Science for families

Earth & space sciences

Exploring Australian earthquakes

Yrs 5 - 6

At least 40 mins | **General stationery** | **Low to medium level of supervison** | **Not applicable** | **Internet access is *required***

Preparation

- Print/ copy the task sheets OR create a version on A4 paper or on a scrapbook.
- Create a database of reliable website and videos for students to refer to *(optional)*.

Purpose

- To analyse numerical and factual information about the measurement of earthquakes.
- To explore, research and prepare an assignment related to an Australian earthquake.

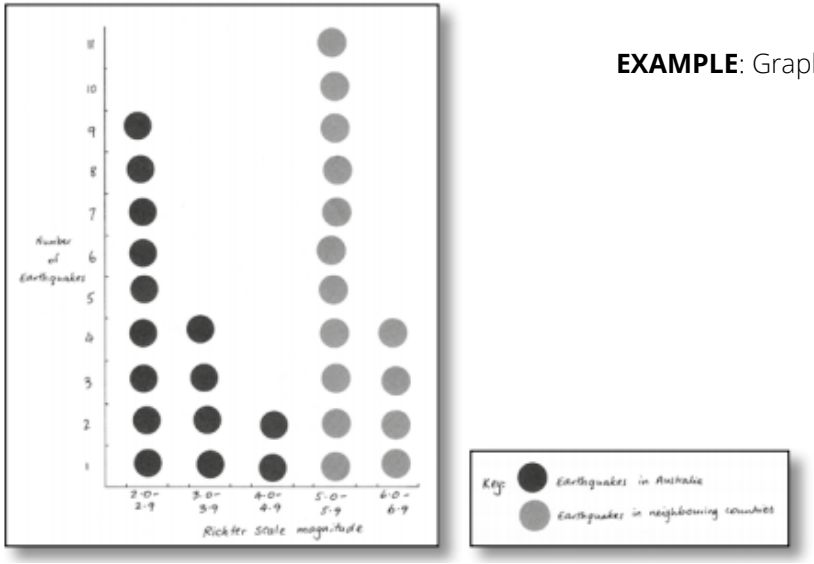
Description

1. Students read factual texts to gather information about earthquakes, create summaries and a glossary of terms.
2. Students analyse numerical data to create a table and graph.
3. Students research an Australian earthquake, prepare a summary using a planner, present and report their research.

EXAMPLE: Suggestions for creating a glossary. You may wish to use the format shown below.

Term	Description	Examples, drawings, notes, links
Richter scale	A measuring system that measure the strength or magnitude of an earthquake.	Video explaining the Richter scale by Bill Nye the Science Guy. https://www.youtube.com/watch?v=1qbg7orb1lc

Earthquake magnitude and frequency recorded in Australia and neighbouring countries



EXAMPLE: Graphing sample

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Before the task

- Support students to set up a glossary – either in hard copy or digitally.
- Discuss what students think they know about earthquakes.
- Read *'Earthquake hits Newcastle: Eyewitness account'* - a factual recount (Task sheet 1).
- Share thoughts, reflections and questions about the text.
- Ask students to complete the task sheet *'Newcastle earthquake summary'* (Task sheet 2).
- Explain next steps, noting these are written for students.

Next steps - student guidelines

1. Read about earthquakes from Geoscience Australia: https://www.ga.gov.au/scientific-topics/community-safety/earthquake, use the information to create a glossary in a notebook or journal for the following terms: earthquake, seismologist, Richter scale, seismometer, magnitude, intensity and Modified Mercalli scale.
2. Read *'Earthquakes around the world'* (Task resource 3) and complete the questions. Add any terms to the glossary.
3. Review *'Earthquake information: 24-29 June 2017'* (Task resource 4) and complete the graphing activities.
4. Research an Australian earthquake using information from this site: https://geoscience-au.maps.arcgis.com/apps/MapSeries/index.html?appid=72ad590cc9364e41b06907406bb7712e; add notes to the *'Earthquake presentation planner'* (Task sheet 5) to create a summary. You may wish to research other sites too. If you do, keep a record of where you obtain information.
5. Present the research as a PPT, poster, infographic, video or written report, using technology as appropriate.
6. Submit your task sheets and research to your teacher.

Explore some more

Science

- Research scientists who have been involved in the development of the Richter scale and Modified Mercalli scale.
- Read more about earthquakes on the Academy of Science website: https://www.science.org.au/curious/earth-environment/what-causes-earthquake and https://www.science.org.au/curious/earth-environment/understanding-earthquake-hazard
- Explore earthquakes through games, videos and more on ABC Education https://education.abc.net.au/home#!/search/Earthquakes//

Mathematics

- Explore data and graphs that show earthquake activity in other countries https://www.statista.com/statistics/269648/number-of-earthquakes-by-country/. Represent data using a chart.
- Calculate the mode, mean and median for earthquake data for Australia and neighbouring countries.

History

- Identify and locate a range of relevant sources about other natural disasters, for example, volcanoes and tsunamis.

SAFETY

There are no specific safety requirements for this task.

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Name:	Date:

Task resource 1

Earthquake hits Newcastle: Eyewitness account

On Thursday 28 December 1989, an earthquake hit the city of Newcastle. Eyewitness reports from the area have estimated that the area shook for around five seconds and caused extensive damage to buildings in the area.

Local authorities have confirmed that over 40,000 buildings have been damaged or destroyed. Shopkeepers and residents have been shocked by the damage caused, with many buildings showing signs of minor damage and others with severe damage. Some residents stated that their neighbourhoods looked like a cyclone had hit it but most tuned into local radio stations to find out the real cause of the destruction.

One shopkeeper was saddened to report that most of the damage seemed to be to older buildings, some of which were over 100 years old, with a long history in the community.

A resident has told how she was talking to a friend and all of a sudden felt the ground shaking with glassware and crockery rattling and falling off the shelves. Other residents have commented on how cracks started to appear in the walls of their homes.

Despite the extensive damage to buildings, major infrastructure, such as railway tracks and telephone lines were not badly damaged.

A local seismologist has reported that the earthquake measured 5.6 on the Richter scale. He has also commented that Australia experiences strong earthquakes like these around every 18 months but they rarely happen in populated areas and have little effect on people and communities. Because this particular earthquake hit a city with buildings and infrastructure, it was estimated to have caused about $4 billion damage.

Members of nearby towns have reported to have felt the shaking, with scientists confirming that the shaking was felt up to 600 kilometres away from the epicentre of the earthquake.

Damage to the Newcastle Workers' Club after the 1989 earthquake.
Photo courtesy of the Newcastle Region Library (ID 046 000544).

Name:	Date:

Task resource 2

Newcastle earthquake summary

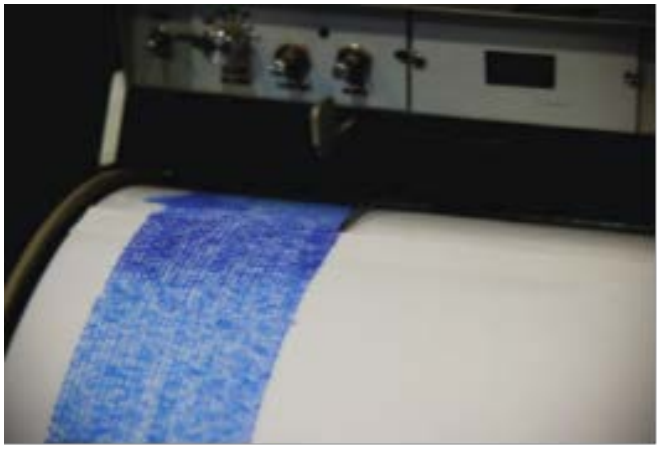
What happened?	What damage was caused?	Where did it happen?
Do you think the earthquake was strong?	**When did it happen?**	**How might people know the earthquake was strong or not?**
Who did it affect?	**What could be used to measure the strength of the earthquake?**	**Why did it happen?**

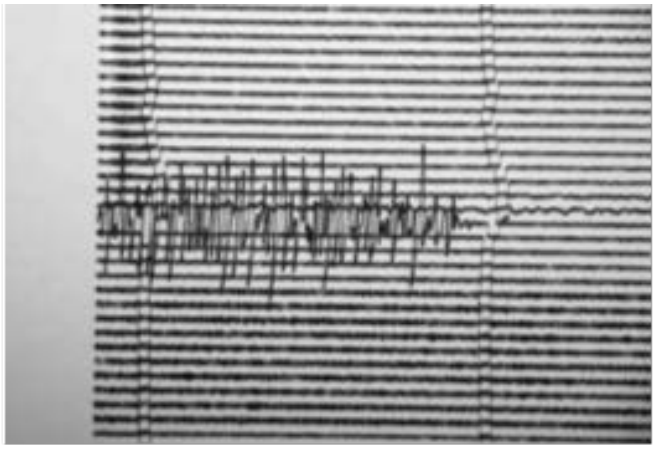
Name:	Date:

Task resource 3

Earthquakes around the world

Scientists measure the magnitude of earthquakes using an instrument called a ‘seismometer’. This instrument allows scientists to work out the size of an earthquake by recording ground movement and vibrations caused by the earthquake. These recordings are called ‘seismograms’.





left: **Seisometer**, right: **Seismogram**
Images courtesy of Geoscience Australia

The magnitude of an earthquake is measured on a scale called the Richter scale, designed by Charles Richter in 1935.
A low value on the Richter scale means the surface of the Earth did not move very much.
A high value on the Richter scale means there was a great deal of movement.

Earthquakes recorded around the world

How big? (Richter scale)	How often? (approximately)
Bigger than 10	Never recorded
10	Very rare–Once every 20 years
9	1 every year
8	18 every year
7	120 every year
6	800 every year
5	6,200 every year
4	49,000 every year
3	365,000 every year
Less than 2 (microquakes)	2,920,000 every year

Source: **http://en.wikipedia.org/wiki/Richter_scale** (modified from US Geological Survey)

Name:	Date:

Task resource 3 (continued)

Earthquakes around the world

Use the information to answer the following questions:

1. How many earthquakes bigger than 9 on the Richter scale occur every year?

2. How many earthquakes measuring between 6 and 9 on the Richter scale occur every year?

3. How might a 7 or 8 Richter scale earthquake affect a city or other built-up area?

4. How might the same size earthquake affect an uninhabited area, for example, a desert?

Name:	Date:

Task resource 4

Earthquake information: 24–29 June 2017

Earthquake magnitude (Richter scale)	Australia
2.5	Australia (SA)
3.2	Australia (SA)
2.9	Australia (WA)
1.5	Australia (NSW)
2	Australia (NSW)
1.9	Australia (NSW)
1.5	Australia (NSW)
1.6	Australia (NSW)
2.7	Australia (NSW)
1.8	Australia (WA)

Earthquake magnitude (Richter scale)	Neighbouring countries
5.4	Papua New Guinea
5.1	Philippines
5.8	New Zealand
6.4	New Zealand
5.1	Molucca Sea
4.9	Indonesia
5.2	Fiji Islands
5	Timor Region
5.9	Fiji Islands
4.5	Indonesia

Source: www.ga.gov.au/earthquakes

Name:	Date:

Task resource 4 (continued)

Graphing activities

1. Use the information to complete the table (the third row/interval is done for you)

Richter scale magnitude	Number of earthquakes	
Interval	Australia	Neighbouring countries
2.0 – 2.9		
3.0 – 3.9		
4.0 – 4.9	0	2
5.0 – 5.9		
6.0 – 6.9		

2. Use the table to create a column graph that shows the total number of earthquakes (vertical or Y axis) for each Richter scale interval (horizontal or X axis).
You may wish to use Excel or a suitable program to generate your graph or the grid below.

Name:	Date:

Task resource 5

Earthquake presentation planner

1. Research an Australian earthquake using information from this site: https://geoscience-au.maps.arcgis.com/apps/MapSeries/index.html?appid=72ad590cc9364e41b06907406bb7712e; add notes to the task sheet (RS 13) to create a summary. You may wish to research other sites too. If you do, keep a record of where you obtain information on this task sheet 'other information sources'.
2. Present your research as a PPT, poster, infographic, video or written report.
3. Submit your task sheets and research to your teacher.

What happened?	**Where did it happen?**	**When did it happen?**

What was the Richter scale reading?	**What was the Modified Mercalli scale level?**	**Who was affected?**

Describe the damage caused.	**What could have caused the earthquake?**

Other information sources: