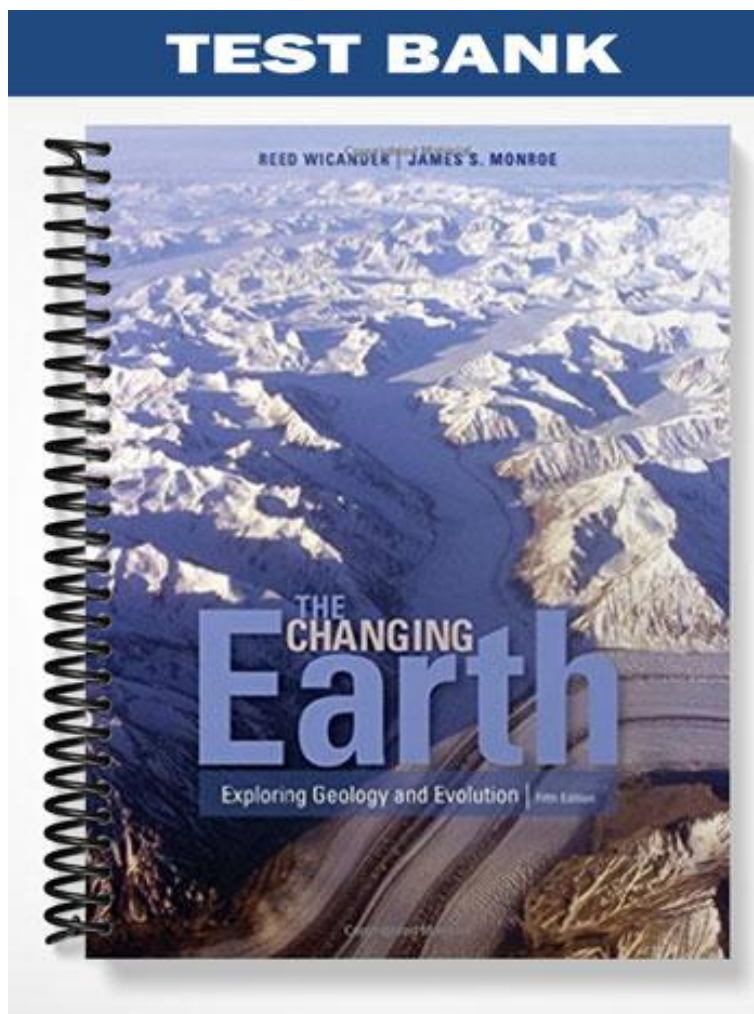


# TEST BANK



## Chapter 2: Test Bank

*Note: Questions with an asterisk (\*) denote appearance in web quiz (Tutorial Quiz)*

### Short Answer Essay Questions

1. What were the major lines of evidence for continental drift as presented by Wegener in the early 20<sup>th</sup> century?

**Answer:** The glaciations on the Gondwana continents could only have occurred if the continents were joined since the centers of the glaciers would have been in the ocean if they were not. Also, the continents, such as South America and Africa, match like a jigsaw puzzle. Similar fossil plant and animals are separated by oceans leading to the assumption that they must have lived in adjacent regions when they were alive. Finally, similar rock sequences and mountain ranges could be connected across oceans. [pp. 31-35]

2. Explain how mountain ranges can be used as evidence to support continental drift.

**Answer:** A mountain range forms under the same geological conditions along its length. This means that the same or nearly the same rock types are found along the range's length in the same or nearly the same sequence. The processes that form mountain ranges tend to create somewhat linear, elevated features. So a mountain range that has been split, even if it has been separated by an ocean, is fairly easy to recognize. [p. 32]

3. How does fossil evidence support continental drift?

**Answer:** The distribution of fossils is such that it would be impossible for the plants and animals not to have lived in contiguous land areas. *Glossopteris* seeds are too heavy to be dispersed by wind and would not have remained viable if they had traveled far across the oceans. The plants associated with *Glossopteris* do not match the climate zones the fossils are found in. As for the animals, it's hard to imagine a freshwater reptile like *Mesosaurus* swimming across the Atlantic. And the land-dwelling reptiles, *Lystrosaurus* and *Cynognathus*, could not have swum at all! [p. 33]

4. What was the principal reason why Wegener's theory of continental drift was rejected?

**Answer:** Wegener lacked a plausible mechanism to explain how continental crust could move through the sea floor. [p. 35]

5. Why were glacially deposited strata important in the development of continental drift theory?

**Answer:** The glacial deposits indicated that all southern continents must have been contiguous and closer to the South Pole. Glaciers cannot form in the middle of an ocean, which is where they would have originated if the continents were not together. [p. 33]

6. What are the three possible explanations for the distribution of paleomagnetic data?

**Answer:** (1) The continent remained fixed and the north magnetic pole moved; (2) the north magnetic pole stayed still and the continent moved; (3) both the continent and north magnetic pole moved. [p. 36]

7. Briefly explain why apparent polar wandering is "apparent."

**Answer:** Paleomagnetic studies of ancient rocks point to different locations for the North Pole at different times. When this is mapped out, it makes the pole appear to wander over time. The alternative to a wandering magnetic pole, for which there is no other evidence at all, is that the continents move and with them the rocks that contain the paleomagnetic data. [p. 36]

8. Briefly explain why the movement of continents over geologic time was the best explanation for polar wandering.

**Answer:** Since the Earth has only one magnetic north pole now, it was extremely unlikely that there would have been more than one in the past, though this would have been required to explain the different polar wander paths of the different continents. The only other possible explanation is that the continents were once joined and have since moved apart. [p. 36]

9. What evidence is there that ocean basins are young and old oceanic crust must be destroyed?

**Answer:** The maximum age for oceanic crust is 180 million years, but the continents contain rocks both younger and much older than 180 million years, so the older oceanic crust must go somewhere. [p. 38]

10. Briefly describe what happens when divergent plate boundaries form within a continent.

**Answer:** High heat flow elevates the continent and a rift valley forms, with normal faults and a central valley called a graben. Magma is intruded into fractures. As the plates diverge, basalt erupts in the rift, creating new ocean crust. Ultimately, as the plates continue to diverge, a new ocean basin forms. [p. 40]

11. Describe how the two models for the driving force of plate motion are the same. How are they different?

**Answer:** Both models involve thermal convection in the mantle. In both models, where two adjacent convection cells have upwelling limbs, there is a divergent plate boundary. Where there is a descending limb of a convection cell, there is a convergent boundary. The models differ in the location of the convection cells. In one, the convection cells are restricted to the asthenosphere. In the other, the convection cells take up the entire mantle. [p. 52]

12. What are the heat sources for each of the two mantle convection models for plate tectonics?

**Answer:** With whole mantle convection, the heat source is the core. With convection only in the asthenosphere, the heat source is harder to identify. [p. 52]

13. How does seafloor spreading explain the movement of the continents?

**Answer:** With seafloor spreading, the continents and oceanic crust move together as part of large plates. The plate is pushed by the formation of new ocean crust and pulled by the subduction of old ocean crust. New crust forms due to seafloor spreading. [p. 52]

14. In what ways does plate tectonics theory have economic applications?

**Answer:** By understanding the geologic history of a region, geologists can predict whether it will be a worthwhile place to search for petroleum or ore deposits. [pp. 53-54]

15. Briefly explain the roles of magma and hydrothermal activity in forming ore deposits along convergent and divergent plate boundaries.

**Answer:** Magma contains valuable elements, some of which leave the magma in gases and fluids. These substances transport the elements and facilitate their exchange for other elements in the surrounding rock. The surrounding rock may then have enough of the valuable elements to become an ore deposit. At convergent plate boundaries, partial melting at the subducting plate allows magma and valuable minerals to rise up in fluids and erupt as volcanoes or cool beneath the surface as plutons. At divergent plate boundaries, hydrothermal vents form. In these locations, seawater filters past hot magma, picks up valuable elements, and then the hot fluids flow onto the seafloor and drop their valuable elements. [pp. 53-54]

16. Draw a cross-section of an oceanic-oceanic convergent plate boundary. Show the directions of relative plate motion. Put stars for the locations of earthquakes. Put triangles with smoke out the top for the locations of volcanoes. Label the trench, back arc basin, and subduction complex.

**Answer:** See Figure 2.18a [p. 45]

17. What are four of the many things that plate tectonics theory explains?

**Answer:** Plate tectonics explains, at least to some extent, all of the following phenomena: the distribution of earthquakes and volcanoes, the locations of ore deposits and mountain systems, climate and ocean circulation patterns, and the geographic distribution, evolution, and extinction of life forms. [p. 54]

18. Draw a cross-section of an ocean-continent convergent plate boundary. Show the directions of relative plate motion. Put stars for the locations of earthquakes. Put triangles with smoke out the top for the locations of volcanoes. Label the trench and subduction complex.

**Answer:** See Figure 2.18b [p. 45]

19. Draw a cross-section of a continental-continental convergent plate boundary. Show the directions of relative plate motion. Put stars for the locations of earthquakes. Show the location of the mountain range. Label the subduction complex.

**Answer:** See Figure 2.18c [p. 45]

20. Briefly explain how magnetic reversals in oceanic crust and fossils in ocean sediments are used to construct a magnetic time scale.

**Answer:** A terrestrial sequence of magnetic reversal in volcanic deposits was dated radiometrically. These dates were extrapolated to regions which were not dated, but showed the same pattern of normal and reversed magnetic polarities. Ages of ocean-floor basalts lying within a zone of normal or reversed polarity are dated by the ages of the fossils found in the sediments which directly overlie the basaltic crust. These fossils have already been incorporated within a biostratigraphic zone. [p. 38]

21. Briefly explain how convection transfers heat.

**Answer:** When a material is heated, it expands, and its density decreases so it rises. After having risen some distance, it begins to cool, contract, and become denser. Thus the material sinks and returns to the original level where it will eventually be heated and rise again. [p. 51]

22. Why is plate tectonic theory so widely accepted?

**Answer:** Plate tectonic theory is supported by diverse lines of evidence from many scientific disciplines, such as geology and biology, and it explains many seemingly unrelated geological phenomena. [p. 39]

23. What is one geologic method for determining the average rate of seafloor spreading?

**Answer:** The strips of oceanic crust can be dated by reference to the ages of reversals in lava flows on land which have been radiometrically dated. Then the age with distance from the spreading ridge can be used to calculate the rate of plate motion and hence seafloor spreading. [p. 50]

24. What is a method by which the present rate of motion between two plates can be measured accurately?

**Answer:** The travel of a laser beam can be timed from one plate to another by bouncing it from a satellite and by calculating the difference in arrival times of a quasar signal at two plates over a period of time. [p. 50]

25. How are hot spots used for determining the absolute motions of plates?

**Answer:** Hot spots appear to be fixed in the mantle relative to each other so they can be used as a reference frame. If the age of a basalt and its distance from the hotspot is determined, then the rate of movement of that rock can be calculated. If a number of these samples are taken from various distances from the hotspot, the calculation can be quite accurate. [p. 61]

26. Briefly explain why there is so much oil in the Persian Gulf region.

**Answer:** During the Mesozoic, the Persian Gulf was a broad, stable marine shelf. Countless microorganisms lived in the surface water and their remains accumulated in the bottom sediments and were buried. The collision between Arabia and Iran has tilted the Arabian plate and crumpled rocks on the edges of both plates. The tilting of Arabia allows oil to migrate upslope to accumulate in traps created by folding. [p. 66]

27. How does the introduction of a geographic barrier encourage the evolution of species?

**Answer:** A population that is not separated will interbreed, and so there will be little opportunity for different species to form. If a barrier separates that population, and if conditions are different on either side of the barrier, natural selection will favor certain traits over others, and over time the two different populations of organisms may evolve to become different species. [p. 56]

## Fill-in-the-Blank

1. Paleomagnetism is the study of the \_\_\_\_\_ magnetism in rocks.

**Answer:** remnant [p. 36]

2. When magma cools, the magnetic iron-bearing minerals align themselves with the Earth's magnetic field and record \_\_\_\_\_ and \_\_\_\_\_.

**Answer:** strength, direction of the North Pole [p. 36]

3. The temperature at which iron-bearing minerals gain their magnetic property is the \_\_\_\_\_.

**Answer:** Curie point [p. 36]

4. Paleomagnetic data plotted on a map suggested that the magnetic pole had moved through time; this phenomenon was called \_\_\_\_\_.

**Answer:** apparent polar wandering [p. 36]

5. At deep sea trenches, \_\_\_\_\_ is subducted back into the \_\_\_\_\_.

**Answer:** lithosphere, mantle [p. 37]

6. At mid-oceanic ridges, hot magma rises from the \_\_\_\_\_ and forms new \_\_\_\_\_.

**Answer:** mantle, seafloor [p. 38]

7. Magnetic stripes in oceanic basalts are \_\_\_\_\_ and \_\_\_\_\_ around ocean ridges.

**Answer:** parallel, symmetrical [p. 38]

8. Radiometric dating shows that the oldest ocean crust is \_\_\_\_\_ years old, and the oldest continental crust is \_\_\_\_\_ years old.

**Answer:** 180 million, 3.96 billion [p. 38]

9. The three kinds of boundaries there can be between adjacent plates are \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

**Answer:** divergent, convergent, transform [p. 39]

10. At divergent plate boundaries, plates are moving \_\_\_\_\_. At these locations, new \_\_\_\_\_ forms.

**Answer:** apart, lithosphere [p. 40]

11. Where divergent plate boundaries form beneath continental masses, low areas known as \_\_\_\_\_ form.

**Answer:** rift valleys [p. 40]

12. At a convergent plate boundary, oceanic crust is \_\_\_\_\_.

**Answer:** destroyed [p. 38]

13. The three types of convergent plate boundaries are \_\_\_\_\_-\_\_\_\_\_, \_\_\_\_\_-\_\_\_\_\_, and \_\_\_\_\_-\_\_\_\_\_.

**Answer:** oceanic-oceanic, oceanic-continental, continental-continental [p. 44]

14. Volcanoes are found at these two types of plate boundaries: \_\_\_\_\_ and \_\_\_\_\_.

**Answer:** divergent, convergent [p. 40, 44]

15. The type of plate boundary that runs through California is called \_\_\_\_\_, and the name of this plate boundary is \_\_\_\_\_.

**Answer:** transform, the San Andreas Fault [p. 48]

16. The names of the plates on either side of the plate boundary that passes through California are \_\_\_\_\_ and \_\_\_\_\_.

**Answer:** Pacific, North American [p. 48]

17. Mountain building events occur along \_\_\_\_\_ - \_\_\_\_\_ or \_\_\_\_\_ - \_\_\_\_\_ plate boundaries.

**Answer:** oceanic-continental, continental-continental [p. 44; p. 48]

\*18. The type of plate boundary at which many of the world's major metallic ore deposits are associated is \_\_\_\_\_.

**Answer:** convergent [p. 53]

## Multiple Choice Questions

- \* 1. One of the most general conclusions to be drawn from plate tectonic theory is that \_\_\_\_\_.
- A. the Earth is gradually losing heat
  - B. the Earth's geography has continually changed
  - C. the Earth is slowly expanding
  - D. the Earth is slowly shrinking
  - E. all the ocean basins are gradually enlarging

**Answer:** B [p. 30]

2. Plate tectonic processes have influenced which of the following?
- A. the distribution of earthquakes and volcanoes
  - B. the locations of ore deposits and mountain systems
  - C. climatic patterns and ocean circulation
  - D. the geographic distribution, evolution, and extinction of life forms
  - E. all of the above

**Answer:** E [various]

3. Which group of fossils is considered evidence for the former existence of Gondwana?
- A. *Glossaurus*
  - B. *Pecopteris*
  - C. *Neuropteris*
  - D. *Glossopteris*
  - E. *Mesopteris*

**Answer:** D [p. 31]

\*4. Geologists locate plate boundaries \_\_\_\_\_.

- A. at continental margins
- B. at volcanoes
- C. by earthquake epicenters
- D. B and C
- E. All of the above

**Answer:** C [p. 30]

5. The first hypothesis of continental drift invoked which mechanism for continental movement?

- A. the biblical deluge
- B. volcanism and earthquakes
- C. sinking of land bridges
- D. tidal forces generated by the moon
- E. continental "drip" movement of continents from the north polar regions toward the equator

**Answer:** D [p. 31]

6. The first person to suggest that all of the continents had originally been joined together as the supercontinent Pangaea was who?

- A. Alexander du Toit, 1937
- B. Frank Taylor, 1910
- C. Alfred Wegener, 1912
- D. Snider- Pelligrini, 1858
- E. Harry Hess, 1962

**Answer:** C [p. 31]

\*7. The principle reason Wegener's theory was rejected was due to his failure to do what?

- A. to show that land bridges had not existed
- B. to show that his geological evidence could be explained in no other way
- C. to explain how continental crust could move through oceanic crust
- D. to show that glaciation could not have occurred within tropical latitudes
- E. to show that fossil species could not have migrated across land bridges

**Answer:** C [p. 35]

8. Glacially deposited strata were important in the development of continental drift theory because \_\_\_\_\_.

- A. the distribution of glacial deposits indicated that the entire Earth must have been glaciated
- B. the distribution of coal-swamp deposits indicated that the entire Earth must have been very warm
- C. the glacial deposits indicated that there must have been many very large glaciers on several continents
- D. the glacial deposits indicated that all of the southern continents must have been closer to the South Pole and contiguous
- E. the glacial deposits indicated that climate can change dramatically over geologic time

**Answer:** D [p. 33]

9. That the northern continents were once joined and located along the equator was shown by what?

- A. the coal-age plant fossils of North America and Europe
- B. the *Glossopteris* flora
- C. the distribution of mountain ranges
- D. the distributions of Permian and Triassic reptiles
- E. the distributions of northern hemisphere glacial tillites

**Answer:** A [p. 34]



10. The name given to the northern supercontinent was \_\_\_\_\_.
- A. Laurasia
  - B. Luentia
  - C. Laurotia.
  - D. Laurentia
  - E. northern Pangaea

**Answer:** A [p. 31]

- \*11. The northern supercontinent consisted of which current continents?
- A. North America, Europe, Asia, India, and Greenland
  - B. North America, Greenland, and Europe
  - C. North America, Europe, Asia, and India
  - D. North America, Greenland, Asia, and India
  - E. North America, Europe, Asia, and Greenland

**Answer:** E [p. 31]

12. The southern supercontinent consisted of which current continents?
- A. South America, Africa, Australia, Antarctica, and India
  - B. Africa, South America, Antarctica, and Australia
  - C. South America, Africa, India, and Australia
  - D. South Africa, India, Africa, and Australia
  - E. South America, Central America, India, Antarctica, Africa, and Australia

**Answer:** A [p. 33]

13. Which of the following was not evidence for Wegener's continental drift hypothesis?
- A. glacial deposits of Gondwana continents
  - B. fit of African and South American shorelines
  - C. paleomagnetic striping of the oceanic crust
  - D. fossil plant and animal distributions
  - E. similar rock sequences and mountain ranges

**Answer:** C [various]

14. The proposal that the coastline fit of South America and Africa was evidence of continental drift was criticized because it could have been due to what?
- A. chance
  - B. shoreline erosion
  - C. the sinking of a land bridge
  - D. ocean currents
  - E. the distribution of resistant rock types

**Answer:** B [p. 32]

15. If the continents were once joined together, rocks and mountain ranges on the margins of each should have \_\_\_\_\_.
- A. formed under the same conditions
  - B. formed the same sequences
  - C. formed at the same time
  - D. the same structural trends and forces
  - E. all of the above

**Answer:** E [p. 32]

16. Two sets of mountain ranges, which are continuous once the continents on either side of the Atlantic are joined, are located where?
- A. eastern North America and Greenland/ Australia and East Africa
  - B. east Africa and Europe/ eastern North America and the Soviet Union
  - C. Australia and Southeast Asia/ Arabia and the Persian Gulf
  - D. South Africa and Brazil/ eastern North America and Great Britain
  - E. Central and South America/ Central and North America

**Answer:** D [p. 32]

17. Glacial deposits gave strong evidence of the existence of Gondwana because \_\_\_\_\_.
- A. a single continent in high latitudes was more sensible than low latitude glaciation on several continents
  - B. glacial striations showed that all glaciers on each continent had flowed from a central location
  - C. fossil plants indicated tropical climate in the northern continents
  - D. A and B
  - E. A and C

**Answer:** D [p. 33]

18. The presence of *Glossopteris* flora fossils on Gondwana was strong evidence for continental drift because \_\_\_\_\_.
- A. the principle of fossil succession indicates that any species must be restricted to either the northern or southern hemisphere
  - B. these seed ferns had seeds that could not have been carried great distances by water or wind
  - C. *Glossopteris* floral members could not have been carried across continents by migrating dinosaurs
  - D. the present day climates of the southern continents could not support the *Glossopteris* flora
  - E. the *Glossopteris* flora was not found in coal-swamp beds of the northern continents

**Answer:** B [p. 33]

19. Fossil evidence linking the Gondwana continents includes which animal fossils?
- A. lake-dwelling *Mesosaurus* and large land-dwelling reptile *Lystrosaurus* and *Cynognathus*
  - B. freshwater *Mesosaurus* and dinosaurs *Brontosaurus* and *Tyrannosaurus*
  - C. freshwater crocodiles and the large amphibian *Eryops*
  - D. reptile *Dimetrodon* and the first bird *Archaeopteryx*
  - E. lake-dwelling *Mesosaurus* and the large land-dwelling reptiles *Dimetrodon* and *Edaphosaurus*

**Answer:** A [p. 34]

20. Fossil evidence of the links among Gondwana continents was compelling because the species \_\_\_\_\_.
- A. should have been found over wide regions if they were able to migrate among continents
  - B. should have exhibited evidence of tolerance for climatic extremes
  - C. should have shown mechanism for widespread dispersal
  - D. A and C
  - E. all of the above

**Answer:** E [p. 34]

21. The Earth's magnetic field is due to \_\_\_\_\_.
- A. the presence of magnetic iron and nickel in the core
  - B. gravity
  - C. the occurrence of magnetite in all rocks
  - D. convection in the liquid outer core
  - E. none of the above

**Answer:** D [p. 35]

22. What do studies of paleomagnetism document?
- A. changes in the Earth's gravitational field
  - B. how the inner core/outer core boundary has evolved
  - C. how the mineral magnetite has varied through time
  - D. how the Earth's magnetic poles have varied through time
  - E. none of the above

**Answer:** D [p. 36]

23. The study of paleomagnetism is possible because \_\_\_\_\_.
- A. the magnetic minerals in rocks create the Earth's magnetic field
  - B. most rocks contain no magnetic minerals
  - C. the magnetic minerals in rocks disrupt the Earth's magnetic field
  - D. the magnetic minerals in a cooling lava point toward the north magnetic pole
  - E. none of the above

**Answer:** D [p. 36]

24. What do studies of paleomagnetism show?
- A. the northern and southern hemispheres have reversed position many times
  - B. the ocean basins are young
  - C. each continent once had its own magnetic pole
  - D. the continents remain fixed and the north magnetic pole has moved
  - E. all of the above

**Answer:** B [p. 35]

25. Certain rock types can be used to determine the locations of past magnetic poles because \_\_\_\_\_.
- A. the Earth's magnetic poles have reversed many times during its history
  - B. the magnetic poles and geographic poles differ slightly
  - C. iron-bearing minerals align themselves in the direction of the current magnetic field when the rock cools below the Curie point
  - D. lava flows in Europe all showed that the continent was once located in the southern hemisphere
  - E. the north magnetic poles of each continent are identical for each geological period

**Answer:** C [p. 36]

26. What did the differing paleomagnetic records for each continent show?
- A. each continent had its own magnetic pole during successive geological periods
  - B. that the magnetic poles for each continent had moved over geological time
  - C. that the magnetic poles have remained in one location and each of the continents has moved
  - D. that both the poles and the continents have moved over time
  - E. none of the above

**Answer:** C [p. 36]

27. Magnetic iron-bearing minerals that crystallize out of magma \_\_\_\_\_.
- A. align themselves with the Earth's magnetic field and only record direction
  - B. record the strength of the Earth's magnetic fields
  - C. become easily altered and lose their magnetic properties
  - D. record both direction and strength of the Earth's magnetic field at time of crystallization
  - E. none of the above

**Answer:** D [p. 36]

28. Ocean crust is youngest where?
- A. subduction zones
  - B. the edges of continents
  - C. the crests of mid-ocean ridges
  - D. hotspots
  - E. none of the above; the age of the ocean crust is the same everywhere.

**Answer:** C [p. 38]

29. Geologists know that oceanic ridges are geologically very active because they \_\_\_\_\_.
- A. have high heat flow
  - B. have many small earthquakes
  - C. are the site of recent volcanic eruptions
  - D. B and C
  - E. all of the above

**Answer:** E [p. 40]

30. The symmetrical pattern of magnetic polarities about spreading ridges in oceanic crust basalts indicates what?
- A. Each plate has had an independent set of magnetic reversals.
  - B. Basalt retains its magnetic signature for only a few million years.
  - C. New ocean crust is created by volcanism at oceanic ridges, and old crust moves laterally away from the ridge.
  - D. The oceanic crust is geologically young.
  - E. Magnetic polarity reverses but northern and southern hemispheres do not.

**Answer:** C [p. 38]

31. That the oceanic crust is geologically young and the parallel magnetic striping pattern of basalts is symmetrical about oceanic ridges was conclusively shown by what?
- A. radiometric dating of oceanic basalts and sequences from continents
  - B. the unusually thin layer of oceanic sediments and ages of contained fossils
  - C. the existence of the same magnetic anomaly patterns in all ocean basins
  - D. A and B
  - E. all of the above

**Answer:** D [p. 38]

32. The fact that no oceanic crust older than 180 million years (Jurassic) has been found indicates what?
- A. The break-up of Pangaea must have occurred before the Jurassic Period.
  - B. The ocean basins must be older than Jurassic age.
  - C. The movement of continents must have begun no earlier than the Jurassic Period.
  - D. The break-up of Pangaea must have begun at about the same time as these oldest basalts were formed.
  - E. C and D

**Answer:** D [p. 38]

33. The seafloor spreading hypothesis indicates what as the primary cause of continental movement?
- A. volcanism in the ocean crust
  - B. convergence of tectonic plates
  - C. the formation and destruction of ocean basins
  - D. the convection of mantle heat
  - E. the decay of radioactive isotopes

**Answer:** C [p. 38]

34. Who was the theory of sea floor spreading proposed by?
- A. Harry Hess
  - B. Frederick Vine
  - C. Oliver and Sykes
  - D. Fred Taylor
  - E. Hess and Matthews

**Answer:** A [p. 37]

35. What is the driving mechanism for plate tectonics?
- A. heat deep within the Earth
  - B. tidal forces caused by the moon
  - C. volcanoes and earthquakes at plate boundaries
  - D. a little man with a steering wheel in Tierra del Fuego
  - E. none of the above

**Answer:** A [p. 37]

36. What was the driving mechanism proposed by Hess to explain sea floor spreading?
- A. downwelling oceanic currents
  - B. hydrothermal cells
  - C. thermal convection cells
  - D. motions in the outer core
  - E. A and D

**Answer:** C [p. 37]

37. Lithospheric plates move on the Earth's surface because \_\_\_\_\_.
- A. warm mantle ascends at ridges and cool mantle descends at subduction zones
  - B. convection occurs only in the asthenosphere
  - C. cool mantle ascends at ridges and warm mantle descends at subduction zones
  - D. A and B
  - E. B and C

**Answer:** A [p. 38]

38. What is the mechanism for plate movement?
- A. conduction of heat from the core
  - B. friction created by tidal forces generated by the Moon
  - C. conduction of heat within the mantle
  - D. convection of heat within the mantle
  - E. convection of heat within the core
- Answer:** D [p. 37]
39. Old, cold, and dense oceanic crust is \_\_\_\_\_.
- A. created at spreading ridges
  - B. found closest to continental margins
  - C. destroyed at subduction zones
  - D. eventually becomes incorporated into continental crust
  - E. always found on plate margins
- Answer:** C [p. 38]
40. Geologists recognize which three major types of plate boundaries?
- A. resurgent, divergent, and emergent
  - B. convergent, divergent, and transform
  - C. transcurrent, oblique, and resurgent
  - D. emergent, transform, and convergent
  - E. transform, transcurrent, and translateral
- Answer:** B [p. 39]
41. At divergent plate boundaries, what are the operating forces?
- A. compressional
  - B. lateral shearing
  - C. tensional
  - D. thrusting
  - E. normal
- Answer:** C [p. 44]
42. At a divergent plate boundary, oceanic crust is \_\_\_\_\_.
- A. transformed
  - B. subducted
  - C. created
  - D. destroyed
  - E. none of the above
- Answer:** C [p. 44]
43. At a mid-ocean ridge spreading center, what happens?
- A. the plates are moving past each other
  - B. the plates are moving away from each other
  - C. the plates are moving toward each other
  - D. one plate is being subducted beneath another
  - E. both plates are being subducted
- Answer:** B [p. 40]

44. Which are **not** associated with a mid-ocean ridge?

- A. old ocean crust
- B. shallow earthquakes
- C. volcanic eruptions
- D. transform faults
- E. hot water

**Answer:** A [p. 40]

45. The forces operating at continent-continent convergent boundaries are \_\_\_\_\_.

- A. transpressional
- B. compressional
- C. tensional
- D. lateral shearing
- E. compressional and tensional

**Answer:** B [p. 53]

\* 46. Large, high mountain ranges without volcanoes are built at which type of plate boundary?

- A. divergent: ocean-ocean
- B. convergent: ocean-continent
- C. convergent: continent-continent
- D. transform: continent-continent
- E. all of the above

**Answer:** C [p. 44]

47. When a continental plate diverges from another continental plate what happens?

- A. a new ocean basin forms
- B. a large mountain range forms
- C. a transform fault forms
- D. there are no earthquakes
- E. a subduction zone forms

**Answer:** A [p. 40]

48. At transform plate boundaries, \_\_\_\_\_.

- A. lithosphere is neither created or destroyed
- B. plates move laterally past each other
- C. active volcanism occurs
- D. A and B
- E. A, B, and C

**Answer:** D [p. 48]

49. A transform plate boundary may connect \_\_\_\_\_.

- A. a spreading ridge and subduction zone
- B. two spreading ridges
- C. two subduction zones
- D. A and C
- E. all of the above

**Answer:** E [p. 48]

50. The San Andreas Fault that runs through California \_\_\_\_\_.

- A. is a transform fault
- B. is a plate boundary
- C. is the location of large earthquakes
- D. A and C
- E. all of the above

**Answer:** D [p. 48]

\*51. Most geological activity (earthquakes and volcanic eruptions) take place where?

- A. subduction zones
- B. convergent plate boundaries
- C. transform faults
- D. plate boundaries
- E. hotspots

**Answer:** D [various]

52. Plate tectonics have affected biological evolution by \_\_\_\_\_.

- A. causing global climatic change with joining together or breaking apart of large landmasses
- B. causing more or fewer habitats to develop as continental masses come together or separate
- C. forming geographic barriers
- D. forming geographic corridors
- E. all of the above

**Answer:** E [p. 56]

## True-False Questions

\_\_\_ 1. Changes in the Earth's magnetic field have occurred throughout geologic time and these are called magnetic reversals.

**Answer:** T [p. 36]

\* \_\_\_ 2. The cause of magnetic reversals is a change in the structure of the Earth's inner core.

**Answer:** F [p. 37]

\_\_\_ 3. Oceanic ridges are geologically stable features where only pelagic sedimentation takes place.

**Answer:** F [p. 38]

\_\_\_ 4. Features associated with ancient continental rift zones include andesite volcanoes and strike slip faulting.

**Answer:** F [p. 40]

\* \_\_\_ 5. During the Triassic, a number of rift related fault basins formed along the eastern margin of North America.

**Answer:** T [p. 41]



\_\_\_ 6. Convergent plate boundaries are characterized by the formation of new oceanic crust.

**Answer:** F [p. 44]

\_\_\_ 7. Hot spots move with continental plates.

**Answer:** F [p. 48]

\* \_\_\_ 8. Volcanic island chains that form along the trace of a hot spot are called aseismic ridges.

**Answer:** T [p. 48]

\_\_\_ 9. The west coast of South America is a convergent boundary.

**Answer:** T [p. 47]

\_\_\_ 10. A transform plate boundary underlies the Alps in southern Europe.

**Answer:** F [p. 48]

\_\_\_ 11. There is a divergent plate boundary within the region of east Africa.

**Answer:** T [p. 46]

## Matching

1. Match the present day continent with the supercontinent that it was once part of.

- |                   |             |
|-------------------|-------------|
| ___ Africa        | A. Laurasia |
| ___ Europe        |             |
| ___ Asia          | B. Gondwana |
| ___ North America |             |
| ___ South America |             |
| ___ Australia     |             |
| ___ Antarctica    |             |
| ___ India         |             |
| ___ Greenland     |             |

**Answer:** B, A, A, A, B, B, B, B, A [pp. 30-31]

2. Match the locations with the type of convergent plate boundary.

- |                       |                        |
|-----------------------|------------------------|
| ___ Peru-Chile Trench | A. oceanic-oceanic     |
| ___ Himalayas         | B. continental-oceanic |
| ___ Aleutian Islands  | C. continent-continent |
| ___ Japan             |                        |
| ___ Philippines       |                        |

**Answer:** B, C, A, A, A [pp. 41, 44, 46]

3. Match the following geologic/geographic features with the type of plate boundary that is associated with each.

- |  |               |
|--|---------------|
| ___ The Himalayan Mountains and Tibetan Plateau  | A. Convergent |
| ___ The central and southern coast of California | B. Divergent  |
| ___ The Gulf of California                       | C. Transform  |
| ___ The Red Sea                                  |               |
| ___ The Gulf of Aden                             |               |
| ___ The Alps                                     |               |
| ___ The Philippine Islands and Japan             |               |
| ___ Java and Sumatra                             |               |
| ___ The Aleutian Islands                         |               |

**Answer:** A, C, B, B, B, A, A, A, A [various]