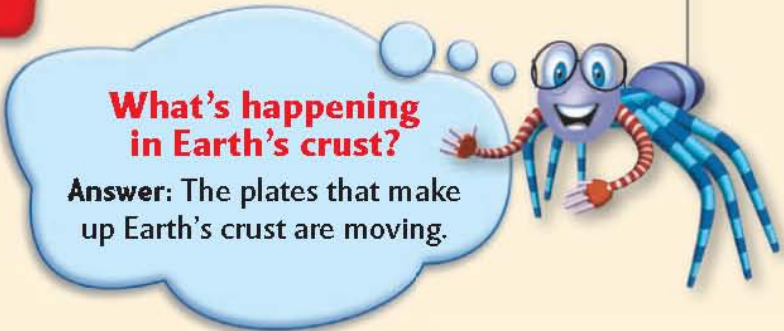


# Earth's Changing Crust

Student Edition,  
pp. 68-73




## 1 FOCUS

### Lesson Prep

#### Key Objectives

- Identify Earth's layers.
- Recognize that Earth's crust is separated into slowly moving plates.
- Describe features and events caused by plate movements.

#### Video Time

Total Running Time  10:59

VIDEO **A**  2:28

VIDEO **B**  2:18

VIDEO **C**  2:37

### VIDEO PREVIEW

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**VIDEO A** **Earth's Layers** **Main Idea** Scientists have divided Earth into many layers.

**VIDEO B** **Plate Movement** **Main Idea** Earth's crust is separated into plates that are moving.

**VIDEO C** **Volcanoes and Earthquakes** **Main Idea** Plate movements cause sudden and gradual changes.

### VOCABULARY PREVIEW

**Academic Vocabulary** Evidence is signs or proof of something. Evidence is used in the definition of the word *fault*. Ask students questions designed to help them find evidence of something. Is there any evidence that shows when it is time for lunch? (Yes, the lunch bell will ring, or stomachs may growl.)

### VIDEO Fun Fact!

Both the lowest and highest points on Earth were formed by plate movements. The Mariana Trench in the Pacific Ocean formed when one plate sank beneath another. It is about 11,000 meters deep. Mount Everest in the Himalayas formed when two plates collided. It is more than 8,840 meters high.

# 2 TEACH

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## VIDEO A Earth's Layers 2:28

- **Identify** the layers of Earth's atmosphere. The atmosphere is divided into several layers based mainly on differences in temperature. Most weather occurs in the troposphere. The stratosphere contains ozone, which protects life on Earth from the sun's harmful UV rays.
- **Describe** the hydrosphere. The hydrosphere includes oceans, rivers, lakes, streams, glaciers, and groundwater.
- **Describe** Earth's structure. The lithosphere, which includes the crust and the upper mantle, is the outer layer of Earth. The asthenosphere is the fluid part of the mantle; it is located above the inner mantle. Beneath the mantle is Earth's core. It is divided into a molten outer core and a solid inner core. The fluid nature of Earth's structure below the crust is an important concept students need in order to understand the next two segments.

Lesson 1 Video A: Earth's Layers

### Understanding Key Concepts

Name \_\_\_\_\_ Date \_\_\_\_\_

**Skill Focus: Comparing and Contrasting**

Comparing means thinking about how things are alike.  
Contrasting means thinking about how things are different.

**After Watching the Video**

Use what you learned from the video to fill in the chart below.  
Write a word or phrase that applies to each segment.

Earth's Layer	State of matter	What it's made of	Examples
Atmosphere	gas		
Hydrosphere			oceans, rivers
Lithosphere		rock	

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**Teacher's Resource Book, p. 57**

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## VIDEO B Plate Movement 2:18

- **Recognize** that Earth's crust is divided into plates that move continuously. Note that this theory is *not* the same as continental drift. Make sure that students realize that plates are not just landmasses.
- **Explain** why Earth's plates move. Plate movement is caused by convection currents deep within the mantle. Convection currents form when hot material in the mantle rises and then cools and sinks in an ongoing cycle that powers plate movement.
- **Discuss** how plate movement affects Earth's surface. The three types of plate boundaries are:
  - Divergent - plates moving away from each other
  - Convergent - plates moving toward each other
  - Transform - plates sliding past each other
 Plate movement causes the following to form: mountains, volcanoes, earthquakes, and land and ocean ridges.

Lesson 1 Video B: Plate Movement

### Understanding Key Concepts

Name \_\_\_\_\_ Date \_\_\_\_\_

**Skill Focus: Inferring**

When you infer, you think about what you observe and what you know. Then you put them together to make a new idea.

**After Watching the Video**

Use the scientific observations below and what you learned from the video to make an inference.

Observation: Plates on Earth are constantly moving.	+	What You Know	=	Inference
Observation: The mantle near the core heats up.	+	What You Know	=	Inference
Observation: South America and Africa have similar fossils and rock formations.	+	What You Know	=	Inference

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## VIDEO C Volcanoes and Earthquakes ▶ 2:37

- **Model** plate movements. Show how divergent, convergent, and transform plate actions occur.
- **Relate** faults and earthquakes to pressure within Earth. When plates grind against one another, the rocks may break or shift abruptly. This abrupt movement causes an earthquake.
- **Relate** earthquakes and volcanoes to plate movements. Earthquakes and volcanoes are most common along plate boundaries such as the Ring of Fire in the Pacific Ocean.
- **Recognize** the magnitude of damage caused by natural hazards, such as the tsunami that occurred in December of 2004.

Lesson 1 of 2: C. Volcanoes and Earthquakes

### Understanding Key Concepts

Name \_\_\_\_\_ Date \_\_\_\_\_

**Still Spoken? Taking Notes**

Taking notes means writing down what you learn from a video. Help you use the information.

**After Watching the Video**

In the left column, write the main ideas from the video. In the right column, list some important details about each main idea.

Main Idea	Details
Plate movement causes gradual change and sudden changes.	<ul style="list-style-type: none"> <li>• A sufficient evidence of movement.</li> <li>• Earthquake is a fault when earthquakes.</li> <li>• A tsunami is a wave caused by an undersea earthquake.</li> </ul>

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## Differentiated Instruction Options

### Enrichment

#### Convection Research

Tell students that Earth's mantle is not the only place where convection occurs. Explain that convection also occurs in Earth's atmosphere and that it affects weather. Have interested students do further research on convection in Earth's atmosphere and report their findings to the class. (For instance: What kind of weather does convection cause?; What is the Coriolis effect?; What are the global wind belts?)

#### Materials:

- library or Internet access

### Remediation

#### Layers T-Chart

Direct students to make a three column chart with the headings Earth, Water, and Air. Have them list the vocabulary words under the correct heading. Challenge them to also classify these words from Lesson 1: *troposphere, stratosphere, mesosphere, ionosphere, thermosphere, exosphere, asthenosphere, crust, upper mantle, inner mantle, outer core, and inner core*. Tell students they can use the T-chart to help them study for tests.

#### Materials:

- paper
- pencils

### Activities for All

#### Travelogue


Tell students to imagine that scientists have invented a vehicle in which people can travel safely to Earth's core. Have them write a description of what they would see, hear, and feel as they moved through Earth toward the core. Tell them to use the vocabulary words *lithosphere, plate, and fault* in their descriptions, as well as other words from the lesson. Have students record their travelogues on an audio recorder so they can practice saying the vocabulary words.

#### Materials:

- tape recorder

# 3 ASSESS

## Wrap Up

**Informal Assessment**  Ask students to infer what is happening to the plates along the San Andreas Fault. Point out the location of the fault on a map of California.

**Answer:** The San Andreas Fault occurs along a transform plate boundary. The plates are sliding past one another.



Play *MindJogger Interactive Lesson Review Game*

## Vocabulary Review

Lesson 1: Earth's Changing Crust  
**Building Your Science Vocabulary**

Name \_\_\_\_\_ Date \_\_\_\_\_

**New Vocabulary**

**atmosphere:** a mixture of gases that surrounds Earth

**fault:** a crack in Earth's crust whose sides show evidence of movement

**hydrosphere:** Earth's water, including oceans, lakes, rivers, underground water, and glaciers

**lithosphere:** the hard outer layer of Earth, about 100 km thick

**plate:** one of the slowly moving pieces of Earth's broken crust

**tsunami:** a giant ocean wave caused by an undersea earthquake

**Academic Vocabulary**  
Something that helps you form a conclusion or make a judgment; an abbreviation for kilometer

**Using Your Words**  
Complete each item with a word or phrase.

1. The atmosphere is held close to Earth by \_\_\_\_\_.
2. A tsunami can change the shape of Earth's surface by \_\_\_\_\_.
3. Earth's crust has been broken into plates by \_\_\_\_\_.
4. Faults are generally located along boundaries between plates because \_\_\_\_\_.
5. A part of Earth's hydrosphere near you is \_\_\_\_\_.

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Chapter 4 • Lesson 1 • Vocabulary 60

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## Answers

### Answers to Student Edition questions on pages 72-73

#### Vocabulary Review

1. atmosphere
2. hydrosphere
3. fault
4. plate
5. lithosphere
6. tsunami

#### Word Study: Word Roots

Students should choose two words with the suffix *-sphere*, such as *hemisphere*, *troposphere*, or *stratosphere*. Students should write the words and their definitions.

#### Show What You Know

1. The main layers of Earth and the area around it include the atmosphere, the hydrosphere, the lithosphere, the mantle, and the core.
2. Earth's crust is moving because of convection currents in the mantle.
3. Plate movement causes volcanoes, earthquakes, mountains, and valleys.

#### Critical Thinking

1. Convection currents in the mantle cause the movement of plates in the crust.
2. An undersea earthquake can cause a tsunami. Monitoring of undersea earthquakes can provide advance warning for people to leave the area.

#### Math

#### In Science

$1/100 = 1\%$  of earthquakes cause damage.  
 $8000 \times 1/100 = 80$ , or  $1\%$  of  $8000 = 80$  earthquakes cause damage in an average year.

#### Process Skill

#### Quick Activity

North and South America and Asia are affected by the Ring of Fire. Buildings can be built to withstand earthquakes, and active volcanoes can be monitored.