Teacher lesson plan
Years 7 & 8
QuakeSafe

Please note:

The following teacher lesson plans utilise computer technology. If you are unable to access this technology, we have provided a package of support materials that will assist you still to complete the lessons, and are identified below.

Lesson 1

What is an earthquake? Why do they occur? What should people do if there is an earthquake? How can we be prepared? What to do during and after an earthquake. What should an emergency plan and kit include?

Outline	Materials	Time	Conclusion
To cover earthquakes, how they happen and where they occur, how to be prepared and what to do during an earthquake.	▪ A video/TV screen ▪ An overhead projector/smartboard ▪ Computers/iPads for students (they can work individually or in small groups) ▪ White board ▪ Students exercise books ▪ Writing materials *Optional* Photocopy for each student or pair/group ▪ *Support material #1: Task cards*	1 hour	Students will develop their understanding of earthquakes, how they occur, how they are measured, what to do before, during and after an earthquake.

Introduction

15 minutes

- Engage students in earthquakes by asking them if they know where large earthquakes have occurred. They might remember the New Zealand earthquake in 2011 or the recent earthquakes in Victoria. The largest earthquake recorded occurred in Chile in 1960, which was a magnitude 9.5 and caused a tsunami. The damage bill was $540 million Australian.

- As a class, watch the national geographic video http://video.nationalgeographic.com.au/video/environment/environment-natural-disasters/earthquakes/earthquake-101 (*2.38 minutes in duration*) that provides information on earthquakes. In the video, information is provided about the earthquake in Alaska, this is the second largest earthquake in recorded history.

- Revise the information from the video. How do earthquakes occur? How are earthquakes measured? Do all earthquakes cause damage? Is something being done to prevent damage during an earthquake?

- **Extension activity:** If time permits, watch this additional video created by Melbourne University which provides further information about earthquakes, the movement of plates, Australia's situation and the building of earthquake proof buildings, http://museumvictoria.com.au/melbournemuseum/discoverycentre/dynamic-earth/videos/earthquakes-and-their-impact-/ (*2.38 minutes in duration*).

Activity 25 minutes

- On the board, write the following headings: **tectonic plates, seismograph, magnitude, aftershocks, tremors, tsunami, earthquake, emergency plan and kit** and **what to do during and after an earthquake.** Explain to students that they will be split up into eight groups and each group will be given a topic about earthquakes to research. They will have 25 minutes to research and become experts about their topic. After their research, they will report back to the class.
- Provide each group with the task card (see *Support material #1: Task cards*). On the task card are questions to guide their research. They are able to find out extra information if time permits.

Conclusion 20 minutes

- Each group gets a chance to present their findings. As groups present, encourage students to make observations about the facts they are hearing, such as 'This is a fact I did not know' or 'That fact relates to my topic because…'
- Once each group has presented, as a whole class go through how earthquakes work, drawing from what has just been learnt and presented. Reflect on how much has been learnt during the hour.

Extension idea

- As tectonic plates move, the countries on the plates move. Australia is moving northward 5.6 cm a year. Students can research the rate at which different countries are moving and calculate how long it will take the country to join up with another country.

Lesson 2

Where do earthquakes happen? What are the areas that are prone to earthquakes?

Outline	Materials	Time	Conclusion
To research where earthquakes occur and learn more about tectonic plates.	▪ An overhead projector/smartboard ▪ Computers/iPads for students (they can work individually or in small groups) ▪ Writing materials ***Optional*** Photocopy for each student or pair/group of students: ▪ *Support material #2: World map* ▪ *Support material #3: Tectonic plates*	1 hour	Students will research and draw the tectonic plates that cover the earth and identify countries that are likely/less likely to have earthquakes.

Introduction — 10 minutes

- Revise what was learnt and discussed in **Lesson 1: What is an earthquake?** Revise how earthquakes occur. Ask the group that research tectonic plates to remind everyone what tectonic plates are and how they can cause earthquakes.
- As a class, watch http://www.teachersdomain.org/asset/ess05_vid_plateintro/ (2.22 *minutes in duration*) a short video that provides further explanation about tectonic plates and how they move.

Activity — 35 minutes

- Students are given a map of the world (please see *Support material #2: World map*). Students are to research tectonic plates on the internet and fill in the tectonic plates on their world map. They are to list countries that are likely to have earthquakes (situated close to borders of multiple tectonic plates) and countries that are less likely to have earthquakes (not situated near the edges of tectonic plates).

  There can be a lot of websites that are difficult to see the tectonic plates, and may be confusing for students. Here is a website that has a clear map with the tectonic plates if you wish to direct students towards it: http://www.worldatlas.com/aatlas/infopage/tectonic.htm (please also see *Support material #3: Tectonic plates* for a copy).

  http://earthquake.usgs.gov/earthquakes/map
  This website shows the plate outline and recent earthquakes. If you demonstrate how to change the settings to show the last 30 days, it becomes clear that quakes happen on the tectonic boundaries.
- If students finish early, direct them to the Earthquakes @ Geoscience Australia, http://www.ga.gov.au/earthquakes. This website provides a map of Australia and surrounding region which provides information where earthquakes have occurred in the last seven days and their size.

Conclusion

15 minutes

- On the overhead projector/smartboard show the tectonic plates on the Worldatlas website or use *Support material #3.*
- On the white board/smartboard draw two columns.
  - Column #1: Countries that are likely to have earthquakes.
  - Column #2: Countries that are less likely to have earthquakes.

  Ask students to come to the front and write down a country in one of the columns (remind them to not write a country that is already up). As countries are written up, look at the map to confirm.
- Reflect on what it might be like to live in the countries that are likely to have earthquakes.

Extension ideas

- Students have learnt about earthquakes, how they are caused, effects they can have and how to be prepared. They can write a newspaper article, pretending a large earthquake has hit Victoria. In their newspaper article, they are to include details of why the earthquake occurred, what magnitude it was, the damage it caused, why it is unusual for Australia to be hit by large earthquakes and provide information of how to be prepared in case there is another earthquake.
- Subduction zones are areas where tectonic plates move under each other during the movement process. Earthquakes, tsunamis and volcanoes can occur above subduction zones. Students can research subduction zones, where they have occurred and the consequences.

Support material #1

Task cards

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1. Tectonic plates

- What are tectonic plates?
- Can you find a map of the tectonic plates around the earth?
- What countries are located between two tectonic plates?
- What happens when tectonic plates move?

2. Seismograph

- What does a seismograph record?
  What does a seismograph look like?
- Is it possible to create your own seismograph?

3. Magnitude

- How are earthquakes measured? Can you find out what small earthquakes that are undetectable to humans measure?
- What do large earthquakes that cause damage measure?

4. Aftershocks

- What are aftershocks?
- Why do they occur?
- Can aftershocks cause damage?

5. Tremors

- What is an earth tremor?
- How would you describe it?
- Can they be different sizes?
- Do they cause damage?

6. Tsunami

- What is the definition of a tsunami earthquake?
- What causes tsunami earthquakes?
- Can you find some examples of tsunami earthquakes that have occurred in the past?

7. Emergency plan and kit

- Look at http://www.ses.vic.gov.au/prepare/quakesafe and find out information about creating an emergency plan and kit.
- What is needed in the plan and kit?
- How can you be prepared?

8. What to do during and after an earthquake

- Look at http://www.ses.vic.gov.au/prepare/quakesafe and find out information on what to do during an earthquake. What should you do if you are indoors or outdoors? What might happen after an earthquake and what precautions should you take?

Support material #2

World map

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Support material #3

Tectonic plates

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Tectonic plates

The crust of our planet is cracked into seven large and many other smaller slabs of rock called tectonic plates, averaging about 80 km thick. As they move (only inches per year), and depending on the direction of that movement, they collide, forming deep ocean trenches, mountains, volcanoes, and generating earthquakes.