

5-7 What are earthquakes?

Objectives

Explain what causes earthquakes. Describe what happens during an earthquake.

Key Terms

earthquake: sudden, strong movement of Earth's crust
focus (FOH-kuhs): point beneath Earth's surface where an earthquake starts
epicenter (EH-PIH-sehnt-uh): place on Earth's surface directly above the focus
seismic (SYZ-mihk) **wave:** earthquake wave
seismograph (SYZ-muh-graf): instrument that detects and measures earthquakes

Tremors and Shakes Earth's crust is always moving. However, most of the movements are so small that you do not even feel them. Movements of the crust that you may or may not feel are called tremors. There may be more than six million tremors each year. Sudden, strong, shaking movements of Earth's crust are called **earthquakes**. Earthquakes can cause a lot of damage.

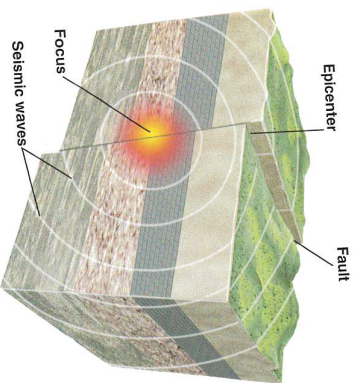
1 ▶ DEFINE: What is an earthquake?

Focus and Epicenter Earthquakes begin deep inside Earth's crust. The point beneath Earth's surface where an earthquake starts is called the **focus**. The place on Earth's surface that is directly above the focus is called the **epicenter**. The surface of Earth shakes the hardest at the epicenter.

2 ▶ DEFINE: What is the focus of an earthquake?

Cause of Earthquakes Earthquakes are associated with faulting. Usually, the rocks on both sides of a fault are squeezed together very tightly. However, they have no place to go. Geologists say that the fault is "locked." The pressure on the rocks increases. Eventually, the rocks break at their weakest point. Rocks first slip and move near the focus. As the rocks slip, they release energy in the form of waves, or vibrations. These vibrations are called **seismic waves**, or earthquake waves.

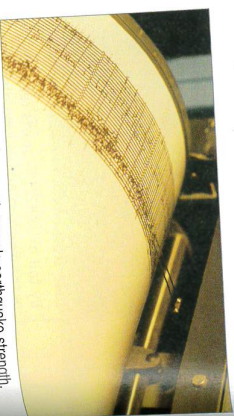
Seismic waves travel out from the focus in all directions. Imagine throwing a pebble into a pond. At the point where the pebble hits the water, waves move outward in all directions. Earthquake waves move out from the focus in the same way.



▶ Figure 5-24 Seismic waves travel from the focus in all directions.

3 ▶ NAME: What is the main cause of earthquakes?

Measuring Earthquakes A **seismograph** is an instrument that detects and measures earthquakes. A seismograph can even measure very small tremors that most people cannot feel. It records the movements in Earth's crust on a sheet of paper. This record is called a **seismogram**. The seismogram has wavy lines. The higher the wavy lines are on the seismogram, the stronger the earthquake.



▶ Figure 5-25 A seismograph records earthquake strength.

4 ▶ DESCRIBE: What is a seismograph?

✓ CHECKING CONCEPTS

1. What are small, often unfelt shifts of Earth's crust called?
2. What are strong, shaking movements of Earth's crust called?
3. Where does the ground shake the hardest during an earthquake?
4. How do the vibrations known as seismic waves travel?
5. What internal process causes most earthquakes?

THINKING CRITICALLY

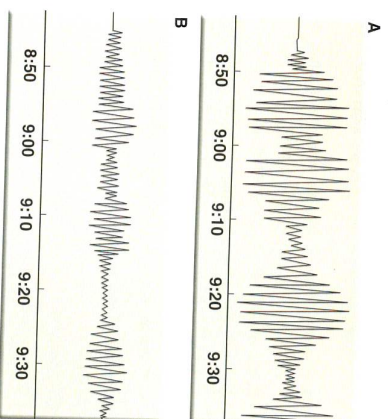
Explain the difference between the words in each of the following pairs.

6. focus, epicenter
7. earthquake, tremor
8. seismograph, seismogram

INTERPRETING VISUALS

Use Figure 5-26 below to answer the following questions.

9. **IDENTIFY:** What are diagrams A and B called?
10. **ANALYZE:** Which shows the stronger earthquake?



▶ Figure 5-26

People in Science SEISMOLOGIST

The study of earthquakes is a specialty in the field of Earth science. This specialty is called **seismology**. Earthquake scientists are known as **seismologists**.

Seismologists study areas of Earth's surface where earthquakes tend to occur. After an earthquake, seismologists will study the ground along the faults. When an earthquake occurred near San Francisco, California, in 1989, seismologists studied the San Andreas Fault. They wanted to learn more about how Earth's crust moves along the fault.

Seismologists collect a lot of data about earthquakes. They take measurements and examine the damage caused by earthquakes. They analyze seismograms, which are records of the movement of Earth during an earthquake. Using the data, seismologists can try to predict where earthquakes will most likely happen. They may even someday be able to find ways to prevent earthquakes.

Thinking Critically What can seismologists learn from studying the damage caused by an earthquake?



▶ Figure 5-27 A seismologist checks a seismogram.