



What causes earthquakes?

KS2

KS3

Ages 7-14 ⏰ 3 min read

The Earth's surface isn't one solid piece. It's cracked, like the shell of a hard-boiled egg, into about 15 major chunks called **tectonic plates**. These plates float on the mantle and are always moving — just incredibly slowly. On average, they drift a few centimetres per year. About the same speed as your fingernails grow.

But they can't always move freely. Where two plates meet, they push against each other, slide alongside each other, or one dives under the other. The rock at these boundary zones gets locked under enormous stress — building up like a compressed spring for years, decades, or centuries.

Press your hands together flat and try to slide them past each other slowly. Your palms are the tectonic plates. If you press hard enough, they don't slide — friction locks them in place. The pressure builds. Then suddenly, they slip — a sudden jolt. That's an earthquake. The energy released in that slip travels through the rock as waves, shaking everything it passes through.

What are seismic waves?

The energy of an earthquake spreads out from the point of rupture (called the **focus**, or hypocenter) as waves through the rock. There are different types: P-waves travel fastest and push through rock like a compression; S-waves arrive next and shake rock side to side; surface waves arrive last but cause the most damage because they travel along the surface. It's these surface waves that topple buildings.

How do we measure them?

The **Richter scale** (and the more modern moment magnitude scale) measures the energy released. Each whole number up represents about 32 times more energy — so a magnitude 7 earthquake releases 32 times the energy of a magnitude 6, and over 1,000 times the energy of a magnitude 5. A magnitude 9 (like the 2011 Japanese earthquake) releases more energy than all earthquakes in a typical year combined.

Can we predict them?

Not reliably, despite a lot of research. We know *where* earthquakes are likely — at plate boundaries, along known fault lines. But predicting *when* one will happen is still beyond us. The physics of when stressed rock will suddenly slip is too complex and variable. Earthquake preparedness — strong buildings, evacuation plans, warning systems — is currently more effective than trying to predict them.