

Heat and Temperature

Heat and temperature are actually two different things. To understand the difference between heat and temperature, you must first understand what heat is. Heat is a form of energy. It takes energy to move something. Heat energy also makes things move, but you do not normally see this movement because the particles that are moving are too small. This movement of particles – atoms and molecules- is what heat actually is.

Temperature, on the other hand, is a measure of the average amount of heat or particle movement in a volume of matter. Volume is the amount of space that something fills.

Consider a cup of tea that is 120 degrees Fahrenheit and a lake that is 75 degrees Fahrenheit. Which one has more heat? The lake has more heat, even though its temperature is lower. If you were to boil a cup of water and pour it into a lake, the hot water would mix with the rest of the water in the lake. The actual temperature of the lake would not rise, because it takes a lot of heat to raise the temperature of a large body of water. The lake already has a lot of heat because it is so large. A cup of tea may have a higher temperature, but it has less heat because it is such a small volume of liquid.

Basically, heat is the total energy of the molecular movement in a substance, while temperature is a measure of the average energy of molecular motion in a substance. Heat energy is dependent upon the speed of particles, the number of particles, and the type of particles in an object. Temperature does not depend on the size or type of an object. The temperature in a small cup of water can be the same as the temperature in a large lake, but the lake has more heat because it has more water.

Heat can increase or decrease the temperature of an object. If heat is added, the temperature will go up. If heat is removed, the temperature will go down. The higher the temperature is, the more the molecules are moving and vibrating. Temperature is not energy, but a measurement of it. Heat is energy.

Since temperature in degrees measures the average amount of heat in a volume of matter, you can figure out how much heat is in something by measuring both the temperature of something and how much of it there is. The unit of measurement for heat is the calorie.

A calorie is defined as the amount of heat that will raise the temperature of one gram of water to 1 degree Celsius. To raise a gram of water from 2 degrees Celsius to 4 degrees Celsius, you would have to give it 2 calories of heat.

You may have heard the term calorie used before when dealing with food. When the term “calorie” is used with regard to food, this normally means kilocalories. A kilocalorie is one thousand calories. Normally, the word “calorie” will be capitalized when it is referring to food. Be careful when reading about calories, so that you know whether the article is referring to calorie (as in heat) or Calorie (as used with food).

Name _____

Date _____

Heat and Temperature Questions

List the 3 factors that heat energy is dependent on:

1. _____

2. _____

3. _____

Matching:

_____ 4. Heat

a. Is a measure of the average energy of molecular motion in a substance.

_____ 5. Temperature

b. Is the total energy of the molecular movement in a substance.

_____ 6. Calorie

c. the amount of heat that will raise the temperature of one gram of water to 1 degree Celsius.

True or False:

_____ 7. Heat and temperature refer to the same thing.

_____ 8. A kilocalorie is equal to one hundred calories.

_____ 9. Temperature does not depend on the size or type of the object.

_____ 10. Temperature is a measure of the average amount of heat or particle movement in a volume of matter.

Name _____

Date _____

Heat and Temperature Answers

List the 3 factors that heat energy is dependent on:

1. Speed of particles
2. Number of particles
3. Type of particles in an object

Matching:

b 4. Heat

a. Is a measure of the average energy of molecular motion in a substance.

a 5. Temperature

b. Is the total energy of the molecular movement in a substance.

c 6. Calorie

c. the amount of heat that will raise the temperature of one gram of water to 1 degree Celsius.

True or False:

F 7. Heat and temperature refer to the same thing.

F 8. A kilocalorie is equal to one hundred calories.

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