Import Settings:
Base Settings: Brownstone Default
Information Field: Section
Highest Answer Letter: D
Multiple Keywords in Same Paragraph: No

Chapter: Chapter 1: The Earth System

Multiple Choice

1. Living organisms have been on Earth for _____ of Earth's history.
A) less than 1%
B) approximately 20%
C) approximately 50%
D) approximately 80%

Ans: D
Section: 1-6: An Overview of Geologic Time

2. Which of the following statements regarding the scientific method is **true**?
A) A hypothesis must be agreed upon by more than one scientist.
B) A theory is a hypothesis that has withstood many scientific tests.
C) A theory is proven to be true and therefore may not be discarded.
D) A hypothesis cannot predict the outcome of scientific experiments.

Ans: B
Section: 1-1: The Scientific Method

3. Which of the following statements about the scientific method is **false**?
A) A scientific theory is never considered finally proved.

B) Data used to generate a hypothesis may come from observations, experiments, and chance findings.
C) A theory that has accumulated a substantial body of experimental support is called a hypothesis.
D) A scientific model represents some aspect of nature based on a set of hypotheses and theories.

Ans: C
Section: 1-1: The Scientific Method

4. According to the principle of uniformitarianism,
A) geologic processes we observe today have operated in the past.
B) animals evolved at a uniform rate.
C) all of the planets formed from a uniform solar nebula.
D) early Earth was covered by a uniform magma ocean.

Ans: A
Section: 1-3: The Geologic Record

5. How old is Earth?
A) approximately 4.5 thousand years
B) approximately 4.5 billion years
C) approximately 4.5 million years
D) approximately 4.5 trillion years

Ans: B
Section: 1-6: An Overview of Geologic Time

6. Earth's core is made up primarily of
A) iron.
B) lead.
C) oxygen.
D) silicon.

Ans: A
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

7. Which of the following elements is more abundant in Earth's crust than in Earth as a whole?
A) iron
B) magnesium
C) nickel
D) silicon

Ans: D
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

8. Which of the following makes up the bulk of Earth?
A) crust
B) inner core
C) mantle
D) outer core

Ans: C
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

9. Ninety percent of Earth is made up of which four elements?
A) iron, oxygen, silicon, and magnesium
B) oxygen, nitrogen, hydrogen, and silicon
C) magnesium, aluminum, silicon, and oxygen
D) silicon, calcium, aluminum, and iron

Ans: A
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

10. Approximately 50% of Earth's crust is made up of which element?
A) aluminum
B) iron
C) oxygen
D) silicon

Ans: C
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

11. Earth exchanges _____ with the rest of the cosmos.
A) energy and mass
B) mass, but not energy,
C) energy, but not mass,
D) neither energy nor mass

Ans: A
Section: 1-5: Earth as a System of Interacting Components

12. Solar energy energizes all of the following major components of Earth system, **except** the
A) atmosphere.
B) biosphere.
C) hydrosphere.
D) lithosphere.

Ans: D
Section: 1-5: Earth as a System of Interacting Components

13. What powers Earth's external heat engine?
A) gravitational energy
B) radioactive decay
C) solar energy
D) tidal forces

Ans: C
Section: 1-5: Earth as a System of Interacting Components

14. In which of the following subsystems is Earth's magnetic field generated?
A) climate system

B) hydrologic system
C) geodynamo system
D) plate tectonic system

Ans: C
Section: 1-5: Earth as a System of Interacting Components

15. Earth's climate system involves interactions between the atmosphere and the
A) biosphere.
B) hydrosphere.
C) lithosphere.
D) biosphere, hydrosphere, and lithosphere.

Ans: D
Section: 1-5: Earth as a System of Interacting Components

16. On average, Earth's lithosphere is approximately ____ km thick.
A) 4
B) 20
C) 100
D) 500

Ans: C
Section: 1-5: Earth as a System of Interacting Components

17. The asthenosphere is
A) cool and strong.
B) cool and weak.
C) hot and strong.
D) hot and weak.

Ans: D
Section: 1-5: Earth as a System of Interacting Components

18. What are the plates of plate tectonics made up of?
A) asthenosphere
B) crust
C) lithosphere
D) mantle

Ans: C
Section: 1-5: Earth as a System of Interacting Components

19. Which of the following relationships is **correct**?
A) asthenosphere = crust
B) lithosphere = crust
C) asthenosphere = crust + upper mantle
D) lithosphere = crust + upper mantle

Ans: D
Section: 1-5: Earth as a System of Interacting Components

20. The motion of a flowing material in which hot matter rises from the bottom and cool matter sinks from the surface is called
A) accretion.
B) convection.
C) differentiation.
D) fusion.

Ans: B
Section: 1-5: Earth as a System of Interacting Components

21. Which of the following statements about convection is **true**?
A) Heat is transferred from hot material to cool material without inducing a flow.
B) Hot material flows upward and displaces cool material.
C) Cool material flows upward and displaces hot material.
D) Random circulation occurs.

Ans: B
Section: 1-5: Earth as a System of Interacting Components

22. How old are the oldest rocks now found on Earth's surface?
A) 0.5 billion years
B) 4.0 billion years
C) 2.5 billion years
D) 4.5 billion years

Ans: B
Section: 1-6: An Overview of Geologic Time

23. Earth's atmosphere has been oxygen-rich for _____ of Earth's history.
A) approximately 25%
B) approximately 50%
C) approximately 75%
D) approximately 99%

Ans: B
Section: 1-6: An Overview of Geologic Time

24. Large continental masses had formed on Earth by
A) 0.3 billion years ago.
B) 2.5 billion years ago.
C) 1.0 billion years ago.
D) 4.0 billion years ago.

Ans: B
Section: 1-6: An Overview of Geologic Time

25. How old are the earliest fossil remains?
A) approximately 65 million years
B) approximately 2200 million years
C) approximately 540 million years
D) approximately 3500 million years

Ans: D

Section: 1-6: An Overview of Geologic Time

26. When did biology's Big Bang (evolutionary explosion) occur?
A) approximately 65 million years ago
B) approximately 2.2 billion years ago
C) approximately 540 million years ago
D) approximately 3.5 billion years ago

Ans: C
Section: 1-6: An Overview of Geologic Time

27. What caused the mass extinctions 65 million years ago that ended the Age of Dinosaurs?
A) major bolide impact
B) massive volcanic eruptions
C) global glaciation
D) all of the above

Ans: A
Section: 1-6: An Overview of Geologic Time

28. Stony meteorites are similar in composition to Earth's
A) mantle.
B) crust.
C) inner core.
D) outer core.

Ans: A
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

29. The group of meteorites that is similar in composition to Earth's core is
A) stony meteorites.
B) high-density meteorites.
C) iron-nickel meteorites.

D) none of the above.

Ans: C
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

30. A _____ aims to predict the complex behavior of Earth systems.
A) scientific hypothesis
B) scientific observation
C) scientific plan
D) scientific model

Ans: D
Section: 1-1: The Scientific Method

31. Change in the ground elevation of Earth's surface is called
A) geodesy.
B) topography.
C) uniformitarianism.
D) none of the above

Ans: B
Section: 1-2: Earth's Shape and Surface

32. Elevation of the ground surface is measured relative to
A) Mount Everest.
B) the equator.
C) sea level.
D) the north pole.

Ans: C
Section: 1-2: Earth's Shape and Surface

33. The daily rotation of Earth causes the equatorial regions to _____ and the polar regions to _____.

A) bulge outward, flatten
B) flatten, bulge outward
C) bulge inward, flatten
D) flatten, bulge inward

Ans: A
Section: 1-2: Earth's Shape and Surface

34. The Mohorovičić discontinuity coincides with the _____ boundary.
A) mantle-core
B) crust-mantle
C) lithosphere-mantle
D) inner core-outer core

Ans: B
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

35. Continental crust is _____ oceanic crust.
A) less dense than
B) the same density as
C) more dense than
D) Geoscientists have no idea how dense the continental crust is.

Ans: A
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

36. Earth's major layers include (from outermost to innermost):
A) inner core, outer core, mantle, crust.
B) outer core, inner core, mantle, crust.
C) crust, mantle, outer core, inner core.
D) crust, outer core, inner core, mantle.

Ans: C
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

37. The plate tectonic system is driven by
A) magnetism.
B) the climate system.
C) solar heat.
D) internal heat.

Ans: D
Section: 1-5: Earth as a System of Interacting Components

38. The first evidence of erosion by water in the rock record occurred
A) 4000 Ma.
B) 3500 Ma.
C) 2500 Ma.
D) 3800 Ma.

Ans: D
Section: 1-6: An Overview of Geologic Time

39. The three major global geosystems are
A) climate system, solar system, and geodynamo system.
B) geodynamo system, plate tectonic system, and solar system.
C) climate system, geodynamo system, and plate tectonic system.
D) plate tectonic system, climate system, and solar system.

Ans: C
Section: 1-5: Earth as a System of Interacting Components

40. Solar energy energizes which of Earth's components?
A) atmosphere
B) biosphere
C) hydrosphere
D) all of the above

Ans: D
Section: 1-5: Earth as a System of Interacting Components

41. The first appearance of *Homo sapiens* on Earth occurred in
A) 16 Ma.
B) 0.16 Ma.
C) 1.6 Ma.
D) 1600 Ma.

Ans: B
Section: 1-6: An Overview of Geologic Time

42. How many major mass extinction events have occurred throughout Earth's history?
A) 5
B) 10
C) 2
D) 1

Ans: A
Section: 1-6: An Overview of Geologic Time

43. The ability of Earth's atmosphere to retain heat is referred to as the
A) solar effect.
B) radiation effect.
C) biosphere effect.
D) greenhouse effect.

Ans: D
Section: 1-5: Earth as a System of Interacting Components

44. Magnetic reversals of Earth's magnetic field are when
A) Earth's north and south poles flip.
B) Earth's magnetic field decreases in intensity.
C) Earth's magnetic poles wander.
D) Earth's magnetic field increases in intensity.

Ans: A

Section: 1-5: Earth as a System of Interacting Components

45. The typical elevation of the land surface occurs within a range of _____ above sea level.
A) 0 to 20 km
B) 0 to 1 km
C) 0 to 10 km
D) 0 to 5 km

Ans: B
Section: 1-2: Earth's Shape and Surface

46. The typical depth of ocean basins is
A) 1 to 2 km.
B) 10 to 12 km.
C) 4 to 5 km.
D) 8 to 10 km.

Ans: C
Section: 1-2: Earth's Shape and Surface

47. The highest topographic point above sea level on Earth is at
A) Mount Himalaya.
B) Mount Mauna Loa.
C) Mount Marianas.
D) Mount Everest.

Ans: D
Section: 1-2: Earth's Shape and Surface

48. A scientific hypothesis that stands repeated testing can be elevated to a scientific
A) model.
B) fact.
C) theory.

D) idea.

Ans: C
Section: 1-1: The Scientific Method

49. The average density of continental crust is _____ g/cm^3.
A) 2.8
B) 3.4
C) 3.0
D) 4.0

Ans: A
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

50. Continents float high because they are
A) denser than the mantle.
B) less dense than the mantle.
C) the same density as the mantle.
D) thicker than the mantle.

Ans: B
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

51. Which of the following is **not** an integral part of the scientific method?
A) experimentation
B) observation
C) belief
D) criticism

Ans: C
Section: 1-1: The Scientific Method

52. In terms of its shape, Earth is
A) a perfect sphere.

B) an imperfect sphere.
C) flattened at the poles and bulging at the equator.
D) bulging at the poles and flattened at the equator.

Ans: C
Section: 1-2: Earth's Shape and Surface

53. The densest part of Earth is the
A) oceanic crust.
B) continental crust.
C) mantle.
D) core.

Ans: D
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

54. The lithosphere is composed of =
A) uppermost crust.
B) lowermost crust.
C) crust and upper mantle.
D) mantle.

Ans: C
Section: 1-5: Earth as a System of Interacting Components

55. Geologist James Hutton advanced the principle of
A) uniformitarianism.
B) uniformity.
C) conformity.
D) universalism.

Ans: A
Section: 1-3: The Geologic Record

56. Devices used to detect earthquakes are called
A) thermometers.
B) vibraphones.
C) seismometers.
D) tilt meters.

Ans: C
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

57. The average density of the bulk earth is most similar to that of
A) a stony meteorite (3.0 g/cc).
B) a granite rock (2.7 g/cc).
C) ice (0.9 g/cc).
D) iron meteorite (8 g/cc).

Ans: D
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

58. The largest jump in density within Earth is at the
A) crust-mantle boundary.
B) mantle-core boundary.
C) upper mantle-lower mantle boundary.
D) outer core-inner core boundary.

Ans: B
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

59. Which of the following of Earth's layers contains the greatest amount of sulfur?
A) crust
B) mantle
C) outer core
D) inner core

Ans: C
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

60. Which of the following of Earth's layers contains the least amount of iron?
A) crust
B) mantle
C) outer core
D) inner core

Ans: C
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

61. "Deep time" refers to time measured in _____ of years.
A) hundreds
B) thousands
C) millions
D) billions

Ans: D
Section: 1-6: An Overview of Geologic Time

62. Roughly how much extraterrestrial material falls on Earth annually?
A) a million tons
B) a billion tons
C) a thousand tons
D) a few hundred tons

Ans: A
Section: 1-5: Earth as a System of Interacting Components

63. The idea that Earth is a sphere is an example of a scientific
A) fact.
B) hypothesis.
C) theory.
D) dogma.

Ans: C
Section: 1-1: The Scientific Method

64. Studies that determine the depth of the seafloor would be considered scientific

A) fact.
B) hypothesis.
C) theory.
D) observations.

Ans: C
Section: 1-1: The Scientific Method

65. The largest topographic *change* relative to sea level on Earth is at
A) the Grand Canyon.
B) Mount Mauna Loa.
C) the Marianas Trench.
D) Mount Everest.

Ans: D
Section: 1-2: Earth's Shape and Surface

66. Geologic processes can take place of over times that last from
A) seconds to billions of years.
B) minutes to weeks.
C) years to decades.
D) seconds to centuries.

Ans: A
Section: 1-3: The Geologic Record

67. The density of most rocks ranges from ___ to ___ g/cm^3.
A) 0; 1
B) 1; 2
C) 3; 4
D) 5; 6

Ans: C
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

68. Which scientist may have been the first to discover that the core consisted of two parts?
A) German Emil Wiechert
B) Englishman Henry Cavendish
C) German-American Beno Gutenberg
D) Dane Inge Lehman

Ans: D
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

69. A Danish seismologist was the first to discover
A) Earth's overall layering.
B) the Moho.
C) the two-part core.
D) the core.

Ans: C
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

70. The statement "planet within a planet" refers to which part of Earth?
A) the crust
B) the mantle
C) the core
D) none of these

Ans: C
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

71. The inner core is solid relative to the outer core because of
A) an increase in temperature with depth.
B) a decrease in temperature with depth.
C) an increase in pressure with depth.
D) a decrease in pressure with depth.

Ans: C
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

72. Continental crust is ____ than oceanic crust so the oceans cover the oceanic floor rather than the continents.
A) is thinner
B) occupies less surface area
C) is less dense
D) is hotter

Ans: C
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

73. According to Wiechert's hypothesis, the chemical layering of Earth is mainly due to
A) its size.
B) gravity.
C) magnetism.
D) its mass.

Ans: B
Section: 1-4: Peeling the Onion: Discovery of a Layered Earth

74. What are the three geodynamic systems?
A) atmosphere, biosphere, geosphere
B) the climate, the plate tectonic, the geodynamo systems
C) lithosphere, asthenosphere, cryosphere
D) atmosphere, hydrosphere, lithosphere

Ans: C
Section: 1-5: Earth as a System of Interacting Components

75. What geologic feature most directly connects the plate tectonic and climate systems?
A) earthquakes
B) volcanic activity
C) earth's magnetism
D) the oceans

Ans: B
Section: 1-5: Earth as a System of Interacting Components