

# EARTHQUAKES

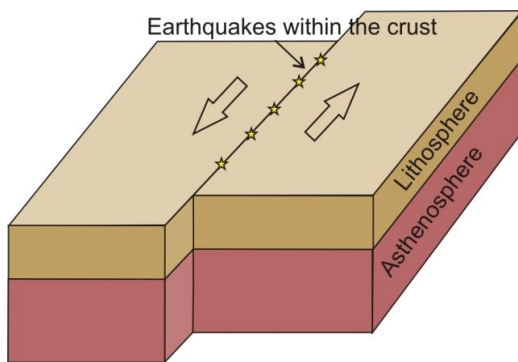


These are photos taken after an earthquake in Kent in 2007. Every year, between 200 and 300 earthquakes are detected in the UK by the British Geological Society. You can check how many earthquakes have occurred in the last month at [http://www.earthquakes.bgs.ac.uk/earthquakes/recent\\_uk\\_event\\_s.html](http://www.earthquakes.bgs.ac.uk/earthquakes/recent_uk_event_s.html) - you may be surprised!

What is an earthquake? An earthquake is simply a vibration of the Earth's crust. Every thirty seconds there is an earthquake somewhere in the world. Some earthquakes are barely detected while others cause immense damage and loss of life.

**Where do earthquakes occur?** Like volcanoes, earthquakes mostly occur along plate boundaries. As we know the plates are not motionless but move across the mantle.

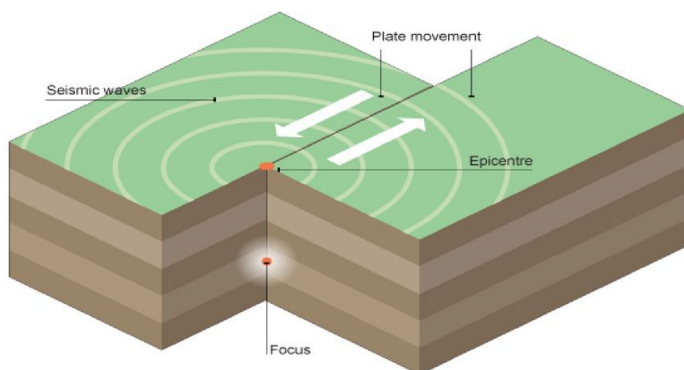
At constructive plate boundaries two plates move apart from each other, and as they do so molten rock bubbles up between the plates and then hardens to form new crust.



Earthquakes are also very common at transform plate boundaries. Here, rather than moving apart or towards each other, the two plates move past each other. Friction may cause them to stick, but when they eventually become unstuck, often with a violent jolt, it can cause an earthquake.

## The Focus and Epicentre

### Structure of an Earthquake



The focus of an earthquake is the point deep underground where the earthquake begins. The epicentre is the point on the Earth's surface that is immediately above the focus. When the earthquake is triggered by the jolting of tectonic plates, shock waves

(called seismic waves) immediately spread out in all directions from the focus. They spread for many kilometres, but their

intensity reduces with distance; the closer to the epicentre, the greater the impact of the seismic waves.

### **How is the power of an earthquake measured?**

The 'power' or strength of an earthquake is called its magnitude. The Richter scale is a measurement of the magnitude of an earthquake. Earthquakes with the highest magnitude have a measurement on the Richter scale of 9. Not all earthquakes can be felt by people on the ground, earthquakes with a magnitude of less than 3 are so faint that they can only be detected by seismographs (a type of measuring and recording instrument). Earthquakes with magnitudes of 5 cause cracks to appear in walls and bricks to fall. With a magnitude of 9, an earthquake is a severe, often catastrophic event. An earthquake of this scale will cause widespread destruction and leave many people injured or dead.

**Can earthquakes be predicted?** Although it is known that most earthquakes occur at the plate boundaries, there is no reliable method of predicting the exact time, place or magnitude of an earthquake. This means it is hard to evacuate an area prior to an earthquake and instead a lot of effort has been put into ensuring that new buildings are constructed to withstand an earthquake; that people know what to do in the event of an earthquake and that warning systems are in place.

### **The San Andreas Fault**

The San Andreas Fault marks the boundary between two tectonic plates: The Pacific plate and the North American plate. This is a transform plate boundary; the Pacific plate (on the west) moves in a north westerly direction, relative to the North American plate (on the east). This causes earthquakes along the

fault. The entire San Andreas Fault is 1287 km long (800 miles) and reaches to depths of 16 km (10 miles). In places the Fault is 1.5 km wide (1 mile). The San Andreas Fault extends from northern California (on the west coast of USA) southwards to Cajon Pass near San Bernardino. From Cajon Pass the main San Andreas Fault branches into smaller fault lines.



**The 1906 San Francisco earthquake:** Thousands of small earthquakes occur in California each year. Large, highly destructive earthquakes, however, occur on average once every 100-150 years along the Fault. The San Francisco earthquake of April 18, 1906 was the most recent of these. It is estimated to



have had a magnitude of 8.3 on the Richter scale and lasted for one minute. It resulted from a displacement, or movement, of the Fault by 6 metres. Damage was caused by both the earthquake and by the fire that swept through the city afterwards. Nearly eight square kilometres and 28 000 buildings were destroyed resulting in millions of dollars in damage. Seven-hundred people were killed and thousands were left homeless.

**The 1989 Loma Prieta earthquake:** A segment of the San Andreas Fault ruptured under the Loma Prieta peak in the Santa Cruz Mountains, northern California. The earthquake, with a magnitude of 6.9 on the Richter scale lifted the mountains themselves and then sent seismic waves 16km away from the epicentre, towards the city of Santa Cruz. When the seismic waves reached San Francisco, the upper deck of a section of Oakland's Interstate 880 collapsed. More than 40 slabs of concrete, each weighing 500 tonnes, fell onto the cars below. In San Francisco's Marina district mud and sand was shaken to form viscose liquid that acted like quicksand and caused buildings to become unstable and collapse. In total 28 000 homes and businesses were destroyed, 3 800 people were injured and 63 people died.

Visit <https://earthquake.usgs.gov/earthquakes/map/> for an up to the hour map of earthquakes on the west coast of the USA.

### Your Task:

We would like you to devise a board game - it could be like monopoly, snakes and ladders or any other game you like playing. To progress in the game, players should answer questions about earthquakes correctly. An incorrect answer

could send a player back a few spaces or require a challenge question.

Make your design eye-catching with pictures, diagrams and/or maps that are linked to the topic!

For a further challenge, you could add in 'community chest' type questions that are trickier or you could make the decorations more geographically detailed! We would love to see any pictures of your designs.