

# What Causes Earthquakes?

## Chapter 1

**E**arthquakes are vibrations inside the Earth that follow the release of energy that has built up inside the rocks. Rocks fracturing, volcanoes erupting, and manmade explosions can release the energy stored in the rocks. The push and pull of tectonic plates causes rocks to bend as the pressure increases in rock segments. The strain in the rocks builds until they break and snap into a new position.

The breaking and realignment of the rocks generates seismic waves that can travel around the world. The most destructive earthquakes are created when there is sudden movement along large pieces of the Earth's crust.



Mission San Juan Bautista is located on the Pacific Plate in California. The man is looking to the east the North American Plate. The San Andreas Fault separates the two crustal plates. MLM

### Three types of tectonic plate boundaries

There are three types of tectonic plate boundaries. Ninety percent of the earthquakes on Earth occur at these boundaries.

- ❖ **Divergent boundaries** are areas where two plates are separating. Spreading ridges form where shallow earthquakes, usually of low magnitude, occur when magma is moving up into a rift zone.
- ❖ **Convergent boundaries** are places where two plates meet, and one slips beneath another. Subduction zones form when two plates converge. One plate bends downward and is forced beneath the other plate creating deep ocean

# Crustal Plate Boundaries

## Activity 1

### Introduction

The Earth's crustal plates contain continental crust and oceanic crust. The oceanic crust is about 5 km thick and heavier and denser than the continental crust. The lighter continental crust is up to 65 km thick.

Both types of crusts ride on the asthenosphere, the layer beneath the lithosphere that has relatively low viscosity and shear strength allowing the plates to move around the Earth's surface.

### Materials

- ◆ Pink frosting
- ◆ Fruit roll ups
- ◆ Graham crackers
- ◆ Wax paper
- ◆ Glass of water



Four crustal plate boundaries MLM

### Directions

#### Setting up the activity

1. The pink frosting represents the asthenosphere that can flow under pressure.
2. The fruit rollups represent the oceanic crust that is thin and dense.
3. The graham crackers represent the thicker and lighter continental crust.
4. Spread pink frosting on a piece of wax paper large enough to hold the four plate boundaries.

#### Divergent plate boundary (upper right corner of the picture)

1. Cut two rectangular pieces of fruit rollups for the oceanic crust.
2. Place the two rectangles next to each other on the frosting.
3. Press down lightly as you force them slightly apart.
4. The oceanic crust sinks slightly in the asthenosphere allowing molten rock to rise between the separating plates.
5. Notice how the frosting fills in the gap between the separating plates.
6. The pink frosting represents the newest igneous rocks on the Earth's surface.

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