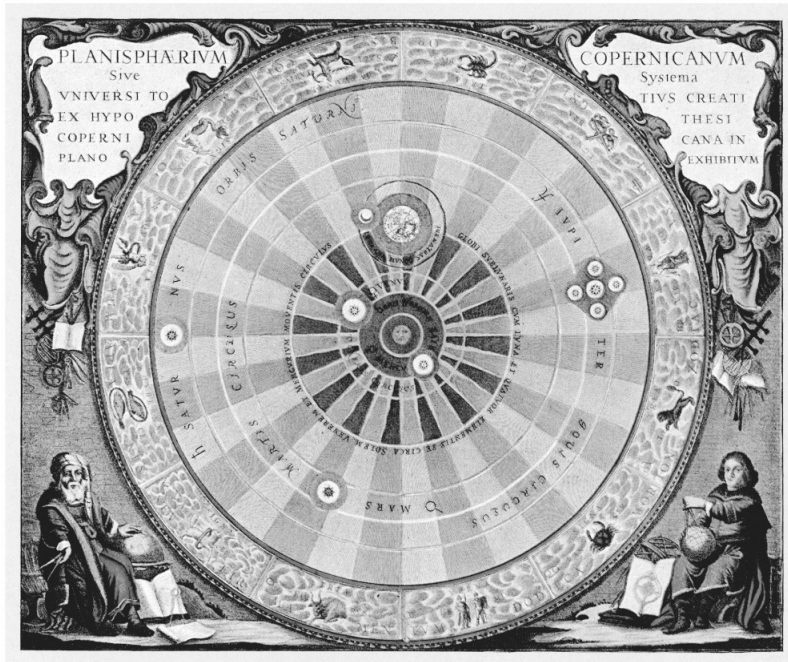


CHAPTER 1: The Earth in Context

MULTIPLE CHOICE

1. In the heliocentric model (shown below) _____.



- a. Earth orbits around the Sun
- b. the Sun orbits around Earth
- c. Earth is a stationary planet
- d. Mercury and Venus orbit around the Sun, but all other planets orbit around Earth

ANS: A

DIF: Easy

REF: 1.2

TOP: I.A.ii

MSC: Factual

2. Aside from Earth, the terrestrial planets are _____.

- a. Mars, Mercury, and Venus
- b. Mars, Venus, and Jupiter
- c. Jupiter, Saturn, Uranus, and Neptune
- d. Mars and Saturn

ANS: A

DIF: Easy

REF: 1.2

TOP: II.B.i

MSC: Factual

3. The gas giant, or Jovian, planets are _____.

- a. Mars, Mercury, and Venus
- b. Mars, Venus, and Jupiter
- c. Jupiter, Saturn, Uranus, and Neptune
- d. Mars and Saturn

ANS: C

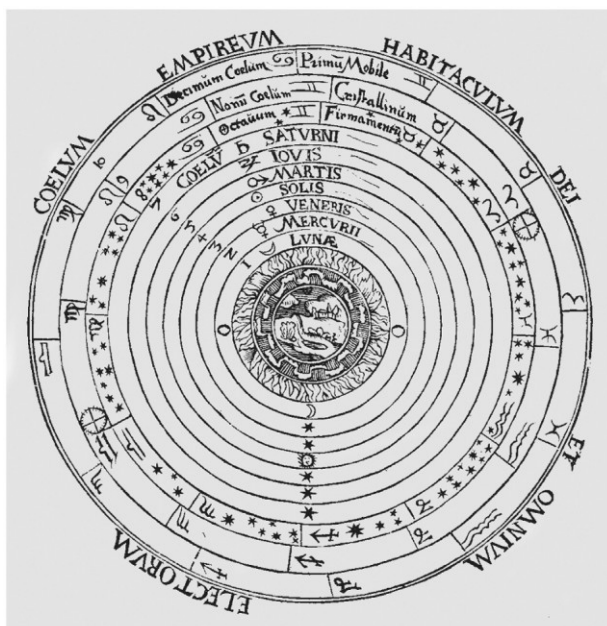
DIF: Easy

REF: 1.2

TOP: II.B.ii

MSC: Factual

4. The geocentric model (shown below) was developed during the time of the ancient Greeks. This model _____.



- was abandoned during the time of the Roman Empire and would never be widely held again
- was held to be true by thinkers throughout the Middle Ages, up until the Renaissance
- was rediscovered by the Polish astronomer Copernicus and has been the accepted model of the Universe ever since
- has been proven by NASA space photos

ANS: B

DIF: Medium

REF: 1.2

TOP: I.A.i

MSC: Applied

- Why do stars and constellations change location over the course of one night?
 - The stars themselves are moving.
 - Our planet rotates around our Sun.
 - Our planet rotates on its own axis.
 - None of the above are correct.

ANS: C

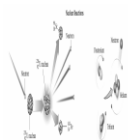
DIF: Medium

REF: 1.2

TOP: II

MSC: Conceptual

- In the figure below, the image on the right is that of fusion, while the image on the left is that of fission.



a. true

b. false

ANS: A

DIF: Easy

REF: 1.3

TOP: II.A

MSC: Factual

- The _____ refers to the change in wavelength (and, therefore, frequency) of waves that happens if the source of the waves is moving.



- a. Big Bang theory
- b. Nebular theory
- c. Expanding Universe theory
- d. Doppler effect

ANS: D DIF: Easy REF: 1.3 TOP: III.A
MSC: Factual

8. A _____ transmits energy from one point to another in the form of periodic motions and is defined by both the distance between these periodic motions (_____) and the number of them that pass a fixed point in a given time interval (_____).
- a. frequency; wavelength; wave
 - b. wavelength; frequency; wave
 - c. wave; frequency; wavelength
 - d. wave; wavelength; frequency

ANS: D DIF: Easy REF: 1.3 TOP: III.A.i
MSC: Factual

9. In agreement with the Big Bang theory, our Universe is _____.
- a. expanding
 - b. contracting
 - c. static (unchanging)

ANS: A DIF: Easy REF: 1.3 TOP: III.B
MSC: Applied

10. The Hubble Telescope took this photo in 2009 of an object 7,500 light years away. What is it?



- a. a protostar
- b. a nebula
- c. a supernova
- d. a protoplanet

ANS: B DIF: Easy REF: 1.3 TOP: IV.B
MSC: Factual

11. First-generation stars tend to be _____.
- a. small and cool
 - b. large and cool
 - c. small and hot
 - d. large and hot

ANS: D DIF: Easy REF: 1.3 TOP: IV.B
MSC: Factual

12. Which of the following is NOT a possible stage in a star's life and collapse?
- a. protostar
 - b. supernova
 - c. gas giant
 - d. black hole

ANS: C DIF: Easy REF: 1.3 TOP: IV.B
MSC: Applied

13. From the choices below, the best estimate of the age of the Universe is _____ old.
- a. 5 million years
 - b. 6 billion years
 - c. 14 billion years
 - d. 100 billion years

ANS: C DIF: Medium REF: 1.3 TOP: II
MSC: Applied

14. Larger stars live longer than smaller stars because of a greater supply of hydrogen fuel.
- a. true
 - b. false

ANS: B DIF: Medium REF: 1.3 TOP: II.A
MSC: Applied

15. Waves that are “blue shifted” have shorter wavelengths than those that are “red shifted.”
- a. true
 - b. false

ANS: A DIF: Medium REF: 1.3 TOP: III.A.i
MSC: Factual

16. Strong evidence that the Universe is expanding comes from the fact that the light emitted from distant galaxies appears to be _____.
- a. red shifted
 - b. blue shifted
 - c. green shifted
 - d. None of the above are correct.

ANS: A DIF: Medium REF: 1.3 TOP: III.A.i.b
MSC: Applied

17. Researchers have determined that the Universe has been expanding throughout its history. When did the Universe begin?
- a. 1.3 Ga ago
 - b. 13.7 Ga ago
 - c. 137 Ga ago
 - d. 13.7 Ma ago

ANS: B DIF: Medium REF: 1.3 TOP: IV
MSC: Factual

18. The Big Bang theory states that _____.
- a. all stars will end their lives explosively as supernovas
 - b. Earth formed through a series of violent collisions
 - c. meteors were responsible for the extinction of the dinosaurs
 - d. all matter in the Universe was once confined to a single point

ANS: D DIF: Medium REF: 1.3 TOP: IV
MSC: Factual

19. In our current understanding of the Big Bang, _____.
- a. Earth is much older than the rest of the Universe
 - b. the Universe is considerably older than Earth
 - c. Earth and the Universe formed at about the same time
 - d. there is no way of knowing how old the Universe might be

ANS: B DIF: Medium REF: 1.3 TOP: IV
MSC: Applied

20. Around 1929, Hubble and other astronomers discovered that the light of distant galaxies displayed red shifts relative to the light of nearby stars. This means that _____.
- a. all distant galaxies are moving away from the Milky Way galaxy
 - b. these galaxies are moving away from a fixed light source
 - c. the whole Universe is expanding
 - d. All of the above are correct.
 - e. Both a and c are correct.

ANS: E DIF: Difficult REF: 1.3 TOP: III.A.i.b
MSC: Conceptual

21. Without which of the following would it have been impossible for our Universe to form following the Big Bang?
- a. hydrogen
 - b. helium
 - c. gravity
 - d. Both a and b are correct.
 - e. All of the above are correct.

ANS: E DIF: Difficult REF: 1.3 TOP: IV
MSC: Conceptual

22. Atoms that are heavier than iron are generally produced by _____.
- a. fission reactions within stars
 - b. fusion reactions within stars
 - c. explosion of supernovas
 - d. the Big Bang

ANS: C DIF: Difficult REF: 1.3 TOP: IV.A.i
MSC: Conceptual

23. Chemically, the Moon is quite similar to _____.
- a. sea water
 - b. Earth's crust
 - c. Earth's mantle
 - d. Earth's core

ANS: C DIF: Easy REF: 1.4 TOP: II.B.i
MSC: Factual

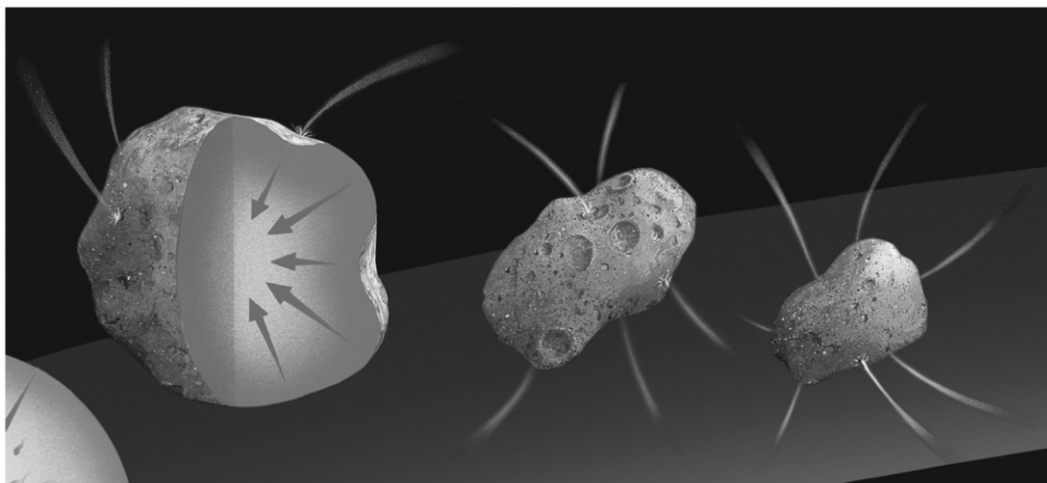
24. By far the most common elements in the Universe and in our solar system are _____.
- a. nitrogen and oxygen
 - b. iron and manganese
 - c. hydrogen and helium
 - d. hydrogen and oxygen

ANS: C DIF: Easy REF: 1.4 TOP: IV.A.i
MSC: Factual

25. An explanation for the origin of planets, moons, asteroids, and comets is the _____.
- a. Expanding Universe theory
 - b. Nebular theory
 - c. Big Bang theory
 - d. theory of plate tectonics

ANS: B DIF: Easy REF: 1.4 TOP: IV.C.i
MSC: Factual

26. This is an image of _____, progressing from right to left.



- a. planetesimals forming protoplanets
- b. protoplanets forming planetesimals
- c. asteroids forming protoplanets
- d. asteroids forming planetesimals

ANS: A

DIF: Easy

REF: 1.4

TOP: IV.C.ii.c

MSC: Factual

27. Which of the following bodies is the smallest?

- a. planet
- b. star
- c. protoplanet
- d. planetesimal

ANS: D

DIF: Easy

REF: 1.4

TOP: IV.C.ii.b

MSC: Applied

28. Without the addition of _____ (produced by fusion reactions in stars and in supernova explosions) to nebulae, planets would not have been produced.

- a. light minerals
- b. heavy minerals
- c. light elements
- d. heavy elements

ANS: D

DIF: Medium

REF: 1.4

TOP: IV.C.i

MSC: Conceptual

29. The inner planets are terrestrial because _____.

- a. they are made of volatile materials
- b. they are made of refractory materials
- c. as our Solar System's proto-Sun formed, the inner part of our protoplanetary disk got hotter causing evaporation
- d. Both b and c are correct.
- e. Both a and c are correct.

ANS: D

DIF: Medium

REF: 1.4

TOP: IV.C.ii.a

MSC: Conceptual

30. The metal alloy that makes up the core of Earth is _____, as compared to the rocky mantle.

- a. less dense
- b. denser
- c. very similar in chemistry and density
- d. distinct in chemistry but of very similar density

ANS: B

DIF: Medium

REF: 1.4

TOP: IV.C.ii.d

MSC: Applied

31. Differentiation of the core from the mantle early in Earth's history was possible because the planet was _____ at the time.

a. very cold
b. very hot
c. very small
d. the only planet in the Solar System

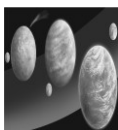
ANS: B DIF: Medium REF: 1.4 TOP: IV.C.ii.d
MSC: Conceptual

32. Why is Earth round?

a. It has gravity.
b. It has a magnetic field.
c. It has a large mass.
d. Both a and c are correct.
e. All of the above are correct.

ANS: D DIF: Medium REF: 1.4 TOP: IV.C.ii.d
MSC: Conceptual

33. The figure below represents the final stages in Earth's formation, which was marked by all of the following EXCEPT _____.



a. atmosphere formation
b. rains creating the oceans
c. gases being added by passing comets
d. differentiation of the core and mantle

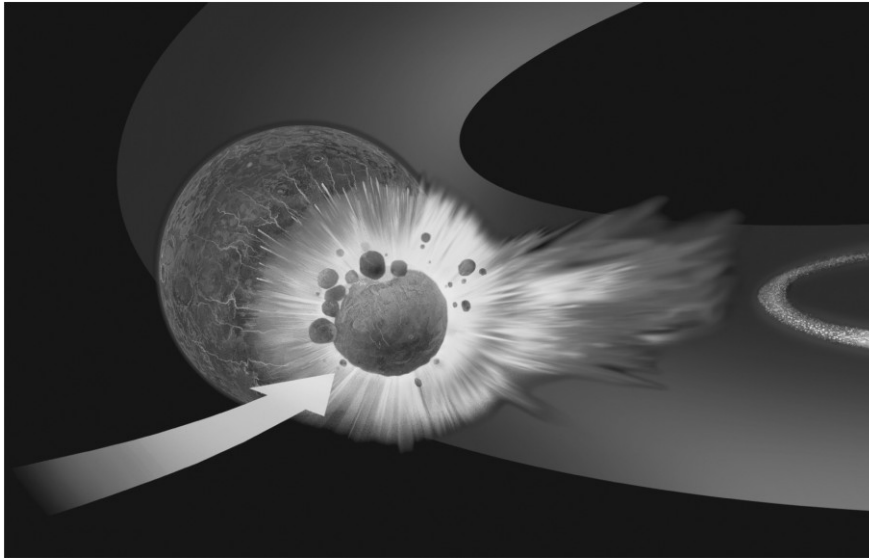
ANS: D DIF: Medium REF: 1.4 TOP: IV.C.ii.f
MSC: Factual

34. Volatile materials can exist as a gas at Earth's surface. Which of the following is NOT a volatile material?

a. water
b. iron
c. hydrogen
d. carbon dioxide

ANS: B DIF: Difficult REF: 1.4 TOP: IV.C.i
MSC: Applied

35. About 4.53 Ga, the Moon formed. Which of the following is NOT correct about that event?



- a. An icy planetesimal collided with the newborn Earth.
- b. A large part of Earth's mantle disintegrated.
- c. Earth developed a ring, like those found around Saturn and Jupiter.
- d. The colliding body disintegrated.

ANS: A

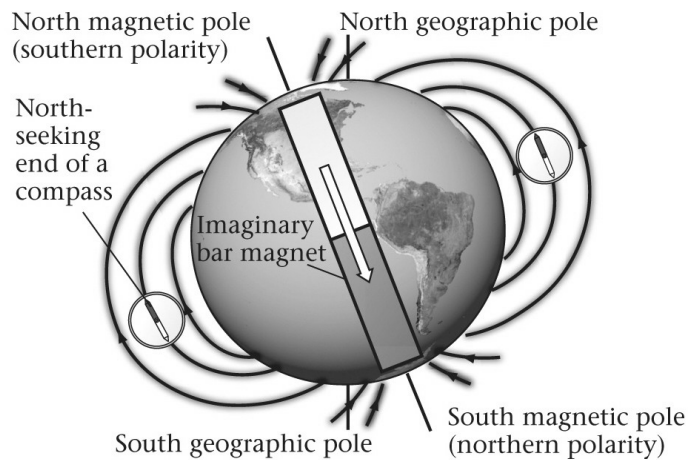
DIF: Difficult

REF: 1.4

TOP: IV.C.ii.e

MSC: Applied

36. The shape of Earth's magnetic field is approximately that of a _____.



- a. monopole
- b. dipole (such as that produced by a bar magnet)
- c. torus, a donut-shaped ring parallel to Earth's equator
- d. quadrupole, which is aligned with the equator

ANS: B

DIF: Easy

REF: 1.5

TOP: V.A

MSC: Factual

37. If one were to ride a hot-air balloon up into the atmosphere, one would experience the concentration of gases _____.

- a. becoming denser
- b. becoming less dense

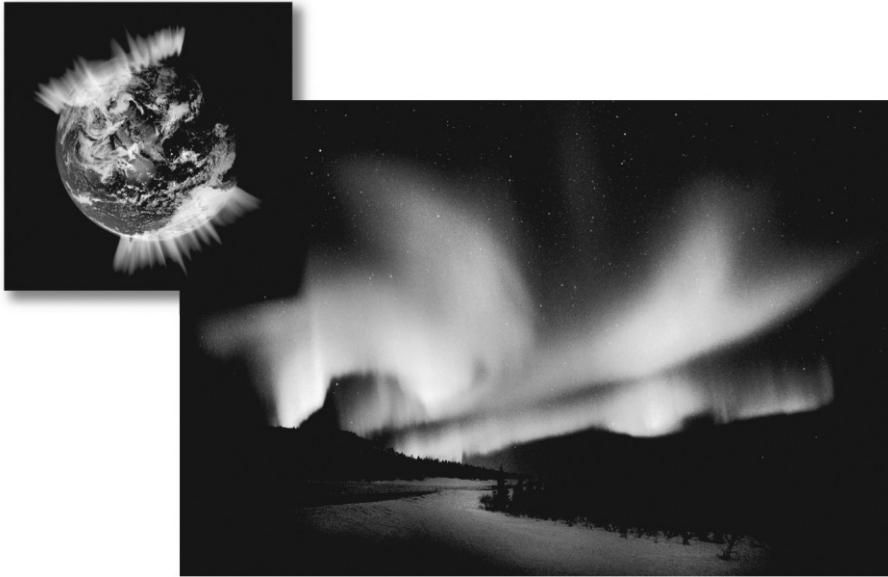
- c. remaining the same
- d. increasing for the first 10 km, then starting to decline

ANS: B DIF: Easy REF: 1.5 TOP: V.B
MSC: Applied

38. Presently, Earth's atmosphere is dominated by which two gases?
- a. hydrogen and oxygen
 - b. carbon dioxide and methane
 - c. nitrogen and oxygen
 - d. nitrous oxide and sulfur dioxide

ANS: C DIF: Easy REF: 1.5 TOP: V.B
MSC: Applied

39. An aurora (shown below) is produced when _____.



- a. solar wind particles are directed toward the poles and excite atmospheric gases
- b. swamp gases rise upward from the arctic tundra
- c. radiation in the Van Allen belts can be seen on a clear, cold night
- d. lightning travels from cloud to cloud rather than cloud to ground

ANS: A DIF: Medium REF: 1.5 TOP: V.A
MSC: Applied

40. Earth's surface is protected from solar wind and cosmic radiation by _____.
- a. Earth's gravitational field
 - b. Earth's magnetic field
 - c. a large, metallic shield launched into orbit by NASA in the 1960s
 - d. a powerful stream of ions emitted by the Sun

ANS: B DIF: Medium REF: 1.5 TOP: V.A
MSC: Applied

41. Earth's magnetic field is generated by the _____.
- a. flow of the liquid inner core
 - b. flow of the liquid outer core
 - c. convective flow of the mantle
 - d. magnetic minerals within the crust

ANS: B DIF: Medium REF: 1.5 TOP: V.A
MSC: Applied

42. The main effect that the Earth's magnetic field has on the Earth's habitability is _____.
a. solar wind
b. magnetic anomalies
c. cosmic rays
d. Both a and b are correct.
e. Both a and c are correct.

ANS: E

DIF: Medium

REF: 1.5

TOP: V.A

MSC: Conceptual

43. If there was less of an atmosphere above Earth, then _____.
a. the air we breathe would be more dense and there would be more air pressure
b. the air we breathe would be less dense and there would be more air pressure
c. the air we breathe would be less dense and there would be less air pressure
d. None of the above are correct.

ANS: C

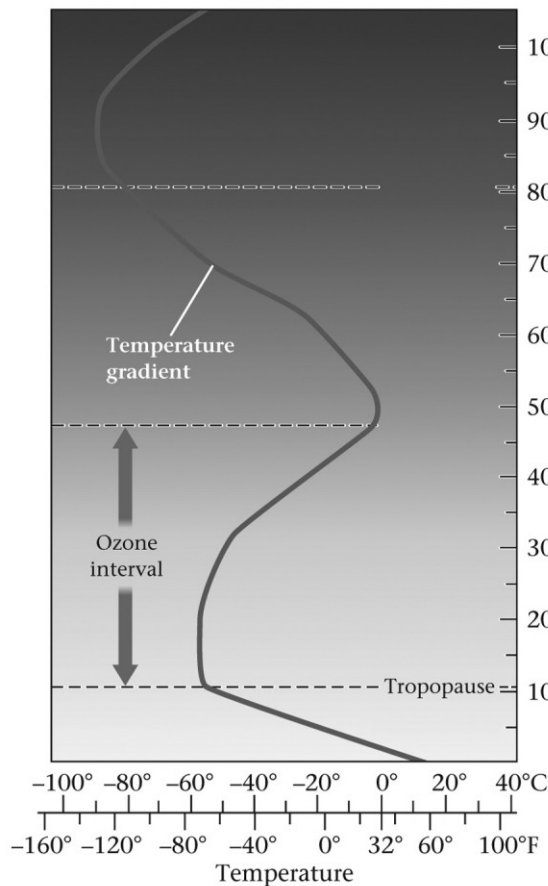
DIF: Medium

REF: 1.5

TOP: V.B

MSC: Conceptual

44. The atmosphere can be divided into several distinct layers.



Beginning with the layer in which we live, they are, in order:

- a. stratosphere, troposphere, mesosphere, thermosphere
b. troposphere, stratosphere, thermosphere, mesosphere
c. troposphere, stratosphere, mesosphere, thermosphere
d. stratosphere, troposphere, thermosphere, mesosphere

TOP: V.B

45. The most common minerals within Earth are _____.

a. silicates	c. oxides
b. carbonates	d. hydroxides

TOP: VI.A

46. Substances that can be transformed to a gas at relatively low temperatures are termed _____.

a. glasses c. volatiles
b. melts d. mineraloids

TOP: VI.A

47. Hydrocarbons, such as petroleum and natural gas, are classified as _____.

a. minerals	c. organic materials
b. fluid rocks	d. alloys

TOP: VI.A

[illegible]

TOP: VI.C

49. Hot, liquid rock beneath the surface of the Earth is termed _____.

a. lava	c. volatiles
b. magma	d. brimstone

TOP: VI.D

50. Earth's geothermal gradient is the rate of temperature change that would be observed if one could move in which of the following ways?

- increasing altitude in the atmosphere
- increasing depth at ocean trenches
- traversing from either pole toward the equator
- traversing down within Earth's interior

TOP: VI.D

51. During a journey to the center of the Earth, one would experience temperature _____.

- a. and pressure both increasing
- b. and pressure both decreasing
- c. increasing, but pressure staying nearly the same
- d. remaining remarkably constant, but pressure increasing

TOP: VI.D

52. In the whole Earth, the four most common elements are oxygen, silicon, magnesium, and _____.

- a. copper
- b. lead
- c. iron
- d. zinc

ANS: C DIF: Medium REF: 1.6 TOP: VI.A
MSC: Factual

53. As seismic (earthquake-generated) waves travel downward and reach the Moho, they _____.

- a. speed up
- b. slow down
- c. continue at the same velocity
- d. are all reflected directly back toward the surface

ANS: A DIF: Medium REF: 1.6 TOP: VI.C
MSC: Factual

54. Why are silicate rocks the most common on Earth?

- a. The most common minerals are silicates.
- b. Iron, oxygen, silicon and magnesium make up 91.2% of the Earth's mass.
- c. Oxygen, silicon, iron, and hydrogen make up 91.2% of the Earth's mass.
- d. Both a and b are correct.
- e. Both a and c are correct.

ANS: D DIF: Difficult REF: 1.6 TOP: IV.C.i
MSC: Conceptual

55. If the inside of Earth was molten, which of the following characteristics about Earth would be true?

- a. The land would rise and fall due to tidal forces.
- b. Earth would have a lesser mass.
- c. Earth would still be roughly spherical in shape.
- d. All of the above are correct.

ANS: A DIF: Difficult REF: 1.6 TOP: VI.E
MSC: Conceptual

56. Of the three primary chemical layers of the Earth (crust, mantle, core), which is the thickest layer?

- a. crust
- b. mantle
- c. core
- d. They are all the same thickness.

ANS: C DIF: Easy REF: 1.7 TOP: VI.E
MSC: Factual

57. Which layer of the Earth has the greatest density?

- a. crust
- b. mantle
- c. core
- d. They all have the same density.

ANS: C DIF: Easy REF: 1.7 TOP: VI.E
MSC: Factual

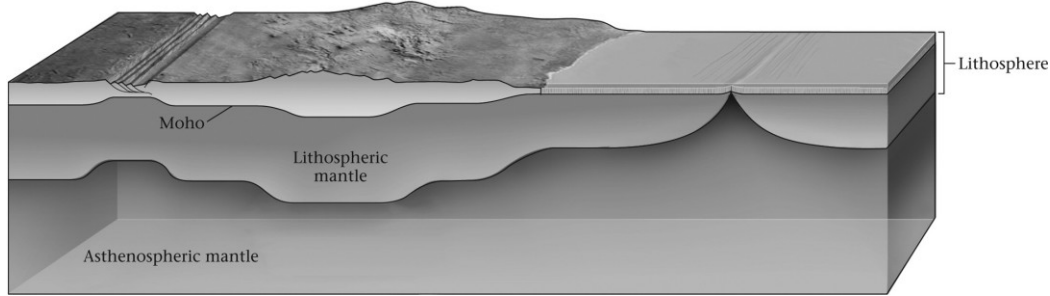
58. The thickness of the Earth's crust varies from _____.

- a. 100 to 500 m
- b. 1 to 10 km
- c. 5 to 500 km
- d. 7 to 70 km

ANS: D DIF: Easy REF: 1.7 TOP: VI.E.i

MSC: Factual

59. On average, continental crust is approximately _____ as oceanic crust.



- a. equally thick
- b. half as thick
- c. five times as thick
- d. 20 times as thick

ANS: C

DIF: Easy

REF: 1.7

TOP: VI.E.i

MSC: Applied

60. The Moho _____.
- a. lies at uniform depth everywhere it is found in Earth
 - b. is found deeper underneath continents than under oceans
 - c. is found deeper underneath oceans than under continents
 - d. is found well below the crust/mantle boundary

ANS: B

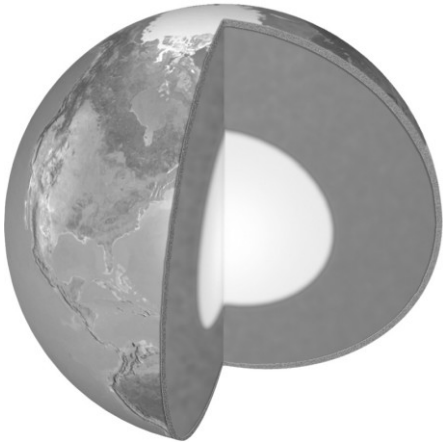
DIF: Easy

REF: 1.7

TOP: VI.E.i.c

MSC: Applied

61. The densest layer of Earth is the _____.



- a. crust
- b. mantle
- c. outer core
- d. inner core

ANS: D

DIF: Easy

REF: 1.7

TOP: VI.E.iii

MSC: Factual

62. The lithosphere lies directly above the _____.
- a. transition zone
 - b. crust
 - c. asthenosphere
 - d. lower mantle

ANS: C

DIF: Easy

REF: 1.7

TOP: VI.F

MSC: Factual

63. The lithosphere is composed of the _____.
- crust only
 - crust, mantle, and outer core
 - top 100 m of sediments and sedimentary rocks
 - crust and the uppermost part of the mantle

ANS: D

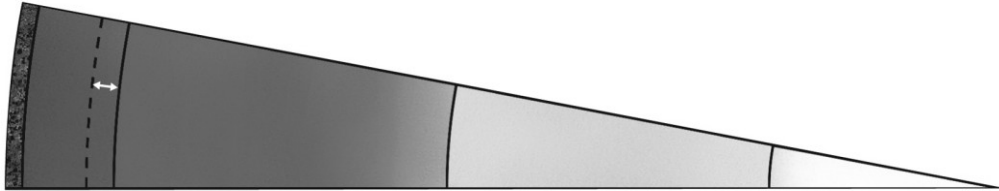
DIF: Easy

REF: 1.7

TOP: VI.F

MSC: Factual

64. From left to right, correctly label each section of this slice of the Earth.



- crust, liquid outer core, transition zone, solid inner core, upper mantle, lower mantle
- crust, upper mantle, transition zone, lower mantle, liquid outer core, solid inner core
- transition zone, crust, upper mantle, lower mantle, liquid outer core, solid inner core
- transition zone, crust, liquid outer core, solid inner core, upper mantle, lower mantle

ANS: B

DIF: Medium

REF: 1.7

TOP: VI.E

MSC: Factual

65. As compared to the rocks that make up the crust, Earth as a whole is _____.
- considerably more dense
 - considerably less dense
 - slightly less dense
 - about the same density

ANS: A

DIF: Medium

REF: 1.7

TOP: VI.E.i

MSC: Applied

66. The boundary between the crust and the mantle is marked by a seismic-velocity discontinuity called _____.

- the Edsel
- the Moho
- Lyell's surface
- the transition zone

ANS: B

DIF: Medium

REF: 1.7

TOP: VI.E.i.c

MSC: Factual

67. The metallic content of Earth's core is _____.



- likely similar to what has been found in metallic meteorites

- b. partly liquid and partly solid
- c. an iron alloy (mostly iron with a few other elements mixed in)
- d. All of the above are correct.

ANS: D DIF: Medium REF: 1.7 TOP: VI.E.iii
MSC: Applied

68. As compared to the asthenosphere, the lithosphere is _____.
- a. cooler and more able to flow
 - b. hotter and more able to flow
 - c. cooler and less able to flow
 - d. hotter and less able to flow

ANS: C DIF: Medium REF: 1.7 TOP: VI.F
MSC: Applied

69. The distinction between the crust and the mantle is primarily on the basis of a difference in _____; the distinction between the lithosphere and the asthenosphere is primarily on the basis of a difference in _____.
- a. chemistry (mineral content); degree of physical rigidity
 - b. color; chemistry (mineral content)
 - c. degree of physical rigidity; chemistry (mineral content)
 - d. chemistry (mineral content); chemistry as well

ANS: A DIF: Medium REF: 1.7 TOP: VI.F
MSC: Conceptual

70. If the outer core was not liquid, which of the following would be true about Earth?
- a. Life on Earth would likely be very different.
 - b. The Earth may not have an atmosphere.
 - c. The Earth would not have a magnetic field.
 - d. All of the above are correct.

ANS: D DIF: Difficult REF: 1.7 TOP: VI.E.iii
MSC: Conceptual

71. If the lithosphere was not relatively rigid, but rather free-flowing, which of the following would be true?
- a. The asthenosphere would be free to flow to Earth's surface.
 - b. Plate tectonics would not occur.
 - c. The temperature of Earth's surface would be hotter.
 - d. All of the above are correct.
 - e. Both a and b are correct.

ANS: D DIF: Difficult REF: 1.7 TOP: VI.F
MSC: Conceptual