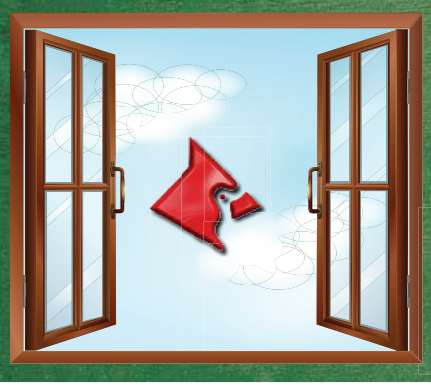
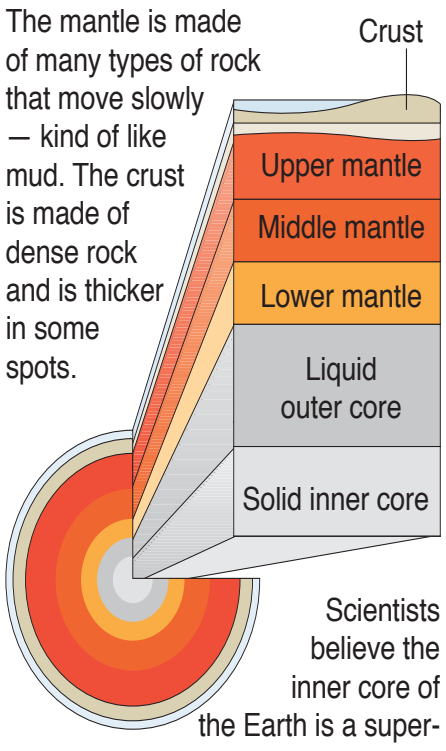


Opening The Windows Of Curiosity

WORLD OF WONDER

Exploring the realms of history, science, nature and technology

TECTONIC PLATES



Ancient people believed that angry gods caused earthquakes and volcanoes. Today we know that these violent reactions are caused by extreme forces under the Earth's crust. Under the Earth's land and water is a layer of rock called tectonic plates. These plates drift on top of a layer of partially melted rock. Their movements can cause the Earth to shake.

Who figured it out?

In 1923, German scientist **Alfred Wegener** proposed that the continents were moving. At the time, geologists around the world denounced his theory. But in the mid 1950s, scientists discovered the **Mid-Atlantic ridge** and some very young volcanic rock on the ocean floor. This discovery suggested that the Earth was indeed on the move. Plate movement explains how identical rocks and species can be found on different continents and how sea creature fossils can be found on the tops of mountains.

Earthquakes

Earthquakes happen when tectonic plates rub together. The stress between two plates builds until the rocks crack or slip, which causes vibrations called **seismic waves** in the Earth's crust. This break usually happens deep underground and is called the **hypocenter** or **focus.** The surface directly above the focus is called the **epicenter**.

Millions of earthquakes happen every year, but only a few are strong enough and near enough to the surface to cause serious damage. Earthquakes near populated areas can cause buildings to fall and roads to crack apart.

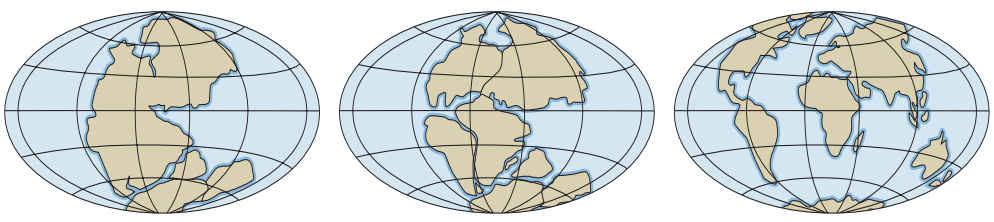
Earthquakes under the ocean can cause giant waves called **tsunamis**. Some of these waves grow more than 100 feet (30 m) high and are very destructive if they reach land.

The future

Some scientists believe that parts of California will eventually sink or move north. It is possible that millions of years from now Africa may break into a series of many islands.

The evolution of the continents

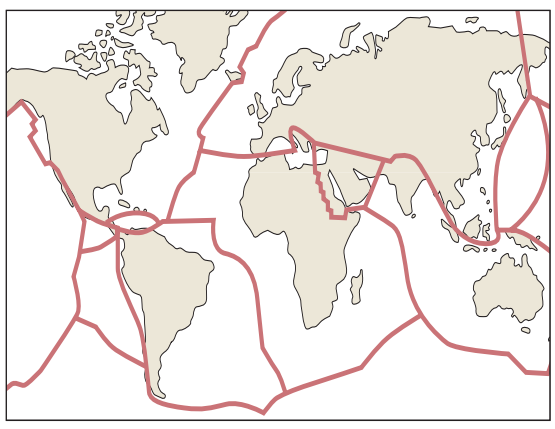
When looking at a map of the world, have you ever noticed that parts of the continents seem to match like pieces in a jigsaw puzzle? Scientists believe that this is because millions of years ago the continents were one giant land mass.



250 million years ago | 130 million years ago | Today

Tectonic plates

The Earth's crust is broken into sections called **tectonic plates**. These plates float on the molten rock of the outer mantle. There are seven major plates and many smaller plates. They bang into each other and scrape against each other. Every year, the plates drift about 1 to 7 inches.



Where the plates meet is called a **fault line**. Earthquakes and volcanic activity are more common along faults. The pressure of two plates pushing against each other eventually builds to the point where the Earth buckles, breaks open or explodes, spewing molten rock.

Shake, rattle and roll: What's happening down there?

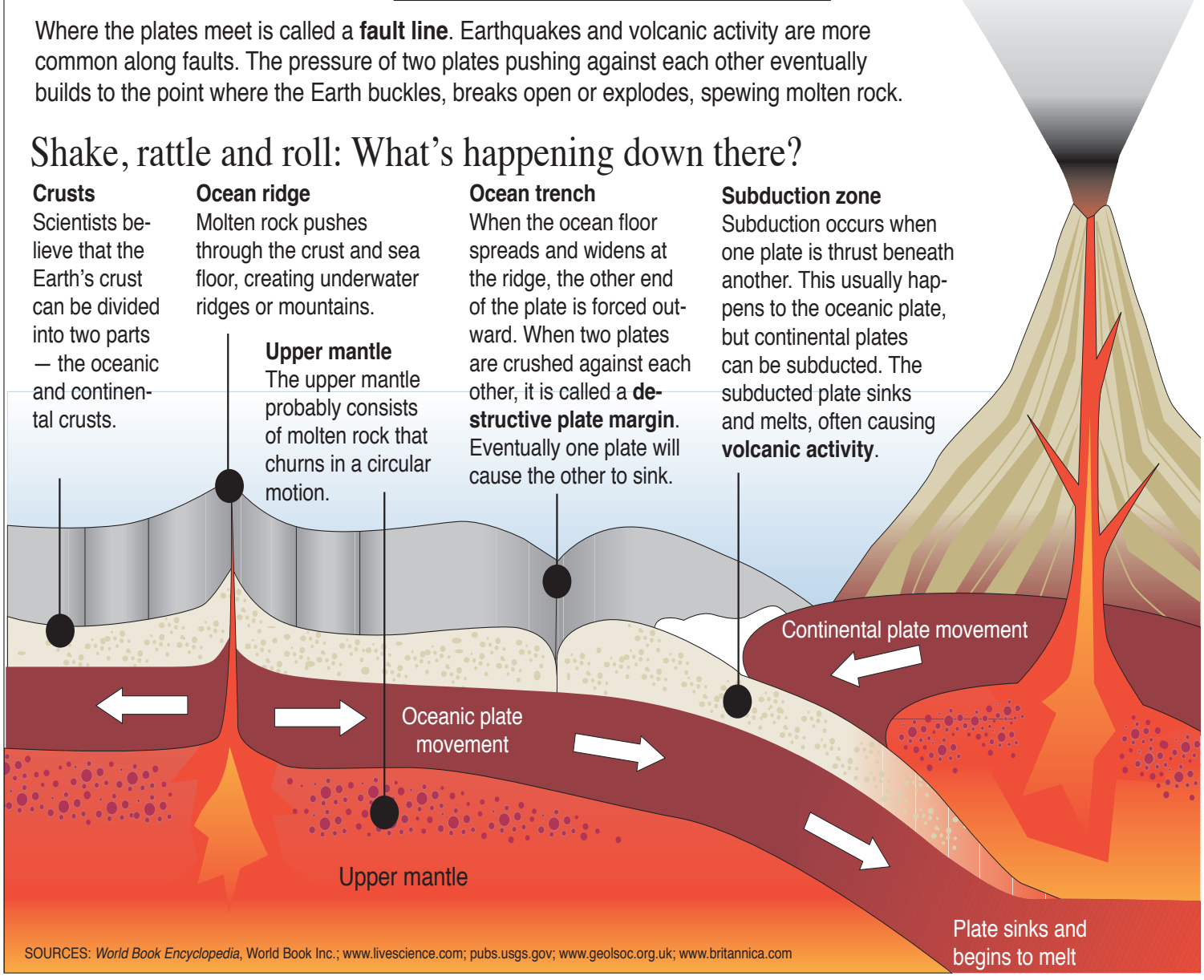
Crusts
Scientists believe that the Earth's crust can be divided into two parts — the oceanic and continental crusts.

Ocean ridge
Molten rock pushes through the crust and sea floor, creating underwater ridges or mountains.

Upper mantle
The upper mantle probably consists of molten rock that churns in a circular motion.

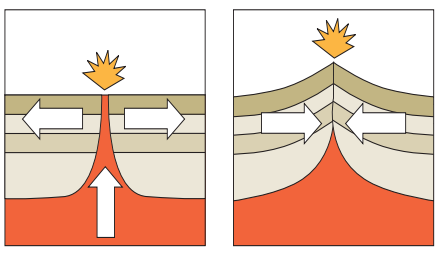
Ocean trench
When the ocean floor spreads and widens at the ridge, the other end of the plate is forced outward. When two plates are crushed against each other, it is called a **destructive plate margin**. Eventually one plate will cause the other to sink.

Subduction zone
Subduction occurs when one plate is thrust beneath another. This usually happens to the oceanic plate, but continental plates can be subducted. The subducted plate sinks and melts, often causing **volcanic activity**.



SOURCES: *World Book Encyclopedia*, World Book Inc.; www.livescience.com; pubs.usgs.gov; www.geolsoc.org.uk; www.britannica.com

Collision courses



Divergent plates move apart.

Convergent plates bump together.

Transform plates slide past or against each other.

Subduction happens at convergent boundaries.

Mountains

Mountains and hills begin under the ground, created by the pressure of tectonic plates colliding and shifting, forcing the surface and underground rocks upward. There are different kinds of mountains, each defined by how it was formed. Most mountains take millions of years to form.

Volcanoes

The word **volcano** comes from the Roman god of fire named Vulcan. Volcanoes are any opening or crack in the Earth's surface that molten rock (**lava**) escapes from.

Some volcanoes are **dormant** and unlikely to erupt. Others are considered **active** and might erupt. An **extinct** volcano will probably never erupt again.

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