Motion  •  Guided Reading and Study

Slow Motion on Planet Earth

This section describes the movements of Earth’s continents. It also gives a theory that explains why the continents move.

Use Target Reading Skills

Before you read the section, preview Figure 8. Write two questions you have about the figure in the graphic organizer. As you read, look for the answers to your questions, and fill in the bottom of the graphic organizer.

**Earth’s Plates**

1. Is the following sentence true or false? Earth’s rocky outer shell is all one piece. ________________________
2. The upper layer of Earth consists of more than a dozen major pieces called ________________________.
3. What is the theory of plate tectonics? _____________________________________________________________________

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Motion • Guided Reading and Study

Slow Motion on Planet Earth (continued)

4. Circle the letter of each sentence that is true about Earth’s plates.
   a. Some plates push toward each other.
   b. Some plates slide past each other.
   c. Earth consists of five major plates.
   d. Some plates pull away from each other.

Plate Movement

5. Is the following sentence true or false? The speed of Earth’s plates is very slow. ________________________

6. By knowing the average speed of a plate, what can scientists estimate about Earth’s continents?
   __________________________________________________
   __________________________________________________
   __________________________________________________
   __________________________________________________

7. What formula do scientists use to predict how far a plate will move in a certain amount of time?
   __________________________________________________

8. Is the following sentence true or false? The shapes and positions of Earth’s continents will not change in the future.
   __________________________________________________
Slow Motion on Planet Earth

Guide for Reading

- How does the theory of plate tectonics describe the movement of Earth’s landmasses?
- How fast do Earth’s plates move?

If you look at a map of the world, you can see that the landmasses seem to fit together like a giant jigsaw puzzle. Earth’s upper layer consists of more than a dozen major pieces called a plate. The theory of plate tectonics states that Earth’s plates move slowly in various directions. Scientists use the concept of plates to explain how landmasses have changed over time. According to the theory of plate tectonics, Earth’s landmasses have changed position over time because they are part of plates that are slowly moving. Some plates move at a rate of several centimeters each year. Others move only a few millimeters per year.

Knowing how far a plate moves in a certain amount of time enables scientists to calculate the average speed of the plate. The average speed lets them predict how far a plate will move in the future. To calculate the distance a plate will move, rearrange the speed formula:

\[ \text{Distance} = \text{Speed} \times \text{Time} \]

If you know that a plate moves 5 cm/yr, and you want to predict the distance it will move in 1,000 years, multiply the speed by the time during which the plate travels.

\[ \text{Distance} = \frac{5 \text{ cm}}{1 \text{ yr}} \times 1,000 \text{ yr} = 5,000 \text{ cm} \]
Motion  •  Review and Reinforce

Slow Motion on Planet Earth

Understanding Main Ideas

Study the map below. Answer the following questions in the spaces provided. Remember to include units in your answers as needed.

1. Which plate is moving the fastest?_____________________________

2. Which plate is moving the slowest?_____________________________

3. If the Juan de Fuca Plate continues to move away from the Pacific Plate at the same speed as shown on the graph, how many meters will it move in 10,000 years?_______________________________________________

4. About how many centimeters does the Nazca Plate move in one year?_________________________________________________________

Building Vocabulary

Write your answer to the following question in the space provided.

5. Briefly describe the theory of plate tectonics. Include in your answer the definition of plates.

_______________________________________________________________

_______________________________________________________________

_______________________________________________________________

_______________________________________________________________

_______________________________________________________________

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Scientists now know that the surface of Earth is separated into plates that move. Scientists calculate the velocity of the various plates in several ways. One way is to monitor the movement of the plates from space with satellites. Another way is to look at the features of the land itself. When the edges, or margins, of the plates collide, the surface of Earth changes. Scientists also examine Earth’s surface and make inferences about the velocities of the various plates.

Many geological events take place when continents bump into each other, depending on their relative motion. For example, the Indo-Australian plate is moving north. It is running into the Eurasian plate, which is moving southeast. Where these two plates collide, their edges rise and crumple like pieces of paper whose edges are being pushed together. This crumpling of Earth’s surface is one way mountains are formed. The Himalayan mountain range is formed where the Indo-Australian plate runs into the Eurasian plate.

Answer the following questions on a separate sheet of paper. Use this map above and the map in your textbook that show the boundaries of some of Earth’s plates.

1. Look at the state of California on the western edge of the United States. What evidence of a plate margin do you see?
2. Look at South America. Can you see any evidence of plates with different relative motions? What is this evidence?
3. Name the plates involved in your answers to Questions 1 and 2.
4. California has frequent earthquakes. Do you think this has anything to do with plate margins? Explain your answer.