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Chapter: Chapter 2: Plate Tectonics: The Unifying Theory

Multiple Choice

1. Who proposed the theory of continental drift?
A) Charles Darwin
B) Harry Hess
C) Alfred Wegener
D) J. Tuzo Wilson

Ans: C

Section: 2-1: The Discovery of Plate Tectonics

2. Which of the following concepts was developed earliest?
A) continental drift
B) plate tectonics
C) seafloor spreading
D) All three concepts were developed at approximately the same time.

Ans: A

Section: 2-1: The Discovery of Plate Tectonics

3. How old are the fossils of the reptile *Mesosaurus* found in Africa and South America

that suggest the two continents were once together?

- A) approximately 100 million years
- B) approximately 1.0 billion years
- C) approximately 300 million years
- D) approximately 3.0 billion years

Ans: C

Section: 2-1: The Discovery of Plate Tectonics

4. When was the theory of plate tectonics developed?

- A) 1860s
- B) 1920s
- C) 1940s
- D) 1960s

Ans: D

Section: 2-1: The Discovery of Plate Tectonics

5. New lithosphere is created

- A) in deep sea trenches.
- B) in subduction zones.
- C) at mid-ocean ridges.
- D) along transform faults.

Ans: C

Section: 2-2: The Mosaic of Plates

6. In which ocean are most of the world's convergent plate margins located?

- A) Arctic Ocean
- B) Atlantic Ocean
- C) Indian Ocean
- D) Pacific Ocean

Ans: D

Section: 2-2: The Mosaic of Plates

7. The east coast of North America is
- A) a convergent plate boundary.
 - B) a transform plate boundary.
 - C) a divergent plate boundary.
 - D) **not** a plate boundary.

Ans: D

Section: 2-2: The Mosaic of Plates

8. Which of the following is associated with a divergent plate boundary?
- A) earthquakes
 - B) volcanism
 - C) rifting
 - D) all of the above

Ans: D

Section: 2-2: The Mosaic of Plates

9. Which of the following is a divergent plate boundary?
- A) the Andes Mountains
 - B) the Mid-Atlantic Ridge
 - C) the Himalayan Mountains
 - D) the San Andreas fault

Ans: B

Section: 2-2: The Mosaic of Plates

10. At what type of plate boundary do the deepest earthquakes occur?
- A) convergent
 - B) divergent
 - C) transform
 - D) All of these plate boundaries have deep earthquakes.

Ans: A

Section: 2-2: The Mosaic of Plates

11. Approximately how deep (below sea level) are the deepest deep-sea trenches?

- A) 3 km
- B) 10 km
- C) 30 km
- D) 100 km

Ans: B

Section: 2-2: The Mosaic of Plates

12. Which of the following is **not** associated with convergent plate boundaries?

- A) earthquakes
- B) deep-sea trenches
- C) spreading centers
- D) volcanoes

Ans: C

Section: 2-2: The Mosaic of Plates

13. Which of the following is a type of convergent plate boundary?

- A) continental rift
- B) spreading center
- C) mid-ocean ridge
- D) subduction zone

Ans: D

Section: 2-2: The Mosaic of Plates

14. Which of the following mountain ranges formed as a result of ocean-continent convergence?

- A) the Andes
- B) the Appalachians
- C) the Himalayas
- D) the Urals

Ans: A

Section: 2-2: The Mosaic of Plates

15. When a deep-sea trench is located next to a continent, where would you expect to find active volcanoes?

- A) on the ocean side of the trench
- B) in the deep-sea trench
- C) on the continent side of the trench
- D) on both the ocean side and continent side of the trench

Ans: C

Section: 2-2: The Mosaic of Plates

16. What plate is subducting beneath southwestern Canada and the northwestern United States?

- A) the Cocos Plate
- B) the Nazca Plate
- C) the Juan de Fuca Plate
- D) the Pacific Plate

Ans: C

Section: 2-2: The Mosaic of Plates

17. The west coast of South America is

- A) a convergent plate boundary.
- B) a transform fault boundary.
- C) a divergent plate boundary.
- D) **not** a plate boundary.

Ans: A

Section: 2-2: The Mosaic of Plates

18. Which of the following is an example of a transform plate boundary?

- A) the East African Rift
- B) the Mid-Atlantic Ridge

- C) the Marianas Trench
- D) the San Andreas Fault

Ans: D

Section: 2-2: The Mosaic of Plates

19. What type of plate boundary is parallel to the direction of plate movement?

- A) convergent plate boundary
- B) transform plate boundary
- C) divergent plate boundary
- D) all of the above

Ans: B

Section: 2-2: The Mosaic of Plates

20. Which of the following mountain ranges is the product of continent-continent convergence?

- A) the Andes
- B) the Cascade Range
- C) the Himalayas
- D) the Japanese islands

Ans: C

Section: 2-2: The Mosaic of Plates

21. The North American Plate is bounded by _____ plate boundaries.

- A) convergent
- B) transform
- C) divergent
- D) convergent, divergent, and transform

Ans: D

Section: 2-2: The Mosaic of Plates

22. Which of the following can be used to determine the rates of plate motion?

- A) astronomical positioning
- B) seafloor magnetic anomalies
- C) global positioning system
- D) all of the above

Ans: D

Section: 2-3: Rates and History of Plate Motions

23. Modern seafloor spreading rates range from

- A) 0.2 to 1.5 millimeters per year.
- B) 2 to 15 meters per year.
- C) 2 to 15 centimeters per year.
- D) 2 to 15 kilometers per year.

Ans: C

Section: 2-3: Rates and History of Plate Motions

24. What two scientists related the positive and negative magnetic bands on the seafloor to seafloor spreading?

- A) Charles Darwin and James Hutton
- B) F.J. Vine and D.H. Mathews
- C) Harry Hess and Robert Dietz
- D) Alfred Wegener and Arthur Holmes

Ans: B

Section: 2-3: Rates and History of Plate Motions

25. Which of the following is commonly used to determine the age of seafloor samples recovered by the deep-sea drilling project?

- A) carbon-14 dating
- B) foraminifera fossils
- C) chemical composition
- D) gravity measurements

Ans: B

Section: 2-3: Rates and History of Plate Motions

26. Which of the following is commonly used to determine the age of seafloor samples recovered by the deep-sea drilling project?

- A) sediment thickness (*was* carbon-14 dating)
- B) foraminifera fossils
- C) chemical composition
- D) gravity measurements

Ans: B

Section: 2-3: Rates and History of Plate Motions

27. Which of the following plates is moving the fastest?

- A) the African Plate
- B) the North American Plate
- C) the Eurasian Plate
- D) the Pacific Plate

Ans: D

Section: 2-4: The Grand Reconstruction

28. On a map of the seafloor, the boundaries between normally magnetized oceanic crust and reversely magnetized oceanic crust are called

- A) dipoles.
- B) isochrons.
- C) isograds.
- D) sutures.

Ans: B

Section: 2-4: The Grand Reconstruction

29. When was the supercontinent of Pangaea assembled?

- A) approximately 100 million years ago
- B) approximately 1.0 billion years ago
- C) approximately 250 million years ago
- D) approximately 2.5 billion years ago

Ans: C

Section: 2-4: The Grand Reconstruction

30. How old are the oldest rocks on the ocean floor?

- A) approximately 20 million years old
- B) approximately 600 million years old
- C) approximately 200 million years old
- D) approximately 4.0 billion years old

Ans: C

Section: 2-4: The Grand Reconstruction

31. The oldest continental rocks are _____ than the oldest oceanic rocks.

- A) much older
- B) slightly older
- C) slightly younger
- D) much younger

Ans: A

Section: 2-4: The Grand Reconstruction

32. Isochrons on the seafloor are roughly _____ the ridge axis along which they were created.

- A) parallel to and symmetric about
- B) perpendicular to and symmetric about
- C) parallel to, but not symmetric about
- D) perpendicular to, but not symmetric about

Ans: A

Section: 2-4: The Grand Reconstruction

33. Why are isochrons on the Pacific seafloor more widely spaced than isochrons on the Atlantic seafloor?

- A) The Pacific seafloor formed at a faster spreading rate than the Atlantic seafloor.
- B) The Pacific seafloor formed at a slower spreading rate than the Atlantic seafloor.
- C) The Pacific seafloor is older than the Atlantic seafloor.

D) The Pacific seafloor is younger than the Atlantic seafloor.

Ans: A

Section: 2-4: The Grand Reconstruction

34. What ocean used to lie between Africa and Eurasia and was the ancestor to today's Mediterranean Sea?

- A) Gondwana
- B) Panthalassa
- C) Rodinia
- D) Tethys

Ans: D

Section: 2-4: The Grand Reconstruction

35. When did the supercontinent Pangaea begin to break apart?

- A) approximately 65 million years ago
- B) approximately 570 million years ago
- C) approximately 200 million years ago
- D) approximately 1.5 billion years ago

Ans: C

Section: 2-4: The Grand Reconstruction

36. Pangaea split into two continents: Laurasia, made up of the northern continents, and _____, made up of the southern continents.

- A) Tethys
- B) Panthalassa
- C) Gondwana
- D) Cascadia

Ans: C

Section: 2-4: The Grand Reconstruction

37. When did India begin to collide with Asia to form the Himalayas?

- A) approximately 50 million years ago
- B) approximately 500 million years ago
- C) approximately 200 million years ago
- D) approximately 2.0 billion years ago

Ans: A

Section: 2-4: The Grand Reconstruction

38. Compared with slower moving plates, faster moving plates are bounded by a greater proportion of

- A) continent collision zones.
- B) subduction zones.
- C) mid-ocean ridges.
- D) transform faults.

Ans: B

Section: 2-5: Mantle Convection: The Engine of Plate Tectonics

39. What drives plate tectonics?

- A) magnetic reversals
- B) mantle convection
- C) solar energy
- D) volcanism

Ans: B

Section: 2-5: Mantle Convection: The Engine of Plate Tectonics

40. Which of the following forces is important in driving plate tectonics?

- A) the pulling force of a sinking lithospheric slab
- B) the pushing force of a plate sliding off a mid-ocean ridge
- C) the suction force of a retreating subduction zone
- D) all of the above

Ans: D

Section: 2-5: Mantle Convection: The Engine of Plate Tectonics

41. How deep are plates subducted?

- A) 100 km
- B) 700 km
- C) 2900 km
- D) 6400 km

Ans: C

Section: 2-5: Mantle Convection: The Engine of Plate Tectonics

42. Regions of intense localized volcanism, such as Hawaii, form above plumes of fast-rising material that originate in the

- A) crust.
- B) deep mantle.
- C) lithosphere.
- D) outer core.

Ans: B

Section: 2-5: Mantle Convection: The Engine of Plate Tectonics

43. The Hawaiian volcanoes are

- A) located at a convergent plate boundary.
- B) located at a divergent plate boundary.
- C) located at a transform plate boundary.
- D) **not** located at a plate boundary.

Ans: D

Section: 2-5: Mantle Convection: The Engine of Plate Tectonics

44. The Earth's lithosphere is broken up into approximately _____ large plates.

- A) 5
- B) 10
- C) 12
- D) 20

Ans: C

Section: 2-2: The Mosaic of Plates

45. New oceanic crust is created at

- A) subduction zones.
- B) deep-sea trenches.
- C) mid-ocean ridges.
- D) transform boundaries.

Ans: C

Section: 2-2: The Mosaic of Plates

46. Shallow focus earthquakes are associated with which type of plate boundary?

- A) divergent
- B) convergent
- C) transform
- D) all of the above

Ans: D

Section: 2-2: The Mosaic of Plates

47. Mid-ocean ridges are also referred to as

- A) spreading centers.
- B) hot spots.
- C) island arcs.
- D) trench zones.

Ans: A

Section: 2-2: The Mosaic of Plates

48. An island arc forms when there is _____ convergence.

- A) ocean-continent
- B) ocean-ocean
- C) continent-continent

D) island-continent

Ans: B

Section: 2-2: The Mosaic of Plates

49. The convergence of the North American Plate with the Juan de Fuca Plate forms the _____ subduction zone.

- A) Marianas
- B) Andean
- C) Aleutian
- D) Cascadia

Ans: D

Section: 2-2: The Mosaic of Plates

50. Mount St. Helens is part of the

- A) Andes Mountains.
- B) Mid-Atlantic Ridge.
- C) Himalayan Mountains.
- D) Cascade Range.

Ans: D

Section: 2-2: The Mosaic of Plates

51. The Great Rift Valley of East Africa is an early-stage

- A) convergent boundary.
- B) divergent boundary.
- C) transform boundary.
- D) deep-sea trench.

Ans: B

Section: 2-2: The Mosaic of Plates

52. The Appalachian Mountains formed from an ancient _____ plate boundary.

- A) convergent
- B) transform
- C) divergent
- D) converform

Ans: A

Section: 2-4: The Grand Reconstruction

53. Oceanic crust that records negative magnetic anomalies formed when the Earth's magnetic field was

- A) the same as it is today.
- B) the same as today, except weaker.
- C) reversed from what it is today.
- D) the same as today, except stronger.

Ans: C

Section: 2-3: Rates and History of Plate Motions

54. Astronomical positioning measures points on the Earth's surface relative to

- A) the position of Mars.
- B) the position of known comets.
- C) the position of the Moon.
- D) the position of fixed stars.

Ans: D

Section: 2-3: Rates and History of Plate Motions

55. If the position between antennas on two plates moving away from each other changes by 5 mm/yr, then each plate is moving at approximately

- A) 5 mm/yr.
- B) 2.5 mm/yr.
- C) 10 mm/yr.
- D) 1 mm/yr.

Ans: B

Section: 2-3: Rates and History of Plate Motions

56. Rhodinia is a supercontinent that formed
- A) after Pangea.
 - B) at the same time as Pangea.
 - C) before Pangea.
 - D) Geoscientists have no idea when Rhodinia was formed.

Ans: C

Section: 2-4: The Grand Reconstruction

57. Geoscientists predict the east coast of North America will be _____ 50 million years in the future.
- A) a divergent plate boundary
 - B) a transform plate boundary
 - C) a convergent plate boundary
 - D) the same as it is today

Ans: C

Section: 2-4: The Grand Reconstruction

58. The main type of plate boundaries are (proper names only):
- A) transform, sliding-past, sizzor.
 - B) convergent, colliding, crumbling.
 - C) divergent, pull-apart, spreading.
 - D) convergent, transform, divergent.

Ans: D

Section: 2-2: The Mosaic of Plates

59. What kind of plate boundary defines the eastern edge of the plate we live on in the United States?
- A) deep sea trench
 - B) mid-ocean rift
 - C) continental spreading center
 - D) transform fault

Ans: B

Section: 2-2: The Mosaic of Plates

60. How do we determine absolute direction of plate movement over millions of years?

- A) with astronomical positioning
- B) with global position systems (GPS)
- C) with seafloor isochrons
- D) by looking at the alignment of mountain ranges on the continents

Ans: C

Section: 2-4: The Grand Reconstruction

61. _____ are the most extensive mountain ranges on Earth today.

- A) theAlps
- B) the Himalayas
- C) theRockies
- D) mid-oceanic ridges

Ans: D

Section: 2-2: The Mosaic of Plates

62. Who first described world tectonics in terms of rigid plates?

- A) Alfred Wegener
- B) Harry Hess
- C) Tuzo Wilson
- D) Robert Dietz

Ans: C

Section: 2-1: The Discovery of Plate Tectonics

63. Who first proposed the three different kinds of plate boundaries widely accepted today?

- A) Tuzo Wilson

- B) Alfred Wegener
- C) Robert Dietz
- D) Harry Hess

Ans: A

Section: 2-1: The Discovery of Plate Tectonics

64. Which of the following locations is least likely to have active volcanoes?

- A) mid-oceanic ridge
- B) continental rift valley
- C) transform fault
- D) island arc

Ans: C

Section: 2-2: The Mosaic of Plates

65. How many major plates cover Earth's surface?

- A) 2
- B) 5
- C) 13
- D) 30

Ans: C

Section: 2-2: The Mosaic of Plates

66. Which of the following plates is the largest?

- A) Cocos Plate
- B) Indian Plate
- C) North American Plate
- D) Pacific Plate

Ans: D

Section: 2-2: The Mosaic of Plates

67. Which of the following plates contains only oceanic crust?

- A) North Atlantic Plate
- B) Australian Plate
- C) Nazca Plate
- D) African Plate

Ans: C

Section: 2-2: The Mosaic of Plates

68. Who first suggested that the Earth's surface might be a fragile shell resting on fluid?

- A) Alfred Wegener
- B) Harry Hess
- C) Benjamin Franklin
- D) Arthur Holmes

Ans: C

Section: 2-1: The Discovery of Plate Tectonics

69. _____ was the first earth scientist to propose a rudimentary form of seafloor spreading.

- A) Arthur Holmes
- B) Harry Hess
- C) Alfred Wegener
- D) Tuzo Wilson

Ans: A

Section: 2-1: The Discovery of Plate Tectonics

70. Which scientist was the first to suggest the existence of so-called "supercontinents"?

- A) German Alfred Wegener
- B) Austrian Eduard Suess
- C) Canadian Tuzo Wilson
- D) Britain Arthur Holmes

Ans: B

Section: 2-1: The Discovery of Plate Tectonics

71. Roughly when did most earth scientists accept plate tectonics as a theory?

- A) 1960
- B) 1970
- C) 1980
- D) 1990

Ans: B

Section: 2-1: The Discovery of Plate Tectonics

72. Compared with oceanic crust the continental crust is generally lighter, _____ and _____.

- A) weaker; thicker
- B) stronger; thinner
- C) weaker; thicker
- D) stronger; thicker

Ans: C

Section: 2-2: The Mosaic of Plates

73. Compared with oceanic rifts the continental rifts generally lack

- A) rift valleys.
- B) earthquakes.
- C) volcanic activity.
- D) transform faults.

Ans: D

Section: 2-2: The Mosaic of Plates

74. Where is the best place to explore the mid-ocean ridge as it comes on land?

- A) Ireland
- B) Iceland
- C) Norway
- D) Africa

Ans: B

Section: 2-2: The Mosaic of Plates

75. Where is one of the best places to study seafloor spreading on dry land?

- A) Ireland
- B) Iceland
- C) Norway
- D) Africa

Ans: B

Section: 2-2: The Mosaic of Plates

76. Most transform-fault boundaries are typically associated with
- A) subduction zones.
 - B) continental rifts.
 - C) oceanic rifts.
 - D) mountain ranges.

Ans: C

Section: 2-2: The Mosaic of Plates

77. The North American Plate is bounded on the west with _____ boundaries and the east with ____ boundaries.
- A) convergent and transform; divergent
 - B) divergent; convergent and transform
 - C) transform; convergent
 - D) divergent; transform

Ans: A

Section: 2-2: The Mosaic of Plates

78. Deep focus earthquakes are typically associated with which type of plate boundary?
- A) divergent
 - B) convergent
 - C) transform
 - D) all of the boundaries

Ans: B

Section: 2-2: The Mosaic of Plates

79. Which type of measurements initially led to determining the rate of plate movement with a high degree of accuracy?
- A) geodesy
 - B) astronomical positioning
 - C) radio telescopes
 - D) GPS

Ans: C

Section: 2-3: Rates and History of Plate Motions

80. Which type of measurements are currently used determine the rate of plate movement with a high degree of accuracy?
- A) geodesy
 - B) astronomical positioning
 - C) radio telescopes
 - D) GPS

Ans: D

Section: 2-3: Rates and History of Plate Motions

81. The width of seafloor isochrons is directly related to

- A) their distance from a mid-ocean ridge.
- B) their age.
- C) spreading rate.
- D) the frequency of magnetic reversals.

Ans: C

Section: 2-4: The Grand Reconstruction

82. Given the current plate configuration we would expect the distance between which of the following cities to increase?

- A) Los Angeles and New York
- B) New York and London
- C) London and Moscow
- D) Honolulu and Tokyo

Ans: B

Section: 2-4: The Grand Reconstruction

83. Roughly how long has the North American Plate been around?

- A) 6 thousand years
- B) 6 million years
- C) 60 million years
- D) 600 million years

Ans: C

Section: 2-4: The Grand Reconstruction

84. Assuming that the direction and rates of plate movement will remain constant for the next 50 million years, how will the distance between London and New York change?

- A) It will remain the same.
- B) It will decrease.
- C) It will increase.
- D) It is impossible to predict.

Ans: C

Section: 2-4: The Grand Reconstruction