

WHAT'S ON OUR PLATES?

EXPLORE OUR ACTIVE PLATE BOUNDARY

MODULE

5

Understanding our Shaky Landscape

EARTHQUAKE ANATOMY

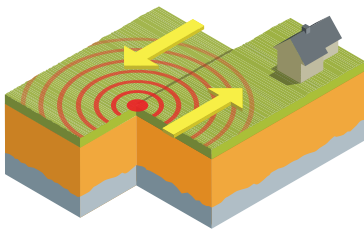
On average how many earthquakes are recorded every year in Aotearoa New Zealand? (circle one)

1,500 5,000 15,000 20,000 35,000

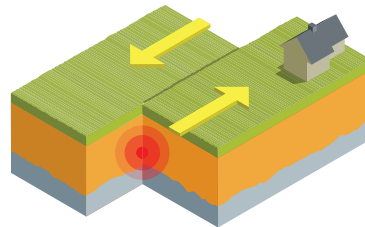
DID YOU KNOW?

On average, GeoNet record 50-80 earthquakes every day across Aotearoa New Zealand!

Thankfully you won't have felt them all due to a few different factors, that we'll explore here.

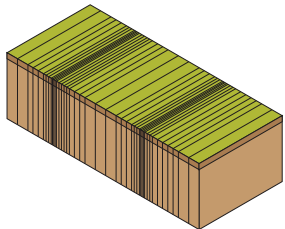


The location an earthquake first reaches the surface is called the _____.



Earthquakes can begin at different depths underground.

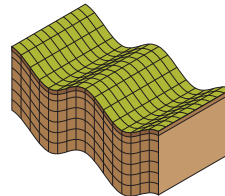
The point underground where the earthquake begins is called the _____.



P (or _____) waves are usually the _____ sign of an earthquake they

travel at approx _____ km an hour .

You can sometimes _____ a P wave.

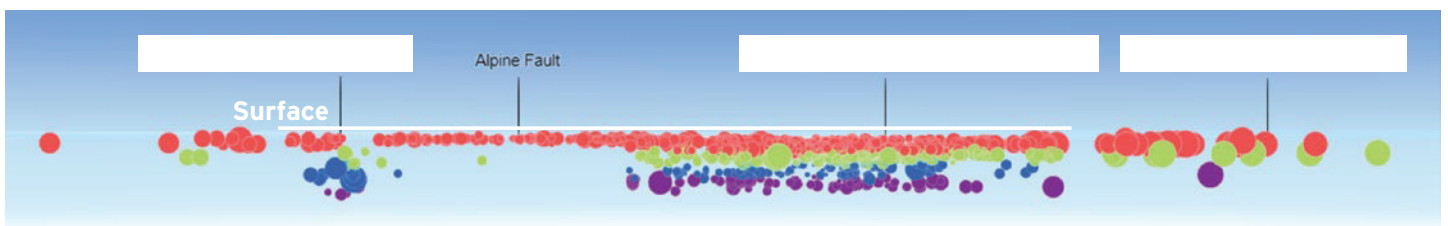


S (or _____) waves come _____ P waves, traveling slower at approx

_____ km an hour.

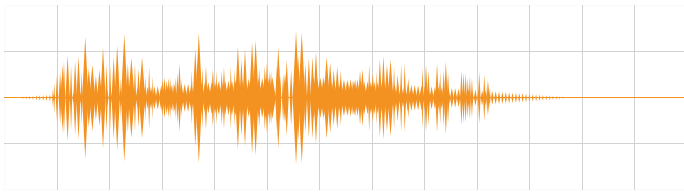
You can sometimes _____ an S wave rolling side to side.

Below is a cross section showing the depths of Aotearoa's earthquakes over a two month period. Each coloured dot marks the origin and depth of an earthquake. The bigger the dot the larger the earthquake. **Knowing that deeper earthquakes happen in subduction zones can you name these three trenches?**



● 0-25km below surface ● 25-50km below surface ● 50-75km below surface ● 75-100km below surface

MEASURING MAGNITUDE



Fill in the blanks:

Magnitude measures the _____ released at the source of the earthquake. And helps us to understand the **size** of an earthquake.

The magnitude scale is **logarithmic**. This means each level of magnitude up the scale releases _____ times more energy than the last.

FILL IN THE BLANK

A magnitude **6** earthquake releases times more energy than a magnitude **5**

Can you work out how much more energy a magnitude 7 earthquake releases compared to a magnitude 5? (circle one)

- 2 10 32 42 1024 5024 times

HELPFUL HINT
Need help figuring out how much bigger one earthquake is compared to another? Check out: www.earthquake.usgs.gov/education/calculator.php

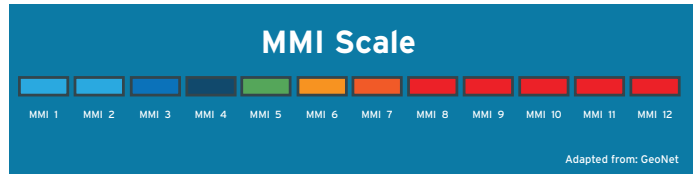
INTENSITY IMPACTS

Intensity measures the _____ of shaking produced by the earthquake at a certain location.

We measure earthquake intensity using the **MMI Scale**.

What does MMI stand for?

M _____ M _____ I _____



The higher the number on the scale the _____ the shaking is in a certain location.

What are the four key factors that impact how we feel an earthquake? (circle four)

- MAGNITUDE
- WEATHER
- DISTANCE FROM EPICENTRE
- SEASON
- COASTAL
- GEOLOGICAL CONDITIONS
- INLAND
- DEPTH

MODELLING INTENSITY

Scientists use modelling to help us understand how future earthquakes are likely to feel so we can prepare for them.

A magnitude 8 earthquake on the **Alpine Fault** is likely to generate shaking intensities between MMI _____ and MMI _____.

"A magnitude 8.9 earthquake on the **Hikurangi subduction zone** is likely to generate shaking intensities between MMI _____ and MMI _____.

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EXTENSION CHALLENGES
FOR EXPERTS

GeoNet's **Strong Motion tool** records the shaking produced by earthquakes measuring **magnitude 4 and above** from many points (Strong Motion Stations) all over the country.

Each station captures the time and magnitude of shaking which is then used to determine the epicentre of the earthquake.

The pinpoint in the middle of each circle on the map represents a station. The circle indicates the likely distance away from the station that the epicentre could be for a particular earthquake. By overlaying the data from each station GeoNet can pinpoint the location of the earthquake's epicentre.

Using this data can you identify the epicentre of the earthquake?



Source: GeoNet

 To see all the data for this earthquake OR to use the **Strong Motion tool** for yourself visit:

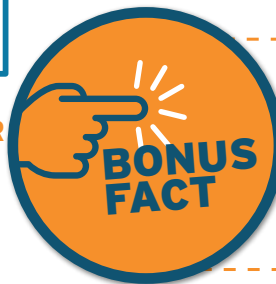
www.strongmotion.geonet.org.nz/#/event/3366146



Using the **New Zealand Active Faults Database** that maps all the active on-land faults (where an earthquake has occurred in the last 100,000 years). Can you name three faults in or near your province?

<https://data.gns.cri.nz/af/> 

1. _____
2. _____
3. _____



Did you know you can help GeoNet work out the intensity of an earthquake you feel? Go to: www.felt.geonet.org.nz/ or download the app to your phone.