Section: Heat and Energy (pp. 90–97)

WHAT IS TEMPERATURE?

Write the letter of the correct answer in the space provided.

_____ **1.** What is temperature a measure of?
- **a.** the total kinetic energy of an object's particles
- **b.** the volume of an object's particles
- **c.** the mass of an object's particles
- **d.** the average kinetic energy of an object's particles

Temperature and Kinetic Energy

_____ **2.** Which of the following is all matter made of?
- **a.** hot particles
- **b.** cold particles
- **c.** constantly moving particles
- **d.** nonmoving particles

_____ **3.** Which of the following do particles have when they are in motion?
- **a.** solar energy
- **b.** kinetic energy
- **c.** chemical energy
- **d.** nuclear energy

_____ **4.** Which of the following statements about kinetic energy is NOT true?
- **a.** A substance's temperature depends on the kinetic energy of the substance's particles.
- **b.** The more kinetic energy an object's particles have, the lower the object's temperature is.
- **c.** The more kinetic energy an object's particles have, the higher the object's temperature is.
- **d.** The faster that particles move, the more kinetic energy they have.

Average Kinetic Energy of Particles

_____ **5.** Why is the *average* kinetic energy of all of an object's particles measured?
- **a.** because the particles are the same size
- **b.** because the particles do not move
- **c.** because the particles move at the same speed
- **d.** because the particles move at different speeds

_____ **6.** Why would tea in a teapot and tea in a teacup be the same temperature, even though the teapot holds more?
a. The tea in the teapot has a higher average kinetic energy.
b. The tea in the teacup has a higher average kinetic energy.
c. The tea in both containers has the same number of particles.
d. The tea in both containers has the same average kinetic energy.

THERMAL EXPANSION

_____ **7.** When does a substance's particles have more kinetic energy?
a. when the substance's temperature increases
b. when the substance's temperature decreases
c. when the substance's volume increases
d. when the substance's particles stop moving

_____ **8.** Which of the following happens when a substance's temperature increases?
a. The substance's particles stop moving.
b. The substance's particles move faster and move apart.
c. The substance's particles move slower and move together.
d. The substance's particles move slower and move apart.

_____ **9.** What is the increase in volume that results from an increase in temperature called?
a. thermal reduction
b. thermal expansion
c. energy reduction
d. energy expansion

_____ **10.** Which of the following is NOT an example of thermal expansion?
a. A mercury-filled thermometer measures temperature.
b. A hot-air balloon rises when it is filled with hot air.
c. A hot-air balloon sinks when it is filled with hot air.
d. An alcohol-filled thermometer measures temperature.

WHAT IS HEAT?

_____ **11.** What is heat?
a. energy that is absorbed by a single object
b. energy that is transferred between objects that have different temperatures
c. energy that is transferred between objects that have the same temperature
d. energy that is absorbed when an object's temperature decreases

Transferring Heat

_____ **12.** Where does heat move when it transfers between objects?
- **a.** from a lower-temperature object to a higher-temperature object
- **b.** from a higher-temperature object to a lower-temperature object
- **c.** from a nonmoving object to a moving object
- **d.** from a slow-moving object to a fast-moving object

Use the terms from the following list to complete the sentences below.

joules thermal energy temperature

13. The kinetic energy of a substance's atoms is called _____.

14. Thermal energy is expressed in _____.

15. Thermal energy depends on _____ and the amount of particles in a substance.

Reaching the Same Temperature

Write the letter of the correct answer in the space provided.

_____ **16.** What happens when two objects that have different temperatures touch?
- **a.** Energy passes from the cooler object to the warmer object.
- **b.** Both objects gain thermal energy.
- **c.** Energy passes from the warmer object to the cooler object.
- **d.** Both objects lose thermal energy.

_____ **17.** What happens when two objects that have the same temperature touch?
- **a.** There is no net change in the thermal energy of either object.
- **b.** One object loses thermal energy and the other object gains thermal energy.
- **c.** Both objects lose a large amount of thermal energy.
- **d.** Both objects gain a small amount of thermal energy.

HOW IS HEAT TRANSFERRED?

_____ **18.** How does radiation differ from conduction or convection?
- **a.** Radiation cannot transfer energy through empty space.
- **b.** Radiation can transfer energy through empty space.
- **c.** Radiation cannot transfer heat as electromagnetic waves.
- **d.** Radiation must transfer energy between two objects that are in direct contact.

Match the correct definition with the correct term. Write the letter in the space provided.

_____ **19.** the transfer of energy as heat through a material

_____ **20.** the transfer of energy due to the movement of matter

_____ **21.** the transfer of heat or other energy as electromagnetic waves through matter or empty space

a. convection
b. radiation
c. conduction

STATES OF MATTER

Write the letter of the correct answer in the space provided.

_____ **22.** Which of the following is NOT a state of matter?
a. liquid
b. color
c. solid
d. gas

State and Chemical Properties

_____ **23.** Which of the following does NOT affect a substance's state?
a. speed of particles
b. attraction between particles
c. color of particles
d. pressure around particles

Changes of State

Match the correct description with the correct term. Write the letter in the space provided.

_____ **24.** changing from gas to liquid

_____ **25.** changing from liquid to solid

_____ **26.** changing from liquid to gas

a. evaporating
b. condensing
c. freezing

Section: The Cycling of Energy (pp. 98–103)

THE FLOW OF ENERGY

Use the terms from the following list to complete the sentences below.

heat flow	sun
energy	waves

1. The transfer of energy from a warmer object to a cooler object is called _____.

2. Energy is transferred by different kinds of _____.

3. Objects carry _____ as they move.

4. A major source of energy for the Earth system is the _____.

RADIATION

Write the letter of the correct answer in the space provided.

_____ **5.** How much energy does the sun transmit to Earth by radiation?
- **a.** 99%
- **b.** 25%
- **c.** 50%
- **d.** 5%

The Electromagnetic Spectrum

Match the correct description with the correct term. Write the letter in the space provided.

_____ **6.** the type of energy that Earth receives from the sun

_____ **7.** a wide range of wavelengths that includes visible light, radio waves, and gamma rays

_____ **8.** a layer of Earth that absorbs energy from the sun

_____ **9.** the type of energy that is transferred through Earth's systems by convection and conduction

- **a.** atmosphere
- **b.** thermal energy
- **c.** electromagnetic radiation
- **d.** electromagnetic spectrum

CONVECTION

Write the letter of the correct answer in the space provided.

_____ **10.** How does most energy move through Earth's systems?

a. by evaporation
b. by conduction
c. by radiation
d. by convection

Use the terms from the following list to complete the sentences below.

convection current convection salinity

11. The uneven heating of matter drives _____.

12. The movement of matter that results from differences in density is called a(n) _____.

13. Ocean water has different densities because of differences in _____, which is the amount of salt in water.

Convection in the Atmosphere

Use the terms from the following list to complete the sentences below.

convection currents mantle
geosphere atmosphere

14. Convection currents form in the _____ when cold air sinks and forces warm air away from Earth's surface.

15. Energy produced deep inside Earth heats rock in the _____.

16. Convection currents in the _____ carry heat from Earth's interior toward the surface.

17. The movement of tectonic plates is caused by _____ in the mantle.

CONDUCTION

Interaction of Particles

Write the letter of the correct answer in the space provided.

_____ **18.** Why does a warmer substance have more kinetic energy than a cooler substance?
- **a.** because particles in the warmer substance do not move
- **b.** because particles in the cooler substance move faster
- **c.** because particles in the warmer substance move faster
- **d.** because particles in the warmer substance move slower

_____ **19.** Which of the following happens when particles in a warm substance transfer energy to particles in a cooler substance?
- **a.** The cooler substance boils.
- **b.** The cooler substance becomes warmer.
- **c.** The cooler substance becomes colder.
- **d.** The cooler substance freezes.

Conduction Between Systems

_____ **20.** How can energy be transferred between the geosphere and atmosphere?
- **a.** by conduction
- **b.** by radiation
- **c.** by convection
- **d.** by convection currents

_____ **21.** When does the ground transfer energy to the atmosphere?
- **a.** when Earth's surface is warmer than the geosphere
- **b.** when Earth's surface is colder than the geosphere
- **c.** when Earth's surface is colder than the atmosphere
- **d.** when Earth's surface is warmer than the atmosphere

Use the terms from the following list to complete the sentences below.

energy conduction air

22. Energy can be transferred between the geosphere and atmosphere by _____.

23. When _____ touches Earth's warm surface, energy is passed to the atmosphere by conduction.

24. If the atmosphere is warmer than Earth's surface, _____ flows from the atmosphere to Earth.

EARTH'S ENERGY BUDGET

Use the terms from the following list to complete the sentences below.

open systems spheres energy budget

25. Energy on Earth moves through and between four _____.

26. The four spheres of Earth are _____ that constantly exchange energy with one another.

27. The movement of energy between Earth's spheres is part of Earth's _____.

Answer Key

Directed Reading A

SECTION: THE EARTH SYSTEM

1. B
2. C
3. D
4. A
5. A
6. C
7. B
8. lithosphere
9. asthenosphere
10. mesosphere
11. outer core
12. inner core
13. B
14. A
15. D
16. C
17. A
18. B
19. C
20. A
21. D
22. A
23. B
24. D
25. C
26. A
27. A
28. B
29. C
30. D
31. C
32. B
33. D
34. biosphere
35. photosynthesis
36. decomposers
37. carbon dioxide

SECTION: HEAT AND ENERGY

1. D
2. C
3. B
4. B
5. D
6. D
7. A
8. B
9. B
10. C
11. B
12. B
13. thermal energy
14. joules
15. temperature
16. C
17. A
18. B
19. C
20. A
21. B
22. B
23. C
24. B
25. C
26. A

SECTION: THE CYCLING OF ENERGY

1. heat flow
2. waves
3. energy
4. sun
5. A
6. C
7. D
8. A
9. B
10. D
11. convection
12. convection current
13. salinity
14. atmosphere
15. mantle
16. geosphere
17. convection currents
18. C
19. B
20. A
21. D
22. conduction
23. air
24. energy
25. spheres
26. open systems
27. energy budget