

**Thermal Energy and Heat** ▪ *Section Summary*

## The Transfer of Heat

### Guide for Reading

- 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.