

CONNECTION TO SOCIAL STUDIES**● Early Central Heating**

Central heating was probably invented in ancient Greece, but engineers in ancient Rome developed the *hypocaust*. A hypocaust was a network of tubes that was built under floors or inside walls of buildings and connected to a fire in the basement. The hot gases from the combustion of wood or coal rose through the ducts and provided heat for the building. The remains of hypocaust systems have been found in many Roman buildings.

Fireplace Designs

After the fall of the Roman Empire, these heating pipes disappeared. People used open fires and fireplaces. One problem with fireplaces is that 80 percent of the heat escapes up the chimney. One design tried to offset this problem by adding a wall behind the fire. The wall absorbed the heat while the fire was hot and then gave off the heat when the flames died down.

In the mid-1600s, a heating system was engineered in France to pull room air through a passage around a fire. Once heated by the fire, the warm air flowed back into the room. The same air was used over and over and sometimes became stale.

Steam Heat

In the 1760s, James Watt experimented with steam engines and made substantial improvements to their design. Within 100 years of his experiments, central heating with steam was widely used in schools, churches, greenhouses, and some homes. The steam was created in a boiler and traveled through pipes, which radiated the heat. Today, warm air or hot water has replaced steam as a source of central heat in most newer buildings.

Your Turn to Think

1. *Conduction* involves objects in direct contact. *Convection* involves the movement of a heated substance. *Radiation* does not involve the movement of matter. Label each of the central heating systems below with the main method or methods of heat transfer used.

Hypocaust: _____ Fireplace with thick wall: _____
French system: _____ Steam heat: _____

2. Direct heating systems circulate warm air through the area being heated. Indirect systems circulate steam or hot water through pipes to radiators or other devices that give off heat. Which of the systems listed in item 1 are direct heating systems?
3. Which of the systems listed in item 1 is most like a modern electric space heater? Why?