

Earthquakes

Earthquakes are caused by the release of built-up pressure inside the Earth's crust, in the form of **seismic waves**. An earthquake's power is measured on the Richter scale, using an instrument called a seismometer.

The effects of an earthquake can be devastating: destroying settlements, changing landscapes, and causing many deaths.

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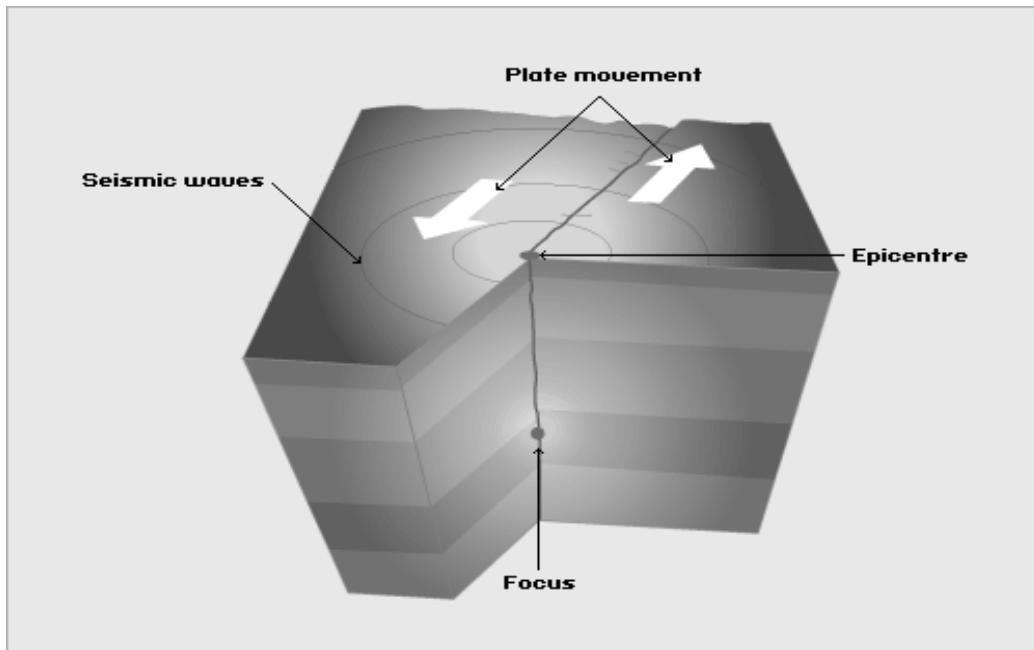
The Causes of Earthquakes

An **earthquake** is the shaking and vibration of the crust due to movement of the Earth's plates (plate tectonics). Earthquakes can happen along any type of plate boundary.

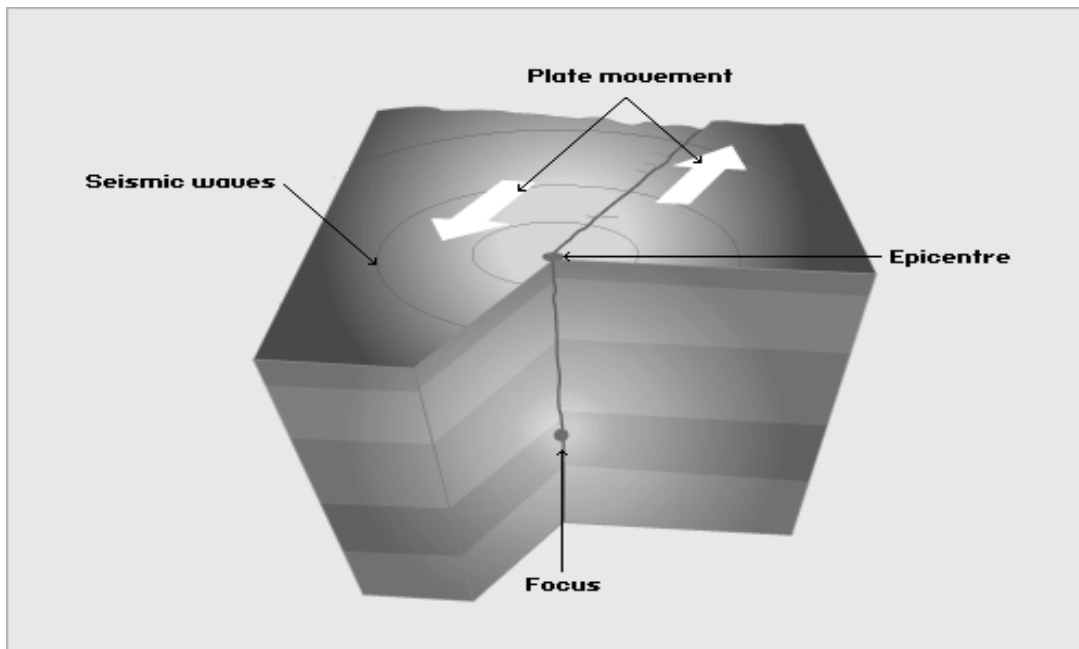
Earthquakes are caused when the tension is released from inside the crust. This happens because plates do not move smoothly - sometimes they get stuck. When this happens a great deal of pressure builds up. When this pressure is eventually released, an earthquake tends to occur.

The point inside the Earth's crust where the pressure is released is called the **focus**. The point above the focus, on the Earth's surface is called the **epicentre**.

In an earthquake, energy is released in the form of waves. These are called **seismic waves**. The waves spread out from the focus. The strongest waves are found near the centre of the earthquake. This means that the most severe damage caused by an earthquake will happen close to the epicentre.



The diagram above illustrates how the movement of two plates at the plate boundary creates pressure deep inside the Earth. This is the focus. This pressure travels up to the Earth's crust and escapes at the epicentre of the earthquake. The pressure, released at the epicentre, travels outwards in all directions in rings (seismic waves). The waves are felt .



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most strongly at the epicentre, becoming less strong as they travel further away

Measurement of Earthquakes



Aftermath of the Kobe earthquake of 1995. It measured 6.9 on the Richter scale.

The power of an earthquake is measured using a **seismometer**. A seismometer is a sensitive machine, which picks up the vibrations caused by the earthquake. It plots these vibrations on a seismograph.

The strength, or magnitude, of an earthquake is measured using a scale called the **Richter Scale**. The Richter Scale is numbered 0-10:

- An earthquake measuring one or two on the scale is very common and can happen everyday in places like San Francisco. These earthquakes are so small that they can only be picked up by a seismometer: people cannot feel them.
- An earthquake measuring around seven or eight on the Richter Scale can be devastating, e.g. the earthquake in Turkey of 1999 which measured 7.5 on the Richter scale.

Effects of an Earthquake



Earthquake destruction, Bhuj, India, 2001

The impact of a strong earthquake can be devastating. Earthquakes can destroy settlements and kill many people. **Aftershocks** can cause even more damage to an area. It is possible to classify the impacts of an earthquake, by taking the following factors into account:

- short-term (immediate) impacts
- long-term impacts
- social impacts (the impact on people)
- economic impacts (the impact on the wealth of an area)
- environmental impacts (the impact on the landscape)

	Social impacts	Economic impacts	Environmental impacts
Short-term (immediate) impacts	<p>People may be killed or injured. Homes may be destroyed. Essential services may be disrupted. Transport and communication links are disrupted. Water pipes may burst and water supplies may be contaminated.</p>	<p>Shops and business are destroyed. Looting may take place. Transport and communication systems are disrupted and so trade is not easy.</p>	<p>The built landscape is destroyed. Fires spread due to gas pipe explosions. Fires can damage areas of woodland. Landslides may occur. Tsunamis may cause flooding in coastal areas.</p>
Long-term impacts	<p>Disease may spread. People may have to be re-housed,</p>	<p>The cost of rebuilding a settlement is high. Investment in the</p>	<p>Important natural and human landmarks may be lost.</p>

	Social impacts	Economic impacts	Environmental impacts
	sometimes in refugee camps.	area is focused only on repairing the damage caused by the earthquake. Income is lost.	

Case study: The Niigata earthquake

On the 23rd of October 2004, Japan suffered a series of powerful earthquakes. Japan experiences regular earthquakes, however these were some of the most powerful in the past 10 years.

On this occasion, three major earthquakes took place within minutes of each other. These three earthquakes were followed by around 300 aftershocks. The aftershocks went on for at least 12 hours. The first earthquake was the most powerful and measured 6.8 on the Richter scale.

The earthquakes took place in the region of Niigata, in northwest Japan.

Japan is found on the boundary between the Eurasian plate and the Philippine plate. It is a destructive boundary as the Philippine plate is forced underneath the Eurasian plate. As the plates move, they often get stuck. As the plates jolt free of each other, tension is released - causing earthquakes.

