

7. If the temperature of a material is raised so high that electrons become stripped from atoms, what is formed?
- a. a gas
 - b. a plasma
 - c. a liquid
 - d. a solid

ANS: B

DIF: Difficult

REF: Box 1.1

OBJ: Understand modern concepts concerning the basic architecture of our Universe and its components.

MSC: Applying

8. Which of the following bodies is the smallest?
- a. planet
 - b. star
 - c. protoplanet
 - d. planetesimal

ANS: D

DIF: Moderate

REF: 1.4

OBJ: Understand modern concepts concerning the basic architecture of our Universe and its components.

MSC: Analyzing

9. In the heliocentric model, _____.
- a. Earth orbits around the Sun
 - b. the Sun orbits around Earth
 - c. Earth is a stationary planet
 - d. all planets orbit Earth

ANS: A

DIF: Easy

REF: 1.2

OBJ: Understand the character of our Solar System.

MSC: Remembering

10. The 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

OBJ: Understand the character of our Solar System.

MSC: Remembering

11. The Sun was created at the center of the accretionary disk when the temperature became high enough for _____ to occur.
- a. fusion
 - b. fission
 - c. combustion
 - d. radiation

ANS: A

DIF: Easy

REF: 1.3

OBJ: Understand the character of our Solar System.

MSC: Understanding

12. The planets orbit the Sun along the _____ plane.
- a. orbital
 - b. concentric
 - c. ecliptic
 - d. rotational

ANS: C

DIF: Difficult

REF: 1.2

OBJ: Understand the character of our Solar System.

MSC: Understanding

13. Terrestrial planets are mainly composed of _____ while Jovian planets are made dominantly of _____.
- a. volatiles; rock and metals
 - b. rock and metals; volatiles
 - c. refractory materials; volatiles and metals
 - d. volatiles and metals; refractory materials

ANS: B

DIF: Easy

REF: 1.2

OBJ: Understand the character of our Solar System.

MSC: Understanding

14. An important contribution made by Copernicus is his (correct) assertion that the _____.
a. Earth is spherical
b. Sun is the center of the whole Universe
c. Sun is the center of Earth's orbit
d. Earth is the center of the Universe

ANS: C DIF: Difficult REF: 1.2

OBJ: Understand the character of our Solar System.

MSC: Applying

15. The image below represents which model of the solar system?



- a. lunarcentric c. geocentric
b. electrocentric d. heliocentric

ANS: C DIF: Easy REF: 1.2

OBJ: Understand the character of our Solar System.

MSC: Applying

16. It is believed that our solar system resulted from a second- or third-generation nebula. How do we know this?
a. The age of the Sun suggests this.
b. The size of the Sun suggests this.
c. The number of gas giants suggests this.
d. The mix of complex elements suggests this.

ANS: D DIF: Difficult REF: 1.4

OBJ: Understand the character of our Solar System.

MSC: Analyzing

17. The best estimate of when the Universe formed is _____.
a. 13.7 Ma c. 4.57 Ma
b. 13.8 Ga d. 4.57 Ga

ANS: B DIF: Moderate REF: 1.3

OBJ: Understand scientific explanations for the formation of the Universe and the Earth.

MSC: Remembering

18. The current estimate for the age of Earth of 4.57 Ga comes from _____.
a. radiometric age dating of meteorites
b. radiometric age dating of sedimentary rocks
c. the light from distant galaxies
d. the amount of nuclear fuel in the Sun

ANS: A DIF: Moderate REF: 1.4

OBJ: Understand scientific explanations for the formation of the Universe and the Earth.

MSC: Remembering

19. According to the Expanding Universe theory, our Universe is _____.
a. expanding only c. not moving at all
b. contracting only d. contracting and expanding

ANS: A DIF: Easy REF: 1.3

OBJ: Understand scientific explanations for the formation of the Universe and the Earth.

MSC: Understanding

20. 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: Moderate

REF: 1.4

OBJ: Understand scientific explanations for the formation of the Universe and the Earth.

MSC: Understanding

21. The process of differentiation results in all of the following EXCEPT _____.
- a. denser materials becoming concentrated near the cores of planets
 - b. rocky material forming the mantles of planets
 - c. planets becoming approximately spherical
 - d. planets forming atmospheres

ANS: D

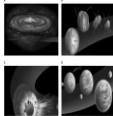
DIF: Easy

REF: 1.4

OBJ: Understand scientific explanations for the formation of the Universe and the Earth.

MSC: Applying

22. Which of the following images shows the formation of the Moon?



- a. A
- b. B

- c. C
- d. D

ANS: C

DIF: Difficult

REF: 1.5

OBJ: Understand scientific explanations for the formation of the Universe and the Earth.

MSC: Applying

23. The age of the Universe is _____.
- a. less than the age of the Earth
 - b. the exact same age as the Earth
 - c. greater than the age of the Earth
 - d. impossible to determine

ANS: C

DIF: Difficult

REF: 1.3

OBJ: Understand scientific explanations for the formation of the Universe and the Earth.

MSC: Applying

24. According to the Big Bang theory, _____.
- a. Earth is much older than the rest of the Universe
 - b. the Universe is much 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: Moderate

REF: 1.3

OBJ: Understand scientific explanations for the formation of the Universe and the Earth.

MSC: Analyzing

25. The Earth's magnetic field is a _____.
- a. monopole, as would be produced by just one pole of a magnet
 - b. dipole, such as that produced by a bar magnet
 - c. torus, a doughnut-shaped ring parallel to Earth's equator
 - d. sphere, following the shape of Earth

ANS: B DIF: Easy REF: 1.5

OBJ: Understand the overall character of the Earth's magnetic field, atmosphere, and surface.

MSC: Remembering

26. Presently, Earth's atmosphere is dominated by which two gases?

- a. hydrogen and helium
- b. oxygen and carbon dioxide
- c. nitrogen and oxygen
- d. carbon dioxide and sulfur dioxide

ANS: C DIF: Easy REF: 1.6

OBJ: Understand the overall character of the Earth's magnetic field, atmosphere, and surface.

MSC: Remembering

27. The atmosphere is divided into several distinct layers. The layer we live in is called the _____.

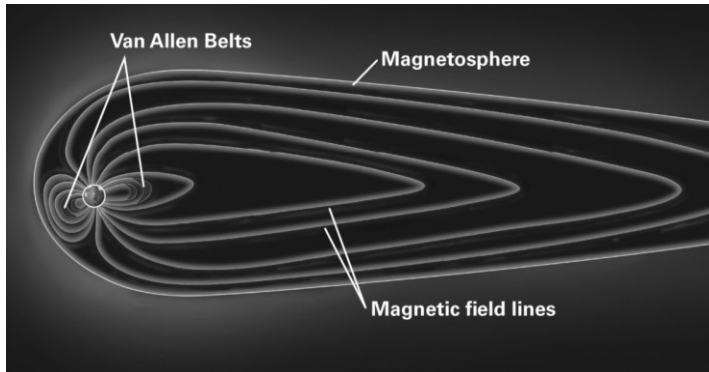
- a. stratosphere
- b. thermosphere
- c. troposphere
- d. mesosphere

ANS: C DIF: Moderate REF: 1.6

OBJ: Understand the overall character of the Earth's magnetic field, atmosphere, and surface.

MSC: Remembering

28. The image below shows Earth's magnetic field. Earth's magnetic field lines are distorted (i.e., not symmetrical) because _____.



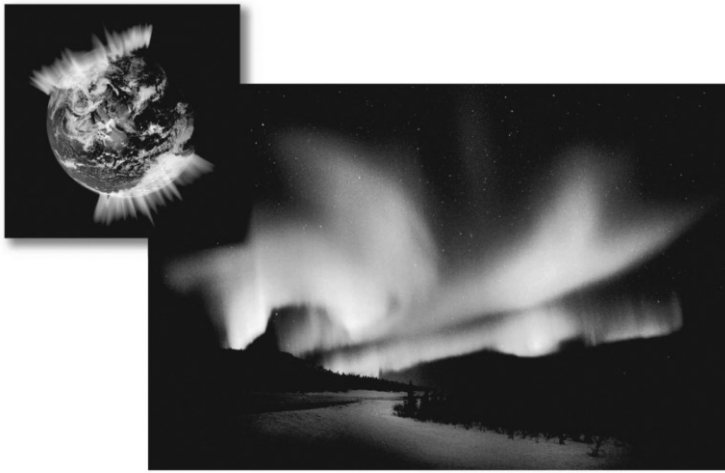
- a. Earth is rapidly rotating around the Sun
- b. Earth is rotating on an internal axis
- c. convection is occurring in the outer core
- d. solar wind deflects Earth's magnetic field lines

ANS: D DIF: Moderate REF: 1.5

OBJ: Understand the overall character of the Earth's magnetic field, atmosphere, and surface.

MSC: Understanding

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



- a. solar wind particles are directed toward the magnetic poles and excite atmospheric gases
- b. swamp gases rise from the arctic tundra and react with the upper atmosphere
- 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: Moderate REF: 1.6

OBJ: Understand the overall character of the Earth's magnetic field, atmosphere, and surface.

MSC: Understanding

30. 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 kilometers, then starting to decline

ANS: B DIF: Moderate REF: 1.6

OBJ: Understand the overall character of the Earth's magnetic field, atmosphere, and surface.

MSC: Applying

31. Volatile materials can exist as a gas at Earth's surface. Which of the following is NOT a volatile material?
- a. water
 - b. silicon
 - c. hydrogen
 - d. carbon dioxide

ANS: B DIF: Moderate REF: 1.6

OBJ: Understand the overall character of the Earth's magnetic field, atmosphere, and surface.

MSC: Applying

32. According to the image below, temperature increases within the stratosphere. Why is this?



- a. The stratosphere contains ozone, which absorbs radiation.
- b. The stratosphere is closer to the Sun, thus receives more heat.
- c. The heat from the troposphere rises into the stratosphere.
- d. The increase in pressure warms gases within the stratosphere.

ANS: A DIF: Difficult REF: 1.6

OBJ: Understand the overall character of the Earth's magnetic field, atmosphere, and surface.

MSC: Analyzing

33. The most common minerals within Earth are _____.
- | | |
|---------------|---------------|
| a. silicates | c. oxides |
| b. carbonates | d. hydroxides |

ANS: A DIF: Easy REF: 1.6

OBJ: Understand the variety and composition of materials that make up our planet.

MSC: Remembering

34. Hot, liquid rock beneath Earth's surface is termed _____.
- | | |
|----------|--------------|
| a. lava | c. volatiles |
| b. magma | d. mantle |

ANS: B DIF: Easy REF: 1.6

OBJ: Understand the variety and composition of materials that make up our planet.

MSC: Remembering

35. In the whole Earth, the four most common elements (by mass) are oxygen, silicon, magnesium, and _____.
a. copper c. iron
b. lead d. zinc

ANS: C DIF: Moderate REF: 1.6

OBJ: Understand the variety and composition of materials that make up our planet.

MSC: Remembering

36. Which of the following is NOT required for a substance to be considered a mineral?
- It must be solid.
 - It must be naturally occurring.
 - It must contain carbon.
 - It must have atoms arranged in an orderly pattern.

ANS: C DIF: Easy REF: 1.6

OBJ: Understand the variety and composition of materials that make up our planet.

MSC: Understanding

37. Which of the following lists compositions in order of increasing silica content?
- a. felsic, intermediate, ultramafic, mafic c. felsic, intermediate, mafic, ultramafic
b. ultramafic, mafic, intermediate, felsic d. mafic, ultramafic, intermediate, felsic

ANS: B DIF: Difficult REF: 1.6

OBJ: Understand the variety and composition of materials that make up our planet.

MSC: Understanding

38. Glass is different from a mineral because it _____.
- a. is not naturally occurring
 - b. is not a solid
 - c. does not have atoms arranged in an orderly pattern
 - d. contains carbon and is therefore organic

ANS: C DIF: Moderate REF: 1.6

OBJ: Understand the variety and composition of materials that make up our planet.

MSC: Understanding

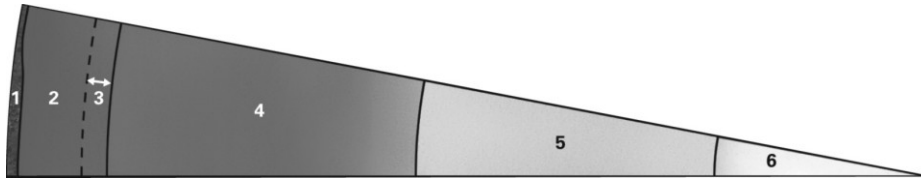
39. If you were measuring the elevation of a mountain, you would be measuring variation in _____, whereas if you were doing the same on a midocean ridge, you would be measuring variation in _____.
- bathymetry; topography
 - bathymetry; isostasy
 - topography; isostasy
 - topography; bathymetry
- ANS: D DIF: Easy REF: 1.6
 OBJ: Understand the variety and composition of materials that make up our planet.
 MSC: Applying
40. The density of rocks is generally related to composition. Which of the following choices places rock compositions in order of increasing density?
- felsic, intermediate, ultramafic, mafic
 - ultramafic, mafic, intermediate, felsic
 - felsic, intermediate, mafic, ultramafic
 - mafic, ultramafic, intermediate, felsic
- ANS: C DIF: Difficult REF: 1.7
 OBJ: Understand the variety and composition of materials that make up our planet.
 MSC: Applying
41. As compared to ultramafic rocks, mafic rocks have a _____.
- greater proportion of silica
 - lesser proportion of silica
 - greater proportion of iron and magnesium atoms
 - greater density
- ANS: A DIF: Moderate REF: 1.6
 OBJ: Understand the variety and composition of materials that make up our planet.
 MSC: Applying
42. The densest layer of Earth is the _____.
- crust
 - mantle
 - outer core
 - inner core
- ANS: D DIF: Easy REF: 1.7
 OBJ: Understand the nature of the Earth's internal layering. MSC: Remembering
43. The lithosphere is composed of the _____.
- crust only
 - crust, mantle, and outer core
 - top 100 meters of sediments and sedimentary rocks
 - crust and the uppermost part of the mantle
- ANS: D DIF: Moderate REF: 1.8
 OBJ: Understand the nature of the Earth's internal layering. MSC: Remembering
44. The lithosphere lies directly above the _____.
- transition zone
 - crust
 - asthenosphere
 - lower mantle
- ANS: C DIF: Easy REF: 1.8
 OBJ: Understand the nature of the Earth's internal layering. MSC: Understanding
45. The distinction between the crust and the mantle is primarily on the basis of a difference in _____.
- composition
 - color of minerals
 - ability to flow
 - distance from the Sun

ANS: A DIF: Easy REF: 1.8
OBJ: Understand the nature of the Earth's internal layering. MSC: Understanding

46. In general, the mantle is made of the rock _____ and has a(n) _____ composition.
- granite; intermediate
 - basalt; mafic
 - gabbro; mafic
 - peridotite; ultramafic

ANS: D DIF: Moderate REF: 1.8
OBJ: Understand the nature of the Earth's internal layering. MSC: Understanding

47. From left to right, correctly label each section of this slice of Earth. Note that 1 starts at the surface of Earth and 6 ends at the center of 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
- crust, transition zone, 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: Moderate REF: 1.8
OBJ: Understand the nature of the Earth's internal layering. MSC: Applying

48. As compared to the asthenosphere, the lithosphere is _____.
- cooler and more able to flow
 - hotter and more able to flow
 - cooler and less able to flow
 - hotter and less able to flow

ANS: C DIF: Moderate REF: 1.8
OBJ: Understand the nature of the Earth's internal layering. MSC: Applying

49. During a journey to the center of Earth, one would experience temperature _____.
- and pressure both increasing
 - and pressure both decreasing
 - increasing but pressure staying nearly the same
 - remaining remarkably constant but pressure increasing

ANS: A DIF: Easy REF: 1.7
OBJ: Understand the nature of the Earth's internal layering. MSC: Applying

50. Which of the following statements about Earth's core is FALSE?
- Its metallic content is likely similar to what has been found in metallic meteorites.
 - It is partly liquid and partly solid.
 - It is composed of an iron alloy (mostly iron with a few other metallic elements mixed in).
 - By volume, it is the largest compositional layer of Earth.

ANS: D DIF: Moderate REF: 1.8
OBJ: Understand the nature of the Earth's internal layering. MSC: Analyzing

SHORT ANSWER

- Why was Pluto removed from the list of planets in our solar system?

ANS:

Pluto has not cleared its orbit of all debris and thus no longer qualifies as a planet according to the new definition.

DIF: Easy

REF: 1.2

OBJ: Understand the character of our Solar System.

MSC: Understanding

2. Scientist have estimated the age of Earth to be 4.57 Ga. What did they use to determine this age and why did they use it?

ANS:

The age of Earth was determined by radiometric age dating of meteorites. Rocks from Earth have been recycled so much that we no longer have any rocks that date back to the formation of Earth. However, since everything in the solar system was created at the same time, and meteorites have not been recycled since their formation, meteorite samples were used to determine the age of the solar system.

DIF: Moderate

REF: 1.5

OBJ: Understand scientific explanations for the formation of the Universe and the Earth.

MSC: Analyzing

3. Where does Earth's magnetic field originate and what is the primary benefit of the magnetic field to life on Earth?

ANS:

Earth's magnetic field is created in convection in the liquid outer core. The magnetic field protects Earth by deflecting charged particles from the Sun.

DIF: Moderate

REF: 1.5

OBJ: Understand the overall character of the Earth's magnetic field, atmosphere, and surface.

MSC: Understanding

4. What is the difference between a mineral and a glass?

ANS:

A mineral contains atoms arranged in an ordered pattern, whereas glass contains no such internal organization.

DIF: Easy

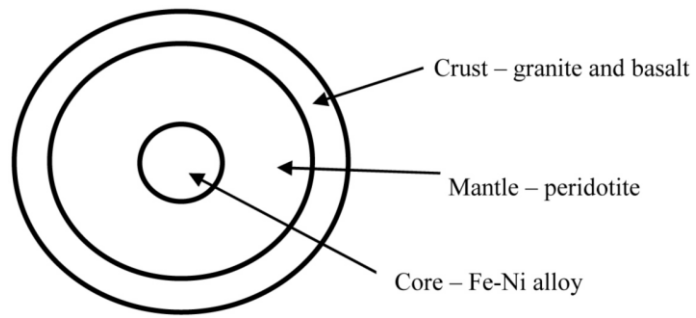
REF: 1.6

OBJ: Understand the variety and composition of materials that make up our planet.

MSC: Analyzing

5. Draw a cross-section of Earth showing its layers. Label the layers and list the average composition of the layers.

ANS:



DIF: Easy

REF: 1.8

OBJ: Understand the nature of the Earth's internal layering.

MSC: Understanding