

Overview

“Living with a Volcano” gives examples of how volcanic activity can affect the lives of people around the world. The text explains that although volcanoes can be dangerous, they can also benefit people and the land.

Curriculum context

SCIENCE

PLANET EARTH AND BEYOND

Earth systems

Achievement objective

L1 and 2: Students will explore and describe natural features and resources.

Key idea

- Volcanoes have positive and negative effects on human life and the landscape.

Learning goals (to be shared with your students)

In this activity, we are learning:

- to classify information
- to identify cause and effect.

MATHEMATICS

NUMBER AND ALGEBRA

Number strategies

Achievement objective

L2: Use simple additive strategies with whole numbers and fractions.

Number knowledge

L2: Know the basic addition and subtraction facts.

L2: Know how many ones, tens, and hundreds are in whole numbers to at least 1000.

Key ideas

The All Aboard! activity provides an opportunity for students to practise interpreting and using information in a table.

- Approximating means to come up with a result that is not exact but is close enough to be useful.
- Any calculation that involves inexact or incomplete information should be treated as an approximation.

Learning goal (to be shared with your students)

In this activity, we are learning:

- to calculate how many people could be directly affected by one volcanic eruption.

ENGLISH

READING

Ideas

Achievement objective

L3: Students will show a developing understanding of ideas within, across, and beyond texts.

Indicators

- Uses their personal experience and world and literacy knowledge confidently to make meaning from texts.

- Starts to make connections by thinking about underlying ideas in and between texts.
- Makes meaning of increasingly complex texts by identifying main and subsidiary ideas in them.

The Literacy Learning Progressions

The relevant knowledge, skills, and attitudes for students at this level are described in the [The Literacy Learning Progressions](#).

Suggestions for providing literacy support for the key ideas

The following strategies will support students to engage with the ideas and information as they use the text for particular curriculum purposes.

The *Connected* series includes a range of texts that provide opportunities for students to locate, evaluate, integrate, and synthesise information and ideas.

It is expected that students will read across the range of texts in this *Connected* to develop their literacy skills and their understanding of the topic.

Text characteristics

- Technical and subject-specific vocabulary
- Clearly structured into four sections
- A table on page 32 relating to a mathematics question
- Balanced argument giving positive and negative effects of volcanoes (“but”, “however”).

1. FINDING THE MAIN IDEAS

The main ideas in the text include:

- Volcanoes can be destructive, but they can also be useful to humans.
- The benefits of volcanoes include attracting tourists, providing an environment for many outdoor sports, and producing good soils for farming.
- Geothermal fields supply heat energy for New Zealand.
- When Mount Eyafjallajökull erupted, it disrupted air travel across the world.

Before reading, **ASK QUESTIONS** to link to students' prior knowledge.

What can be the effects of a volcanic eruption? Why do you think there is a lot of farming around Mount Taranaki? What other activities do people do around the mountain? What did you see on television or in the papers about the Icelandic volcano that erupted in 2010? How did it affect people?

PROMPT students' prior knowledge of the geographical locations that students will read about: Auckland, Taranaki, Taupō, Rotorua, and Iceland.

Read and discuss the opening two sentences. Point out that this section provides readers with an anomaly: although volcanoes can be dangerous, people live and play on and around them.

Have students **SKIM** the article to identify the four sections and to decide what each is about. You could draw their attention to the colon in three of the headings. *What does the text after the colon tell you?*

Then ask them to **SCAN** the text under each heading, jot down three key points that elaborate on those headings and, in pairs, compare their findings.

Remind students that connecting to prior knowledge, asking questions, and skimming and scanning are all helpful strategies for finding the main ideas of an article.

2. MAKING CONNECTIONS

PROMPT students to theorise and infer, building their own interpretations. For example, as they identify the benefits of the volcanoes, encourage them to think critically of the negative impacts.

The article tells us that people enjoy climbing over lava outcrops. Would there be people who found the rocks a nuisance? Are the rocks useful for anything else, or just to enjoy?

The geothermal fields in Taupō and Rotorua are useful for making electricity. I wonder if there would be any disadvantages to having such high temperatures just under the ground.

3. DEALING WITH UNFAMILIAR VOCABULARY

Students will encounter many topic-specific words that they may have encountered in the other articles in this book. **IDENTIFY** those words, for example, “eruption”, “dormant”, “active”, “ash”, “lava”, and “lahars”, and other words specific to the land, such as, “fertile”, “landscape”, “basalt”, “quarried”, “enriched”, “minerals”, nutrients.

MODEL “reading around” unfamiliar words to gain meaning from context.

Quarried – now we can say it, we have to work out what it means. We know it's a verb – “The rock is quarried” – so it's something that's happening to the rock. Where would they get the rock from? Perhaps it could be a verb describing the way they get the rock from the ground? That makes sense.

Build on students' **PRIOR KNOWLEDGE**. For example:

IDENTIFY the part of speech. *What parts of speech do we know? What part of speech is “quarry”? If it's a verb, then it must be some action that is done to the rock.*

ASK QUESTIONS about what the students have just read. *From the title and the first two sentences, what do you think this article will be about? (The dangers and the uses of volcanoes.) So could this be something to do with how the rock is useful?*

MAKE CONNECTIONS. *What is a quarry? What happens in a quarry?*

Then **MAKE PREDICTIONS** about what the word could mean. *So if “quarried” is a verb and it comes from the word “quarry”, what might it mean?*

READ ON (or back) to confirm. *OK, let's read that sentence again and see if that meaning makes sense.*

Develop a class chart of useful strategies for working out unfamiliar vocabulary.

Exploring the science

The following activities and suggestions are designed as a guide for supporting students to develop scientific understanding as they explore natural features of planet Earth.

Key ideas

- Volcanoes have positive and negative effects on human life and the landscape.

Activity 1: Positives and negatives

Explain that while they read, students will be finding information on some positive and negative effects of volcanoes.

Have them prepare a graphic organiser with two columns, Positive and Negative, and ask them to note down the information as they locate it.

Discuss their information. The list of positive effects could be classified further into “useful” and “recreational” and the negative effects could be classified into “those that harm people” and “those that harm the planet”.

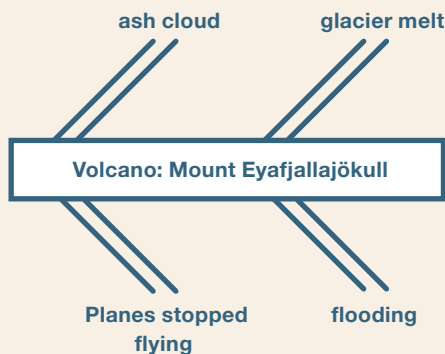
Encourage the students to think critically, and to hypothesise about other possible effects that are not mentioned in the text.

Activity 2: Cause and effect (A)

Ask the students to recall the information about the Icelandic volcano, Mount Eyafjallajökull, and draw graphic representations of its cause and the effect.

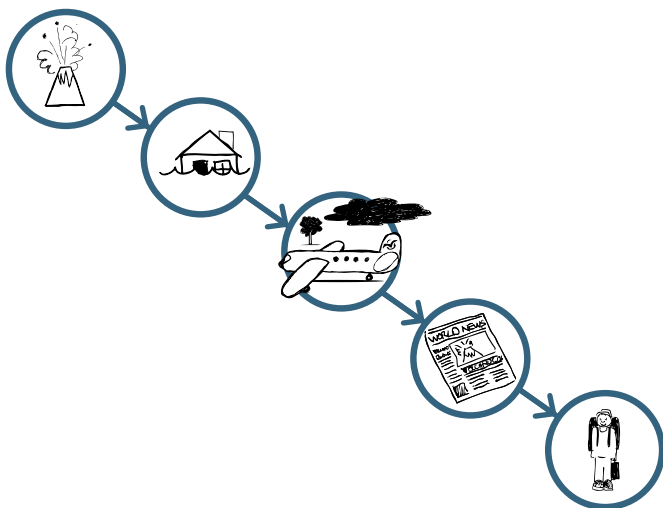
For example, students could use a fishbone diagram or a flow diagram like the ones below.

Fishbone diagram



Flow diagram

Using representational drawings of the volcano, the flooded homes, grounded aircraft, and so on, students could depict the knock-on effects, which despite the damage and disruption, resulted in international attention that caused the tourism industry to be affected positively.



Activity 3: Cause and effect (B)

Investigating the effect of fertile soil on plants

The text talks about the long-term effect of volcanic material on the land and how it has enriched the soils around Mount Taranaki. In this activity, students experiment with a range of materials and investigate their impact on plant growth by experimenting with a range of materials.

Fair testing

Discuss the concept of “fair testing”. A fair test is an experiment in which only one factor or condition is changed. In this way, the impact of changing this condition can be clearly seen. (You could illustrate this by testing whether a marble and a ping-pong ball travel the same distance when they roll down a slope. Using a board or large book on an incline, hold the marble at the top of the incline and release it, noting where it rests. Do the same using the ping-pong ball. Then repeat, but instead of allowing the ping-pong ball to roll, give it a push. The students will see that the conditions were not the same for each object, so the results cannot be judged fairly.)

For more on fair testing, see Science Online: <http://scienceonline.tki.org.nz/Teaching-science/Teaching-Strategies/Types-of-investigation>

For information on different types of investigations (including fair testing), see the Assessment Resource Banks: <http://arb.nzcer.org.nz/supportmaterials/science/investigations.php>

Working in pairs or groups, have the students fill seed trays with a range of materials, for example, potting mix, pumice, and clay, and then plant seeds (or seedlings of the same size) in each of the materials.

The purpose of the investigation is to see if plants grow at different rates when growing in different materials. (Link this to the information in the article about volcanic material enriching the soil.) Students measure and record the plant growth over time and draw conclusions.

Explain that it is not only the origin of the soil that affects how plants grow but also the properties such as water retention and the amount and number of nutrients it contains. For investigations that can be carried out to explore some of these other properties, see *Making Better Sense of Planet Earth and Beyond*, pages 48–55.

Discuss the steps students will need to take to ensure this is a fair test (for example, the containers with the seeds/seedlings should be positioned in the same location and given the same amount of water each day).

MINISTRY OF EDUCATION RESOURCES

- *Making Better Sense of Planet Earth and Beyond* 1999, pages 23–58
- Building Science Concepts (BSC series) Book 12: *Volcanoes*
- For appropriate tasks, see the Assessment Resource Banks site and linking documents to the Making Better Sense books and the Building Science Concepts series:
 - <http://arb.nzcer.org.nz/resources/science/bsc.php>
 - <http://arb.nzcer.org.nz/resources/science/bettersense/>
- *Connected 2* 2003, “A History of Rock”
- *Connected 2* 2005, “Living on a Lava Flow”

FURTHER RESOURCES

- Science Learning Hub, Context: Volcanoes:
 - www.sciencelearn.org.nz/Contexts/Volcanoes
- See also the resource lists in BSC and MBS books
- Pita, Graham (1995). "The Wrath of Rūaumoko". In *Children of Earth and Sky*, ed. Gordon Ell and Mervyn Taylor. Auckland: Bush Press.

Exploring the mathematics

The last page of this article provides a mathematical challenge. Students are given a table of information that they can use to calculate the answer to the problem posed in the text. The All Aboard! activity provides an opportunity for students to interpret and use information in a table. They can also develop their understanding of approximation.

Key ideas

- Approximating means to come up with a result that is not exact but is close enough to be useful.
- Any calculation that involves inexact or incomplete information should be treated as an approximation.

MATHEMATICAL IDEAS AND LANGUAGE

- Approximating values
- Reading tables

FOCUS QUESTIONS

- How can we find an approximate answer?
- Why is approximation a useful skill?

Activity: All Aboard!

The All Aboard! activity, on page 32 of the student book, could be approached in two ways. Students could use additive strategies to work out the exact number of people who would have been on the eight grounded flights. Alternatively, the activity could be presented as an approximation exercise. This is reasonable, particularly because in real life some of the flights might not have been full.

Ask the students whether the eight flights combined could have held:

- about 1000 people
- more than 5000 people.

Ask students to explain their answers.

Approximating is a useful skill with many real-life applications. Use the students' understanding of place value to approximate how many hundreds of people are represented by the eight flights. Remember that there are two flights for each aircraft, so the number of hundreds per flight will need to be doubled. Students can work out the total number of hundreds for the four separate flights and then double their answer, or double the hundreds for each flight separately.

Approximations can help students to see whether their solution to a problem is sensible. Ask the students whether adding the actual numbers together will give a total bigger or smaller than their approximation, and ask them to explain their answers.

Ask the students to suggest ways that they could make their approximations more accurate.

Point out to the students that, in real life, Heathrow Airport would have had far more than eight grounded flights in one day. The actual number of flights from Heathrow per day is over 500.

Students often struggle with the idea that an approximation can be just as useful, and may be more convincing, than a precise number. For example, "There were 1000 people at the concert" is more convincing than "There were 973 people at the concert" because the first implies an approximation whereas the accuracy of the second makes it questionable. Ask the students to suggest other situations where an approximation would be more convincing than a precise number.

MINISTRY OF EDUCATION RESOURCES

- *Connected 2* 2005, "Living on a Lava Flow"