

How does sound reach our ears?

Interact Teacher Manual

Science

Years 1-4

By Allana Hiha and
Helen Pearson

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CONTENTS

2	Overview for this Term
3	Introduction
4	Pre-planner Guide
5	Background Information
8	Key Competencies, Habit of Mind, Habit of Character
9	Big Idea, Key Understanding, Focus Question
10	New Zealand Curriculum Requirements
11	Key Areas of Investigation
13	Firing Up
25	Finding Out Further
29	Focusing Forward
35	Scriptures Relevant to this Unit
I	Understanding <i>Interact</i>
III	The <i>Interact Resources</i>
IV	Options for Using this <i>Interact Teacher Manual</i>
V	Planning With <i>Interact</i>
VI	The <i>Interact</i> Learning Process
VII	Key Learning Intentions
X	Acknowledgements
XI	Bibliography



OVERVIEW FOR THIS TERM

This Teacher Manual is for one subject of an integrated unit based around the theme of *God is Peace*. The subject of this particular Teacher Manual is shaded grey. Further information about the supplementary books and teaching resources mentioned below are available from www.interactcurriculum.com

Year 1-4

Year 5-8

Devotions

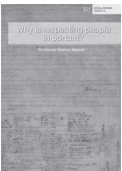


How can God bring peace to us when we are angry?



How can God bring peace into a broken world?

Social Science

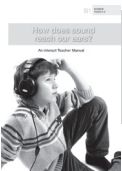


Why is respecting people important?

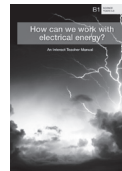


How have people dealt with conflict in our nation's history?

Science

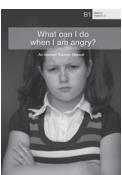


How does sound reach our ears?



How can we work with electrical energy?

Health

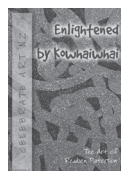


What can I do when I am angry?



How can we help to resolve conflicts?

Art



Enlightened by Kowhaiwhai
The Art of Reuben Paterson

Language



What's so funny?



How do people express different points of view?



INTRODUCTION

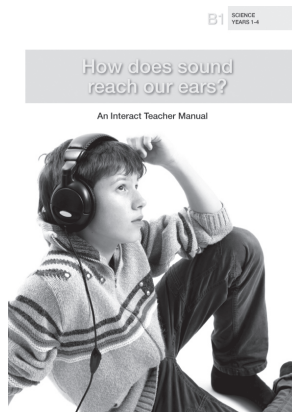
Welcome to our investigation of *How does sound reach our ears?* God created the amazing phenomena of sound, and our ability to hear it.

Sound facilitates relationship with God, with others and with God's world. Through sound, we can communicate thoughts and feelings. We can celebrate, warn, and pass on important facts with loud, raucous noise or beautiful, soothing murmurs. The Bible exhorts us to make use of the gift of sound in developing our relationship with our Creator and with those around us.

One of the things that separates us from the animal world is the ability God has given us to discover new things about the world: *to think God's thoughts after him*. Through scientific investigation and discovery, we can have a greater sense of awe at God's creation, a greater ability to use our understanding of creation to benefit and not to harm ourselves, or our environment.

During this term, as we learn about how God is our peace, we are reminded that everything in God's world has the capacity for harmony and beauty, or discord and unpleasantness. We can choose to make a joyful sound to the Lord (*Psalm 100:1*), to be God's witness of love in the world, or we can contribute to being like a clashing cymbal (*1 Corinthians 13:1*).

Let's see if our discoveries, words and actions this term can be a sweet sound in God's ear!



If you are new to Interact resources we invite you to turn to Appendix I to learn about the Interact Learning Path on which this Teacher Manual is based, and to gain additional planning help.



PRE-PLANNER GUIDE

Resource People

- Sound technicians
- Musicians
- Audiologists
- Hearing testers

Special Features could include:

- Attending a live orchestra or band performance
- Creating musical instruments
- Participating in a musical performance using our self-made instruments
- *An Ear Parade*



BACKGROUND INFORMATION

God created the amazing phenomena of sound, and the ability to hear sounds. We are designed for relationship with God, with others and with God's world, and sound enables relationship. Through sound, we communicate thoughts and feelings. We celebrate, warn, and pass on important facts, as do the animal world. But one of the things that separates us from the animal world is the ability God has given us to discover new things about the world: to *think God's thoughts after him*. Through scientific investigation and discovery, we can have a greater sense of awe at God's creation, a greater ability to use our understanding of creation to benefit and not to harm ourselves, or our environment.

How are different sounds made?

Sound is energy made when something vibrates or moves backwards and forwards, or up and down, very quickly. The vibration makes the air around the object move, creating a sound wave that moves out from the vibrating object until it runs out of momentum. Soft noises do not travel very far, whereas loud noises travel a longer way and can be heard from further away.

We are to use our voice and different musical instruments to praise God (*Psalms 98:4-6*). God sings over us (*Zephaniah 3:17*).

How does sound travel?

Sound travels from an object and toward us, in all directions. It moves in waves. The shorter the wavelength, the higher the pitch of the sound heard.

We can change the direction of a sound by channeling it between hard surfaces like loud hailers or pipes, or by it bouncing off hard surfaces like walls, to create echoes. Some surfaces, such as cotton padding or egg carton cardboard, will absorb or muffle sound; others, like sheer, shiny metals or rocks, reflect sound, while smooth surfaces deflect sound. We can influence how a sound is 'heard'.

How do our ears hear?

God has made our outer ears a special shape to collect the sound and channel it into the middle of our ear. In the middle of our ears is a special 'drum', which vibrates when sounds hit it, a bit like a trampoline vibrates when a bouncing child hits it. If the sounds are high, it vibrates very fast, and if the sounds are low it vibrates more slowly. If the sounds are soft, it vibrates only a little bit, and if the sounds are loud, it vibrates more deeply. The vibrations get passed further into the ear and messages get sent to the brain by nerves.



Background Information continued

God speaks to us – sometimes by using an audible voice that our ears can hear (see *Exodus 3:1-14; 33:11; 1 Samuel 3:1-19*). Sometimes we 'hear' God speaking in our hearts, and although our ears do not hear a sound, the Bible tells us that we will know God's voice (*John 10:2-4, 14-16*). God wants us to learn to listen and obey so that we can be close to God (*Psalms 95:7-8, John 10:2-4, 14-16, Revelation 3:20*).

How can we use sound?

Sounds can be used to communicate many things such as happiness, celebration, sadness, horror and warning. Sound is in fact, a universal means of communication used by many creatures in God's universe. Some scientists have even identified sounds coming from distant stars! Humans not only make sounds, but we can change sounds to suit our purposes.

God can hear the sounds we make. We should be careful to make a 'beautiful noise' by living a life of love, not a 'clanging noise' that brings no peace to anyone (*1 Corinthians 13:1*). God wants us to make joyful sounds in praise to him (*Psalms 100:1; 150*).



the key competencies are:

Relating to Others

the habit of character focus is:

Diplomacy

the habit of mind focus is:

Finding Humour



the big idea is:

**God is Peace and
wants us to be
peacemakers**

the key understanding is:

**Sound is
vibrations moving
through the air
in waves**

the focus question is:

**How does sound
reach our ears?**



New Zealand Curriculum requirements

Students will:

Vision: Be *connected* in living and learning

Principles: Learn in accordance with the *Treaty of Waitangi*

Demonstrate *inclusion* of others in living and learning

Values: Appreciate *respect, equity, community and participation*

Key Competencies: Develop skills in *relating to others*

Science

Level 1-2

Understanding about science

Appreciate that scientists ask questions about our world that lead to investigations and that open-mindedness is important because there may be more than one explanation

Physical World

Physical inquiry and physics concepts

Explore everyday examples of physical phenomena, such as movement, forces, electricity and magnetism, light, sound, waves, and heat

Seek and describe simple patterns in physical phenomena



key areas of investigation

We are investigating:

- 1.0** How are different sounds made?
- 2.0** How does sound get from one place to another?
- 3.0** How do our ears hear?
- 4.0** How can we use sound?

For a list of Key Learning Intentions to select from as a skill focus, please refer to the Appendix



Interact Learning Path | Phase 1

Firing Up

Fire Up imaginations and learning desires and gain knowledge in the following ways:



Relate

Be connected, in engaging ways, with the topic to get 'hooked' into learning
The exclamation mark reminds us to get enthused



Recall

Recall prior knowledge of this topic
The arrows remind us to consider all we have experienced, learnt and felt about this topic



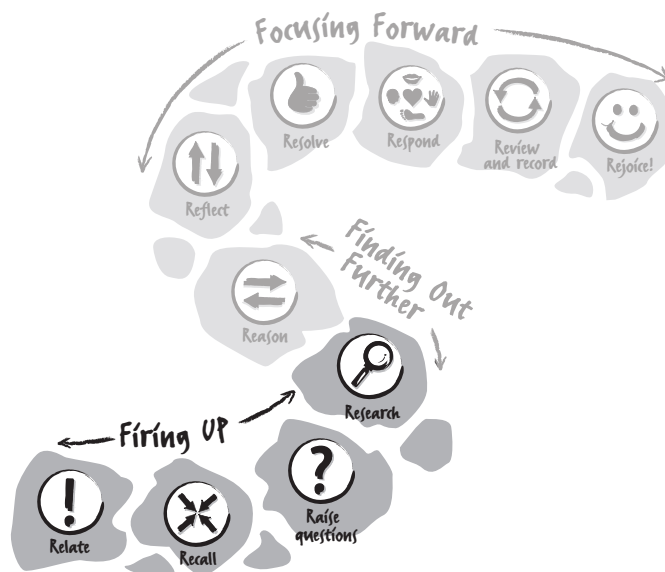
Raise questions and recognise problems

Consider what questions we have about this topic that we need to or would like to know the answers to. Identify possible problems. Some of these questions may be springboards into the topic study. Others may become the basis for further research later in the unit
The question mark reminds us to question



Research (initial)

Initiate research in the key areas of investigation, seeking to answer questions as you go
The magnifying glass reminds us to go searching





Relate

questions and activities

indicators of achievement

Provide an interesting, information-rich environment that engages the students in their learning. The following is a range of suggested ideas:

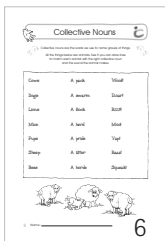
Listen to recordings of everyday household sounds like a tap running, toilet flushing, motor mower, cat meowing, door shutting, key unlocking, electric jug boiling. See if you can identify the sounds. Visit www.soundbible.com for a great range of sound clips

- Engages with scientific exploration and discussion

Lie down and close your eyes outside and just listen. Identify the different sounds you hear

Listen to at least five different types of music for about a minute each, e.g. gentle 'classical' music, dance music, rap, etc. After each track, talk about:

- how it made you feel
- your first thoughts when listening to it



Play a game of 'Find your flock' or similar. In order to play, each player is secretly given the name of an animal. There must be at least two groups of animals. Choose from sheep, cats, dogs, pigs, cows, ducks, etc. When the game starts, players move slowly around the room trying to find the other animals of their kind by making their animal noise. When everyone has 'found their flock', discuss the collective nouns used to describe them, e.g. flock, herd, bevy, pride, school etc.

Talk about words that sound like sounds (onomatopoeia). Listen to and share or recite onomatopoeic poems together

Play Chinese Whispers

Our *Habit of Mind* focus is *Finding Humour*. Look at some pictures of different types of ears. Brainstorm, in groups, different ways of describing them. Make up a short poem to describe some of the ears in a humorous way





Recall

questions and activities

indicators of achievement

Assist the students to consider what they already know and to build on that knowledge by asking further questions as they learn. The following is a range of suggested ideas:

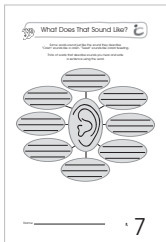
Tell stories in a small group about favourite memories of events or activities. Describe the sounds you would have heard when you were involved. Discuss how those sounds made you feel

- Identifies prior knowledge
- Engages with scientific discussion

Some sounds are used to warn us or alert us, such as bells, sirens, horns, etc. For a short time, have a *Siren Sounds Competition* to see who can make the various types of siren sounds

Recall what you already know about each *Key Area of Investigation* and write your ideas on a separate chart for each question

Talk about the thoughts that come to mind when you hear a 'sound' word like *crash* or *tweet* or *giggle*. By making categories or headings to focus your thinking, you will find you will remember more. Try categories like 'Looks Like', 'Feels Like', 'Sounds Like', or recall times you have heard these sounds by answering 'What', 'Where', 'Why', 'How', 'When' and 'Who' questions



Make a list of up to ten sounds and separate into two lists, one headed 'Happy sounds' and the second headed 'Scary sounds'. Consider:

- *What makes a sound 'happy' or 'scary'?*
- *Why is our ability to hear sound valuable to us?*



Listen to recordings of different musical instruments and see if you can guess what instrument made the sound, and whether it was made by blowing wind through a hole, through moving strings, or through banging. *How did you decide your answer?*





Raise questions

questions and activities

indicators of achievement

As a class, identify questions you would like to know the answers to in relation to this topic. The following is a range of suggested ideas:

Attend an orchestra or band concert or listen to a piece of orchestral music with three questions in mind as you listen:

- *What is my favourite piece of music or my favourite instrument or my favourite sound?*
- *How do I feel when I listen to each piece?*
- *What questions do I have about how the sounds are made?*

Organise to have the students' hearing tested and discuss the experience. Interview the tester about sound and what is interesting about the job

Consider what you know about sounds, what you would like to know and how you could find out. Build a *Question Collection*. Draft questions you have about sounds and hearing and write them on interesting ear shapes. Make a *Big Book About Sounds* that has the questions on the left pages, to which you gradually add answers on the right pages. Use your big book as a class reading exercise

Sounds are important in many different types of jobs. Brainstorm types of jobs. *What questions could you ask someone who works with people who use sounds in their job?* Draft a questionnaire to ask a musician, an audiologist, speech therapist or sound technician

As a class brainstorm all the words you know about sound. Use a mind-map to link common ideas together. Create a list of words relating to this topic and generate questions about words you would like to understand more about

- Defines a problem
- Predicts
- Identifies possible solutions

- Designs open-ended questions
- Conducts an interview

- Writes questions to identify what we want to know

- Writes questions to identify what we want to know
- Designs open-ended questions

- Designs open-ended questions





Research

questions and activities

indicators of achievement

Immerse yourself in ideas and information about the topic as you develop those skills outlined in the *Key Learning Intentions*. As you research, try to:

- take notes as individuals or as a class
- identify groups of ideas and sort under headings
- note titles of interesting or helpful resources
- identify new questions you would like to investigate

The following is a range of activities, based on the *Key Areas of Investigation*:

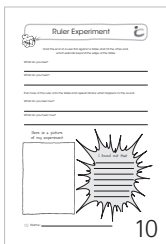
1.0 How are different sounds made?

Sound is energy made when something vibrates or moves backwards and forwards, or up and down, very quickly. The vibration makes the air around the object move, creating a sound wave that moves out from the vibrating object until it runs out of momentum. Soft noises do not travel very far, whereas loud noises travel a longer way and can be heard from further away.

1.1 What is sound?

Find out what various 'sound' words you generated in the *Raise Questions* section mean. Add to your list as you find out more

- Identifies main ideas
- Uses scientific vocabulary
- Defines scientific terms
- Shares ideas



The vibrations that start a sound wave affect the pitch, i.e. how high or low the sound is. Fast vibrations result in a high note whereas low vibrations sound lower. Do the ruler experiment. Practise explaining what is happening, and then conduct the experiment and give explanations to your parents at home, or another class of older or younger students

Speak to each other in low tones, or hum a song together with your hand on your throat so you can feel the vibrations of your windpipe. Look at a diagram of your windpipe and see the vocal cords that vibrate when you make sounds

- Uses a range of sources to research
- Uses a systematic approach

- Interprets pictures and diagrams
- Identifies main ideas
- Uses scientific vocabulary

1.2 What are the natural sounds we can hear?

Animal, human, weather and water sounds are important in our environment.

Consider the fact that animals can make sounds, and can hear sounds. Discuss:

- What sorts of sounds do they make?
- Why do they make certain sounds?
- Do all animals hear the same sounds?
- Do all animals have ears with which to hear? If so, where? If not, can they hear sounds?

- Identifies main ideas
- Shares ideas



Choose a photo from a collection showing different weather patterns, e.g. storm with lightning, blustery gale or tornado, a sunny summer's day, crashing waves etc. Describe the sounds you can 'hear' by looking at the picture you have chosen. Gather words to use in a poem

- Identifies main ideas
- Shares ideas



Research continued

questions and activities

indicators of achievement

1.3 What are some of the man-made sounds we can hear?

The sounds of machines and instruments are important in our environment.

Collect as many hard objects as you can, e.g. small rocks, tins, coins, sticks. Bang two similar objects together, i.e. two rocks or two sticks. Do the same with two different objects, i.e. a stick and a rock. *What can you say about the sounds you made?* Repeat the experiment by rubbing the two objects together

- Identifies main ideas
- Uses a range of sources to research
- Uses a systematic approach



Sounds

Unless we are in a vacuum, we will have sound around us. Those sounds can become background noise until we concentrate on trying to hear them. Sit outside and listen to hear sounds. List the sounds you hear and draw what made the sounds in three groups: *Sounds People Made, Sounds Machines Made, and Sounds from Nature*

- Uses a systematic approach
- Sorts and classifies

Noise

Sound waves travel to our ears from a vibrating object. When we hear sound waves that are not related we call it 'noise'. Think about noise. Discuss:

- *Can noise be a problem? If so when and why?*
- *Can noise be good? If so when and why?*

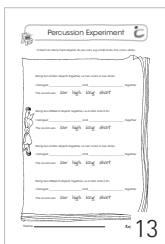
- Shares ideas
- Recognises dangers

Music

Regular sound waves that are repeated are commonly described as 'making music'. Brainstorm different types of music. Consider:

- *What do you like?*
- *Does everyone like the same sorts of music?*
- *What do your parents or grandparents like?*
- *Can you make music with an instrument or with your voice?*

- Shares ideas



Percussion

In a small group choose a percussion instrument each, e.g. a tambourine, shaker, drum or rattle. Practise using the instruments to see what sorts of sounds they make. Experiment with making loud and soft noises, higher sounds and lower sounds. Discuss:

- *What is a percussion instrument?*
- *What is vibrating when a percussion instrument is played?*
- *What similarities and differences can you see between percussion instruments that make a high sound and others that make a lower sound? A louder sound or a softer sound?*
- *What is the purpose of percussion instruments?*

- Uses a range of sources to research
- Uses a systematic approach
- Uses scientific vocabulary
- Defines scientific terms
- Reports observations
- Pays close attention to details

Wind Instruments

Wind instruments work when air is blown through the pipe or across the blowhole. Different notes are made when different finger holes are covered while air is being blown through. In a small group choose a wind instrument each, e.g. a recorder or flute. Practise using the instruments to see what sorts of sounds they make. Experiment with making loud and soft noises. Discuss:

- *What is a wind instrument?*
- *What is vibrating when a wind instrument is played?*
- *Why do you think the sound is different when different holes are covered?*
- *What is the purpose of wind instruments?*

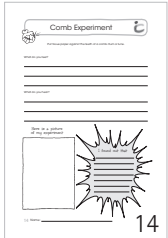
- Uses a systematic approach
- Uses scientific vocabulary
- Explains phenomena



Research continued

questions and activities

indicators of achievement



Put tissue paper against the teeth of a comb and hum a tune. *Can you feel the vibrations against your lips as the noise is made?*

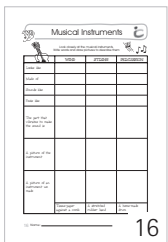
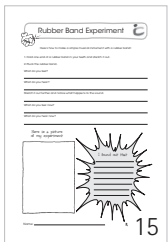
String Instruments

String instruments work when the strings are strummed or plucked to make them vibrate. Higher notes are made when the string's length is shortened. Hold one end of a rubber band in your teeth and stretch it out. Pluck the rubber band and notice the vibrations and the sound. Stretch it out further and notice what happens to the sound. Discuss:

- *What is a string instrument?*
- *What is the difference between strings that play higher sounds and strings that play lower sounds?*
- *What can you do to make a single string play a higher or lower sound? Why do you think this might happen?*
- *What is the purpose of string instruments?*

- Uses a systematic approach
- Uses scientific vocabulary

- Identifies main ideas
- Pays close attention to detail
- Uses scientific vocabulary





Research continued

questions and activities

indicators of achievement

2.0 How does sound travel?

2.1 How do we describe how a sound wave moves?

Sound travels from the object, and toward us in all directions. It moves in waves. The shorter the wavelength, the higher the pitch of the sound heard.

Complete the following activities to investigate how sound waves move:

- *From the object* - On a calm day, throw a stone into a pond and see how the waves spread out from the centre. You can observe the same phenomenon on a smaller scale by dropping a small pebble into a large tub of water
- *Towards us* - Experiment with moving ribbons to music in a ribbon dance, moving your arm up and down. The ribbon will 'snake' in waves. This resembles the movement of a sound wave as it moves towards the hearer. The shorter the wavelength, the higher the pitch of the sound heard. Alternatively, 'snake' a skipping rope along the floor to demonstrate the length of wavelength
- *In all directions* - Have one student stand in the middle of a circle of students with eyes closed, and get a student to make a noise. The student in the middle must point to where the sound is coming from. If he or she guesses correctly, the two swap places. The winners are those who guess correctly the first time. Discuss how sound travels in all directions

- Creates a model
- Observes
- Identifies main ideas
- Shares ideas
- Explains phenomena
- Uses a systematic approach



2.2 What affects the direction that sound travels from its source?

We can change the direction of a sound by channeling it between hard surfaces like loud hailers or pipes, or by it bouncing off hard surfaces like walls, to create echoes. Some surfaces, such as cotton padding or egg carton cardboard, will absorb or muffle sound; others, like sheer, shiny metals or rocks reflect sound, while smooth surfaces deflect sound. We can influence how a sound is 'heard'.

Bouncing off hard objects

Sometimes sounds hit a hard object and get bounced back as an echo. Throw a ball against a wall and watch it bounce back. Shout in a place that creates echoes, e.g. an empty school auditorium, and notice that the bounce-back of the sound is not as loud as the original sound. Discuss how the echo does not occur when the auditorium is full of people (Some sound will be absorbed by the surface of the auditorium and therefore a lesser amount will be reflected back, appearing to be quieter)

- Observes
- Identifies main ideas
- Reports observations
- Reports conclusions
- Uses scientific vocabulary

Put a ticking clock on a table in the middle of the room. Stand back from the table in a circle and listen. *What can you hear?* Move around the table to another position. *Has it made any difference to what you hear from the clock?* (The clock can be heard from all vantage points with no obvious difference)

- Observes
- Identifies main ideas
- Reports observations
- Reports conclusions

Experiment with speaking through hose pipes, tubes, loud hailers or amplifiers. *Can you make sound go around corners if you speak through a hose or pipe?*

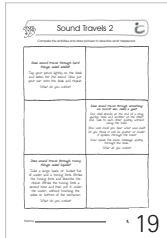
- Uses a systematic approach



Research continued

questions and activities

indicators of achievement



2.3 How can we find out whether sound travels through hard things called solids?

Tap your pencil lightly on the desk and listen for the sound. Now put your ear onto the desk and repeat. Discuss:

- What do you notice?
- Do you think that sound can travel through hard solid objects?

Demonstrate the transfer of sound by a solid medium, in the following way, and then record your results:

- Take two cans and drill a hole in the bottom of each. Place the end of a long piece of string (up to 5 metres long) through one hole and tie so that the can forms a mouthpiece and the string protrudes out the bottom. Poke the other end of the string into the bottom of the other can and tie off to form an earpiece
- Two people take a can each and stand at a distance apart. (It does not matter whether they can see each other or not). Try speaking quietly to each other to check whether your voice will carry across the distance. When you have a sound level when you cannot hear your partner use the 'can' telephone line to convey a message. Hold the line taut. One person speaks into his or her can with a quiet voice while the other listens with his or her can up to one ear

- Observes
- Identifies main ideas
- Reports observations
- Reports conclusions
- Explains phenomena
- Uses a systematic approach
- Observes
- Makes observational drawings
- Identifies main ideas
- Shares ideas

2.4 How can we find out whether sound travels through runny things called liquids?

Take a large basin or bucket $\frac{3}{4}$ full of water and a tuning fork. Strike the tuning fork and describe the result. Strike the tuning fork a second time and then submerge it into the water, being careful not to touch the sides or bottom of the container. Describe your results. (There should be a 'muffled' effect on the sound you can hear when the tuning fork is submerged)

Have you heard sounds when you are under water in the bath or a swimming pool? Do you hear them more clearly or less clearly? At home, while having a bath, tap the side of the bath and listen to the sound. Now put your ears under water and hit the side of the bath. Discuss:

- Do you think you will hear the sound through the water?
- What did you hear when you did this experiment?
- Do you think sound travels through liquids like water?

- Observes
- Uses a systematic approach
- Shares ideas
- Explains phenomena
- Describes findings
- Pays close attention to details
- Shares ideas
- Describes findings
- Explains phenomena

2.5 How can we find out whether sound travels through something we cannot see, called a gas?

Have one student stand at the end of a long garden hose and another at the other end. Give them a message to convey to each other quietly, without using the hose. *How well could they hear what was said? Do you think it will be quieter or louder if spoken through the hose?* Now speak the same message quietly through the hose. *Do you think that sound can move through gases like air?*

- Observes
- Uses a systematic approach
- Shares ideas
- Explains phenomena
- Describes findings
- Pays close attention to details



Research continued

questions and activities

indicators of achievement

Air

Put a small bell into a pliable plastic container and shake the container. Suck the air out of a plastic container to create a vacuum, using a vacuum cleaner hosepipe, and seal the bag. Shake again. Share your ideas:

- *Do you notice any difference in the sound level?*
- *What changed to make the difference?*

- Observes
- Uses a systematic approach
- Shares ideas
- Explains phenomena
- Describes findings
- Pays close attention to details

Wind

What happens to the sounds you hear on a calm day, when wind is blowing towards you, or blowing away from you? Listen to a regular sound in your area, e.g. the town clock, a train going past, the school bell. What changes do you observe when the wind is blowing from different directions?

- Describes findings
- Pays close attention to details
- Explains phenomena





Research continued

questions and activities

indicators of achievement

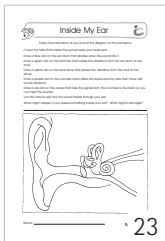
3.0 How do our ears hear?

God has made our outer ears a special shape to collect the sound and channel it into the middle of our ear. In the middle of our ears is a special 'drum', which vibrates when sounds hit it, a bit like a trampoline vibrates when a bouncing child hits it. If the sounds are high, it vibrates very fast, and if the sounds are low it vibrates more slowly. If the sounds are soft, it vibrates only a little bit, and if the sounds are loud, it vibrates more deeply. The vibrations get passed further into the ear and messages get sent to the brain by nerves.



Observe a model of the ear, or look at a diagram. Find the outer ear and the ear drum

- Interprets pictures and diagrams
- Identifies main ideas
- Uses scientific vocabulary



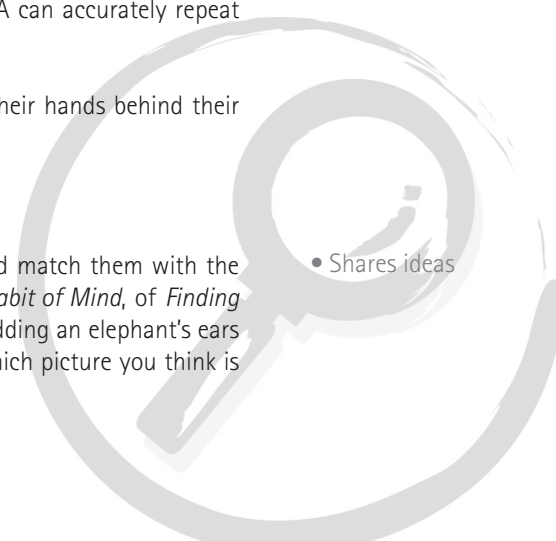
In groups or two or three, complete the following:

1. One person (A) is blindfolded while their partner (B) moves quietly from place to place and claps three times. After each series of claps, A points in the direction of the sound. Record how many times out of ten A can indicate the direction accurately.
2. Repeat the experiment, but this time, A covers their ears with their hands. A third person (C) will be needed to indicate (by tapping A's shoulder once) each time B 'claps'
3. Change roles and repeat 1 and 2
4. One person (A) is blindfolded and their partner (B) moves quietly from place to place in front of A. B says something quietly. A repeats what they heard. Record how many times A can accurately repeat what was they heard
5. Repeat experiment, and this time A cups their hands behind their ears. Discuss your results
6. Change roles and repeat 4 and 5

- Uses a systematic approach
- Uses consistent procedures
- Uses equipment safely
- Makes fine measurements
- Observes
- Describes findings
- Shares ideas
- Makes observational drawings

Look at a collection of pictures of different ears and match them with the animal to which they belong. Thinking about our *Habit of Mind*, of *Finding Humour*, have fun making strange animal faces by adding an elephant's ears to a mouse or a rabbit's ears to a person. Discuss which picture you think is the funniest

- Shares ideas





Research continued

questions and activities

indicators of achievement

4.0 How can we use sound?



Sounds can be used to communicate many things such as happiness, horror, celebration and warning. Sound is in fact, a universal means of communication used by many creatures in God's universe. Some scientists have even identified sounds coming from distant stars! Humans not only make sounds, but we can change sounds to suit our purposes.

Communication

Most people would consider their voice and ears to be their main instruments of communication. We craft messages to be said and heard using words, although it is not only what we say but also how we say it (tone, intensity and loudness) that carries our message. Write a short speech and practise delivering it in a variety of different intensities, as well as really quietly or really loud

- Observes
- Pays close attention to details
- Identifies main idea
- Describes findings
- Explains phenomena

Identify sounds that communicate ideas such as *peace, comfort, celebration, joy, fear, warning or attention*. Make a list and compare with other people's ideas. Discuss similarities and differences between your lists

- Shares ideas

Music is a means of using sounds to communicate. Describe a type of music (e.g. classical, reggae, hip-hop, pop, jazz, blues, country, hymns, contemporary worship) and explain the underlying messages conveyed by the sounds associated with that genre

- Shares ideas

Mood or setting

Create a simple survey to ask your class's family members about the types of music they enjoy

- Conducts a survey

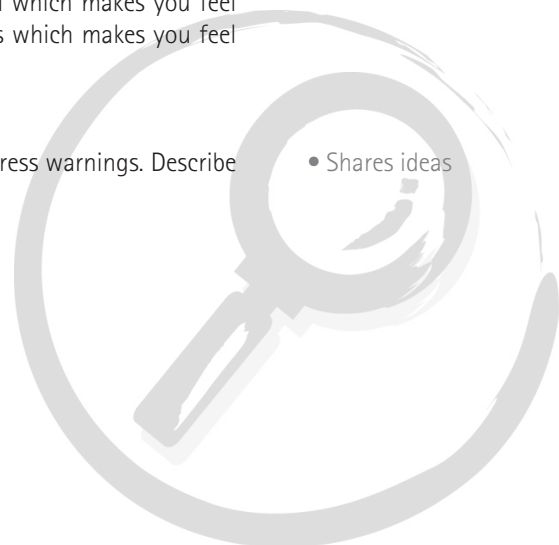
Identify sounds that communicate feelings. Listen to minor chords and major chords and discuss which makes you feel happy and which makes you feel sad. Listen to fast music and slow music and discuss which makes you feel energetic and which makes you feel relaxed

- Shares ideas

Warning

Identify sirens and calls and animals sounds that express warnings. Describe how you feel when you hear a siren

- Shares ideas





Interact Learning Path | Phase 2

Finding Out Further

Find Out Further and gain understanding in one of two ways:

1. Individual or group investigation
2. Whole class investigation

During this phase the students will gain understanding:



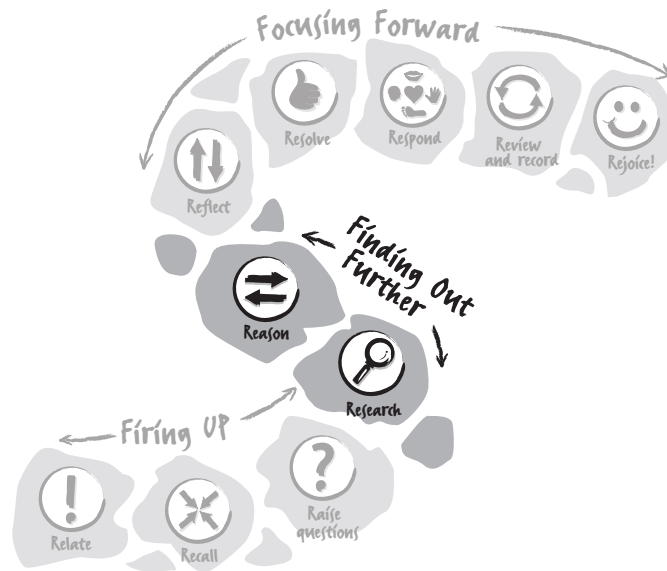
Research (further)

Find answers to other questions generated at the beginning of, or during, the study
The magnifying glass reminds us to go searching



Reason

Apply, analyse, interpret, compare and contrast findings
The arrows remind us to pull apart (analyse) and draw comparisons (compare)



Finding Out Further



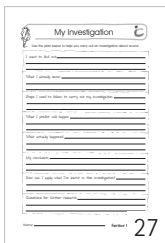
Further research

questions and activities

indicators of achievement

1. Identify an issue or topic which you would like to investigate further, based on what you have learned so far
2. Make a plan
3. Research
4. Organise your notes and plan ways to communicate your understandings

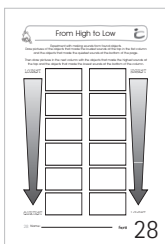
The following is a range of suggestions for you to consider:



As a group or class, identify something about sound that you could conduct an inquiry about. Frame questions so that the response can be, "Let's test it!" For example:

- *What is the highest sound we can make using a rubber band?*
- *What is the lowest sound we can make using a container with water in it and a tapping instrument?*
- *What is the furthest distance we can make our voices travel, without the use of technology? How can we convey messages from one end of the field to the other without using technology?*

- Frames a question to guide an investigation
- Plans a schedule of tasks
- Uses a range of sources to research

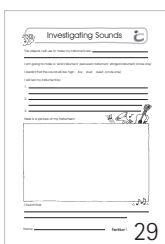


Have a 'sound-making' table set up with various types of elastic or rubber bands, sticks, bottles, water, hoses, combs of different sizes, containers. Encourage students in predict what sounds will be made in certain circumstances, test their ideas and draw conclusions. You may like to order sounds in terms of pitch (from low to high) or in terms of volume (soft to loud)

Investigate hearing aids and how they work, what people used to aid hearing hundreds of years ago and why

- Predicts
- Observes
- Uses a systematic approach
- Shares ideas
- Explains phenomena

- Uses a range of sources to research



Investigate different ways that instruments are 'tuned'. Investigate how you can tell if an instrument is in tune. Make a musical instrument of your own

Learn about pitch, beat and rhythm and use them to create a 'symphony of sounds'. Perform it for others and invite them to describe what images or feelings it evokes for them

- Uses a range of sources to research

- Uses a range of sources to research
- Uses a systematic approach
- Shares ideas
- Explains phenomena

Investigate different types of stringed, wind or percussion instruments. Report on different types and the way in which they are played to create different sound

- Uses a range of sources to research
- Uses a systematic approach
- Shares ideas
- Explains phenomena

Ask older people what sounds are heard today that were not heard when they were young. Describe your findings

- Conduct surveys and interviews

Investigate whether the ears of different animals are on the top of the head or the side, whether they sit up or flop down, and what size they are. Prepare for an *Ear Parade* by making large cardboard ears, representing different animals, attached to headbands

- Shares ideas



Reason

questions and activities

indicators of achievement

Consider ways you can apply your ability to reason to your study. The following are a range of ideas, but students and teachers may come up with their own as a result of their research:

Gather a range of musical instruments. Look at them and predict which will make the highest and lowest sounds. Put them in order from lowest sounds to highest sounds, explaining your reasons. Test them to find out and draw conclusions

Some animals can make louder sounds than others. An elephants 'trumpeting' can be heard across many kilometres of jungle whilst the squeak of a mouse is barely heard across a small room. *Why do you think God created such a range abilities in terms of volume?*

Musicians today often use amplifiers to increase the volume of the sounds they produce. *Why do you think this is so?* Discuss what the benefits and drawbacks are to this technology

Sometimes it is easy to accept advances in technology without thinking about their side effects. We use computers because they help us in our daily lives, but are we aware that they 'hum' and therefore add to the 'white noise' surrounding us. Explore the concept of 'white noise' and consider what is reasonable to accept and what levels of background noise we should reject

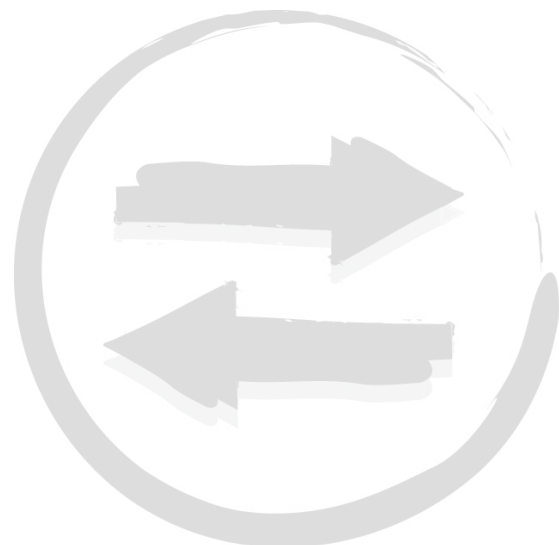
- Identifies cause and effect
- Distinguishes likeness and differences
- Sequences

- Draws conclusions
- Justifies conclusions

- Thinks critically
- Identifies cause and effect

- Identifies cause and effect
- Distinguishes likeness and differences
- Draws conclusions
- Justifies conclusions

Finding Out Further





Interact Learning Path | Phase 3

Focusing Forward

Focus Forward to develop wisdom in the following ways:



Reflect

Think deeply about the value and purpose of the subject, consider ethical issues, reflect on findings

The arrows remind us to think from a higher perspective, and a deeper perspective



Resolve

Choose. The benefit of our learning is evidenced by what we do more than what we can repeat. We consider how what we have learnt might impact who we are and what we do. De Bono's Thinking Hats can help in the decision-making process. The 'thumbs up' remind us that we can say 'yes' to a response of some kind

Our learning may have impacted our thinking, our attitudes, our actions, our communication on this topic, or where we stand on an issue



Respond

Take action. We apply our understanding

The symbols remind us to consider our thinking, our attitudes, our actions, our communication on this topic, or where we stand on an issue



Review and record

Review the *Big Idea*, the *Key Understanding*, the *Focus Question*, the *Habits of Character*, the *Habits of Mind* and the *Competencies or Skills* you have focused on. Evaluate. Consider what we have done well and how we could have improved. Identify what our next steps are in developing values, habits and skills

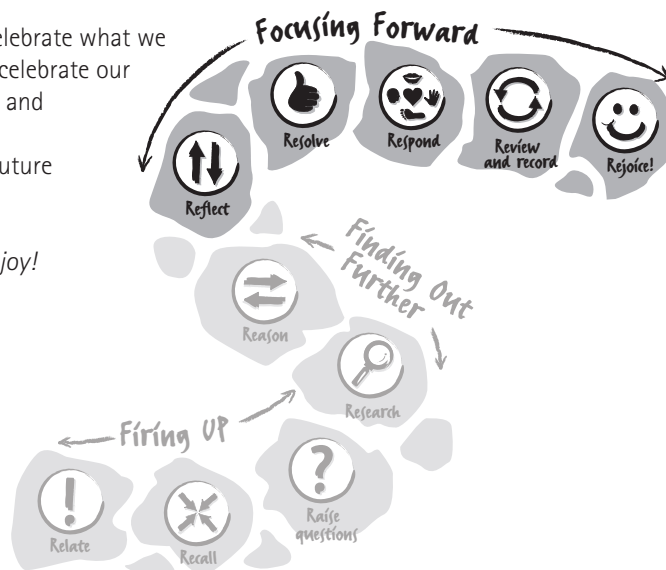
The arrows remind us that we need to look back in order to move forward



Rejoice!

Celebrate! We celebrate what we have learnt. We celebrate our gifts and talents and developing skills
We celebrate a future and a hope

The smiling face reminds us to enjoy!





Reflect

questions and activities

indicators of achievement

Reflect on what is valuable, important or conclusive about your topic of study by considering one or more of the following. Share your ideas:



Discuss:

- Why do you think God made sounds?
- Which sounds do you think God made to be beautiful?
- Which sounds do you think God made to be funny?
- Which sounds do you think God made to be for communication with God's creation?
- Which sounds do you think God made to help us as a warning?
- What other reasons might God have had for making sound?
- What benefits are there in appreciating the different kinds of sounds around us?

- Expresses an opinion
- Evaluates consequences

Consider that you are like an instrument in God's orchestra. Discuss:

- What helps you 'stay in tune' with others?

- Indicates understanding of biblical principles and analogies

Read the story of Samuel listening to God in *1 Samuel 3*. God can speak in any way God wants to. Usually it is not a 'sound' we hear with our ears, but Samuel heard God's voice. Read other stories about people who heard God speak, e.g. Noah in *Genesis 8:15*, Moses at the burning bush in *Exodus 3:1-14* and in *Exodus 33:11*, Gideon in *Judges 6:15*, David in *2 Samuel 2:1*. Dramatise the stories and imagine what it would have been like to hear God's voice

- Indicates understanding of biblical principles and analogies

God has given people the ability to choose whether they will use the gift of sound for benefit or for harm. Think about the positive and negative ways that people use sound. Discuss:

- How can we use sound to express anger, hatred, fear, happiness, love or peacefulness?
- How can very loud sounds damage the ears and hearing God has given people?
- Does damaging what God has made bother God? Does it bother us?

- Is aware of scientific issues of concern
- Expresses an opinion
- Evaluates consequences

Think about the verses below. Whether there is sound or not, God speaks to us, and wants us to learn to listen and obey so that we can be close to God: *Psalms 95:7-8, Psalm 100:1, John 10:2-4, 14-16, 1 Corinthians 13:1, Revelation 3:20*

- Indicates understanding of biblical principles and analogies





Resolve

questions and activities

indicators of achievement

Identify how what you have personally learnt might impact who you are and what you do. Consider how this study might affect your actions in the future:

Heart

- Your attitude toward God
- Your attitude to people who are hearing impaired

- Makes decisions about possible actions

Head

- How you think about the noises you hear or allow yourself to hear

Hands

- Your actions regarding sound levels
- How to 'fight against' irritating sounds

Mouth

- How you might communicate what you have learnt about sound

Feet

- The ways your behaviour may change now that you know that sound can damage our ears





Respond

questions and activities

indicators of achievement

Take individual or group action:



Change your attitudes

Share any new insights or change of attitude which you have regarding:

- Sounds
- Noise
- Hearing
- Hearing impairment
- Communicating
- Worshipping God with music and voice
- Vocal raise
- Audible prayer

- Expresses an opinion



Change your thinking

Discuss the following, and write statements in answer to the following questions:

- *What have you learnt about sound and how it is made?*
- *What should everyone know about sound?*
- *How has this study shown us that God is amazingly creative?*

- Expresses an opinion

Think about what you have learnt this term. Write your ideas under the headings of *Before I thought that.... and Now I think that....*

- Expresses an opinion



Take action

Make a poster to remind people of the dangers of listening to music that is too loud

- Uses means and media appropriate to the information and the audience

Visit a retirement village or age concern group. Consider the hearing needs of the group you are visiting and create a presentation that includes mime as well as spoken drama, music and rhythmic movement

- Uses means and media appropriate to the information and the audience
- Works well in a team



Communicate your learning

Choose one aspect of your study and create a PowerPoint presentation to highlight the main points. Try to use five slides or fewer for your presentation

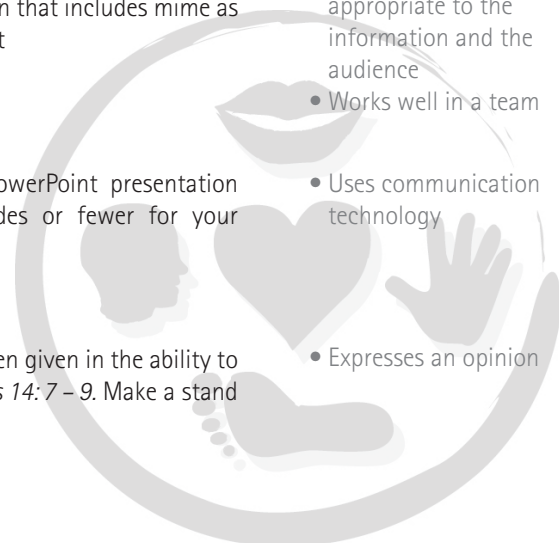
- Uses communication technology



Stand for what is right

Consider the gift of communication that you have been given in the ability to make 'sounds to the glory of God'. Read *1 Corinthians 14: 7 – 9*. Make a stand to use the gift given to the glory of God

- Expresses an opinion





Review and record

questions and activities

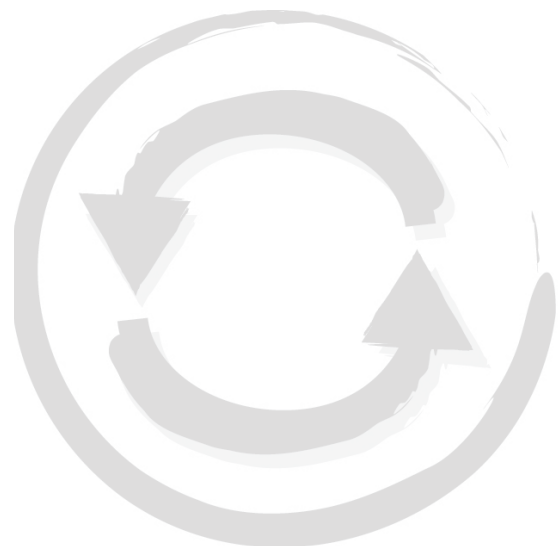
indicators of achievement

Consider what you have learned and the skills you have developed:

Review the *Big Idea*, *Focus Question*, and *Key Areas of Investigation*. Describe what you now know, thinking about how it relates to or differs from what you knew before

Explain what activity or topic interested you the most, and why

- Determines whether the information needed as originally defined is met
- Identifies personal strengths and weaknesses





Rejoice!

questions and activities

indicators of achievement

Celebrate your learning:

Have an *Ear Parade*

- Celebrates learning

Make a percussion or musical orchestra using simple instruments made from found objects and celebrate making a joyful noise to the Lord

Thank God for sounds and the way we can hear them





Scriptures relevant
to this unit



HOW DOES SOUND REACH OUR EARS? SCRIPTURES RELEVANT TO THIS UNIT

Exodus 3:1-14

1 Now Moses was tending the flock of Jethro his father-in-law, the priest of Midian, and he led the flock to the far side of the desert and came to Horeb, the mountain of God. 2 There the angel of the LORD appeared to him in flames of fire from within a bush. Moses saw that though the bush was on fire it did not burn up. 3 So Moses thought, "I will go over and see this strange sight—why the bush does not burn up." 4 When the LORD saw that he had gone over to look, God called to him from within the bush, "Moses! Moses!" And Moses said, "Here I am." 5 "Do not come any closer," God said. "Take off your sandals, for the place where you are standing is holy ground." 6 Then he said, "I am the God of your father, the God of Abraham, the God of Isaac and the God of Jacob." At this, Moses hid his face, because he was afraid to look at God. 7 The LORD said, "I have indeed seen the misery of my people in Egypt. I have heard them crying out because of their slave drivers, and I am concerned about their suffering. 8 So I have come down to rescue them from the hand of the Egyptians and to bring them up out of that land into a good and spacious land, a land flowing with milk and honey—the home of the Canaanites, Hittites, Amorites, Perizzites, Hivites and Jebusites. 9 And now the cry of the Israelites has reached me, and I have seen the way the Egyptians are oppressing them. 10 So now, go. I am sending you to Pharaoh to bring my people the Israelites out of Egypt." 11 But Moses said to God, "Who am I, that I should go to Pharaoh and bring the Israelites out of Egypt?" 12 And God said, "I will be with you. And this will be the sign to you that it is I who have sent you: When you have brought the people out of Egypt, you will worship God on this mountain." 13 Moses said to God, "Suppose I go to the Israelites and say to them, 'The God of your fathers has sent me to you,' and they ask me, 'What is his name?' Then what shall I tell them?" 14 God said to Moses, "I am who I am. This is what you are to say to the Israelites: 'I AM has sent me to you.'"

Exodus 33:11

11 The LORD would speak to Moses face to face, as a man speaks with his friend. Then Moses would return to the camp, but his young aide Joshua son of Nun did not leave the tent.

Judges 6:15-17

15 "But Lord," Gideon asked, "how can I save Israel? My clan is the weakest in Manasseh, and I am the least in my family." 16 The LORD answered, "I will be with you, and you will strike down all the Midianites together." 17 Gideon replied, "If now I have found favor in your eyes, give me a sign that it is really you talking to me. 18 Please do not go away until I come back and bring my offering and set it before you." And the LORD said, "I will wait until you return."

1 Samuel 3:1-19

1 The boy Samuel ministered before the LORD under Eli. In those days the word of the LORD was rare; there were not many visions. 2 One night Eli, whose eyes were becoming so weak that he could barely see, was lying down in his usual place. 3 The lamp of God had not yet gone out, and Samuel was lying down in the temple of the LORD, where the ark of God was. 4 Then the LORD called Samuel. Samuel answered, "Here I am." 5 And he ran to Eli and said, "Here I am; you called me." But Eli said, "I did not call; go back and lie down." So he went and lay down. 6 Again the LORD called, "Samuel!" And Samuel got up and went to Eli and said, "Here I am; you called me." "My son," Eli said, "I did not call; go back and lie down." 7 Now Samuel did not yet know the LORD: The word of the LORD had not yet been revealed to him. 8 The LORD called Samuel a third time, and Samuel got up and went to Eli and said, "Here I am; you called me." Then Eli realized that the LORD was calling the boy. 9 So Eli told Samuel, "Go and lie down, and if he calls you, say, 'Speak, LORD, for your servant is listening.'" So Samuel went and lay down in his place. 10 The LORD came and stood there, calling as at the other times, "Samuel! Samuel!" Then Samuel said, "Speak, for your servant is listening." 11 And the LORD said to Samuel: "See, I am about to do something in Israel that will make the ears of everyone who hears of it tingle. 12 At that time I will carry out against Eli everything I spoke against his family—from beginning to end. 13 For I told him that I would judge his family forever because of the sin he knew about; his sons made themselves contemptible, and he failed to restrain them. 14 Therefore, I swore to the house of Eli, 'The guilt of Eli's house will never be atoned for by sacrifice or offering.'" 15 Samuel lay down until morning and then opened the doors of the house of the LORD. He was afraid to tell Eli the vision, 16 but Eli called him and said, "Samuel, my son." Samuel answered, "Here I am." 17 "What was it he said to you?" Eli asked. "Do not hide it from me. May God deal with you, be it ever so severely, if you hide from me anything he told you." 18 So Samuel told him everything, hiding nothing from him. Then Eli said, "He is the LORD; let him do what is good in his eyes." 19 The LORD was with Samuel as he grew up, and he let none of his words fall to the ground.



HOW DOES SOUND REACH OUR EARS? SCRIPTURES RELEVANT TO THIS UNIT

2 Samuel 2:1

In the course of time, David inquired of the LORD. "Shall I go up to one of the towns of Judah?" he asked. The LORD said, "Go up." David asked, "Where shall I go?" "To Hebron," the LORD answered.

Psalm 95:7-8

7 For he is our God and we are the people of his pasture, the flock under his care. Today, if you hear his voice, 8 do not harden your hearts as you did at Meribah, as you did that day at Massah in the desert.

Psalm 98:4-6

4 Shout for joy to the LORD, all the earth, burst into jubilant song with music; 5 make music to the LORD with the harp, with the harp and the sound of singing, 6 with trumpets and the blast of the ram's horn— shout for joy before the LORD, the King.

Psalm 100:1

Shout for joy to the LORD, all the earth.

Zephaniah 3:17

The LORD your God is with you, the Mighty Warrior who saves. He will take great delight in you; in his love he will no longer rebuke you, but will rejoice over you with singing.

John 10:2-4

2 The man who enters by the gate is the shepherd of his sheep. 3 The watchman opens the gate for him, and the sheep listen to his voice. He calls his own sheep by name and leads them out. 4 When he has brought out all his own, he goes on ahead of them, and his sheep follow him because they know his voice.

John 10:14-16

14 "I am the good shepherd; I know my sheep and my sheep know me — 15 just as the Father knows me and I know the Father—and I lay down my life for the sheep. 16 I have other sheep that are not of this sheep pen. I must bring them also. They too will listen to my voice, and there shall be one flock and one shepherd.

1 Corinthians 13:1

If I speak in the tongues of men or of angels, but do not have love, I am only a resounding gong or a clanging cymbal.

1 Corinthians 14: 7 – 9a

7 Even in the case of lifeless things that make sounds, such as the flute or harp, how will anyone know what tune is being played unless there is a distinction in the notes? 8 Again, if the trumpet does not sound a clear call, who will get ready for battle? 9 So it is with you.

Revelation 3:20

Here I am! I stand at the door and knock. If anyone hears my voice and opens the door, I will come in and eat with him, and he with me.



Understanding Interact

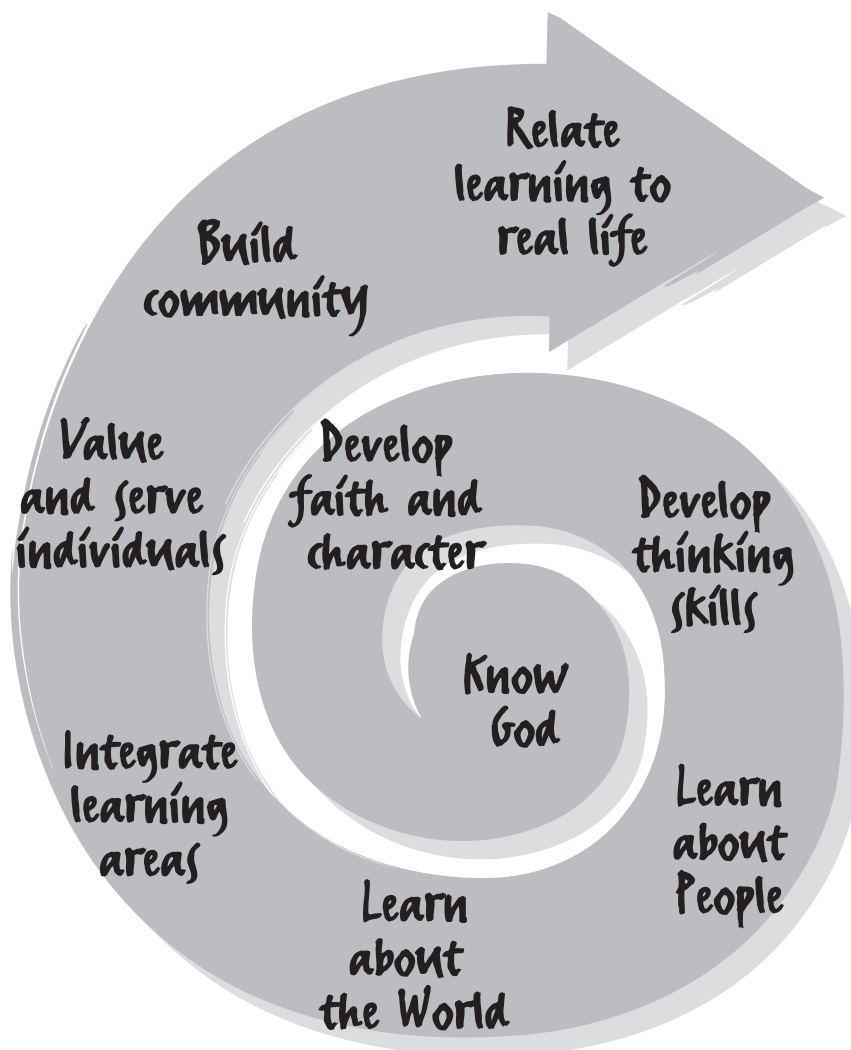


THE INTERACT RESOURCES

The *Interact Curriculum* is a biblically-based and integrated programme of learning suitable for students in Years 1-8. It is designed to inspire teachers with a multitude of creative ideas, questions and learning activities through which students can engage in learning about God and his world.

This *Interact Teacher Manual* is part of a set of manuals produced for a single term's work on an integrated theme. The *Interact Curriculum* provides teacher manuals in the subject areas of Devotions, Science, Social Science, Health and English on 16 such themes over a four-year cycle. Additional resources are also available in other subjects, including reproducible student worksheets entitled Discovery Sheets.

The *Interact Curriculum* is designed to encourage students to interact with God, with others and with their world in the course of their learning day, and it is our intention to serve teachers by resourcing them with leading-edge curriculum material that helps students to:





OPTIONS FOR USING THIS INTERACT TEACHER MANUAL

Introduction:

This *Interact Teacher Manual* is designed to give you many different ideas from which to select and plan a programme for your own class. It is recommended that the *Interact Learning Path* be used as a guide in the planning process, but there is plenty of scope for choice in this manual.

This *Interact Teacher Manual* will give opportunity for teachers to design either:

(a) A short, more traditional unit of work

By focusing on the *Firing Up* stage, covering the *Key Areas of Investigation* as a class, and selecting one or two activities in the *Focusing Forward* section, a teacher could design a short programme of work for a whole class lasting two to three weeks and follow it with assessment.

(b) A longer inquiry investigation

By working through the process of the *Interact Learning Path*, it will be possible to develop understanding of key concepts and skills in the *Firing Up* section, and then to ignite student enthusiasm to take responsibility, in negotiation with the teacher, for their own research, reasoning, reflecting and responding. This will engage the students in developing questioning and research skills and therefore equip and inspire them for future learning.

(c) A combination of both

The more independent students in the class could be given more control over their learning by setting them off on their independent inquiry approach whilst the teacher approaches the topic in a more traditional / teacher-centred approach with the remainder of the class.

N.B. Regardless of what approach to the material is used, the *Interact Learning Path* provides the structure so that students are given opportunity to have some degree of choice about their learning. Because they have more ownership, deeper and more independent learning may occur.



PLANNING WITH INTERACT

- 1. Term Overview**
Read the *Term Overview* document at the front of the Term Folder to understand the integrating thread of the term and the national curriculum requirements.
- 2. Understanding *Interact***
Read the *Understanding Interact* section on page (I) so that you are confident in understanding the principles and processes of the *Interact Resources*.
- 3. Overview and Introduction**
Read these pages to understand what this subject area is about, and where it fits into the integrated term's work.
- 4. Big Idea and Focii**
Read the *Big Idea*, the *Habit of Character Focus* and *Habit of Mind Focus*, the *Key Understanding* and the *Focus Question* which summarise the main focii of this unit.
- 5. Biblical World View and Background Information**
Read these pages to familiarise yourself as a teacher with the content being taught this term. Look up the *Scriptures* (found at the end of the manual for your convenience).
- 6. Key Areas of Investigation**
These four points summarise the content the students may learn in this subject. Confirm with your national requirements and determine your priorities.
- 7. Key Learning Intentions**
These points give ideas for Skills you can select as focii during this unit. All the skills listed are found in the *Indicators of Achievement* throughout the book, and any can be selected to become the focus of your teaching and assessment of skills for this subject this term. Determine what is appropriate for your class.
- 8. Plan for School-wide Activities or Visitors**
Meet several times with other staff to engage personally and corporately with the term theme and plan school-wide activities.
- 9. Determine Main and Subsidiary Topics**
Determine the main focus topic for your class (e.g. Science, Social Science, Health) this term and the supporting topics. Note that the main focus topic may vary between classes. At the conclusion of the term, when school-wide presentations are made, all students may benefit from each other's deeper learning in particular topics.
- 10. Plan**
Plan, using the *Interact Learning Path* as a guide.

Have a great term teaching!

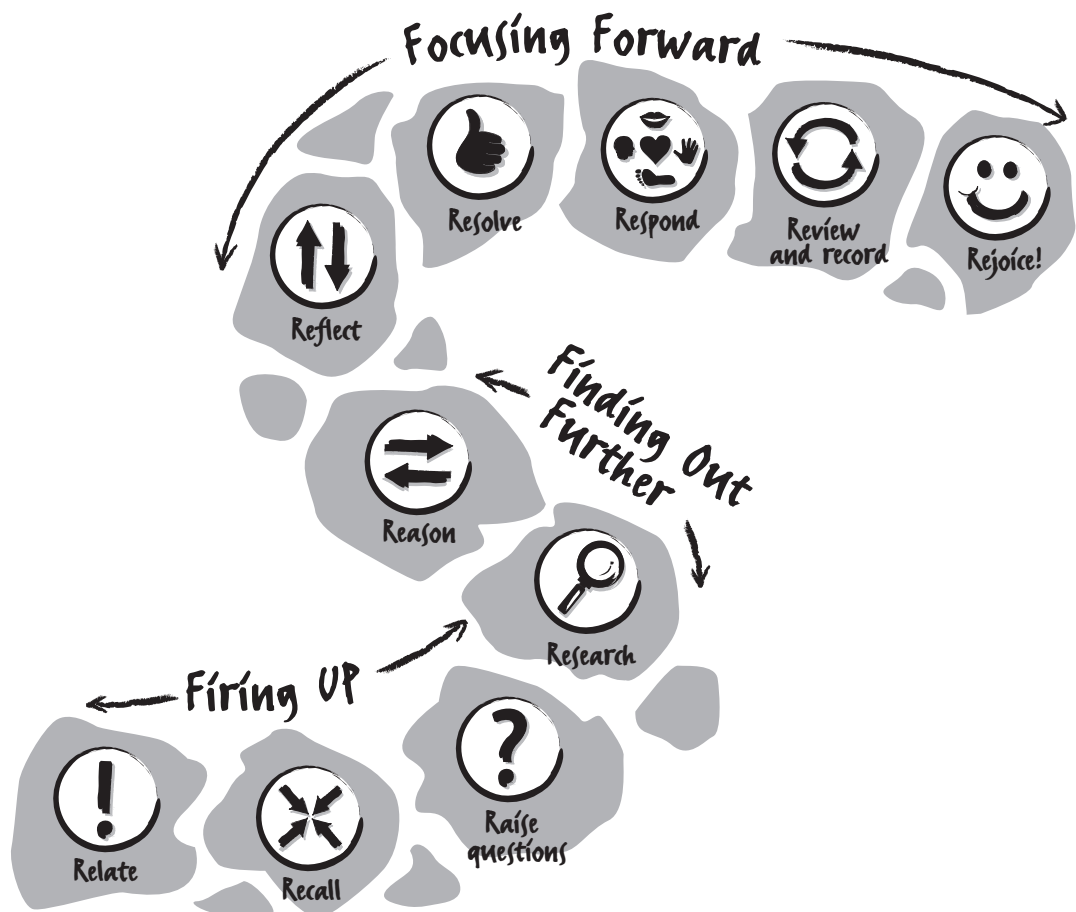


THE INTERACT LEARNING PROCESS

The *Interact Curriculum* resources are being developed in a framework of learning, developed by Helen Pearson, called the *Interact Learning Path*.

The *Interact Learning Path* helps students to recall prior knowledge, to develop knowledge, skills, understanding and godly wisdom, to consider how what they have learned impacts who they are and what they do, to respond with the benefit of new skills and understanding, to evaluate their work, and to celebrate their learning in a range of ways as outlined below:

The Interact Learning Path



We hope you enjoy discovering, with your students, a fresh perspective on the world!



KEY LEARNING INTENTIONS

We are learning to:



Relate
Engage

Engages with scientific exploration and discussion



Recall
Remember

Identifies prior knowledge
Engages with scientific discussion



Raise questions and recognise problems
Inquire

Writes questions to identify what we want to know
Designs open-ended questions
Conducts an interview

Form a hypothesis

Defines a problem
Identifies possible solutions
Predicts



Research
Plan

Frames a question to guide an investigation
Plans a schedule of tasks
Recognises dangers
Predicts

Gather information

Uses a range of sources to research
Conducts surveys and interviews
Makes observational drawings

Understand scientific language

Interprets pictures and diagrams
Defines scientific terms
Uses scientific vocabulary

Test a hypothesis

Uses a systematic approach
Uses consistent procedures
Uses equipment safely
Makes fine measurements
Observes
Pays close attention to details



KEY LEARNING INTENTIONS

We are learning to: *continued*



Research continued Process information

- Describes findings
- Shares ideas
- Creates a model
- Identifies main idea
- Sorts and classifies
- Reports observations
- Reports conclusions
- Explains phenomena



Reason Interpret information

- Identifies cause and effect
- Distinguishes likeness and differences
- Sequences

Draw evidence-based conclusions

- Draws conclusions
- Justifies conclusions



Reflect Identify a biblical perspective

- Indicates understanding of biblical principles and analogies

Discuss ethics

- Is aware of scientific issues of concern
- Expresses an opinion
- Evaluates consequences



KEY LEARNING INTENTIONS

We are learning to: *continued*



Resolve
Make judgments and decisions

Makes decisions about possible actions



Respond
Participate and contribute

Works well in a team

Present information

Uses communication technology
Uses means and media appropriate to the information and the audience

Act on issues linked to science learning

Expresses an opinion



Review and record
Make judgments about the process

Determines whether the information needed as originally defined is met
Identifies personal strengths and weaknesses



Rejoice!
Celebrate

Celebrates learning



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Helen Pearson

Co-author, Editor and Publisher of *Interact Curriculum*



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