CHAPTER 6—THE TERRESTRIAL PLANETS

MULTIPLE CHOICE

1. Which of the following is NOT one of the four stages in the development of a terrestrial planet?
2. That Earth _____, evidence that Earth differentiated.
3. In contrast to the outer solid mantle, parts of the central regions of Earth's interior are thought to be fluid because
4. The central regions of Earth's core are solid because
5. Earth's magnetic field is generated by the dynamo effect in the
6. The youngest parts of Earth's crust are
7. Which of the following is not produced by plate tectonics?
8. The oxygen in Earth's atmosphere
9. The greenhouse effect occurs on Earth because carbon dioxide is
10. Which of these gases is most responsible for the greenhouse effect on Earth?
11. Earth possesses few visible craters and the moon possesses many. This is because
12. The Himalayan Mountains are rugged, jagged peaks and the Appalachians are smooth and rolling. Why is there a difference?
13. The ozone layer is
14. In the development of a terrestrial planet, the stage of ____ occurred when molten rock flowed through fissures and filled deep basins.
15. In the development of a terrestrial planet, the stage of ____ when dense material settled to the core and less dense to the outer parts.
16. Slow surface evolution is caused by
17. Motion of the plates of Earth's crust is thought to be due to
18. Why would a decrease in the density of the ozone layer create a public health concern?
19. Slow surface evolution on the moon is limited to
20. The lunar maria are
21. The presence of vesicular basalts among the lunar rock samples shows that
22. Compared to the Earth, the moon is no longer geologically active because
23. The presence of breccias among the lunar rock samples shows that
24. In the giant impact theory of the Moon's origin,
25. In the condensation theory of the Moon's origin
26. In the fission theory of the Moon's origin
27. The theory that Mercury shrunk slightly when it was young has been proposed to explain
28. That Mercury has a large iron core is evidenced by
29. Which hypothesis concerning the formation of the Moon makes predictions that best fit the observed lunar data?

30. ____ are believed to have formed on Mercury when the planet's interior cooled and shrank.

31. That the moon has no magnetic field implies that
32. Which of the following are not found on Venus?
33. The geology of Venus appears to be dominated by
34. The surface of Venus has been studied
35. The greenhouse effect keeps Venus hot because
36. Measurements of the magnetic field of Venus reveal that the
37. The flow patterns found on the surface of Mars and the number of craters on top of them suggest that
38. Which of the following supports the idea that the Martian crust is not divided into moving plates like those on Earth?

39. Coronae on Venus are believed to be
40. Which of the solar system objects listed below is most similar to Earth in terms of mass and density?
41. The graph below plots the escape velocity of each planet along the vertical axis and its surface temperature along the horizontal. The lines plotted in the figure are the speeds of the fastest gas particles as a function of temperature for various gases. Which of the gases plotted in the diagram could be retained in the atmosphere of Mars?

42. How rapidly a planet loses its atmosphere depends on the planet's
43. The crust of Mars is believed to ____ than Earth's.
44. The moons of Mars are believed to be

45. Mars has a sufficient mass and a low enough temperature that water molecules could exist in its atmosphere as vapor. One reason Mars' atmosphere does not contain a significant amount of water vapor is that

46. ____ is a very long and deep canyon on Mars.

47. The graph below plots the escape velocity of each planet along the vertical axis and its surface temperature along the horizontal. The lines plotted in the figure are the average speeds of gas particles as a function of temperature for various gases. Which of the planets plotted in this diagram has the greatest escape velocity?

48. The graph below plots the escape velocity of each planet along the vertical axis and its surface temperature along the horizontal. The lines plotted in the figure are the average speeds of gas particles as a function of temperature for various gases. Which of the planets or satellite plotted in this diagram is least able to hold an atmosphere?

49. The extreme size of volcanoes on Mars indicates that

50. Besides Earth, which of the terrestrial planets and/or satellites of terrestrial planets show(s) evidence for the possible existence of liquid water flowing on its surface in the past?
51. Most terrestrial planets have portions of their surface that appear to be significantly older than other portions of their surface. What evidence suggests that the surface of Venus is all of the same age?

52. One hypothesis suggested to explain the uniform age of the surface of Venus is that

53. The moon's distance from Earth is measured very accurately by bouncing a laser beam off of a small mirror left on the surface of the moon. If a laser is fired at the moon and the signal returns in 2.6 seconds, what is the distance to the moon?

54. The greenhouse effect produces excess heat in a planet's atmosphere by

55. Mercury's major atmospheric gas is

56. Why does Mars have seasons similar to the Earth?

57. Which of the terrestrial planets has the most difficult time retaining an atmosphere?

58. What physical property of Venus is vastly dissimilar compared to Earth?

59. What do astronomers generally believe about the origin of Mars' moons?

**COMPLETION**

1. _______________ is responsible for absorbing ultraviolet radiation in Earth's upper atmosphere.
   
   ANS: Ozone
   
   PTS: 1

2. In the diagram below label each of the major divisions of Earth's interior.

   ![Diagram](image)

   ANS: A: Crust, B: Mantle, C: Liquid Core, D: Solid Core
   
   PTS: 1

3. _______________ waves are seismic waves that do not travel through Earth's liquid core.

   ANS:
   S
   Stress
   
   PTS: 1
4. The separation between Africa and Arabia is a(n) ____________________ valley.

ANS: rift

PTS: 1

5. The ____________________ hypothesis for the formation of the moon suggests that the moon and Earth formed from the same cloud of material and coalesced as two separate objects.

ANS: Condensation

PTS: 1

6. _________________ are great lava flows covering 17% of the lunar surface.

ANS: Maria

PTS: 1

7. _________________ formed as Mercury cooled and shrank.

ANS: Lobate scarps

PTS: 1

8. ________________ is the molecule most responsible for the greenhouse effect on Venus and Earth.

ANS: Carbon dioxide

(\text{CO}_2)

PTS: 1

9. The largest volcano found on one of the terrestrial planets is _______________.

ANS: Olympus Mons

PTS: 1

10. The size of the volcanoes on Mars indicate that Mars has a(n) ____________________ crust than Earth.

ANS: thicker

stronger

PTS: 1

11. The atmosphere of ________________ contains acid compounds including sulfuric and hydrochloric acid.

ANS: Venus
12. The largest satellite orbiting a terrestrial planet is ____________________.
   ANS: Earth's moon
   PTS: 1

13. The terrestrial planet with the oldest surface is ____________________.
   ANS: Mercury
   PTS: 1

14. The terrestrial planet with the most moons is ____________________.
   ANS: Mars
   PTS: 1

15. The terrestrial planet with the most effective greenhouse effect is ____________________.
   ANS: Venus
   PTS: 1

**TRUE/FALSE**

1. The Earth never passed through the cratering stage in planetary development.
   ANS: F       PTS: 1

2. The central part of Earth's core is solid.
   ANS: T       PTS: 1

3. The oldest parts of Earth's crust are located along the midocean rifts.
   ANS: F       PTS: 1

4. Earth's magnetic field is generated in the iron rich mantle.
   ANS: F       PTS: 1

5. Volcanism can occur in a midocean rift, above a hot spot in the mantle, or where one tectonic plate slides below another.
   ANS: T       PTS: 1

6. Earth's magnetic field has reversed itself.
   ANS: T       PTS: 1
7. Oxygen in Earth's atmosphere is outgassed in volcanic eruptions.
   ANS: F  PTS: 1

8. The greenhouse effect occurs because carbon dioxide is opaque to infrared radiation.
   ANS: T  PTS: 1

9. On the moon, the maria are younger than the highlands.
   ANS: T  PTS: 1

10. On the moon, the maria have fewer craters than the highlands.
    ANS: T  PTS: 1

11. The first Apollo missions to the moon found the maria to be plains of solid lava.
    ANS: T  PTS: 1

12. Fragmenting during meteorite impacts caused the vesicular basalts found among the lunar samples.
    ANS: F  PTS: 1

13. Fragmenting during meteorite impacts caused the breccias found among the lunar samples.
    ANS: T  PTS: 1

14. The moon stopped evolving because it is too small to have kept its internal heat.
    ANS: T  PTS: 1

15. Earth and the moon could not have condensed from the same materials because they have different densities and compositions.
    ANS: T  PTS: 1

16. We know Mercury must have a large metal core because it has a high density.
    ANS: T  PTS: 1

17. Mercury's smooth plains are probably the oldest parts of the crust.
    ANS: F  PTS: 1

18. Lobate scarps are believed to have formed on the moon when its interior cooled and shrank.
    ANS: F  PTS: 1

19. Flow channels on Venus suggest it was once rich in water.
    ANS: F  PTS: 1

20. Venus is very hot because its atmosphere is rich in carbon dioxide.
   ANS: T  PTS: 1

22. Radar maps of Venus show impact craters.
   ANS: T  PTS: 1

23. Valles Marineris is a long valley on Mars believed to resemble the rift valleys of eastern Africa.
   ANS: T  PTS: 1

24. The canals of Mars were eventually found to be crustal faults.
   ANS: F  PTS: 1

25. The size of Olympus Mons suggests that the crust of Mars is very thick.
   ANS: T  PTS: 1

26. The absence of folded mountain ranges on Mars suggests that it has been subjected to plate tectonics.
   ANS: F  PTS: 1

27. Earth is the terrestrial planet with the largest moon.
   ANS: T  PTS: 1

ESSAY

1. Describe the four stages in the development of a terrestrial planet.

   ANS:
   Answer not provided.

   PTS: 1

2. What evidence do we have that Earth has a molten core?

   ANS:
   Answer not provided.

   PTS: 1

3. Why is volcanism associated with regions where one plate descends below another plate?

   ANS:
   Answer not provided.

   PTS: 1
4. What is the difference between volcanism on Venus and that around the ring of fire on Earth?

   ANS: Answer not provided.

   PTS: 1

5. Why is carbon dioxide important in maintaining a greenhouse effect?

   ANS: Answer not provided.

   PTS: 1

6. Why is the ozone layer in Earth's atmosphere important to life on its surface?

   ANS: Answer not provided.

   PTS: 1

7. Explain how we can determine the relative ages of lunar features.

   ANS: Answer not provided.

   PTS: 1

8. What do the lunar rocks tell us about the origin of the lunar crust?

   ANS: Answer not provided.

   PTS: 1

9. How do we know that the maria formed more recently than the highlands on the moon?

   ANS: Answer not provided.

   PTS: 1

10. What does the presence of vesicular basalts and breccias among the lunar rock samples tell us about the history of the moon?

    ANS: Answer not provided.

    PTS: 1

11. Describe the large impact theory of the Moon’s origin.

    ANS:
12. How do we know that the interior of the moon does not contain a large, molten core?

ANS: Answer not provided.

PTS: 1

13. What evidence do we have that the crust of Mercury has been impacted in the past?

ANS: Answer not provided.

PTS: 1

14. How is the greenhouse effect on Venus similar to the same effect on Earth?

ANS: Answer not provided.

PTS: 1

15. Why did the atmosphere of Venus develop differently from that of Earth?

ANS: Answer not provided.

PTS: 1

16. Discuss the evidence we have that the surface of Venus is marked by volcanism.

ANS: Answer not provided.

PTS: 1

17. How did the four-stage history of Venus differ from that of Earth?

ANS: Answer not provided.

PTS: 1

18. What evidence do we have that Mars once had a thicker atmosphere?

ANS: Answer not provided.

PTS: 1

19. What evidence do we have that the surface of Mars has never divided into moving plates?
20. What factors determine the rate of loss of gases from a planet's atmosphere?

ANS:
Answer not provided.

PTS:  1

21. Explain how the surfaces of the terrestrial planets are similar. In what ways are they different?

ANS:
Answer not provided.

PTS:  1

22. Evaluate the evidence that Mars had a liquid water past.

ANS:
Answer not provided.

PTS:  1