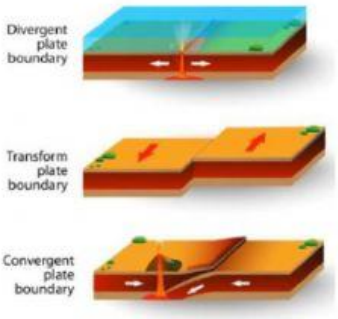
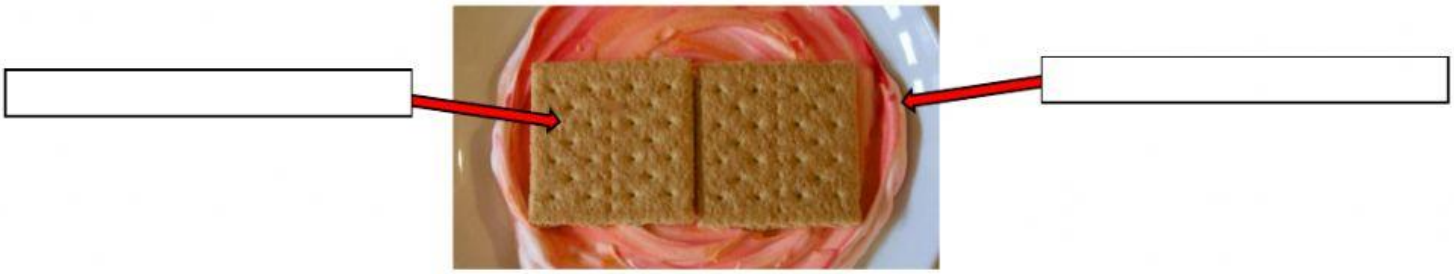
Explore: Will you crack under pressure?



The movement of tectonic plates is responsible for the formation of most of the continental and ocean-floor features on Earth. Each plate consists of a piece of crust lying on top of the upper portion of the mantle. This combination of portions of two layers of Earth is referred to as the lithosphere. The part of the mantle directly below the lithosphere is the asthenosphere, a solid with the property of plasticity meaning it can flow like putty.

1. Spread a heaping tablespoon of marshmallow fluff on the large cracker piece.
2. Cover the fluff with the two smaller cracker pieces.
3. The two small cracker pieces represent lithospheric plates of Earth. The marshmallow fluff represents the asthenosphere layer of Earth. Label the model below. Label the lithosphere and the asthenosphere.



4. Model plate movement at a **transform boundary** by sliding one cracker one direction and the other cracker in the opposite direction (↑ ↓).
    a. What do you feel as the sides of the crackers rub against each other as they slide over the fluff?
    _____
    b. What events may occur as a result of the plate movement? _____
5. Re-center the two smaller crackers.
6. Model plate movement at a **convergent boundary** by moving the two small graham crackers toward each other such that they form a small upside down "V" on top of the marshmallow fluff. (2 continental)
    a. What features may be formed by this plate movement? Record your ideas below.
    _____
7. Re-center the two smaller crackers.
8. Model plate movement of **divergent plates** by moving the two small crackers away from each other so that they are slightly separated on the marshmallow fluff.
    a. What features may be formed by this plate movement? Record your ideas below.
    _____
9. Re-center the two smaller crackers.
10. Model plate movement of **converging plates** once again, by moving your two small graham crackers toward each other again. This time push one graham cracker a little under the other graham cracker when they meet, so that one slightly overlaps the other. The prior model of converging plate movement modeled the meeting of two plates of continental crust, this model shows the collision of either continental crust and oceanic crust or two plates of oceanic crust.
    a. What features may be formed by this plate movement? Record your ideas below.
    _____

Check for understanding: Match the image with the correct terminology.

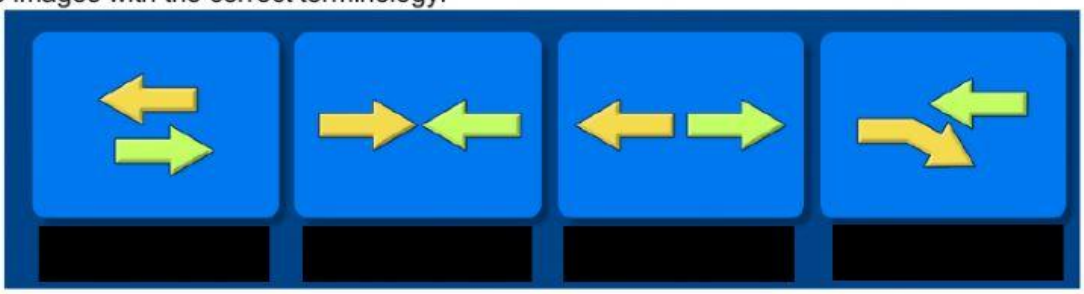
Before you begin match the images with the correct terminology.

Slip = Transform

Collision = Convergent

Spreading = Divergent

Subduction = Subduction



Explore: Are you smarter than a 5th Grader

What plate do we live on? _____

1906 San Francisco Earthquake

Which tectonic plate interaction caused this? _____

California has tens of thousands of earthquakes every year because it lies at the boundary of two tectonic plates. These two plates are slowly sliding past each other at a speed of about 5 centimeters (2 inches) every year.

This movement has formed the San Andreas Fault, a zone of deep cracks in Earth's crust that extends from northern to southern California. Almost all the earthquakes in California occur along the San Andreas Fault.1964 Alaska Earthquake

1980 Mount Saint Helens Eruption

Which tectonic plate interaction caused this? _____

Suddenly, the magma held deep inside the volcano was released. Hot gas, ash, and rocks exploded out of the volcano.

1964 Alaska Earthquake

Which tectonic plate interaction caused this? _____

This earthquake was caused by the slow steady push of the Pacific Plate under the North American Plate.

Hawaiian Islands

The Hawaiian Islands are actually volcanoes.

A hot spot is an intensely hot area in the mantle. Magma rises from the hot spot, forming a volcano at Earth's surface. As the tectonic plate moves over the hot spot, new volcanoes form.

The Hawaiian Islands are growing over a hot spot, an extremely hot zone in Earth's mantle. The hot spot causes magma to rise up through Earth's crust and form a volcano. As the volcanoes grow, they break above the surface of the ocean and become islands.

Mount Fuji

Which tectonic plate interaction caused this? _____

1999 Izmit Earthquake

Which tectonic plate interaction caused this? _____

Mount Kilimanjaro

Which tectonic plate interaction caused this? _____

The tallest mountain in Africa is actually a sleeping volcano. Most volcanoes form where tectonic plates meet. This is a very rare example of continental crust splitting. As the African Plate slowly separates, a deep crack or rift has been forming in Earth. Magma from Earth's mantle rises and fills in the crack to form new crust.

The Island of Iceland

Which tectonic plate interaction caused this? _____

Iceland is growing over a _____.

The island of Iceland was formed as a result of underwater volcanic eruptions along the Mid-Atlantic Ridge. The Mid-Atlantic Ridge is one of the longest volcanic chains in the world, but very few people have ever seen it. Along the Mid-Atlantic Ridge, the plates are spreading apart. Between the spreading plates, magma rises up from Earth's mantle to form volcanoes on the ocean floor. As the magma cools, it hardens to form new crust.

1960 Great Chilean Earthquake

Which tectonic plate interaction caused this? _____

Mount Etna (Italy)

Which tectonic plate interaction caused this? _____

Mount Everest (Nepal)

Which tectonic plate interaction caused this? _____

The tallest mountain in the world is still growing.

If two continental plates crash into each other, they'll crumple and fold. The crust is forced up, mountains form, and earthquakes happen.

Term	Prefix/suffix - meaning	Definition	Example	Not an example
Divergent boundary	Diverge – move apart			
Subduction	Sub – under/below Duction - guidance			
Convergent Boundary	Con –with/together Verge - border			
Transform boundary	Trans – across/over Form – shape			
Fault	----------			
Convection	Con – with Vec – to drive Tion – process			
Boundary	Bound – limit Ary- place			