

# Temperature, Thermal Energy, and Heat (pages 176–181)

## Temperature (pages 176–178)

**Key Concept:** The three common scales for measuring temperature are the Fahrenheit, Celsius, and Kelvin scales.

- All objects are made up of tiny particles. **Temperature** tells how quickly the particles in an object are moving.
- The particles in a warm object move quickly. The object has a high temperature. The particles in a cool object move slowly. The object has a low temperature.
- A thermometer measures temperature. A thermometer contains liquid. The level of the liquid tells the temperature.
- There are three temperature scales that are commonly used. On the **Fahrenheit scale**, water freezes at 32°F and boils at 212°F. On the **Celsius scale**, water freezes at 0°C and boils at 100°C. On the **Kelvin scale**, water freezes at 273 K and boils at 373 K.

*Answer the following questions. Use your textbook and the ideas above.*

1. A measure of how quickly the particles in an object are moving is \_\_\_\_\_.
2. Which of these has the fastest-moving particles?
  - a. an ice cube
  - b. a cup of cold water
  - c. a mug of boiling water

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3. A tool used to measure temperature is an(an)  
\_\_\_\_\_.

4. Read the words in the box. Use the words to fill in the blanks in the table about temperature scales.

Fahrenheit      Celsius      Kelvin

<b>Temperature</b>		
<b>Scale</b>	<b>Water Freezes</b>	<b>Water Boils</b>
a. _____	273	373
b. _____	0°C	100°C
c. _____	32°F	212°F

5. Is the following sentence true or false? The particles in a cool object move more quickly than the particles in a warm object. \_\_\_\_\_

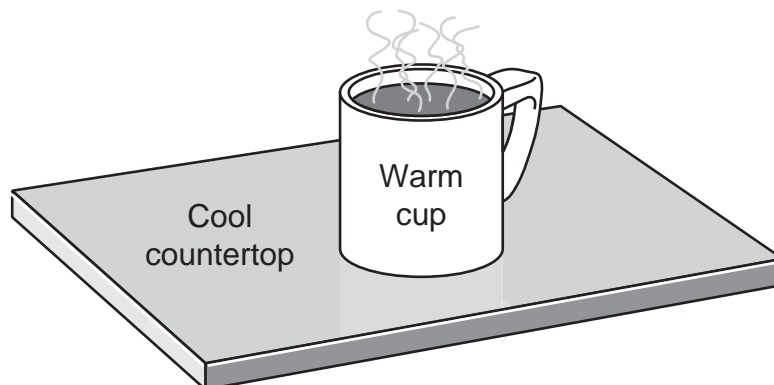
**Thermal Energy and Heat** ▪ *Adapted Reading and Study***Thermal Energy and Heat** (pages 178–179)

**Key Concept:** Heat is thermal energy moving from a warmer object to a cooler object.

- Thermal energy is the total energy of all the particles in an object.
- Thermal energy depends on how fast the particles are moving. Thermal energy also depends on how many particles there are. That is why a liter of hot water has more thermal energy than a drop of water at the same temperature.
- **Heat** is moving thermal energy. Heat always moves from a warmer object to a cooler object.

*Answer the following questions. Use your textbook and the ideas above.*

6. Circle the letters of two things that determine how much thermal energy an object has.
  - a. how many particles it has
  - b. which temperature scale is used
  - c. how fast its particles are moving
7. Thermal energy that moves from a warmer object to a cooler object is called \_\_\_\_\_.
8. Draw arrows in the picture to show in which direction heat moves.



**Thermal Energy and Heat** ▪ *Adapted Reading and Study***Specific Heat** (pages 180–181)

**Key Concept:** A material with a high specific heat can absorb a great deal of thermal energy without a great change in temperature.

- When an object is heated, its temperature rises. How much its temperature rises depends on its specific heat.
- **Specific heat** is the amount of energy needed to raise the temperature of 1 kilogram of a material by 1 kelvin.
- Different materials have different specific heats. Water has a high specific heat. It takes a lot of energy to raise the temperature of water. Silver has a low specific heat. It does not take much energy to raise the temperature of silver.

*Answer the following question. Use your textbook and the ideas above.*

9. Use the table to answer the question. If one kilogram of each of these materials absorbed the same amount of energy, which material would have the biggest change in temperature? \_\_\_\_\_

<b>Specific Heat of Some Materials</b>	
<b>Material</b>	<b>Specific Heat (J/ kg·K)</b>
<b>Glass</b>	837
<b>Iron</b>	450
<b>Sand</b>	800