

CHAPTER

17

STUDY GUIDE

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Plate Tectonics

SECTION 17.1 Drifting Continents

In your textbook, read about continental drift.

Circle the letter of the choice that best completes each statement.

1. Early mapmakers thought continents might have moved based on their observations of
 - a. magnetism.
 - b. rock and fossil evidence.
 - c. matching coastlines.
 - d. earthquakes and floods.
2. Pangaea was an ancient supercontinent made up of
 - a. South Africa, India, Australia, and South America.
 - b. the United States, Greenland, and Europe.
 - c. Antarctica, India, and South America.
 - d. all of Earth's continents.
3. To support his hypothesis of continental drift, Alfred Wegener did NOT use
 - a. ancient climatic evidence.
 - b. magnetic field data.
 - c. data on ancient reptiles and ferns.
 - d. evidence from rock formations.
4. Fossil evidence that supported Wegener's idea of continental drift included
 - a. land-dwelling animals.
 - b. ocean plants.
 - c. ocean mammals.
 - d. tropical flowers.
5. Fossils of aquatic reptiles found in freshwater rocks suggested to Wegener that these reptiles
 - a. swam the great distances between continents.
 - b. probably did not cross the oceans.
 - c. ate *Glossopteris*.
 - d. once lived in Earth's oceans.
6. Based on observations of fossils of *Glossopteris*, Wegener concluded that
 - a. magnetic reversals had occurred in Earth's past.
 - b. continental rocks containing these fossils had once been joined.
 - c. Earth's continents were never joined.
 - d. *Glossopteris* grew only in the tropics.
7. Coal beds in Antarctica indicated to Wegener that this continent was
 - a. always cold.
 - b. inhabited by penguins.
 - c. once located closer to the equator.
 - d. once beneath the ocean.
8. Based on the glacial deposits he observed, Wegener argued that
 - a. glaciers form near the equator.
 - b. Earth's axis of rotation had changed in the past.
 - c. landmasses drifted away from the south pole.
 - d. *Glossopteris* could not survive hot weather.
9. Most scientists at the time rejected Wegener's hypothesis of continental drift because he
 - a. had collected little evidence to support his hypothesis.
 - b. would not state his hypothesis publicly.
 - c. insisted that Earth's axis of rotation had changed.
 - d. couldn't explain how or why the continents moved.

SECTION 17.2 Seafloor Spreading

In your textbook, read about seafloor spreading.

In the space at the left, write *true* if the statement is true; if the statement is false, change the italicized word or phrase to make the statement true.

- _____ 10 Sonar uses sound waves to measure water depth.
- _____ 11. Maps made from sonar and magnetometer data led to the discovery of *ocean ridges and deep-sea trenches*.
- _____ 12. *Deep-sea trenches* are vast, underwater mountain chains.
- _____ 13. Rock samples taken near ocean ridges are *older* than rock samples taken near deep-sea trenches.
- _____ 14. The thickness of ocean-floor sediments *decreases* with distance from an ocean ridge.
- _____ 15. The oldest ocean floor rocks are about *3.8 billion* years old.
- _____ 16. The study of the magnetic record preserved in Earth's rocks is called *paleomagnetism*.
- _____ 17. *An isochron* is a change in Earth's magnetic field.
- _____ 18. Earthquake activity and volcanism are common along *ocean ridges*.
- _____ 19. The magnetic patterns on either side of a *deep-sea trench* are mirror images of each other.
- _____ 20. The theory of *continental drift* states that new ocean crust is formed at ocean ridges and destroyed at deep-sea trenches.
- _____ 21. As new seafloor is carried away from an ocean ridge, it *heats up, expands, and becomes less dense* than the material beneath it.
- _____ 22. The theory of seafloor spreading explains that Earth's continents move because they *ride atop ocean crust as it moves away from ocean ridges*.

The statements below describe the steps involved in the process of seafloor spreading. Number these steps in the order in which they occur.

1 (A) 2 (B) 3 (C)

- _____ 23. Magma fills the gap that is created.
- _____ 24. Magma hardens to form new ocean crust.
- _____ 25. Magma is forced upward toward the crust.

SECTION 17.2 Seafloor Spreading, continued

In your textbook, read about magnetism.

Use each of the terms below just once to complete the passage.

- (A.) older (B.) magnetic field (D.) normal polarity
(C.) reversed polarity (E.) younger

Earth's (26) _____ has changed over time. A field with the same orientation as today's field is said to have (27) _____. A field that is opposite the present field has (28) _____. Magnetometers have been used to measure the ocean floor's magnetic field. Magnetic data of the ocean floor has been used to generate _____ Isochron _____ maps, which have shown that the ocean floor is (29) _____ near ocean ridges and (30) _____ near deep-sea trenches.

In your textbook, read about ocean rocks and sediments, magnetism, and seafloor spreading.

For each item in Column A, write the letter of the matching item in Column B.

Column A

- _____ 31. Device that can detect small changes in magnetic fields
- _____ 32. Minerals containing this act like small compass needles and record the orientation of Earth's magnetic field at the time of their formation
- _____ 33. Was constructed from data gathered from continental basalt flows
- _____ 34. This type of line connects points on a map that have the same age
- _____ 35. Each cycle of spreading and magma intrusion along an ocean ridge results in the formation of this

Column B

- a. isochron
- b. iron
- c. geomagnetic time scale
- d. new ocean crust
- e. magnetometer

SECTION 17.3 Theory of Plate Tectonics

In your textbook, read about plate tectonics and plate boundaries.

Circle the letter of the choice that best completes the statement or answers the question.

36. Which theory states that Earth's crust and rigid upper mantle move in different directions and at different rates over Earth's surface?
- a. ridge push and slab pull
 - b. seafloor spreading
 - c. continental drift
 - d. plate tectonics
37. Tectonic plates interact at places called plate
- a. reversals.
 - b. boundaries.
 - c. regions.
 - d. subductions.
38. Places where tectonic plates move apart are called
- a. convergent boundaries.
 - b. transform boundaries.
 - c. subduction zones.
 - d. divergent boundaries.
39. Where are most divergent boundaries found?
- a. on the seafloor
 - b. on continents
 - c. along coastlines
 - d. at subduction zones
40. What happens along a divergent boundary?
- a. Continental mountain ranges form.
 - b. New ocean crust forms.
 - c. Oceanic plates are subducted into the mantle.
 - d. Ocean basins become smaller.
41. The Mid-Atlantic Ridge is an example of a
- a. divergent boundary.
 - b. convergent boundary.
 - c. subduction zone.
 - d. transform boundary.
42. Places where tectonic plates come together are called
- a. convergent boundaries.
 - b. divergent boundaries.
 - c. transform boundaries.
 - d. rift valleys.
43. Convergent boundaries are classified according to the
- a. types of fossils found at the boundaries.
 - b. rate at which the plates collide.
 - c. compass direction of movement of the plates.
 - d. type of crust involved.

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SECTION 17.3 *Theory of Plate Tectonics, continued*

44. Oceanic crust is made mostly of
- a. granite.
 - b. basalt.
 - c. water.
 - d. sediments.
45. Which of the following features forms when two oceanic plates converge?
- a. magnetic reversal patterns
 - b. divergent boundaries
 - c. subduction zones
 - d. rift valleys
46. What can happen when two oceanic plates converge and one is subducted into the mantle?
- a. Melted magma erupts and forms an arc of islands.
 - b. The colliding plate edges become crumpled to form a mountain range.
 - c. The lithosphere splits to create a divergent plate boundary on land.
 - d. A continent splits to form a new ocean basin.
47. Which of the following landforms results from divergence of continental crust?
- a. a mountain range
 - b. a rift valley
 - c. a deep-sea trench
 - d. a long fault
48. Which of the following best describes what happens when an oceanic plate converges with a continental plate?
- a. A deep-sea trench and an island arc form.
 - b. Both plates become fractured, and a series of long faults form on the surface.
 - c. Both plates crumple and a folded mountain range forms.
 - d. A trench and a mountain range with many volcanoes form.
49. Which feature is associated with a continental-continental plate boundary?
- a. a subduction zone
 - b. a mountain range
 - c. a deep-sea trench
 - d. a volcano
50. At which tectonic plate boundary do plates slide horizontally past each other?
- a. transform boundary
 - b. divergent boundary
 - c. continental-continental boundary
 - d. oceanic-oceanic boundary
- ➔ Which of the following is NOT associated with transform boundaries?
- a. deformed and fractured crust
 - b. shallow earthquakes
 - c. long faults
 - d. volcanoes