

Thermal Energy and Heat • Section Summary

## The Transfer of Heat

### Key Concepts

- In what direction does heat move?
- How are conductors and insulators different?
- What are the three forms of heat transfer?

**Heat is transferred by conduction, convection, and radiation.** In the process of **conduction**, heat is transferred from one particle of matter to another without the movement of matter itself. A metal spoon sitting in a pot of boiling water is heated by conduction.

**Convection** transfers heat within a fluid (a liquid or a gas) by the movement of currents. Heated fluids are less dense than cooler fluids. So heated fluids rise. As warmer fluid moves away, cooler fluid takes its place. This flow creates a circular motion known as a **convection current**.

**Radiation** is the transfer of energy by electromagnetic waves. Unlike conduction and convection, radiation does not require matter to transfer thermal energy. For example, all of the sun's energy that reaches Earth travels through millions of kilometers of empty space.

**If two objects have different temperatures, heat will flow from the warmer object to the colder one.** Heat will flow spontaneously from one substance to the other until the two substances have the same temperature.

A material that conducts heat well is called a **conductor**. Metals such as silver or stainless steel are good conductors. A material that does not conduct heat well is called an **insulator**. Wood, wool, straw, paper, cork, and the gases in air are good insulators.



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# **The Transfer of Heat** (pp. 479–483)

*This section describes three ways heat is transferred, and tells ways in which conductors and insulators are different.*

## **Use Target Reading Skills**

*As you read How Is Heat Transferred?, write the main idea in the graphic organizer. Then, as you read, find three supporting details that give examples of the main idea and record those in the details section of the graphic organizer.*

Main Idea		
Heat can be transferred in three ways . . .		
Detail	Detail	Detail

## **How Is Heat Transferred?** (pp. 480–481)

1. Circle the letter of the three ways that heat can move.
 

a. conduction	b. insulation
c. radiation	d. convection
2. Think of a metal spoon in a pot of hot water. How do the particles of the water affect the particles of the spoon?

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3. How is heat transferred in convection?

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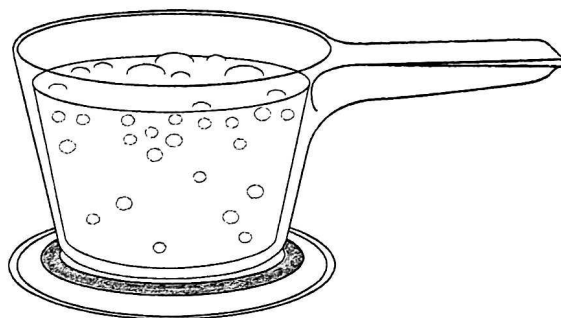
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4. The circular motion of fluid caused by rising and sinking of heated and cooler fluid is known as a(n) \_\_\_\_\_.

5. The illustration shows a pot of liquid on a stovetop burner. Draw the convection currents that result.



6. Is the following sentence true or false? Radiation transfers energy only through matter. \_\_\_\_\_

7. Complete the table.

Heat Transfer		
Process	How Heat Moves	Example
Conduction		
Convection		
Radiation		



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**The Transfer of Heat** *(continued)*

**Heat Moves One Way** (p. 482)

8. When heat flows from one substance to another, what happens to the temperature of the substance giving off the heat and to the temperature of the substance receiving the heat?

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9. Why can't ice transfer coldness into another substance?

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**Conductors and Insulators** (pp. 482–483)

10. A material that conducts heat well is called a(n)

\_\_\_\_\_.

11. A material that does not conduct heat well is called a(n)

\_\_\_\_\_.

12. Classify each of the following materials as either a conductor or an insulator by writing the correct term on the line.

a. air \_\_\_\_\_

b. wool \_\_\_\_\_

c. wood \_\_\_\_\_

d. tile \_\_\_\_\_

e. silver \_\_\_\_\_

f. fiberglass \_\_\_\_\_