

Skills Worksheet

Directed Reading

Section: Continental Drift

1. Who obtained new information about the continents and their coastlines 400 years ago?

2. What did people notice when they studied new world maps 400 years ago?

WEGENER'S HYPOTHESIS

_____ 3. The German scientist Alfred Wegener proposed a hypothesis now called

- a. paleomagnetism.
- b. continental drift.
- c. floating continents.
- d. sea-floor spreading.

_____ 4. Wegener hypothesized that the continents formed part of a single land mass, or

- a. mid-ocean ridge.
- b. moncontinent.
- c. supercontinent.
- d. world land.

_____ 5. When did Wegener think that small continents began forming?

- a. 25 million years ago.
- b. 2.5 billion years ago.
- c. 250 million years ago.
- d. 2.5 million years ago.

_____ 6. Wegener speculated that over millions of years these small continents

- a. moved closer together.
- b. did not move.
- c. drifted to the southern hemisphere.
- d. drifted to their present locations.

Directed Reading *continued*

_____ **7.** What did Wegener hypothesize about mountain ranges such as the Andes?

- a.** that the crumpling of the crust in places produced them
- b.** that volcanic eruptions created them
- c.** that they always existed
- d.** that the pressure of the oceans produced them

8. Why was Wegener interested in finding fossils of the same plants and animals on two different continents?

9. Where were the fossils from the extinct land reptile called *Mesosaurus* found?

10. Why did Wegener believe that the fossils found in South America and western Africa proved that South America and Africa had once been joined?

11. How did the ages and types of rocks found in some coastal areas of Africa and South America support Wegener's hypothesis?

12. How did the locations of mountain chains support Wegener's hypothesis?

13. Give an example of a mountain chain that seems to continue from one continent to other continents across the ocean.

Directed Reading *continued*

14. What do layers of debris from ancient glaciers in southern Africa and South America indicate to geologists?

15. What evidence shows that tropical or subtropical swamps used to cover areas that now have colder climates?

16. How did Wegener account for differences in climate between the past and today?

17. According to Wegener, how did the continents move?

18. Why did scientists disagree with Wegener's theory of how the continents moved?

19. Why was Wegener's theory not proven in his lifetime?

MID-OCEAN RIDGES

_____ **20.** Undersea mountain ranges with steep, narrow valleys in the center are called

- a.** black smokers.
- b.** the Mid-Atlantic Ridge.
- c.** mid-ocean ridges.
- d.** sea floor ridges.

_____ **21.** Compared to sediment found farther from a ridge, sea-floor sediment closer to a ridge is

- a.** thicker.
- b.** thinner.
- c.** older.
- d.** larger.

Directed Reading *continued*

- _____ **22.** Compared to rocks farther from a ridge, rocks closer to a ridge are
a. larger.
b. smaller.
c. older.
d. younger.
- _____ **23.** The oldest ocean rocks are
a. 3.8 billion years old.
b. 175 million years old.
c. more than 175 million years old.
d. older than rocks on land.

SEA-FLOOR SPREADING

In the space provided, write the letter of the definition that best matches the term or phrase.

- | | |
|--------------------------------------|--|
| _____ 24. magma | a. the mechanism that causes the continents to move |
| _____ 25. paleomagnetism | b. molten rock |
| _____ 26. rift | c. a crack in Earth's crust |
| _____ 27. sea-floor spreading | d. the study of the magnetic properties of rocks |

28. Describe the process of sea-floor spreading.

PALEOMAGNETISM

29. In what way is Earth like a giant magnet?

30. How does a compass determine direction?

Directed Reading *continued*

31. Explain how solidified magma comes to be magnetic.

32. Why do scientists think that Earth's magnetic field has not always pointed north?

33. Rocks with magnetic fields that point north have _____.

34. Rocks with magnetic fields that point south have _____.

35. What pattern did scientists discover when they placed rocks into chronological periods of normal and reverse polarity?

36. The pattern of normal and reverse polarity in rocks enabled scientists to create the _____.

37. Describe the puzzling magnetic patterns scientists found on the ocean floor.

38. On a map of the ocean floor, what do the magnetic patterns show?

39. What did scientists think happened to cause the magnetic patterns they found?

40. What did scientists do in order to assign ages to sea-floor rocks?

Directed Reading *continued*

41. Where were the youngest rocks on the sea floor?

42. Where were the older rocks on the sea floor?

43. Where does new rock form on the sea floor?

44. What do sea-floor rock patterns indicate about how rock forms?

45. What supports Hess's theory of sea-floor spreading?

WEGENER REDEEMED

_____ **46.** Scientists have found evidence of reversal patterns in

- a.** rocks only on the ocean floor.
- b.** rocks only on land.
- c.** rocks on the ocean floor and on land.
- d.** rocks from the moon.

_____ **47.** Continents move over Earth's surface

- a.** by plowing through the sea floor.
- b.** on ice sheets on the sea floor.
- c.** by rolling on Earth's molten core.
- d.** by the widening sea floor, which acts as a conveyor belt.

_____ **48.** The mechanism that verifies Wegener's hypothesis of continental drift is

- a.** geomagnetic reversal.
- b.** magnetic symmetry.
- c.** sea-floor contracting.
- d.** sea-floor spreading.

Skills Worksheet

Directed Reading

Section: The Theory of Plate Tectonics

1. The theory that explains why and how continents move is called

_____.

2. By what time period was evidence supporting continental drift, which led to the development of plate tectonics, developed?

HOW CONTINENTS MOVE

In the space provided, write the letter of the definition that best matches the term or phrase.

_____ 3. oceanic crust

a. the solid outer layer of Earth, that consists of the crust and the rigid upper part of the mantle

_____ 4. continental crust

b. dense crust made of rock that is rich in iron and magnesium

_____ 5. tectonic plates

c. blocks of Earth's shell that ride on a deformable layer of the mantle

_____ 6. lithosphere

d. solid, plastic layer of the mantle beneath the lithosphere

_____ 7. asthenosphere

e. low-density crust made of rock that is rich in silica

8. What is "plastic" rock and how does it move?

9. Describe how continents and oceans are carried on tectonic plates.

TECTONIC PLATES

10. How many major tectonic plates have scientists identified?

11. Why are the boundaries of the tectonic plates not always easy to identify?

Directed Reading *continued*

12. How do scientists identify plate boundaries?

13. A sudden movement along the boundary of a tectonic plate is a(n)

_____.

14. Frequent earthquakes in a given zone are evidence that

15. How do volcanoes help identify the locations of plates boundaries?

16. A zone of active volcanoes that encircles the Pacific Ocean is known as the

_____.

17. In addition to volcanoes, what also occurs frequently in the Pacific Ring of Fire?

18. What do the characteristics of the Pacific Ring of Fire indicate?

TYPES OF PLATE BOUNDARIES

In the space provided, write the letter of the definition that best matches the term or phrase.

_____ **19.** divergent

_____ **20.** convergent

_____ **21.** transform

_____ **22.** mid-ocean ridge

_____ **23.** subduction zone

_____ **24.** fracture zone

a. boundary between tectonic plates that are sliding past each other horizontally

b. region where one plate moves under another

c. boundary between tectonic plates that are moving away from each other

d. undersea mountain range

e. short segments of a mid-ocean ridge that are connected by transform boundaries

f. the boundary between tectonic plates that are colliding

Directed Reading *continued*

25. Name three areas where plate boundaries may be located.

26. What happens to magma at divergent boundaries?

27. Describe the rock that forms when magma cools to form new oceanic lithosphere.

28. A narrow area that forms where the plates at a divergent boundary separate is called a _____.

29. Where are most divergent boundaries located?

30. Describe an example of a rift valley.

31. When oceanic lithosphere collides with continental lithosphere, the oceanic lithosphere is less dense than the continental lithosphere, so it sinks, or _____.

32. What deep-ocean feature forms at subduction zones?

33. As the oceanic plate subducts, it releases fluids into the mantle, causing magma to form and rise to the surface, forming _____.

Directed Reading *continued*

34. What happens when two plates made of continental lithosphere collide?

35. What is an example of a large mountain range formed when two plates made of continental lithosphere collided?

36. What happens when two plates made of oceanic lithosphere collide?

37. What is produced from magma formed from melted mantle rock?

38. An example of a feature that formed when two plates made of oceanic lithosphere collided is _____.

39. What causes earthquakes at transform boundaries?

40. How are transform boundaries different from other types of boundaries?

41. An example of a transform boundary is the _____.

42. The San Andreas Fault is located between what two plates?

43. Transform boundaries that connect short segments of a mid-ocean ridge are called _____.

44. What is an example of a convergent boundary?

45. What is an example of a divergent boundary in the mid-Atlantic?

Directed Reading *continued*

CAUSES OF PLATE MOTION

- _____ **46.** The movement of heated material due to differences in density is called
- a.** convection.
 - b.** a convection cell.
 - c.** radioactivity.
 - d.** plate motion.
- _____ **47.** The cycle in which the cooler, denser water sinks and the warmer water rises to the surface to create a cycle is called
- a.** convection.
 - b.** plate tectonics.
 - c.** a convection cell.
 - d.** boiling water.
- _____ **48.** Earth's mantle is heated by
- a.** tectonic plates.
 - b.** core energy and radioactivity.
 - c.** boiling water.
 - d.** cool, dense mantle material.
- _____ **49.** What causes tectonic plate movement?
- a.** Hot material in the mantle sinks.
 - b.** Lack of a convection cell causes plates to rise.
 - c.** The mantle drags overlying tectonic plates along.
 - d.** Divergent boundaries come together.
- _____ **50.** What happens to newer, warmer rock at a mid-ocean ridge as it cools?
- a.** It is elevated above nearby rock.
 - b.** It slopes downward away from the ridge.
 - c.** It sinks into the mantle and pulls away from the ridge.
 - d.** It exerts force on the plate.
- 51.** The force on the rest of the plate from the asthenosphere below cooling, sinking rock is called _____.
- 52.** What happens as a result of ridge push?

Directed Reading *continued*

53. Is ridge push the main driving force of plate motion? Along with ridge push, what did scientists study for clues to forces that drive plate motion?

54. What happens to magma in places where plates pull away from each other at mid-ocean ridges?

55. The force exerted by a sinking plate caused by the subduction of lithosphere into the asthenosphere is called _____.

56. Compared to speed of plates that are not subducting, plates that are subducting move _____.

57. What three forces work together to cause plate motions?

Skills Worksheet

Directed Reading

Section: The Changing Continents

1. What is the result of slow movements of tectonic plates?

RESHAPING EARTH'S CRUST

In the space provided, write the letter of the definition that best matches the term or phrase.

- | | |
|------------------|--|
| _____ 2. shield | a. rocks that have been exposed at Earth's surface |
| _____ 3. rifting | b. large areas of stable rock older than 540 million years |
| _____ 4. cratons | c. the process by which a continent breaks apart |

5. Describe continental crust.

6. What probably causes continental lithosphere to become thinner and weaken?

7. What happens when the lithosphere weakens?

8. What are two ways by which continents can change?

In the space provided, write the letter of the definition that best matches the term or phrase.

- | | |
|---------------------|---|
| _____ 9. terrane | a. a small volcanic island or underwater mountain |
| _____ 10. accretion | b. the process by which a terrane becomes part of a continent |
| _____ 11. seamount | c. a piece of lithosphere that has a unique geologic history |
| _____ 12. atoll | d. a small coral island |

Directed Reading *continued*

13. Describe the rocks and fossils of a terrane.

14. What is found at the boundaries of a terrane?

15. Describe the magnetic properties of a terrane.

16. What happens when a tectonic plate carrying a terrane subducts under a plate made of continental crust?

17. What two forms might terranes take when they become part of a continent?

18. Name three kinds of materials that can form terranes.

19. What often happens when large terranes and continents collide?

20. What is an example of a mountain chain that formed when a large terrane and a continent collided?

EFFECTS OF CONTINENTAL CHANGE

21. Name three factors that affect a continent's climate.

22. How have movements of tectonic plates affected modern climates?

23. Most of Earth's continental surfaces were once covered

by _____.

Directed Reading *continued*

24. Ice covered most of Earth when all the continents were located

near _____.

25. What caused Earth's temperatures to change and its ice sheet to melt?

26. What happens to populations of organisms as continents rift or as mountains form?

27. What is an example of a unique species that evolved on Madagascar?

28. Why did unique species of plants and animals evolve on Madagascar?

THE SUPERCONTINENT CYCLE

_____ **29.** A picture of continental change throughout time has been constructed by

- a.** paleontologists.
- b.** geologists.
- c.** geographers.
- d.** scientists from many fields.

_____ **30.** Supercontinents are

- a.** large landmasses formed in the past from smaller continents.
- b.** the large continents that exist today.
- c.** pieces of large landmasses that broke apart.
- d.** large oceans that covered Earth in the past.

_____ **31.** According to the theory of the supercontinent cycle, what will probably occur in the future?

- a.** No new supercontinents will form.
- b.** Old supercontinents will reappear.
- c.** Continents will stay as they are.
- d.** A new supercontinent will form.

_____ **32.** Supercontinents form when

- a.** rifts form in the lithosphere.
- b.** new convergent boundaries form after continents collide.
- c.** heat builds up in Earth's interior.
- d.** continental lithosphere subducts.

Directed Reading *continued*

- _____ **33.** What causes a supercontinent to break apart?
- a. Heat inside Earth causes rifts to form in the supercontinent.
 - b. The convergent boundary between two continents becomes inactive.
 - c. A new convergent boundary forms.
 - d. The supercontinent cycle stops.
- _____ **34.** The supercontinent that formed about 300 million years ago is called
- a. Laurasia.
 - b. Gondwanaland.
 - c. Africa.
 - d. Pangaea.
- _____ **35.** The body of water on the eastern edge of Pangaea was
- a. the Ural Sea.
 - b. the Tethys Sea.
 - c. the Panthalassa Ocean.
 - d. the Russian Sea.
- _____ **36.** Pangaea was surrounded by
- a. mountains.
 - b. seas.
 - c. an ocean.
 - d. other supercontinents.
- _____ **37.** One mountain range that formed when Pangaea was created was
- a. the Rocky Mountains.
 - b. the Alps.
 - c. the Himalayas.
 - d. the Appalachians.
- _____ **38.** How were Laurasia and Gondwanaland created?
- a. Pangaea collided with another supercontinent.
 - b. North America collided with Eurasia.
 - c. Pangaea split from north to south.
 - d. A rift split Pangaea from east to west.
- _____ **39.** The Tethys Sea eventually became
- a. the North Atlantic Ocean.
 - b. Gondwanaland.
 - c. the Mediterranean Sea.
 - d. Laurasia.
- 40.** How were South America and Africa formed?
- _____
- _____

Directed Reading *continued*

41. How was the South Atlantic Ocean formed?

42. How were India, Australia, and Antarctica formed?

43. How were the Himalaya Mountains formed?

44. When did the Himalaya Mountains begin to form?

45. How did the Rocky Mountains, the Andes, and the Alps form?

46. How did tectonic plate motion affect the oceans?

47. What will happen to Africa and the Mediterranean Sea in 150 million years if plate movements continue at current rates?

48. Describe how east Africa will change if plate movements continue at current rates.

49. What will cause the Atlantic Ocean to widen over the next 150 million years?

Directed Reading *continued*

50. What will happen to Australia if plate movements continue?

51. What will happen to the region west of the San Andreas Fault in 150 million years?

52. According to scientists' predictions, what will happen to the continents in 250 million years?
