

Conduction

When you cook an egg sunny side up in a pan on a hot stove, there is a transfer of thermal energy. The thermal energy transfers from the hot stove burner and through the pan. The energy then moves from the pan and into the cold egg (Figure 1).

LINKING TO LITERACY

Note Taking and Summarizing

Note-taking and summarizing are related strategies that help us capture important ideas and details in what we are reading. You start by recording key information as jot notes; then you can use these notes to write a summary that uses the main ideas to create a shorter, but accurate version of the section.

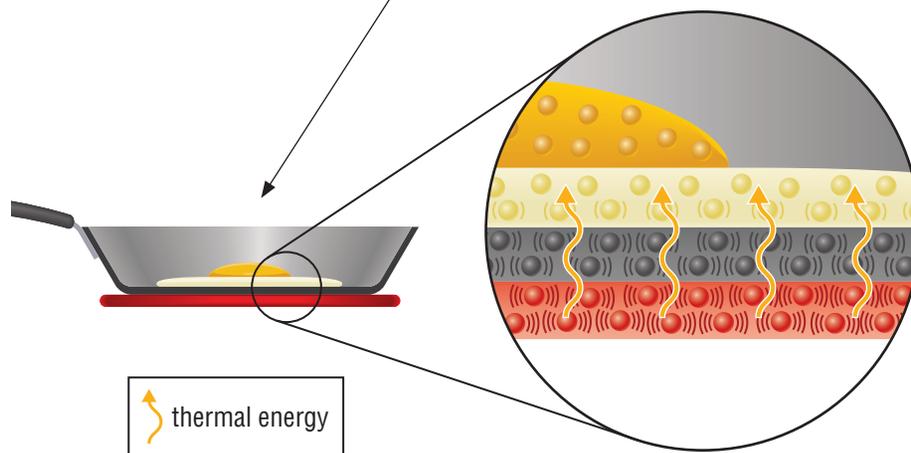


Figure 1 Energy from the burner travels through the pan and into the egg. The particles of the pan collide with the particles of the egg, causing the egg's particles to move faster. This faster motion causes the temperature of the egg to rise.

The particles in the hot stove burner vibrate quickly. When the pan comes into contact with the burner, the fast-moving particles of the burner collide and transfer energy to the slow-moving particles of the cold pan. This energy transfer raises the temperature of the pan.

The same process occurs between the hot pan and the cold, raw egg. The egg is in direct contact with the pan, so the fast-moving particles of the hot pan collide and transfer energy to the particles of the cold egg. The temperature of the egg rises, and the egg begins to cook.

Cooking an egg in a pan on a stove is an example of conduction. **Conduction** is the transfer of thermal energy through a substance, or between substances in contact. This energy transfer is caused by the collision of particles.

conduction: the transfer of thermal energy through a substance, or between substances in contact, by the collision of particles

Some devices we use are designed to conduct energy quickly. The pots and pans we use for cooking conduct energy quickly from a hot burner to cold food. Metals, such as copper and aluminum, are called “conductors” because they transfer energy easily (Figure 2). Other devices are designed to prevent conduction. The boots we wear in the winter are designed to prevent energy transfer from our warm feet to the cold snow. The foam, fleece, or felt that lines the boots is called an “insulator” because it reduces the conduction of thermal energy (Figure 3). A chef usually stirs hot soup with a wooden or plastic spoon instead of a metal spoon. Thermal energy is transferred less easily through wood and plastic than through metal. This means that there is less chance of the chef burning his or her hand.



Figure 2 Metals are good conductors of energy and are used in many useful products.



Figure 3 Insulators are used in products to prevent the transfer of energy.

Unit Task How can you apply what you have learned about conductors and insulators when selecting materials for your doghouse?

✓ CHECK YOUR LEARNING

1. How has your understanding of the word “conductor” changed since you read this section?
2. In your own words, explain how thermal energy is transferred by conduction.
3. List one material that is a good conductor and one that is a good insulator. Suggest one use for each material.
4. Sketch a diagram that shows how thermal energy is transferred from a pot of hot soup to a chef’s hand, if the chef uses a metal spoon to stir the soup. What advice could you give the chef to help her avoid a painful burn?