Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_#:\_\_\_\_\_Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Study Guide**

**01. A hot pan was taken from the oven and placed on a table. The rate of thermal energy transfer between the pan and its surroundings depends on which of the following?**

Select one:

a. The temperature of the pan, the mass of the pan, and the temperature of the surroundings.

b. The mass of the pan.

c. The temperature of the pan and the temperature of the surroundings.

d. The temperature of the pan.

**02. The variables that the scientist changes in the experiment are called what?**

Select one:

a. uncontrolled variable

b. controlled variable

c. independent variable.

d. dependent variable

**03. What is the part of an experiment you measure in the experiment?**

Select one:

a. controlled variable

b. dependent variable

c. independent variable

d. uncontrollable variable

**04. On a hot day, a student dropped a bottle of safe, strong-smelling gas.  The smell reached the student across the room in a quicker time than on a cold day. What does this data provide evidence of?**

Select one:

a. On a cold day, more energy is transferred to the gas in the container.

b. On a cold day, more energy was needed to move the gas across the room.

c. On a hot day, the molecules of gas in the room have more kinetic energy on average.

d. On a hot day, the molecules of gas in the room are lighter.

**05. The two identical cups with the same amount of water are place in a 25 degree room.   The temperature of the water in Cup 2 will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ over time.**

Select one:

a. stay the same

b. increase

c. decrease

**06. A measure of the average kinetic energy of the particles in an object is called**

Select one:

a. temperature

b. potential energy

c. kinetic energy

d. thermal energy

**07. Hot warm air tends to sink while cool cold air tends to rise.**

Select one:

True

False

**08. The total amount of thermal energy of a system DOES NOT depend on which of the following?**

Select one:

a. The kinetic energy of the molecules in the system.

b. The transfer of thermal energy between objects in the system.

c. The amount of matter in the system.

d. The types of matter in the system.

**09. Because the temperature of the water in Cup 1 is WARMER than the temperature in the room, thermal energy is transferred from the**

Select one:

a. cup to the room

b. thermal energy cannot be transferred

c. room to the cup

**10. Vocabulary:**

* The change of a state from a liquid to a solid; opposite of melting.
* The opposite of vaporization; where gas particles lose enough thermal energy to become a gas.
* The transfer of thermal energy by collisions between particles of matter.
* The movement of thermal energy from a region of higher temperature to a region of lower temperature.
* This occurs when the surface particles of a solid gain enough thermal energy to become a gas; dry ice is an example.
* The transfer of thermal energy by electromagnetic waves; the shorter and faster the wave the more energy.
* The change from a liquid into water vapor and/gas; evaporation and boiling are examples.
* The change in the state from a solid to a liquid; opposite of freezing.
* The transfer of thermal energy by the movement of the particles from one part of a material to another; while keeping in mind warm air rises and cool air sinks.

**11. Two identical plastic cups contain the same amount of water at two different temperatures, as shown below. Both cups are placed in a room at 25° C.

At the time the cups were placed in the room, in which cup do the water molecules have higher average kinetic energy?**

Select one:

a. Cup 1.

b. There is not enough information to tell.

c. The kinetic energy is the same.

d. Cup 2.

**12. The two identical cups with the same amount of water are place in a 25 degree room.
The temperature of the water in Cup 1 will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ over time.**

Select one:

a. stay the same

b. increase

c. decrease

**13. A cook uses a metal frying pan to cook a meal.  After cooking, he places the hot frying pan on the cold counter.  After some time, the frying pan, the counter, and the air in the room will be at the same temperature.  Why?**

Select one:

a. Because coldness will be transferred from the counter to the frying pan and from the air to the frying pan.

b. Because thermal energy will be transferred from the frying pan to the counter and from the frying pan to the air.

c. Because thermal energy will be transferred from the frying pan to the air, but thermal energy will not be transferred from the frying pan to the counter.

d. Because thermal energy will be transferred from the frying pan to the counter and from the frying pan to the air, and coldness will be transferred from the counter to the frying pan and from the air to the frying pan.

**14. The energy an object has because of the movement of its molecules is called**

Select one:

a. kinetic energy

b. potential energy

c. thermal energy

d. temperature

**15. You are interested in how different air temperatures affect the speed at which gas molecules move. With a classmate, you have planned the following investigation:**

**Choose a very hot day in the classroom.
The students close all of the windows and doors in the classroom and turn off any fans.
The students measure the temperature in the classroom with a thermometer.
One student stands in the corner of the classroom with a stopwatch.
Another student, 10 meters away in the opposite corner of the room, opens a container filled with a safe, but strong-smelling gas.
The student with the stopwatch measures the amount of time before they can smell the gas.
Repeat the steps above on a very cold day in the classroom.**

**Identify the controlled variable in this investigation?**

Select one:

a. The type of gas in the container

b. The distance between the chairs in the room.

c. The temperature of the room

d. The amount of time before they smell the gas

**16. You are interested in how different air temperatures affect the speed at which gas molecules move. With a classmate, you have planned the following investigation:

Choose a very hot day in the classroom.
The students close all of the windows and doors in the classroom and turn off any fans.
The students measure the temperature in the classroom with a thermometer.
One student stands in the corner of the classroom with a stopwatch.
Another student, 10 meters away in the opposite corner of the room, opens a container filled with a safe, but strong-smelling gas.
The student with the stopwatch measures the amount of time before they can smell the gas.
Repeat the steps above on a very cold day in the classroom.

Identify the dependent variable in this investigation?**

Select one:

a. The temperature of the room

b. The type of gas in the container

c. The distance between the two students in the room.

d. The amount of time before they smell the gas

**17. The variables that the scientist does not change in an experiment are called the what?**

Select one:

a. uncontrolled variable

b. controlled variable

c. dependent variable

d. independent variable.

**18. You are interested in how different air temperatures affect the speed at which gas molecules move. With a classmate, you have planned the following investigation:

Choose a very hot day in the classroom.
The students close all of the windows and doors in the classroom and turn off any fans.
The students measure the temperature in the classroom with a thermometer.
One student stands in the corner of the classroom with a stopwatch.
Another student, 10 meters away in the opposite corner of the room, opens a container filled with a safe, but strong-smelling gas.
The student with the stopwatch measures the amount of time before they can smell the gas.
Repeat the steps above on a very cold day in the classroom.

Identify the independent variable in this investigation?**

Select one:

a. The amount of time before they smell the gas

b. The distance between the chairs in the room.

c. The type of gas in the container

d. The temperature of the room

**19. You are interested in how different air temperatures affect the speed at which gas molecules move. With a classmate, you have planned the following investigation:

Choose a very hot day in the classroom.
The students close all of the windows and doors in the classroom and turn off any fans.
The students measure the temperature in the classroom with a thermometer.
One student stands in the corner of the classroom with a stopwatch.
Another student, 10 meters away in the opposite corner of the room, opens a container filled with a safe, but strong-smelling gas.
The student with the stopwatch measures the amount of time before they can smell the gas.
Repeat the steps above on a very cold day in the classroom.

Identify the controlled variable in this investigation?**

Select one:

a. The amount of time before they smell the gas

b. The distance between the chairs in the room.

c. The type of gas in the container

d. The temperature of the room

20. What is a **psychrometer**?

21. What is the difference between **surface area** and **concentration**?

22. Draw a picture that illustrates **thermal energy** being gained and lost. Use arrows and labels.