and how far they travel, by listening to the sounds of a story being read.

Consider the space where the investigation will be conducted, and if there will be enough room for all students to get far enough away from the sound source for it not to be heard. You may need to use the school hall, library or oval to find a space large enough.

Students stand in a circle around the teacher, who will be the sound source. Explain that you will read a story, and as soon as they cannot hear the sound of the story, they should sit down wherever they are standing. Discuss what it means to be able to ‘hear’ the story and decide if being able to ‘hear’ the teacher’s voice is enough, or if you need to be able to understand the words being said.

Begin reading the story in a normal speaking voice. Pause at the end of the first page and ask any students left standing to take a step backwards, further away from the sound source. Continue reading the story and repeat this process at appropriate intervals until all students are sitting down because they can no longer hear the sound of the story.

It’s important to keep the sound source at the same, or as close to the same, loudness as possible, so that eventually all students will reach a distance where the story can no longer be heard.

## Integrate • See the waves

Return to a typical classroom discussion seating arrangement and discuss which direction the sound travelled and how well they could hear it as they moved further away.

**Potential discussion prompts**

* *At the start, could everyone hear the story being read?*
* *Do you think you could all hear it as clearly?*
  + *Students behind the teacher might not have heard it as loudly as those in front.*
* *What direction were the sound waves travelling? How do you know?*
  + *The sound was travelling in all directions because students standing in different positions of the circle—in front and behind the teacher—could hear the story to start with.*
* *Did the sound get louder or softer as you moved further away?*
* *Why can’t we hear the story when we get further away?*
  + *To hear a sound the sound wave needs to reach our ear with enough energy to vibrate our ear drum inside our ear—the sound wave loses energy and gets smaller the further it travels.*
* *How might the location have affected how well we could hear? What might happen if we repeated the investigation in a different location?*
  + *For example, if the investigation was carried out on the school oval then outside noise such as wind, traffic and animal noises, might have impacted how well the story could be heard. On the other hand, the school hall might be specially designed so that sound carries well during school assemblies and performances, so it might be easier to hear in the hall.*

Discuss how more energy would be needed to read more loudly and less energy to read more softly. Experiment in different ways, reading more loudly or softly to see if the sound travels a further or lesser distance.

Discuss when the sound seemed to travel the greatest distance, and what factors caused that—did louder sounds travel further than softer sounds? Jointly construct a sentence to answer the question What makes a sound travel further?

Students create an annotated drawing to show what they thought was happening in the science journal. Remind them that it is not necessary to represent every student in the class, only key locations, such as students behind the teacher versus students facing the teacher etc.

**Optional:** Repeat the process using a different sound source in the middle of the circle (tapping sticks, bell, speaker, popping bubble wrap etc.) then compare how far the sound wave travelled.

View 0:13-0:30 of the [What does sound look like?](https://youtu.be/px3oVGXr4mo?feature=shared&t=13) video. Watch with the sound muted, and no captions. This video explains concepts outside the scope of the Year 2 curriculum, and is not appropriate for their level of conceptual development. To avoid confusing students (or creating or reinforcing any alternative conceptions) it is important to only watch the section of the video indicated, and to watch without sound.

Ask students to observe the video closely, describing what they can see. Watch the suggested section/s of the video multiple times as required.

**Potential discussion prompts**

* *What can you see as the hands clap together?*
  + Students should have observed and describe the disturbance in the air around the hands, and the ripples/waves that move through the air as the hands clap together.
* *How can you tell that the air around the hands is moving?*
  + It looks different to the air further away from the hands. You can see ripples/waves come out when the hands reach each other.
* *In which directions do the waves move?*
  + You can see them clearly coming from the fingers and travelling outwards.
* *Even though you can't see the waves of sound moving towards the person’s head/ear, do you think they are? How do you know?*
  + The waves must be moving towards the ear, because the person who is clapping would be able to hear the clap.
  + You might like to get students to demonstrate, to prove that the sound waves will move in all directions, even if they can't see in the video.
* *How many waves are there?*
  + You can see there is more than one wave, they follow each other—that's why they are called waves.
* *Why do you think the waves stop? How could we make them keep going?*
* *How might we make the waves bigger or smaller?*
  + Putting more energy into the clap would make the waves bigger and the sound louder. Putting less energy into the clap would make the waves smaller and the sound softer.

**Optional:** Repeat the ‘sound waves in all directions’ task, making a louder sound in the middle of the circle to see if the sound travels further.

Remind students of the vibration role-play done in an earlier lesson, and how the students were in one straight line. **Pose the question:***If sound waves travel outward in all directions and not one straight line, how could we improve the role-play to represent this?*

Discuss and trial different ideas to improve the role-play.

Ask students to draw their own representations in their science journal.

## Question • Faster and faster

If students have asked questions during the question generation task in Lesson 1 in relation to high/low pitched sounds, use these questions as a starting point for the investigation.   
  
Otherwise, or additionally, pose the questions: Is a loud sound the same as a high sound? Is a soft sound always a low sound?

## Investigate • The elastic ‘band’

Students work in pairs to investigate the different sounds that can be made when an elastic band is plucked with different amounts of energy, or when stretched differently.

Using a demonstration copy of the **Playing the band Resource sheet** as required, discuss the steps of the investigation with students. Students:

1. Describe the elastic band.
2. Stretch it out lightly between their thumbs.
3. Have their partner pluck the elastic band slowly/with less energy.
4. Have their partner pluck the elastic band quickly/with more energy.
5. Record their observations of the sound that was made, and a comparison between the loudness when plucking it with more energy and less energy.
6. Stretch their elastic band lightly between their thumbs, as before.
7. Have their partner pluck it with an energy level of their choosing (more or less energy).
8. Now stretch the elastic band out tightly. Remind students to take care not to stretch it so tightly it snaps.
9. Have their partner pluck it with the same amount of energy as previously used.
10. Record their observations of the sound that was made, and a comparison between the sounds when plucking a lightly vs tightly stretched band.
11. Repeat this investigation with a second (differently-sized) elastic band.

Before you begin the investigation you might like to discuss the similarities and differences between the two elastic bands each group has been given. Discuss how the bands are the same thickness and colour but different lengths, so one can be stretched further than the other. Show rubber bands of other thicknesses and discuss why it wouldn't be fair to compare the sounds made using a short, thin band to a long, thick one: changing multiple things (the thickness and length) means that it's not fair to compare them, because you won't know which one had the most impact.

## Integrate • Volume or pitch?

Students share the results of their investigation, including the different sounds made when plucking the elastic band with more or less energy, versus when it was plucked when stretched lightly, then tightly.

**Potential discussion prompts**

* *What did you notice about the sound the elastic band made when you stretched it the same distance (looser) but played it with different amounts of energy?*
  + In this instance, the sounds should be the similar, but when played with more energy it will sound louder.
* *What did you notice about the sound made when you stretched the rubber bands at different distances (loose versus tight)?*
  + In this instance, the **pitch**was different—when the band was loosely stretched the sound had a lower pitch and when tightly stretched the pitch was higher.
  + There is no need to introduce this language yet. Allow the students to describe their observations using their existing vocabulary, such as high and low.
* *Do you think that a sound that is high is the same as a sound that is loud?*
  + Consider demonstrating that the low and high-pitched sounds can be both soft or loud when played with different amounts of energy.

Introduce the term ‘pitch’ and ask students to describe what they think the term means. Provide a definition as appropriate: how high or low a sound is.

Ask students what types of vibrations they think would make high-pitched sounds and low-pitched sounds: fast or slow? Discuss how pitch is different to loudness.

**Optional:**It might be necessary to spend some time discussing and demonstrating the difference between pitch (different sound) and volume (louder or softer sound). A xylophone or glockenspiel, or glasses of different sizes filled with different amount of water, are effective ways of doing this.

Demonstrate this for students by placing a hex nut inside a balloon, inflating the balloon and tying it off.

1. Hold the balloon by each end and spin it. It should quickly begin to make a distinctive whirring noise.
2. Spinning the balloon/hex nut slowly will produce a low-pitched sound.
3. Spinning the balloon/hex nut quickly will produce a high-pitched sound.

Ask students to turn around for this demonstration, or demonstrate from behind them. This is because, due to the nature of the demonstration, more energy is required to spin the balloon at a speed that makes the hex nut move quickly inside it, and less energy to make the hex nut move slowly. Students viewing the demonstration may then understand high-pitched sounds as needing more energy, which is not the case. By removing the students' ability to see the demonstration, alternative conceptions are less likely to be inadvertently formed or reinforced. Students should be able to hear that the hex nut is spinning quickly, and thus will be able to infer that faster vibrations lead to higher-pitched sounds.

Revisit the [Disney sound effects video](https://youtu.be/20UISl1e81U?feature=shared&t=130) (timestamp 2:10) to see how Disney used a hex nut in a balloon to create sound effects.

Discuss what students could hear as the hex nut spun inside the balloon, and if the vibrations created by one of the sounds (high or low) sounded faster than the other. The vibrations of the higher pitched sound should sound faster.

Make a list of other high- and low-pitched sounds students might have heard before, for example a whistling kettle, squeaking a balloon, sneakers squeaking on a wooden floor (high-pitched) or a bass drum, a stereotypical cow's moo, thunder (low-pitched).

***Reflect* on the lesson**

You might:

* invite students to move around the room and choose a body movement that matches the vibration coming from the hex nut. For example, wiggling fast with their arms in the air for the fast vibration (high pitch) and moving slower with their arms drooping towards the floor for the slow vibration (low pitch).
* discuss which items on the sound table make high-pitched or low-pitched sounds.
* invite students to bring more items for the sound table that make a high- or low-pitched sound.
* update the word wall with words and images. For example, ‘high pitch’ and 'low pitch'.
* relate what students have experienced to the context of creating sound effects by discussing what other sounds the sounds students made during the lesson could represent. For example, you might tap several different pots to simulate the ringing of a collection of bells that all sound slightly different.
* record videos of the students’ new sound wave role-play to view themselves or share with others.

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**Year 2**

Sound studio • Lesson 5 • Music makers?

**lesson 5**

**inquire**

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| To read the most recent version of this task, download associated resources, and view embedded professional learning including classroom videos and work samples, visit:  [https://primaryconnections.org.au/teaching-sequences/year-2/sound-studio/lesson-5-music-makers](https://primaryconnections.org.au/teaching-sequences/year-2/sound-studio/lesson-5-music-makers?utm_source=docx&utm_medium=lesson5&utm_campaign=SS) |

# Lesson overview

Students explore making different sounds by making objects vibrate in different ways.

## Key learning goals

Students will:

* explore and describe the different sounds that a ruler and box guitar can make.
* predict how changes to the box guitar will affect pitch and provide reasoning.
* record box guitar observations and attempt to explain their observations scientifically.
* compare guitar strings to vocal cords (optional).

Students will represent their understanding as they:

* demonstrate and describe ruler sounds produced.
* complete the **Box guitar PROE chart**.
* draw a labelled diagram of a box guitar producing a high and low pitch.

## Assessment advice

In this lesson, assessment is formative.

Feedback might focus on:

* can students recognise the correlation between vibration speed and pitch with different materials?
* are students using the terms ‘high pitch,’ ‘low pitch,’ fast vibrations’ and ‘slow vibration’ appropriately?
* can students apply their prior learning about rubber band or hex nut vibration speed, to explain their observations with the ruler and box guitar?
* can students demonstrate their understanding with a labelled diagram?

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)
* Optional: Video of a balloon deflating, for example [Deflation balloon sound effect](https://www.youtube.com/watch?v=0u6rrdUhceM)
* Optional: [Video explanation of how tones of different heights are created](https://www.youtube.com/watch?v=fFwLOPu7I_U)
* Demonstration copy of the **Sample box guitar image Resource sheet**
* Demonstration copy of the **Box guitar Resource sheet**

**Each group**

* 1 x ruler—wooden, plastic or metal. Plastic rulers should be of the non-flexible kind. Each group might have a different type of ruler to enable discussion about the different tones made by different materials.
* Items from sound table to strike with ruler (buckets, jars, paper, leaves etc.)
* 1 x small empty box (tissue box, muesli bar/snack box, small packaging box). Alternatively any rectangular prism, such as a book or pack of cards, will suffice as long as an elastic band can fit around it.
* 2-3 elastic bands of different sizes but the same width
* 2 x textas/pencils
* Blu-tac, sticky tape or masking tape
* Optional: Additional elastic bands of varying length/thickness

**Each student**

* Individual science journal (digital or hard-copy)
* **Box guitar Resource sheet**

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Re-orient | 5 minutes | Whole class |
| Question | 10 minutes | Whole class |
| Investigate | 20 minutes | Collaborative teams, Whole class |
| Integrate | 15 minutes | Collaborative teams, Whole class |
| Investigate | 20 minutes | Whole class, Individual |
| Integrate | 20 minutes | Whole class, Individual |

# Inquire

## Re-orient

Recall the previous lesson, focusing on:

* the meaning of pitch (whether a sound is higher/squeakier or lower/deeper), and its difference to the meaning of loudness.
* how higher and lower-pitched sounds were created.

## Question • Making sounds

**Ask:** *What different sounds could we make using a balloon?*

**Optional:** View [video footage of a balloon deflating](https://www.youtube.com/watch?v=0u6rrdUhceMa), or blow a balloon up and release the air in different ways—letting the air out fast and slow etc.

**Pose the question:***How many different sounds can an everyday object make?*

Link this to the Foley artists making sounds for movies, referring back to the objects students saw in the [Disney sound effects video](https://www.youtube.com/watch?v=20UISl1e81U) and how they were used to make sounds.

## Investigate • Ruler sounds

Students work in pairs to investigate how to make different sounds with common, everyday items, in this case a ruler.

Ask students to name the different materials rulers are typically made of (wood, plastic—sometime flexible and sometimes hard—and metal).

Brainstorm different ways of making sounds with a ruler and ask students to model. For example:

* waving the ruler through the air.
* gently tapping the ruler against the table.
* holding the ruler on a desk with its end protruding over the edge and flick it. Varying the length of the ruler protruding over the edge of the desk and listen to the different sounds (the greater length of ruler that is hanging over the desk, the lower the sound).

Discuss if the sounds were high or low-pitched.

Allow time for them to explore making different sounds with the ruler. Encourage students to ask their partner questions, such as: How did you make that sound? Do you think it would make a sound if you…? Why?

Remind students that rulers can break and leave sharp edges. Encourage them to start with gentle taps and gradually increase the force they use.

Students select another item in the classroom to explore the sounds it can make in combination with the ruler. For example, tapping a plastic bucket up the right way and upside down with the ruler.

## Integrate • Making sense

Invite pairs to demonstrate and describe two different sounds they produced with their ruler.

As each pair shares their sounds, in the class science journal record any of the words they use to describe how the sound was made or the sound itself. Also include the material the items were made of. For example "tapping wooden ruler on plastic tub sitting on desk—sounded like thunk."

Further discuss the investigation with a focus on encouraging students to use the scientific vocabulary learned so far in their responses. Refer to the word wall if you have been building one throughout the sequence.

**Potential discussion prompts**

* *What is happening to the ruler when it makes a sound?*
  + *The ruler is vibrating.*
* *If groups used rulers made of different materials, How would you describe the sound your ruler made? Do you think the rulers made of different materials made different sounds? Why? Why not?*
* *What must be done to a ruler to make a louder sound?*
  + *Use more energy when you hit, tap or twang it.*
* *Can you describe what happens when the sound is louder?*
  + *When you tap the ruler with more energy it causes bigger vibrations, which mean the sound is louder.*
* *When you held the ruler on the desk, with some of it overhanging, what did you find changed the pitch of the sound?*
  + *When less of the ruler was overhanging the side of the desk the pitch was higher. When more was overhanging, the pitch was lower.*
* *Why do you think this happened?*
  + *When less ruler is hanging off the desk it vibrates faster. Faster vibrations make higher pitched sounds. Just like the hex nut was moving faster inside the balloon when it was making a high-pitched noise.*
  + *This is a good opportunity to demonstrate that faster vibrations create higher pitched sounds. Students will be able to physically see the ruler vibrating faster when less of it is hanging over the desk. Start with as much ruler hanging over the desk as possible, before sliding more of the ruler onto the desk, leaving less overhang. After demonstrating a few times ask students to describe the speed of the vibrations.*

**Optional:** View this [video explanation of how tones of different heights are created](https://www.youtube.com/watch?v=fFwLOPu7I_U) (2:25) to support students to understand how the vibrating ruler makes a high pitch and a low pitch.

## Investigate • Box guitar

Remind students what they discovered in the previous lesson when they plucked an elastic band with different levels of energy, and when it was stretched out to different lengths.

Discuss how humans have used this idea for centuries to create music, and if they can think of how. Give students an opportunity to identify string instruments as a way humans do this, then ask students to name any string instruments they know (guitar, ukulele banjo, sitar, violin, cello, harp, or even a piano). Consider showing images of these instruments.

Explain that students will be using the idea to make their own simple string instrument—a box guitar.

Review the **Playing the band activity** from the previous lesson, noting that students tested two different types of rubber bands. Discuss the strings on a guitar—it may be helpful to have a guitar available for students to look at, or to show a large image of one. Guide students to notice that all the strings are the same size/thickness.

Introduce the word ‘tension’ (the amount something is stretched) and relate it back to the Playing the band activity: when the elastic was stretched tight it was under a lot of tension, when it was only stretched a little it was looser and more floppy—under less tension. Discuss what this means in relation to how much the elastic is able to move when it is stretched tightly versus stretched lightly.

Using the **Sample box guitar image Resource sheet**, show students an image of a box guitar. Alternatively, make a show your own box guitar. Provide teams with the equipment they need to build a box guitar, providing guidance and assistance where required.

A box with a pen tied to it

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A completed sample box-guitar. Here the textas are held in place with two pieces of blu-tac.

Sticky tape or masking tape would also work.

Raising the elastic bands from the surface of the rectangular prism is essential for demonstrating the different levels of tension in the bands, and also makes the differences in pitch more noticeable. If using a tissue box, using the existing hole instead will not work effectively.

After they have built their box guitars, students complete the first three columns of the **Box guitar Resource sheet**, describing the tension in the bands by seeing how much further they will stretch (little, more, the most, or stretches a little, stretches a lot), and completing the P and R sections of the PROE chart, predicting what sounds they think it will make when plucked, and giving a reason for their predictions.

They then 'play' their box guitar, completing the O section of the PROE chart, making their observations. Encourage them to describe the sound they heard in as much detail as possible, as well as what they notice about the movement speed of the elastic band.

## Integrate • What did we learn?

Students share and discuss the results of the box guitar investigation.

**Potential discussion prompts**

* *What kind of sound did the elastic band under more tension make?*
* *What kind of sound did the elastic band under less tension make?*
* *Did you notice any difference in how the rubber bands moved when you plucked them? What did you notice?*
  + The elastic band under more tension vibrates faster, making a higher pitched sound. The one under less tension is more floppy, so it vibrates slower and makes a lower pitched sound.
  + You might need or wish to demonstrate to students again during the discussion. You might also note that because the elastic band under less tension is looser, it can move further, so each vibration is bigger, and therefore slower.
* *How might you make sounds of even higher or lower pitch?*
* *What do you think this tells us about instruments that use strings, such as a guitar?*
* *Did you notice any similarities between what happened when you plucked the guitar strings and when you twanged the ruler over the edge of the desk?*
  + When less ruler was hanging over the desk, it couldn't move as far, so it vibrated faster and made a higher-pitched sound.
  + When more of it was hanging over the desk it could move further, so it vibrated slower and made a lower-pitched sound.

Using the display copy of **Box guitar Resource sheet,** students complete the E section of the PROE chart, explaining what they think happened.

Students represent their understanding by drawing labelled diagrams of the box guitar producing a high pitch and a low pitch.

Undertake a gallery walk to share/discuss students’ labelled diagrams.

**Reflect on the lesson**

You might:

* add a box guitar to the sound table.
* invite students to group the items on the sound table as ‘high’ and low’ pitch.
* use the [virtual keyboard](https://www.onlinepianist.com/virtual-piano), and invite students to match the pitch on the keyboard to the pitch produced by some items on the sound table.(This is difficult to do. Emphasise finding a ‘similar’ pitch rather than a perfect pitch.)
* view how a [guitar can be used to create city sound effects](https://www.youtube.com/watch?v=V8jt54DfWcY) (1:37).
* invite students to strum/pluck a guitar, ukulele or other string instrument
* view \* [Operation Ouch- Vocal Cords](https://www.youtube.com/watch?v=GDzcLZDdxqs) (3:33) to see how we use our vocal cords to change the pitch of our voice. \*Stop at 2:20 to discourage breathing helium

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**Year 2**

Sound studio • Lesson 6 • Muffling sound

**lesson 6**

**inquire**

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| To read the most recent version of this task, download associated resources, and view embedded professional learning including classroom videos and work samples, visit:  [https://primaryconnections.org.au/teaching-sequences/year-2/sound-studio/lesson-6-muffling-sound](https://primaryconnections.org.au/teaching-sequences/year-2/sound-studio/lesson-6-muffling-sound?utm_source=docx&utm_medium=lesson6&utm_campaign=SS) |

# Lesson overview

## Students conduct a fair test to determine if the medium that sound travels through (air, water, solids) affects its loudness or clarity.

## Key learning goals

Students will:

* identify variables that need to be controlled.
* make predictions about how the medium may affect the transfer of sound.
* conduct a fair-test investigation.
* analyse data and draw conclusions about sound waves.

Students will represent their understanding as they:

* use oral, written and visual language to record and analyse investigation results.
* record data in a table.
* discuss findings to reach consensus about how changing the medium through which sound travels affects its loudness and clarity.

## Assessment advice

In this lesson, assessment is summative.

Students working at the achievement standard (science inquiry) should have:

* contributed to the planning of a procedure to investigate to answer a question, including safety considerations.
* followed investigation procedures and made and recorded observations.
* used informal measurements to record observations, and/or digital tools where appropriate.
* compared their observations with others, recognising similarities and differences.

Refer to [the Australian Curriculum content links on the Our design decisions tab](https://primaryconnections.org.au/teaching-sequences/year-2/sound-studio?tabIndex=2) for further information.

## Resources

**Whole class**

* Class science journal (digital or hard-copy)
* Demonstration copy of the **Variables grid Resource sheet**
* Demonstration copy of the **Muffled sounds investigation planner Resource sheet**

**Each group**

* 1 x device that can be set to make a sound after a delay, for example, a kitchen timer, iPad timer etc.
* 1 x container large enough for this device to sit in
* 3 x ‘muffling’ materials, enough to fill the container, for example:
  + fabrics such as towels, clothes, blankets, felt etc.
  + paper products such as paper, newspaper, magazines, paper towels etc.
  + foam—including polyurethane and styrofoam.
  + plastic materials such as bubble wrap, soft plastic, etc.
  + assorted classroom materials, which might include maths equipment.
* Optional: To measure the volume of sounds accurately, groups might use a:
  + web-based decibel meter such as this [sound meter](https://www.checkhearing.org/soundmeter.php), the [Applause Meter](https://classroomscreen.com/templates/applause-meter)
  + decibel measuring app downloaded onto a smart device
  + digital sound level meter

**Per student**

* Individual science journal (digital or hard-copy)
* **Muffled sounds investigation planner Resource sheet**

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Re-orient | 5 minutes | Whole class |
| Question | 15 minutes | Whole class |
| Investigate | 25 minutes | Collaborative teams |
| Integrate | 15 minutes | Whole class |

# Inquire

## Re-orient

Review the investigations that students have participated in so far, tracking the journey of sounds from their source to the students’ ears:

* Lesson 2: Sound travelling through a balloon, their arms, a coat hanger, and potentially a string telephone or desk.
* Lesson 3: Sound created at the sound stations travelling through the air to our ears.
* Lesson 4: Sound travelling through the air to our ears, but getting softer over larger distances until it cannot be heard.

Also review the ideas explored around loud and soft sounds, and how adding more energy into an action can result in a louder sound. Demonstrate this again by tapping two objects, such as spoons, together with more and less energy.

## Question • Controlling the noise

Discuss with students how they can control the loudness of the sounds they create (for example when they were at the sound stations, or when they are talking). Also discuss how they might control the loudness of sounds that they don't make themselves.

**Potential discussion prompts**

* *If you wanted to make a soft ringing sound with two spoons, how would you tap them together?*
  + With less energy, more softly, smaller movements.
* *And how would you tap them if you wanted to make a louder sound?*
  + Use more energy, move your arms/hands more quickly, and start with them further apart.
* *How can you control the loudness of the sounds you make?*
* *Can you control the loudness of the sounds around you, that you don’t make? How?*
  + You can ask people to be quiet, you can turn down the volume on devices, you can move away from loud sounds, and you can wear earplugs.

Send two students to stand just outside the closed classroom door, or into a separate enclosed section of the classroom, and ask them to talk with each other at a ‘normal’ volume. Ask those remaining in the classroom if they can hear the students' conversation. Have two students inside the classroom talk to each other, so that the two students outside get the same experience.

Once all students are back inside, discuss if the people outside the classroom (or inside) could be heard, how loudly and clearly they could be heard, and why they could not be heard clearly.

**Potential discussion prompts**

* *Could you hear the two students on the other side of the door talking?*
* *How loudly and clearly could you hear them?*
* *Why do you think you couldn't hear them loudly/clearly?*
  + They were not talking loudly enough, they were further away, or there was a door/wall in the way blocking the sound.

**Optional:** Repeat the demonstration, but with the door open, and see if the students’ conversation can be heard more loudly/clearly.

Introduce the term ‘muffled’ to describe sounds that can still be heard, but that we might not be able to hear clearly or as loudly as they actually are.

Brainstorm a list of situations where you would want to stop outside sounds from being able to be heard. For example, when you're trying to sleep, when you're watching a movie, or when you're trying to record someone speaking or singing.

**Pose the question:***What things might affect how loudly we can hear a sound, without being able to control the sound itself?*

## Investigate • Muffle that sound

As a class, list things that might affect how loudly we can hear a sound and record them on a variables grid. Not every section needs to be filled and more can be added if the students identify lots of variables. Variables may include: the loudness of the sound, other sounds being made nearby, where the sound is coming from, anything that might get in the way of the sound wave (like a wall for example), how the loudness of the sound is measured, the distance between the sound source and the listener, students’ ability to hear sounds (one ear or both ears) etc.

Note that for this investigation students will be measuring the loudness of the sound. Mark that part of the grid with a M to indicate it will be the measured variable.

Discuss fair-testing principles, and how only changing one thing and leaving everything else the same will help us figure out how much the thing we changed had an impact on what we measured. In this investigation, the thing students will change is what might be blocking the sound waves (mark that with a C on the variables grid), and everything else will stay the same (mark with an S on the variables grid).

Use the sentence stem on the bottom of the variables grid to determine that students will investigate to find out what happens to the loudness of a sound when we change what's might be blocking the path of the soundwaves.

Show students the equipment for the investigation and use the **Muffled sounds investigation planner Resource sheet** to discuss and clarify the process for the investigation. You might like to jointly construct the responses for each section of the planner.

Discuss safety considerations, such as not putting electronic devices in water, or using dangerous objects in order to muffle the sounds.

Students will:

1. Select three materials they think might effectively muffle, or quieten, a sound.
2. Using a device that can be set to sound after a delay (such as a kitchen timer, or a timer on a digital device like an iPad), describe and/or measure the ‘sound starting point’—that is, listen to the sound without muffling it and describe/measure its loudness.
3. Place the sound measurer (a person or device) somewhere, and do not move it until the investigation is complete.
4. Place the container in a specific spot (and take care to place it back in the same spot after each test).
5. Start the timer on the device and place it inside the container.
6. Place the muffling material around the device, up to the top of the container.
7. Wait for the device to make its sound after the set timing interval has elapsed.
8. Measure how loudly/clearly the sound can be heard.
   * There are multiple ways students might measure the loudness/clarity of the sound, and the measurement method might impact whether you use the term ‘clarity’ or ‘loudness’. See below and the embedded professional learning on *Measuring sound* for further information.
     + No Tech: Students determine their own scale for how well they can hear the sound. In this case it might be helpful to have a recorded word or phrase the students are listening to. You might also refer to the 'Noise meter' developed by the class earlier in the sequence.
     + Low Tech: Use a web-based decibel meter such as this [sound meter](https://www.checkhearing.org/soundmeter.php), the [Applause Meter](https://classroomscreen.com/templates/applause-meter), or download a decibel measuring app onto a smart device.
     + High Tech: Use a specialised digital sound level meter to measure, and thus record, accurate and detailed decibel readings. These can be purchased quite easily at hardware and electronic stores, or downloaded onto a mobile device.

Allow teams time to complete their investigation and record their observations.

## Integrate • What makes a good muffler?

Students share the results of their investigations, including which materials (if any) muffled the sound and how effectively it was muffled.

**Potential discussion prompts**

* *What materials did you choose to muffle the sound?*
* *Did any of your chosen materials muffle the level of sound really effectively? By how much?*
* *Why do you think that material helped muffle the sound?*
* *How/where do you think the sound waves were moving when they were muffled by the material?*

Use the results of students’ investigation to place the tested materials in order of most to least effective at muffling the sound. Discuss the characteristics of the materials that muffled sound most effectively, identifying similarities and differences.

Discuss how and when this type of knowledge is used in real-life.

**Potential discussion prompts**

* *When do you think people need to know how to block out sound?*
* *If you were a singer and you were recording a song, what might you have to do?*
* *If you're recording a video, what might you need to consider?*
* *When else might it be important to know?*
* *When might you hear 'muffled' sounds in movies, TV shows, ads etc.?*

**Reflect on the lesson**

* explore the sound table and see if you can/would muffle the sounds of the items on it.
* update the word wall with words and images. For example, 'muffled'.

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**Year 2**

Sound studio • Lesson 7 • Foley

**lesson 7**

**ACT**

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| To read the most recent version of this task, download associated resources, and view embedded professional learning including classroom videos and work samples, visit:  [https://primaryconnections.org.au/teaching-sequences/year-2/sound-studio/lesson-7-foley](https://primaryconnections.org.au/teaching-sequences/year-2/sound-studio/lesson-7-foley?utm_source=docx&utm_medium=lesson7&utm_campaign=SS) |

# Lesson overview

## Students design and create sound effects for a teacher-selected prompt, using readily available items.

## Key learning goals

Students will:

* be guided through the design thinking process to create sound effects for a given prompt.
* apply their understanding of how sounds are made, volume, pitch to create sound effects.

Students will represent their understanding as they:

* create a storyboard with labels and descriptions of sound effects being produced.
* share their sound effects and communicate their design choices to a selected audience.

## Assessment advice

In this lesson, assessment is summative.

Students working at the achievement standard should have:

* demonstrated how different sounds can be produced.
* described the effect of sound energy on objects.
* used everyday and scientific vocabulary to communicate observations, findings and ideas.

Refer to the [Australian Curriculum content links on the Our design decisions tab](https://primaryconnections.org.au/teaching-sequences/year-2/sound-studio?tabIndex=2) for further information.

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)
* The video [How the sounds from your favorite movies are made](https://www.youtube.com/watch?v=0GPGfDCZ1EE) (2:43)
* Sound table filled with a variety of items to make sound effects
* Prompt for students to make sound effects for—s[ee the *Preparing for this sequence*tab on the Sequence overview page](https://primaryconnections.org.au/teaching-sequences/year-2/sound-studio?tabIndex=3#toc-selecting-the-prompt-for-the-act-phase) for prompt ideas
* Demonstration copy of the Sound effects storyboard Resource sheet

**Each group**

* Various everyday items to use to make sound effects, including those on the sound table and items that have been investigated throughout the sequence
* Optional: Materials to make sound makers

**Each student**

* Individual science journal (digital or hard-copy)
* **Sound effects storyboard Resource sheet**

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Anchor | 10 minutes | Whole class |
| Connect | 10 minutes | Whole class |
| Design | Variable | Collaborative team |
| Communicate | Variable | Collaborative team , Whole class |

# Act

## Anchor • What have we learned?

Use the class science journal to review and discuss the data and ideas collected in the class science journal over the course of the teaching sequence.

**Potential discussion prompts**

* *What is sound?*
* *What makes sound?*
* *How do we hear sound?*
* *How can we change the sound being heard?*
* *Why are sounds important to us?*
* *Why are sounds important in TV, movies and advertisements?*

## Connect • Movie magic

Remind students of the Disney sound effects they viewed in the Launch phase, and how movies and television often require the creation of sound effects for the viewer to hear—known as Foley.

**Optional:** Revisit the [**Old Disney Sound Effects**video](https://www.youtube.com/watch?v=20UISl1e81U).

View [How the sounds from your favorite movies are made](https://www.youtube.com/watch?v=0GPGfDCZ1EE) (2:43), an explanatory video of the work of a sound effects creator/Foley artist.

Discuss the foley artist video and challenge students to think more deeply about the creation of different sound effects.

## Design • Creating sound effects

Using the steps of the design thinking process, students will apply their understanding of creating and changing sound to create a sound effects storyboard.

Give students a specific prompt to direct the task. This prompt should be relevant to your class and context, and might involve a community or school event, a recently read story, or another theme or topic being explored. For example:

* The school has an upcoming fete. Brainstorm a list of 'scenes' that might happen at the fete, like children on a ride, a can topple stall, or a chocolate wheel spinner.
* Imagine the sound effects that might enhance selected scenes from a recently read story. By giving pairs of students a specific scene or image from the book you can retell the story in sound effects, creating your own 'class movie' by recording the effects and adding them to a slideshow of images.
* The class has been learning about significant places in the local community, and how they meet the community’s needs. Imagine events that take place at these places, and what they would sound like.

Consider if you will add some parameters around the design (for example, it needs to contain a sound that uses body percussion, vocal sounds, items from nature, student designed sound makers or items from the sound table) and how the storyboards will be shared/communicated and with whom (sounds might be recorded, and played alongside an image students draw of the scene).

Using the first two sections of each 'scene' card on the **Sound effects storyboard Resource sheet**, students draw an image to represent a selected scene, describe the sounds that would be heard there, and whether they are loud, soft, and high- or low-pitched.

Students then continue through the design process to investigate ways they can recreate/represent these sounds using equipment available in the classroom.

### Define

Outline the design challenge in a simple manner such as:

How can we… (use available items and materials) ...to... (create sound effects) …for… (a movie scene/advertisement/20 second scene)?

### Ideate

Brainstorm ideas related to the required sound effects. You may need to ask probing questions specific to the prompt selected. For example, how can we make a sound like wind whooshing past our ears on a ride, or how can we make a sound like horse galloping through a field?

At this stage, to support creative thinking, every idea offered by students should be recorded in the class science journal. No idea is discounted, as the practicality/possibility of each idea will be considered later.

As students offer ideas, ask probing questions (Why do you think… or How do you know that…) to draw out the reasoning and evidence behind the idea.

### Prototype

Working in pairs (or individually), students test different potential ways to make the desired sound effects for their scene. They record their final sound effect designs in the last section of each scene card on the **Sound effects storyboard Resource sheet**.

Remind students that their storyboard is not the final prototype—they can make changes to their sound effects throughout the entire process and they are not ‘locked in’ to what they put on their storyboard.

Once students have completed the storyboard, they should test and refine the sound effects. Encourage students to use a variety of available sounds, including body percussion, vocal sounds, items from the schoolyard/garden/sound table etc.

**Optional:** Students design and make their own sound makers to create a specific sound effect.

**Optional:** Students are provided opportunities to share their ideas so they might receive peer feedback.

## Communicate •Play it out

### Test and share

Students share their sound effects with an appropriate audience, such as classroom peers, buddies, school assembly, school concert audience etc.

Consider how students might communicate their ideas about the sound effects they have created. Depending on the audience and context, examples include:

* Storyboards can be displayed for the audience to see.
* Pairs can describe their thinking behind their sound effects and how they overcome difficulties or why they made changes.

### Reflect on this sequence

You might:

* provide an opportunity for students to write a reflection about the sound effect performance in their class science journal. Writing prompts could include “creating the sound of \_\_\_\_ was difficult/challenging because…”, “next time I would…”, “I really enjoyed how \_\_\_ made the sound of \_\_\_.”
* ask students to represent their learning about sound in words, symbols and pictures.
* discuss how understanding sound can help us in our everyday lives.
* discuss how understanding sound can help people in their jobs.