Programme title: Awesome Forces

Years: 3–8

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<tr>
<th>Theme</th>
<th>Big questions</th>
<th>Key competencies</th>
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<tr>
<td>We can feel the Earth moving, and we can prepare ourselves for when it does.</td>
<td>• How can we explain earthquakes and volcanoes?</td>
<td>Thinking: Students seek information about earthquakes, consider why Aotearoa New Zealand has earthquakes, and learn how to prepare for them.</td>
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<td></td>
<td>• Why does New Zealand have earthquakes and volcanoes?</td>
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<td>• What is the best way to prepare for natural events?</td>
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<tr>
<td>English-medium curriculum</td>
<td>Māori-medium curriculum</td>
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<tr>
<td><strong>Science</strong></td>
<td><strong>Pūtaiao</strong></td>
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<td>Planet Earth and Beyond – Interacting systems</td>
<td>The Natural World – Earth Science</td>
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<td>• L1 and L2: Describe how natural features are changed and resources affected by natural events and human actions.</td>
<td>• L1 and L2: Learn how volcanoes and earthquakes change the appearance of the landscape, particularly the effects on mountains and rivers.</td>
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<td>Planet Earth and Beyond – Earth systems</td>
<td>• L4: Develop understanding of the key features of the Earth’s surface, including water, rocks, and soil, and the factors which enable life to exist.</td>
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<td>• L3 and L4: Appreciate/develop an understanding that water, air, rocks and soil, and life forms make up our planet and that these are also Earth’s resources.</td>
<td><strong>Tikanga-ā-Iwi</strong></td>
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<td><strong>Social Sciences</strong></td>
<td>Place and Environment</td>
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<td>• L1: Understand how places in New Zealand are significant for individuals and groups.</td>
<td>• L1: Explain the natural and cultural features of a place.</td>
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<td>• L2: Understand how places influence people and people influence places.</td>
<td><strong>The Changing World</strong></td>
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<td>• L3: Understand how people view and use places differently.</td>
<td>• L4: Identify the causes and effects of events that have shaped the lives of people.</td>
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<tr>
<td>• L4: Understand that events have causes and effects.</td>
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Learning intentions

- Describe the reasons why we feel the Earth moving.
- Explain the ways we can prepare for an earthquake or other emergency.

Programme description

In this programme, students explore the inner workings of our planet. They experience what it is like at the centre of the Earth and uncover the layers of the Earth. Students piece together the puzzle of plate tectonics before investigating the causes of earthquakes and volcanoes. Finally, they discover how we can prepare ourselves and our families for an earthquake.
Possible pre-visit activities

Mind map

- As a class, mind map natural events that have occurred in New Zealand. You may have seen them in the news or heard about them from your family. *(Teachers: If necessary, narrow the focus to events that are seen as disasters.)*

- Sort your ideas into weather-related events, events caused by people, and events that seem to be caused by something going on inside the Earth.

Big questions

- Share some ‘big questions’ that you have about the Earth’s inner workings, earthquakes, volcanoes, or tsunamis. Display these in your classroom, and use them to guide your inquiries.

Shaky planet

- In groups, research the ‘vital statistics’ of earthquakes, volcanoes, and tsunamis that have occurred globally since you were born, eg, the Indian Ocean tsunami, the Chilean earthquake and eruption, the Icelandic eruption, the Haitian earthquake, the Japanese earthquake and tsunami, the Christchurch earthquake. These statistics could include where the event was located, what it measured on the Richter scale, what countries it affected, what damage it caused, etc.

- Turn your findings into brief fact cards and mark them on a world map in the classroom.

*Teachers: You can use the map and data to:*

- *elicit the idea that these events happen globally, not just in New Zealand*

- *introduce the fact that the location of earthquakes and volcanic eruptions can tell scientists where plate boundaries are located*
• introduce the focus of the Te Papa education programme – understanding why these events happen and what can be done to prepare for them.
### Possible self-guided activities around Te Papa

#### Bush City activity trail – Level 1

Use the activity trail to explore the geology of Bush City.


Best printed in colour on A3 paper. The trail folds to make a mini booklet that students can use in the museum and keep.

#### Earth rocks! A tour of Te Papa – Levels 1–2

- Check out the rolling ball in the foyer as an introduction to plate tectonics. The ball is made from a rock called gabbro and came from Transvaal in South Africa and is 1.4 billion years old. Gabbro is a type of basalt that forms much of the earth’s crust.

- Visit NatureSpace Discovery Centre. Use the microscopes, rock samples, and other information to learn more about the different rocks that make up our planet and the role they might play in plate tectonics.

#### Earth investigation – Level 2

In groups, and using OurSpace and Awesome Forces, investigate an aspect of Earth science, eg, the Earth’s structure, plate tectonics, earthquakes, volcanoes, or tsunamis – as well as how to quake-safe your home.

#### Awesome Forces activity trail – Levels 2

Use the activity trail to explore Awesome Forces and OurSpace. The trail can be found by using the following link


Best printed in colour on A3 paper. The trail folds to make a mini booklet that students can use in the museum and keep.
### Possible post-visit activities

**For students working at Levels 2–4 of the curriculum**

#### Thinking back

- Individually or in groups, create a drawing or a mind map of a particular part of the Te Papa programme – what you most remember or were most interested in. (Teachers: If necessary, use prompts to guide your students – Earth’s structure, tectonic plates, earthquakes, volcanoes.)
  How can we prepare?

- As a class, consider ‘So what?’ and ‘Now what?’ Has the Te Papa programme answered your questions about how our Earth works? What questions do you still have? What could you do next to find the answers?

**For students working at Level 3–4 of the curriculum**

#### Earthquake watch

- Choose two or three countries that experience earthquakes, and monitor their earthquakes over a week or a month. Compare their frequency with that of earthquakes in New Zealand. Record the locations and magnitudes on a world map. As an extension for numeracy, graph the results. Use your findings to decide which parts of the world experience the most earthquakes.

- Find out about the latest earthquakes in the world on the website of the United States Geological Survey (USGS).
  

**For students working at Level 4 of the curriculum**

#### 3-D Earth
Create your own 3-D model of the Earth’s core. Search for the following YouTube videos, which show one way to make a 3-D model.

www.youtube.com

- ‘Ben Holt – Mrs Kepner cutting ball for Model of Interior of Earth Project Part 1’
- ‘Ben Holt – Mrs Kepner & Model Earth Project Part 2’

Research

Investigate natural forces at work around the planet. The BBC science website is an excellent starting point for images, information, and film clips on the Earth’s surface and interior, as well as historical tectonic and volcanic events. Explore in particular the ‘Surface & interior’ topic.

www.bbc.co.uk/science/earth
**Supporting material**

### Online resources

- **Te Papa** [www.tepapa.govt.nz/Education/OnlineResources](http://www.tepapa.govt.nz/Education/OnlineResources)
  Access the *Awesome Forces* teacher resource on the Te Papa website for more information on the exhibition and activity ideas to use with your students.

- **Collections Online, Te Papa** [www.collections.tepapa.govt.nz](http://www.collections.tepapa.govt.nz)
  Search for ‘Earthquakes’ and ‘Volcanoes’ on Collections Online to see images of past earthquakes and volcanic eruptions in New Zealand and overseas, and to learn about their impact.

- **GNS Science** [www.gns.cri.nz/Home/Learning/Lesson-Plans](http://www.gns.cri.nz/Home/Learning/Lesson-Plans) and [www.gns.cri.nz/Home/Learning/Science-Topics](http://www.gns.cri.nz/Home/Learning/Science-Topics)
  The GNS Science website includes education resources on the Earth sciences and how to prepare for events such as earthquakes and volcanic eruptions.

  This Civil Defence website has lots of helpful tips on how to be prepared for an earthquake and what to do if an earthquake strikes.

- **What's the Plan, Stan?** [www.whatstheplanstan.govt.nz](http://www.whatstheplanstan.govt.nz)
  This website helps teachers and students understand what causes natural hazards and how to be prepared for when they happen.

  TKI contains useful resources for supporting students after an earthquake.

  ‘Active Earth’ is a National Geographic article on the Earth’s inner workings.

  Check out fact sheets, games, and resources on geology.

- **This Dynamic Planet** [http://volcano.si.edu/tdpmap/](http://volcano.si.edu/tdpmap/)
  Interactive world map of volcanoes, earthquakes, impact craters, and plate tectonics

- **Christchurch Quake Map** [http://www.christchurchquakemap.co.nz/](http://www.christchurchquakemap.co.nz/)
  An interactive map that illustrates the magnitude and depth of the all the earthquakes around Christchurch since September 2010.

  QuakeStories is a place where you can tell your stories (or read others' stories) about the earthquakes of September 2010 and February 2011 and their aftershocks. There are also photos that have been shared to tell stories as well.