Scope and sequence summary

In Science and Technology, Stage 1 students will be investigating sound and light, and the effects of pushes and pulls on objects.

Duration

Unit duration

Duration details

10 weeks

Outcomes

* Delete selection

Science K–10

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

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

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

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

**ST1-7PW** describes effects of pushes and pulls on objects they encounter

Unit overview

Throughout the unit, students use skills in Working Scientifically and Working Technologically to develop ideas about the properties of sound, light and force. They will investigate light sources, natural and artificial, considering intensity of light. They will investigate where sounds come from and how sound is made. They will also consider how different environments have different sounds. Students will also investigate forces, considering how things are made to move by pushing and pulling, and the forces of gravity, wind and water and speed. They will also consider how toys from around the world use forces.

Links to other KLAs

**English:**

**EN1-6B**
recognises a range of purposes and audiences for spoken language and recognises organisational patterns and features of predictable spoken texts

**EN1-12E**
identifies and discusses aspects of their own and others’ learning

**EN1-1A**
communicates with a range of people in informal and guided activities demonstrating interaction skills and considers how own communication is adjusted in different situations

**EN1-2A**
plans, composes and reviews a small range of simple texts for a variety of purposes on familiar topics for known readers and viewers

Content

Teaching, learning and assessment

Adjustments and extensions

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Stage 1 - Physical World

* Light and sound are produced by a range of sources and can be sensed.(ACSSU020)

Students:

* share their observations and ideas about different sources of light and sound encountered in their daily lives and their senses that detect them

**Introducing the unit**

**Teacher background**

*During the unit, students investigate some sources of light, sound and force that they sense and feel in their surroundings. Throughout the unit, they use a variety of ways to keep a record of ideas and observations in their portfolios, eg worksheets, photographs, and informative and persuasive writing, using digital technologies as appropriate.*

Students review their knowledge from Early Stage 1 about the five senses through activities such as watching a video or reading texts.

**Week 1**

**Conducting investigations: Finding out about light**

*Students conduct a variety of investigations to identify why we need light to see and the different ways light is generated.*

* The teacher introduces the topic by darkening the classroom (lights off and blinds closed), allow students eyes to adjust to the darkness, then ask how it feels and what they can see.
* Students can move carefully from one place to another around the room, using a safe light source. Teacher may light a candle or lantern to consider how we used light to see in the past.
* Students classify and order the brightness of light sources, natural and artificial, using images and place on a continuum of brightness (candle, torch, sun, classroom light, phone light, moonlight as a reflected light source)
* Students investigate some of the properties of light, eg bouncing off shiny surfaces such reflecting from mirrors, refraction as it relates to rainbows.

resources: [www.bbc.co.uk/schools/scienceclips/ages/5\_6/light\_dark](http://www.bbc.co.uk/schools/scienceclips/ages/5_6/light_dark)

[www.misterteacher.com/science/light.html](http://www.misterteacher.com/science/light.html)

*Adjustments for students with hearing impairment:*

Encourage students to reflect on the collaboration goals or group role they were assigned when working in a group. How well did they fulfil or achieve the role or goals? What would they like to improve on in terms of their collaboration and communication skills?

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Stage 1 - Working Scientifically

Students question and predict by:

* responding to and posing questions(ACSIS024, ACSIS037)

Students conduct investigations by:

* working cooperatively and individually when participating in different types of guided investigations to explore and answer questions, such as manipulating materials, testing ideas, and accessing information sources, surveys and fieldwork(ACSIS025, ACSIS038)

Stage 1 - Physical World

* Light and sound are produced by a range of sources and can be sensed.(ACSSU020)

Students:

* share their observations and ideas about different sources of light and sound encountered in their daily lives and their senses that detect them

* produce different sounds from familiar objects using actions, eg striking, blowing, scraping or shaking
* explore how the loudness and range of types of sounds are related to the action used to produce them
* compare the range of types of sounds produced by musical instruments used by people from different cultures, eg didgeridoo or sitar

* A push or a pull affects how an object moves or changes shape.(ACSSU033)

Students:

* describe the effects of pushes and pulls on familiar objects, including moving, stopping and changing direction, changing shape or breaking
* explore how different strengths of pushes and pulls affect the movement of objects on land and through water and air

* demonstrate some ways that people use pushes and pulls in their everyday life, eg sweeping with brooms or riding skateboards

**Week 2 Sound**

*Students conduct a variety of investigations to identify different ways sounds are made such as by familiar objects, eg musical instruments, machines, nature.*

The teacher allocates students to collaborative groups. Students recall their responsibilities when working collaboratively and in some team roles.

* Students are provided with a range of musical instruments to investigate how they make sound. These can include instruments form different cultures or everyday materials such as kitchen utensils.
* For each instrument, students observe what type of sound it makes and add these words to a theme-related word bank. Students place the instruments into one of four large hoops to group the instruments based on the way they produce the sound, eg striking, blowing, scraping and shaking. They record their grouping findings using drawings or digital images.
* Ask students to make the loudest and quietest sound on their instrument.
* Using the word bank, introduce the term onomatopoeia, eg boom, bang, rip, clap, clink. Investigate onomatopoeia sounds by watching onomatopoeia YouTube videos.

*Adjustments for students with hearing impairment:*

Provide students with instruments within their range of hearing and ensure they are able to feel and observe when sound has been produced. Pair students with a buddy and instruct the buddy to encourage the students to touch and observe the instruments, as well as hear them.

Provide sentence models to illustrate what onomatopoeic words describe, such as, ‘Matt was so angry that he **slammed** the door’, ‘“**Woof, woof**!” barked the dog when the children ran past’.

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Stage 1 - Working Scientifically

Students plan investigations by:

* identifying the purpose of the investigation

Students process and analyse data and information by:

* describing changes in objects and events observed in investigations(ASSHE021, ASSHE034)

Students communicate by:

* representing and communicating observations and ideas using oral and written language, drawing and role-play(ACSIS029, ACSIS042)

Stage 1 - Physical World

* Light and sound are produced by a range of sources and can be sensed.(ACSSU020)

Students:

* share their observations and ideas about different sources of light and sound encountered in their daily lives and their senses that detect them

* use their sense of touch to feel vibrations from familiar objects and infer that sound is made when an object vibrates, eg vocal cords, a stringed instrument or a rubber band

**Week 3**

**Investigations: Sensing sounds**

**Teacher background**

*Students participate in guided investigations and follow a planned method to describe some sources of sound that they sense in their surroundings.*

**Class activity: How are we able to detect sounds?**

The teacher asks the students to think about and share what they know about sound, including:

* different sources of sound
* different types of sound
* how sounds can be made
* how sounds are detected.

The teacher demonstrates sensing sound by seeing and feeling its effects, eg by connecting an audio player to a speaker (such as a computer speaker or MP3 dock with the cover removed) and observing the speaker cone vibrating. The music being played should include a range of sounds that are loud, soft, high and low. Students should watch and take turns to feel the speaker as the sounds are played. (Alternatively, students watch Questacon video.)

Through teacher questioning, students are introduced to the word ‘vibrate’ when describing sound.

**Pair activity: Observing vibrations**

Students make model musical instruments such as a drum and guitar. They follow a planned procedure at workstations, recording their observations in Science Journals using words and pictures.

Students share their observations and add to the visual display, their findings and ideas about sources and types of sound, and how sound is detected.

*Adjustments for students with hearing impairment:*

Encourage students to share how they feel, see and hear sounds.

Demonstrate with objects that are obviously vibrating, before working with objects that cause vibrations that can only be detected by touch.

For example, vibrating ruler – place a ruler against a desk and tap the end to feel the vibration. Move the ruler to increase or decrease the ruler length and observe how vibrations/sounds change.

Ensure closed captioning is on if watching video.

Rubber bands may not be within students’ range of hearing. Students may not be able to make the rubber band guitar. OR students may need to observe and feel the differences in vibrations in the rubber bands by placing their other hand on the box or over the bands.

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Stage 1 - Working Scientifically

Students question and predict by:

* responding to and posing questions(ACSIS024, ACSIS037)

Students conduct investigations by:

* working cooperatively and individually when participating in different types of guided investigations to explore and answer questions, such as manipulating materials, testing ideas, and accessing information sources, surveys and fieldwork(ACSIS025, ACSIS038)

* using a range of methods to gather data and/or information, including using their senses to make observations safely and carefully, using simple tools and equipment

Students process and analyse data and information by:

* describing changes in objects and events observed in investigations(ASSHE021, ASSHE034)
* comparing observations with those of others to identify similarities and differences in the findings of their investigations(ACSIS213, ACSIS041)

**Week 4**

**Conducting investigations: Searching for sound**

**Class activity: How would I describe that sound?**

The students sit quietly in the classroom and playground for 1 minute and listen for any sounds they observe (sense by hearing or feeling). During the listening activity the teacher makes a recording of the sounds heard, eg using a smartphone or a microphone and computer software such as sound buttons.

In a class discussion, the students share and compare their observations. They listen to the audio recording made by the teacher, and pose, respond to and suggest answers to questions such as:

* What sounds did I hear?
* What do I think made that sound?
* Where did the sound come from, eg inside or outside the room?
* How would I describe that sound?
* How do different sounds make you feel?

The teacher demonstrates a way the loudness of the recorded sounds can be displayed and compared using, for example, a VU meter on a smartphone or a computer software sound file. The students use words from the prompt list to describe some features of the observed sound, eg high, squeaky and soft.

A range of words that students have selected to describe sounds could be included in the visual display.

Students add to the visual display, new ideas and information from the sound search around the school.

*Adjustments for students with hearing impairment:*

Provide specific experiences of sound for students within their range of hearing, eg alarm clock. Prompt students to listen for the sound before activating. Ensure the students are sitting close enough to hear the sound.

Some students may require sound experiences that can be felt or seen, rather than heard, eg alarms with light activation/vibrations.

Students use the sound display to identify which sounds are loud and which are soft.

Pair students with a buddy. Reinforce the role of the buddy in encouraging participation of the students with hearing impairment, as well as reminding other group members of good practice when working with a hearing impaired person. The buddy can assist the student to identify sounds they hear, feel and see. Buddies could draw attention to sounds and include sound visuals and vibrations in the students’ sound experiences. Provide students with an audio recorder that includes a volume scale to assist students to recognise when sounds are being created.

Encourage students to predict locations around the school where it might be louder or quieter than in the classroom and justify their responses.

When comparing sounds, students view the sound files to identify when sounds are loud or soft.

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Stage 1 - Working Scientifically

Students question and predict by:

* responding to and posing questions(ACSIS024, ACSIS037)

Stage 1 - Working Technologically

Students explore and define a task by:

* identifying needs and wants of users/audiences, eg using interviews, observations and surveys

Students generate and develop ideas by:

* researching and exploring different sources of information, including the internet
* exploring different materials by observing and manipulating them and using trial-and-error

Stage 1 - Working Scientifically

Students plan investigations by:

* recognising that the results of investigations can inform the processes of Working Technologically

Stage 1 - Material World

* The different properties of materials enable them to be used for particular purposes.

Students:

* use their senses to identify the similarities and differences in the properties of materials, eg the textures of different fabrics, the difference in hardness of solid materials and the runniness of different liquids
* identify the properties of some common materials and why they are used for particular purposes, eg the waterproof property of plastic rainwear or insulating property of a woollen jumper

**Week 5**

**Generating and developing ideas: Investigating materials that conduct sound**

**Teacher background**

*Students working collaboratively in groups investigate and gather information about the properties of sound. They use the findings of their investigation to develop and present a report of their findings to the class.*

The teacher and students discuss the experimental procedure to carry out investigations. The teacher introduces how they will contribute to the group tasks by posing and responding to questions about the task such as:

* What equipment is needed?
* What is the procedure to carry out the investigation?
* What did you observe, using your senses?
* What did you learn?

**Group investigations**

In their groups, the students rotate through four activities:

* Ruler rapping (table, ruler)
* Cone fun (cardboard, tape)
* Rubber band banjo (plastic cup, rubber band)
* Hanger Gong (metal coat hanger, string, pencil)

Resource- Good Vibrations, Experimenting with sound, by Renee Rogers (Rigby Reader, Level 19)

The teacher conferences with each group and through guided questions encourages students to identify the properties of sound.

The students record and share their observations.

*Adjustments for students with hearing impairment:*

Encourage students to reflect on what interferes with their hearing, eg background/competing noise. What contexts/situations do they find it harder to hear or communicate in?

Ask students what strategies they use to reduce the level of sound, eg moving away, turning off or taking out hearing aids.

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Stage 1 - Working Scientifically

Students plan investigations by:

* identifying the purpose of the investigation
* suggesting some types of activities that need to be undertaken during the processes of Working Scientifically

Students conduct investigations by:

* working cooperatively and individually when participating in different types of guided investigations to explore and answer questions, such as manipulating materials, testing ideas, and accessing information sources, surveys and fieldwork(ACSIS025, ACSIS038)

* using a range of methods to gather data and/or information, including using their senses to make observations safely and carefully, using simple tools and equipment

* using informal measurements in the collection and recording of observations, with the assistance of digital technologies as appropriate(ACSIS026, ACSIS039)

Students process and analyse data and information by:

* describing changes in objects and events observed in investigations(ASSHE021, ASSHE034)
* comparing observations with those of others to identify similarities and differences in the findings of their investigations(ACSIS213, ACSIS041)
* comparing observations with predictions through discussion, as to whether observations were expected and related to their questions and/or predictions(ACSIS212, ACSIS214)

Students communicate by:

* displaying data and information in a variety of ways, including drawings, simple texts, provided tables and graphs, using digital technologies as appropriate

Stage 1 - Working Technologically

Students produce solutions by:

* using a range of everyday tools, equipment, materials and techniques
* working cooperatively and safely

**Week 6**

**Producing solutions: How is sound used to produce music?**

**Group activity**

The students think about the materials they have identified and how they could find out which materials could be used to create music.

In their groups, students allocate team roles and follow the experimental procedure to design and make a musical instrument, planning and providing resources as needed.

Students record on a teacher-supplied worksheet the materials used, the steps followed, what they observed and then describe how the sound was produced.

With teacher-guided questions, students:

* state how sound travels
* discuss how sound is produced
* consider if the sound produced can be modified in terms of pitch and volume

*Adjustments for students with hearing impairment:*

Pair students with a buddy to assist them to record each sound.

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Stage 1 - Working Scientifically

Students question and predict by:

* responding to and posing questions(ACSIS024, ACSIS037)
* making predictions about familiar objects and events and the outcomes of investigations(ACSIS024, ACSIS037, ACSHE021, ACSHE034)

Stage 1 - Physical World

* A push or a pull affects how an object moves or changes shape.(ACSSU033)

Students:

* describe the effects of pushes and pulls on familiar objects, including moving, stopping and changing direction, changing shape or breaking
* demonstrate some ways that people use pushes and pulls in their everyday life, eg sweeping with brooms or riding skateboards

**Week 7**

**Conducting investigations: how objects move or change shape**

To capture students’ interest and find out what they think about how a push or a pull affects how an object moves or changes shape, students bring in a range of toys that move.

Students:

1. work in teams to explore how toys move
2. share questions about how toys move or change shape
3. use arrows to show pushes and pulls
4. create a list of push and pull words to develop a word wall.

Teacher elicits students’ questions about how toys move. Students explain how their toy moves, creating a diagram showing pushing or pulling.

Students suggest, roleplay and discuss everyday situations where push/pull forces are in action, eg pushing a pram, moving a shopping trolley, mowing the lawn, opening and closing a door/drawer, pulling a Christmas bonbon, putting socks on.

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Stage 1 - Physical World

* A push or a pull affects how an object moves or changes shape.(ACSSU033)
* Students:
* explore how different strengths of pushes and pulls affect the movement of objects on land and through water and air

**Week 8**

**Conducting investigations: How objects float on Air**

To provide students with hands-on, shared experiences of the push of air, using Think-Pair-Share strategy and the process Predict, Observe, Explain (POE).

Students:

* explore where air can be found
* observe and discuss the result of placing a glass containing a tissue upside down in a container of water
* observe and discuss the differences in the fall of a crumpled sheet of paper and a flat sheet.
* write and draw in Science journals using force arrows to represent a push or a pull

Resources

Primary Investigations Unit Push-pull, Year 2 , Lesson 5

glass, water, tissue, sheets of paper, plastic bags

**What sinks? What floats?**

To provide students with hands-on, shared experiences of how to change an object that sinks into one that floats. Students use the POE process to compare and review the objects, using Resource Sheet 3

Students:

* work in teams to investigate objects that sink or float in water and explain why
* investigate how to change an object that sinks into one that floats.
* write and draw in Science journals using force arrows to represent a push or a pull

Resources:

Primary Investigations Unit Push-pull, Year 2 , Lesson 4, Resource sheet 3

Plasticine, buckets, water, a variety of objects

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**Week 9**

**Conducting investigations: Force and Gravity**

To provide students with the opportunity to represent and explain their understanding of how a push or pull affects how toys move or change shape.

Students:

* reflect on their observations and experiences of pushes and pulls, based on previous lessons, by acting out and explaining a push or pull force (Resource sheet 4)
* discuss the terms force and gravity and explain why the pull of gravity is also a force (BLM 71-72)
* represent push and pull forces using force-arrow diagrams

Primary Investigations Unit Push-pull, Year 2 , Lesson 6, Resource sheet 4

Australian Curriculum Science, Year 2, BLM 71-72

**Evaluation and reflection**

Students reflect on their learning by:

* participating in a teacher-led discussion about the information recorded in the class Science Journal
* comparing the similarities and differences in the class presentations
* peer assessment of the oral presentations, identifying what they liked about them, and why
* individually reflecting on their learning by identifying one thing they already knew, one thing they learned and one question they would like to ask
* identifying what they learned from working with others in a group.

**Assessment**

Formative-

Examine individual worksheets and Science Journal entries

Summative- of students' Science Inquiry Skills and Understandings

Push and Pull pictures from Resource sheet 1

Primary Investigations Unit Push-pull, Year 2 , Lesson 1, Resource sheet 1

Add another row

**Materials and equipment required for hands-on practical investigations, including:**

* Ruler rapping (table, ruler)
* Cone fun (cardboard, tape)
* Rubber band banjo (plastic cup, rubber band)
* Hanger Gong (metal coat hanger, string, pencil)
* Resource- Good Vibrations, Experimenting with sound, by Renee Rogers (Rigby Reader, Level 19)
* Light sources, eg candle, phone, torch
* Primary Investigations Unit Push-pull, Year 2 , Lesson 1, Resource sheet 1
* Primary Investigations Unit Push-pull, Year 2 , Lesson 6, Resource sheet 4
* Australian Curriculum Science, Year 2, BLM 71-72
* Primary Investigations Unit Push-pull, Year 2 , Lesson 4, Resource sheet 3
* Plasticine, buckets, water, a variety of objects
* Primary Investigations Unit Push-pull, Year 2 , Lesson 5
* glass, water, tissue, sheets of paper, plastic bags
* *The Magic School Bus Explores the Senses* by Joanna Cole
* video: *Onomatopoeia* by Mindy Bauer
* sound/audio recorders
* computer/MP3 speakers (with removable covers) or a loudspeaker
* computer software to convert recorded sounds to sound files
* cameras
* equipment for investigating how sounds are produced, eg a range of musical instruments (include some that make sound by striking, blowing, shaking and scraping)
* cardboard boxes
* pieces of different materials, eg carpet, egg cartons, cloth, foam pre-cut to size to cover the cardboard boxes
* glue for attaching the material to cardboard boxes
* alarm clocks

**Websites**

onomatopoeia YouTube videos

[www.bbc.co.uk/schools/scienceclips/ages/5\_6/light\_dark](http://www.bbc.co.uk/schools/scienceclips/ages/5_6/light_dark)

[www.misterteacher.com/science/light.html](http://www.misterteacher.com/science/light.html)

* <http://canberra.questacon.edu.au/sciencetime/#toggler_music>
* [www.reachoutmichigan.org/funexperiments/agesubject/lessons/other/una4.html](http://www.reachoutmichigan.org/funexperiments/agesubject/lessons/other/una4.html)
* <http://en.kioskea.net/download/download-7281-flash-sound-buttons>
* [www.edsoft.com.au/rm-talking-points](http://www.edsoft.com.au/rm-talking-points)
* [www.bbc.co.uk/schools/scienceclips/ages/5\_6/sound\_hearing.shtml](http://www.bbc.co.uk/schools/scienceclips/ages/5_6/sound_hearing.shtml)
* [www.crickweb.co.uk/ks1science.html#sound1f](http://www.bbc.co.uk/schools/scienceclips/ages/5_6/sound_hearing.shtml)
* [www.ngfl-cymru.org.uk/vtc/16022007/sound\_loundness/lesson.html](http://www.ngfl-cymru.org.uk/vtc/16022007/sound_loundness/lesson.html)
* [www.ngfl-cymru.org.uk/vtc/16022007/sound\_sources/lesson.html](http://www.ngfl-cymru.org.uk/vtc/16022007/sound_sources/lesson.html)
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Assessment overview

Assessment opportunities could include:

* verbal interaction demonstrating acquired/applied knowledge
* written texts/findings
* use of digital applications
* cause-and-effect reasoning.

Evaluation

