

section 1 Forces Inside Earth

● Before You Read

Have you ever stretched a rubber band so far that it broke? On the lines below, tell why you think a rubber band breaks when it is stretched too much.

● Read to Learn

Earthquake Causes

Rubber bands are elastic so they can stretch and then return to their original shape. But if the rubber band is stretched too far, it will break. It has reached its elastic limit. Rocks also have an elastic limit. Forces in Earth bend or stretch rocks. Rocks can bend and stretch up to a point. But once a rock's elastic limit is passed, the rock breaks.

When rocks break in this way, they move along surfaces, or faults. A **fault** is the surface along which rocks move when they pass their elastic limit and break. A great deal of force is needed to move rocks along a fault. Rock on one side of a fault may move up, down, or sideways in relation to rock on the other side of the fault.

What causes faults?

The surface of Earth is in constant motion because of forces deep inside the planet. These forces cause sections of Earth's surface, called plates, to move. The movement puts stress on rocks near the edges of the plates. To relieve this stress, rocks bend, stretch, or compress. If the force is great enough, the rocks will break. An **earthquake** is the vibrations, or shaking, produced when rocks break along a fault.

What You'll Learn

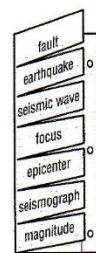
- how earthquakes result from buildup of energy
- how different types of faults form

Study Coach

Summarize As you read each paragraph, write a one or two sentence summary of its main idea.

FOLDABLES™

A Define Make a seven-tab foldable to help you remember the terms in this chapter.



What causes earthquakes to occur?

As rocks along a fault move past each other, the rough surfaces catch, or grind, to a temporary halt. However, the forces inside Earth are so strong, they do not let the rocks stop moving. The forces keep driving the rocks, and stress builds up along the fault. When the rocks are stressed beyond their elastic limit, they break, move along the fault, and then return to their original shapes. An earthquake results. Earthquakes may be small vibrations that no one notices. Or they may be enormous vibrations that cause a great deal of damage. No matter what their strength, most earthquakes result from rocks moving over, under, or past each other along fault surfaces.

Types of Faults

Three types of forces act on rocks—tension, compression, and shear. Tension is the force that pulls rocks apart. Compression is the force that squeezes rocks together. Shear is the force that causes rocks on either side of a fault to slide past each other. ✓

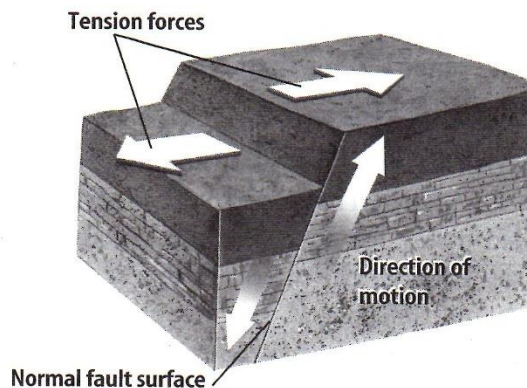
✓ Reading Check

1. **Identify** Name three types of forces that act on rocks.

What are normal faults?

Forces of tension inside Earth cause rocks to be pulled apart. When rocks are stretched by these forces, a normal fault can form. Along a **normal fault**, rocks are pulled apart, and the rock above the fault moves downward in relation to rock below the fault.

The figure below shows how rocks move along a normal fault. Arrows show where tension forces pull the rocks apart. Find the arrows that point out direction of motion. These arrows show how rock above the normal fault surface moves downward in relation to rock below the fault surface.



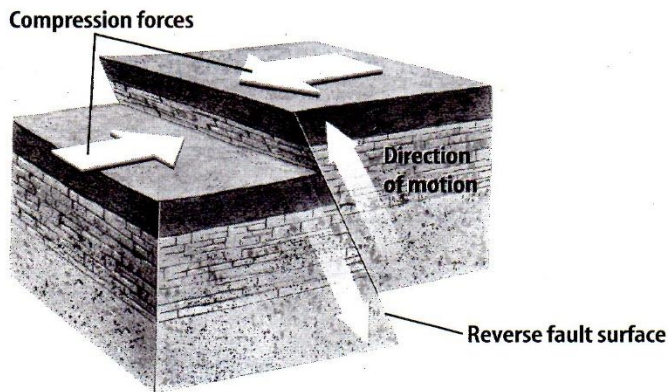
Picture This

2. **Identify** Trace over the arrows in the figure that show the direction that rock moves in a normal fault.

What are reverse faults?

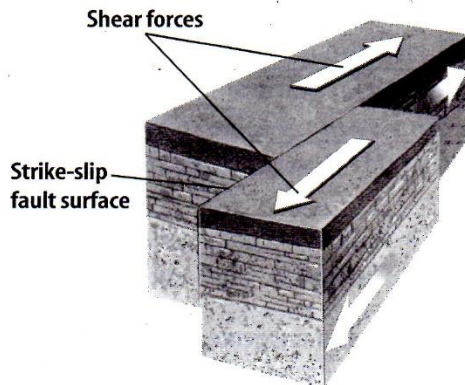
Some faults occur when forces of compression squeeze rocks together. In a **reverse fault**, rock breaks from forces of compression pushing on it from opposite directions. The force of compression along a reverse fault pushes the rock that is above the fault up and over the rock that is below the fault.

In the figure below, arrows show forces of compression pushing the rock together. The rock above the reverse fault surface moves upward in relation to the rock below the fault surface.



What are strike-slip faults?

In a **strike-slip fault**, rocks move past each other without much movement upward or downward. The figure below shows that shear forces push rocks past each other on either side of the strike-slip fault surface. The San Andreas Fault in California is a strike-slip fault that extends for more than 1,100 km through the state. The San Andreas Fault is the boundary between two of Earth's plates that are moving sideways past each other.



FOLDABLES™

B Classify Make a three-tab Foldable to record information about normal, reverse, and strike-slip faults.



Picture This

3. Compare Look at the diagrams of a reverse fault and a strike-slip fault. How does the direction of force differ in these two faults?

● After You Read

Mini Glossary

earthquake: vibrations, or shaking, produced when rocks break along a fault

fault: surface along which rocks move when they reach their elastic limit and break

normal fault: break in rock caused by tension forces where rock above the fault surface moves down in relation to rock below the fault surface

reverse fault: break in rock caused by compression forces where rock above the fault surface moves upward in relation to rock below the fault surface

strike-slip fault: break in rock caused by shear forces where rocks move past each other without much movement upward or downward

1. Review the terms and their definitions in the Mini Glossary. Then write a sentence that explains how earthquakes and faults are related. Use at least two terms in your sentence.

2. Write the correct term in each box.

Types of Faults

caused by shear forces

caused by tension forces

caused by forces of compression

3. How did summarizing the main idea in each paragraph help you understand the information in this section?

