10A Theory of Plate Tectonics

Theory of PLATE TECTONICS

Vocabulary

convection current
(kuhn VEK shuhn KUR uhnt)
up-and-down motion of heated matter

Using Science Words

1. How does matter in a convection current move?
   A. sideways
   B. up and down
   C. in a straight line

1 In 1912 a scientist named Alfred Wegener noticed that the continents seem to fit together. They look like pieces of a puzzle. Wegener concluded that at one time the continents must have been one big continent. He called this supercontinent *Pangaea*.

2 Wegener needed evidence to show that his idea was possible. He learned of rocks and fossils in South America that were the same as some rocks and fossils in Africa. This evidence supported his idea that the continents had once been joined.

Reading Check

2. What evidence showed that the continents had once been joined?
- **a.** lakes
- **b.** fossils
- **c.** trees

3 Wegener concluded that the continent Pangaea began to break apart about 200 million years ago. The pieces of Pangaea slowly drifted apart. These pieces make up the continents we know today. Wegener was right about Pangaea and his theory of continental drift. But he didn't know what made the continents drift apart. So other scientists did not believe his ideas.

4 In the 1960s scientists began to study the ocean floor. They found that new ocean crust is made at tall ridges on the ocean floor. Heated rock rises through cracks in the crust. Then it cools, hardens, and makes new ocean floor. As new crust forms, the two sides of the ridge spread apart, or drift. Old ocean crust is destroyed at deep trenches on the ocean floor. This happens when ocean crust is pushed into Earth's hot mantle, where it melts. This is the theory of seafloor spreading.

Reading Check

3. New ocean crust forms at _____.
- **a.** beaches
- **b.** ocean trenches
- **c.** ocean ridges

5 Seafloor spreading helps explain continental drift. Earth is like a ball with several different layers. Earth's crust and solid upper mantle form the **lithosphere.** The lithosphere is broken into huge pieces called tectonic plates. These tectonic plates fit together. When the ocean floor spreads apart, the continents on these plates move apart too.

6 The theory of plate tectonics explains how these huge plates move. The layer of Earth beneath the lithosphere is like a soft plastic. This soft layer of Earth is called the **asthenosphere.** Hot matter in this layer flows like a liquid. This matter from deep inside Earth flows up toward the crust. There, it cools and sinks toward Earth's core. This up-and-down motion of heated matter is called a **convection current.**

Reading Check

4. The theory of plate tectonics explains _____.
- **a.** how matter inside Earth is heated
- **b.** how tectonic plates move
- **c.** where the lithosphere is

7 Tectonic plates sit on top of the asthenosphere. As convection currents in the asthenosphere move up and down, the tectonic plates also move. Tectonic plates move very slowly—they move only a few centimeters each year. But these small movements can make big things happen over time.

Reading Check

5. How do tectonic plates move?
   - **a.** quickly
   - **b.** slowly
   - **c.** rapidly

8 Tectonic plates can collide, or run into one another. They can spread apart. They can slide past one another. The movement of tectonic plates can cause earthquakes and volcanoes. It can even build mountains. These events happen anywhere tectonic plates move.

Reading Check

6. The movement of tectonic plates can cause _____.
   - **a.** earthquakes
   - **b.** convection currents
   - **c.** tornadoes

Word Study

Antonyms Terms with opposite meanings are antonyms. *Large* is an antonym of *small.*

Lions are **large** cats, not **small** ones.

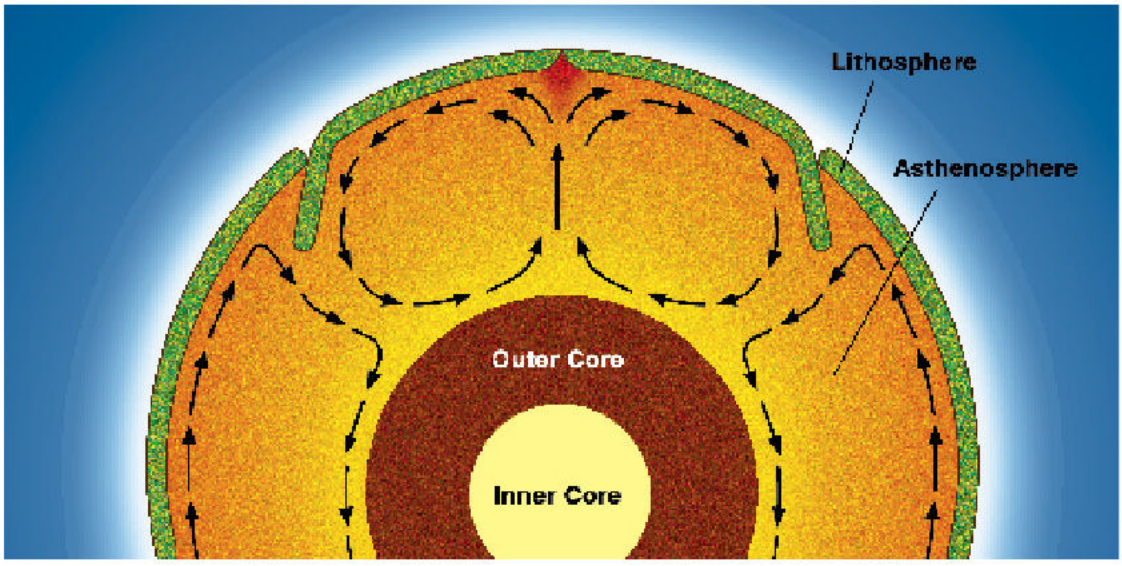
Read each sentence and the terms below it. Write the term that means the opposite of the term in bold type.

7. Alfred Wegener noticed that the **continents** seemed to fit together.
   oceans landmasses
8. This evidence **supported** his idea.
   opposed confirmed
9. The **same** kinds of fossils were found on two continents.
   similar different
10. Pangaea began to **break apart** about 200 million years ago.
    separate join
11. New ocean crust is **made** at ocean ridges.
    destroyed created
12. The lithosphere is made of Earth's crust and solid **upper** mantle.
    lower higher
13. Tectonic plates move **a few** centimeters each year.
    many several
14. Tectonic plates are **massive.**
    small large
15. Earth's asthenosphere is like a **soft** plastic.
    gentle hard
16. Hot matter from inside Earth **moves up** toward the crust.
    rises falls

Standardized Test Practice

Test Tip **Diagrams** First read the title, and then quickly review the diagram. Refer back to the diagram as you answer each question.

Tectonic Forces



Multiple Choice **Use the diagram to answer the questions.**

17. What do the arrows represent?
- **A.** the location of tectonic plates
- **B.** a type of energy
- **C.** the movement of matter
- **D.** the changing shape of the seafloor

18. What causes the pattern shown in the diagram?
- **A.** heat from inside Earth
- **B.** heat from outside Earth
- **C.** energy from the atmosphere
- **D.** friction from moving tectonic plates

19. What is this pattern called?
- **A.** continental drift
- **B.** seafloor spreading
- **C.** Pangaea
- **D.** a convection current

10A Key Card
Plate Tectonics

Using Science Words

1. B

Comprehension

2. b
3. c
4. b
5. b
6. a

Word Study

7. oceans
8. opposed
9. different
10. join
11. destroyed
12. lower
13. many
14. small
15. hard
16. falls

Standardized Test Practice

17. C
18. A
19. D

Writing About Science

Describe how you could model plate tectonics. What materials would you use?