

DETECTION DEVICE: Seismographs are equipped with electromagnetic sensors that translate ground motions into electrical charges.

Picture: iStock/Petrovichg

# ROCK 'n' ROLL

## The 'shaky' science of earthquakes in full focus

EARTHQUAKES have been in the news lately.

Do you know what causes them?

Have you ever heard of the lithosphere?

This is the rocky outer layer of the Earth.

The Earth has layers - the super-hot inner core, the outer core, the mantle and the crust.

The lithosphere is made up of the Earth's crust and the upper brittle portion of the mantle.

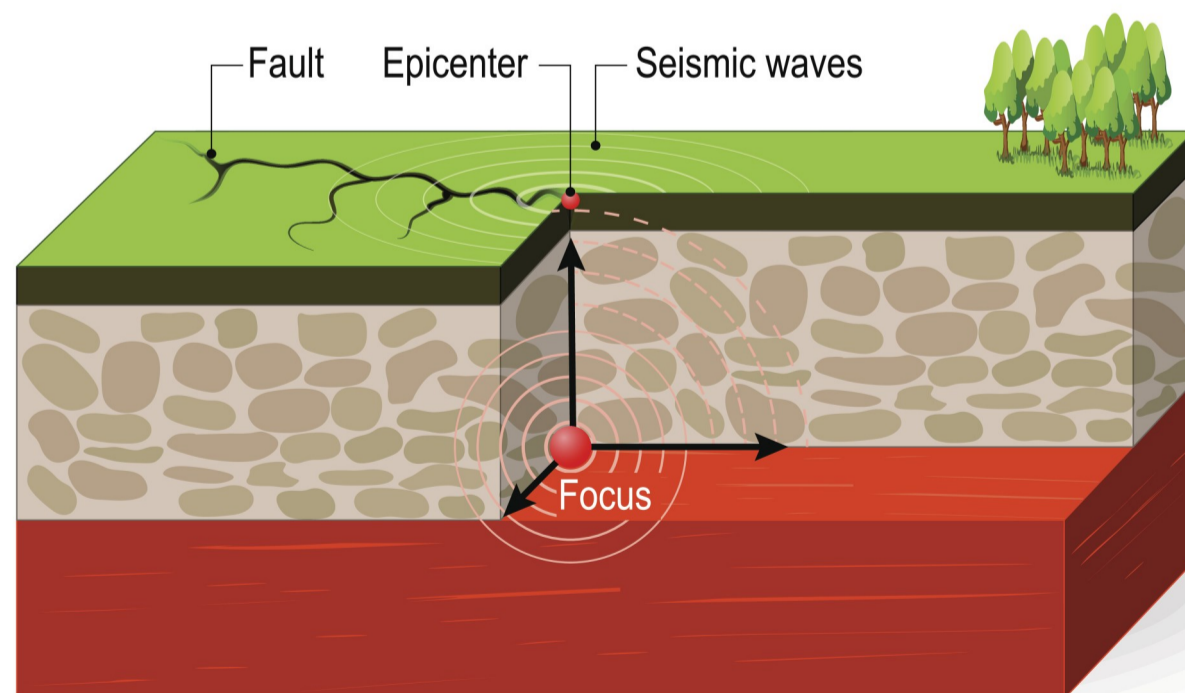
It is not the only 'sphere'.

All the water on Earth is known as the hydrosphere.

The cryosphere is the frozen water on Earth.

While the atmosphere is the air surrounding our planet.

Anyway, the lithosphere is divided into sections - a bit like a jigsaw puzzle - called tectonic plates, which move continuously



and slowly past one another. They are like massive slabs of concrete, grinding and colliding together.

This tectonic activity puts huge rocks at the edges of plates

under stress, and eventually they shift or break with great force.

When they break, the stress is released as waves of energy, known as seismic waves, that travel through the layers of the

Earth and along its surface. The result is an earthquake, and more than a million earthquakes shake areas of the world each year.

The focus, or hypocentre, of an

earthquake is the point where it originated within the Earth.

The point on the Earth's surface directly above the focus is called the epicentre.

The edges of the plates, or plate boundaries, are made up of many 'faults' - fractures between two blocks of rock, which can range in length from a few millimetres to thousands of kilometres.

The San Andreas Fault, in California, marks the boundary between the North America plate and the Pacific plate and can be viewed from space.

Tectonic activity is the source of not just earthquakes, but also volcanoes, and the creation of mountains and deep ocean trenches.

In fact the movement of tectonic plates formed the Andes and the Himalayas mountain ranges.

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# Quake proof towers

WE know there are some parts of the world which are exposed to more damaging earthquakes than Australia.

Our nearest neighbour New Zealand, for example,

In these locations, engineers have the very important task of designing buildings that are earthquake-proof, or at least earthquake resistant.

One technique they use to minimise damage is called 'base isolation'.

Base isolators are flexible bearings or pads placed between the floor of the building and the foundation to absorb the shock of an earthquake.

They work in a similar way to suspension in cars.

Many of the major buildings around the world, including the world's tallest, the Burj Khalifa in Dubai, include a range of sophisticated earthquake proof technologies.

But one very common construction technique to make structures stronger is the use of trusses.

The Eiffel Tower, right, is a famous example.

A truss is a series of connected triangles.

Triangles are strong because if you apply pressure to one edge the force is evenly distributed to the other two sides

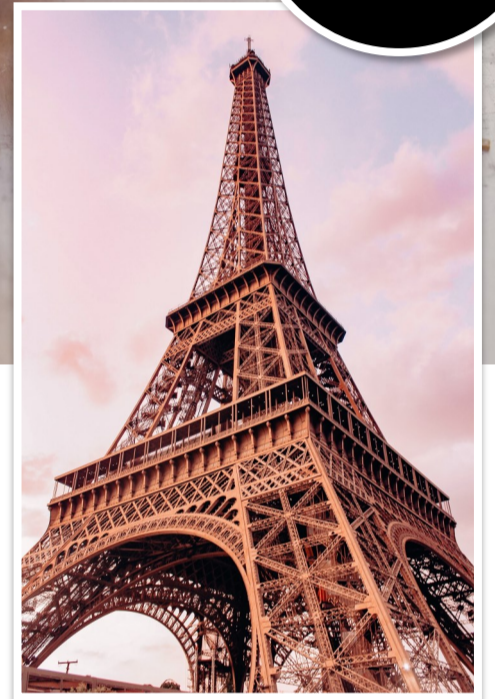
You have probably travelled on a truss bridge.

Next time you are travelling over a bridge, or just passing by a large structure, you might like to look for triangles.



Picture: iStock/ ThitareeSarmkasat

The Eiffel Tower contains 16 trusses and 186 triangles.



**Your challenge** is to build an earthquake-proof tower made only from pieces of spaghetti and marshmallows.

You will also need a quake table - a solid foundation you can attach your tower to and give a good shake around.

A clipboard, or a thin piece of MDF or plywood will work well.

You can also use tape to connect your tower to the board.

If your tower topples, you will just have to console yourself by eating marshmallows.

Children's University Tasmania members can earn stamps in their passports for this challenge, at the discretion of their school coordinator.

## The science behind earthquake activity

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The magnitude (size or extent of) an earthquake is measured by a machine called a seismograph.

An earthquake's strength is measured on what is called the Richter scale.

The Richter scale goes from 1-10, but each increase of one on the Richter scale means the earthquake is actually 10 times more powerful.

The largest earthquake ever recorded on Earth was in Bio-Bio, Chile, in 1960, and measured 9.5.

The largest ever recorded on the Australian continent was at Tennant Creek, in the Northern Territory, and had a magnitude of 6.6.

We do have earthquakes in Tasmania. Thankfully they are usually so small we don't even feel them.

A 5.9 magnitude earthquake near Mansfield, Victoria, on September 22 this year, was felt by people in Launceston.

A significant earthquake 'swarm' was recorded in the late 1800s, with the epicentre east of Flinders Island, and some damage was recorded to buildings in Launceston.

An earthquake measuring 8.1 on the Richter scale, with an epicentre 400 kilometres from Macquarie Island, occurred on December 23, 2004, and was felt in Tasmania.

But because it occurred 10 kilometres below sea level, even scientists on Macquarie Island barely noticed it.

Scientists at the Institute for Marine and Antarctic Studies, at the University of Tasmania, are monitoring earthquake activity and studying the geological structure of Macquarie Island, by mapping the seafloor and deploying ocean bottom seismometers.

If you ever feel an earthquake you can help Geoscience Australia's research by reporting it: [earthquakes.ga.gov.au](http://earthquakes.ga.gov.au)

## SPOT THE DIFFERENCE

There are seven small differences between the first red uakari picture and the second one. See if you can spot them. The solution is below.



**SOLUTION:** 1. Tail changed, 2. Fur on elbow missing, 3. Finger missing, 4. Mouth changed, 5. Vine missing at top left, 6. Part of tree at left missing, 7. Leaf at bottom changed.

### DID YOU KNOW?

Red uakaris live high in the trees in tropical rainforests in Peru and Brazil. Fruit is their favourite food, but they also eat nuts, leaves, and insects.