Name _____ Class _____ Date _____

CHAPTER 7 Plate Tectonics

SECTION 2

Restless Continents

BEFORE YOU READ

After you read this section, you should be able to answer these questions:

- What is continental drift?
- How are magnetic reversals related to sea-floor spreading?

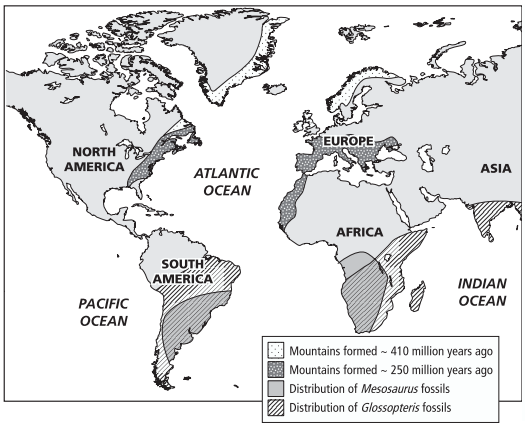
National Science Education Standards
ES 1b, 2a

What Is Continental Drift?

Look at the map below. Can you see that South America and Africa seem to fit together, like the pieces of a jigsaw puzzle? In the early 1900s, a German scientist named Alfred Wegener made this same observation. Based on his observations, Wegener proposed the hypothesis of **continental drift**. According to this hypothesis, the continents once formed a single landmass. Then, they broke up and drifted to their current locations.

Continental drift can explain why the continents seem to fit together. For example, South America and Africa were once part of a single continent. They have since broken apart and moved to their current locations. ☑

Evidence for continental drift can also be found in fossils and rocks. For example, similar fossils have been found along the matching coastlines of South America and Africa. The organisms that formed these fossils could not have traveled across the Atlantic Ocean. Therefore, the two continents must once have been joined together.



Similar fossils and rocks are found on widely separated continents. For example, *Glossopteris* and *Mesosaurus* fossils are found in Africa and in South America. These fossils and rocks indicate that, at one time, all of the continents were joined together.

STUDY TIP

Paired Summarizing Read this section silently. In pairs, take turns summarizing the material. Stop to discuss ideas that seem confusing.

READING CHECK

1. Explain Why do South America and Africa seem to fit together?

_____

_____

Critical Thinking

2. Infer Which continent was once joined with Greenland? How do you know?

_____

_____

_____

TAKE A LOOK

3. Explain How do fossils indicate that the continents have moved with time?

_____

_____

_____

BREAKUP OF PANGAEA

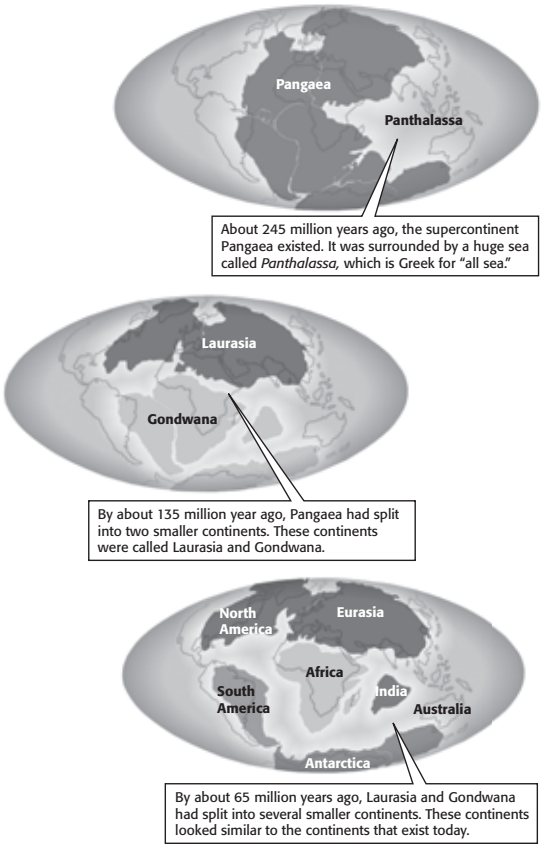
About 245 million years ago, all of the continents were joined into a single *supercontinent*. This supercontinent was called *Pangaea*. The word *Pangaea* means "all Earth" in Greek. About 200 million years ago, Pangaea began breaking apart. It first separated into two large landmasses called Laurasia and Gondwana. The continents continued to break apart and slowly move to where they are today. ☑

As the continents moved, some of them collided. These collisions produced many of the landforms that we see today, such as mountain ranges and volcanoes.

READING CHECK

4. Identify When did Pangaea start to break apart?

_____



TAKE A LOOK

5. Describe How were the locations of the continents 65 million years ago different from the locations of the continents today? Give two ways.

_____

_____

_____

_____

What Is Sea-Floor Spreading?

Mid-ocean ridges are mountain chains on the ocean floor. They form a continuous chain that is 50,000 km long. The chain wraps around Earth like the seams of a baseball. Mid-ocean ridges are the sites of intense volcanic activity. ☑

At a mid-ocean ridge, melted rock rises through cracks in the sea floor. As the melted rock cools and hardens, it forms new crust. The newly formed crust pushes the older crust away from the mid-ocean ridge. This process is called **sea-floor spreading**.

READING CHECK

6. Define What is a mid-ocean ridge?

_____

_____

SEA-FLOOR SPREADING AND MAGNETISM

In the 1960s, scientists studying the ocean floor discovered an interesting property of mid-ocean ridges. Using a tool that can record magnetism, they found magnetic patterns on the sea floor! The pattern on one side of a mid-ocean ridge was a mirror image of the pattern on the other side of the ridge. What caused the rocks to have these magnetic patterns?

Throughout Earth's history, the north and south magnetic poles have switched places many times. This process is called magnetic reversal. This process, together with sea-floor spreading, can explain the patterns of magnetism on the sea floor. ☑

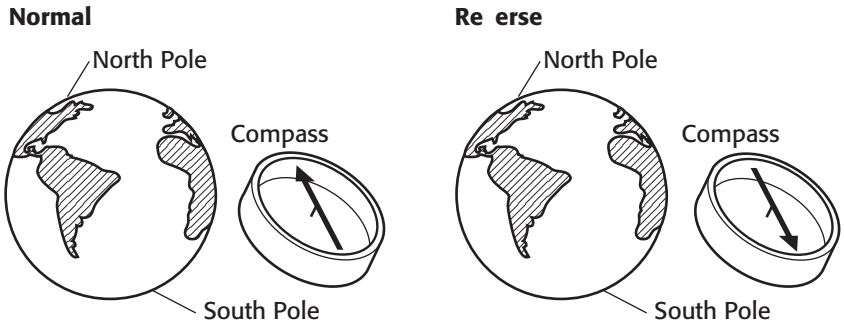
READING CHECK

7. Define What is a magnetic reversal?

_____

_____

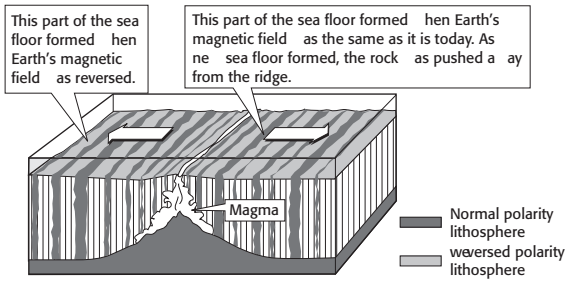
_____



During times of normal polarity, such as today, a compass needle points toward the North Pole. During times of reverse polarity, a compass needle points toward the South Pole.

As ocean crust forms from melted rock, magnetic minerals form. These minerals act as compasses. As they form, they line up with Earth's magnetic north pole. When the melted rock cools, the minerals are stuck in place.

After Earth's magnetic field reverses, these minerals point to Earth's magnetic south pole. However, new rock that forms will have minerals that point to the magnetic north pole. Therefore, the ocean floor contains "stripes" of rock whose magnetic minerals point to the north or south magnetic poles.



Sea-floor spreading produces new oceanic lithosphere at mid-ocean ridges. The oldest oceanic crust is found far from the ridges, and the youngest crust is found very close to the ridges.

TAKE A LOOK

8. Describe How are the "stripes" of magnetism on each side of the ridge related?

_____

_____

Name _____ Class _____ Date _____

Section 2 Review

NSES ES 1b, 2a

SECTION VOCABULARY

continental drift the hypothesis that states that the continents once formed a single landmass, broke up, and drifted to their present locations	**sea-floor spreading** the process by which new oceanic lithosphere (sea floor) forms as magma rises to Earth's surface and solidifies at a mid-ocean ridge

1. **Identify** Give three pieces of evidence that support the idea of continental drift.

_____

_____

_____

2. **Describe** How does oceanic lithosphere form?

_____

_____

_____

3. **Identify** Does the oceanic lithosphere get older or younger as you move closer to the mid-ocean ridge?

_____

4. **Explain** How do the parallel magnetic "stripes" near mid-ocean ridges form?

_____

_____

_____

_____

_____

_____

5. **Apply Concepts** The Earth is about 4.6 billion years old. However, the oldest sea floor is only about 180 million years old. What do you think is the reason for this? (Hint: Remember that new seafloor is constantly being created, but the Earth is not getting bigger with time.)

_____

_____

_____

_____