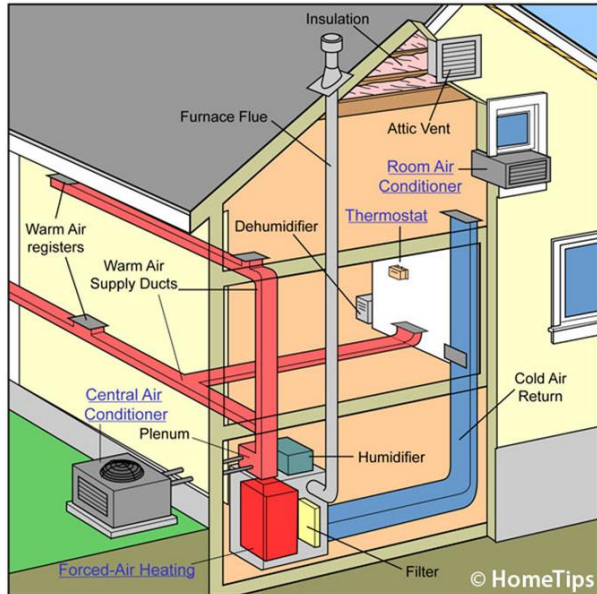


Thermal Energy

Section 3: Using Heat



All heating systems require some source of energy. A long time ago, people burned wood, oil, or candles to generate heat and electricity, but today there are much more efficient methods. Common types include forced-air systems, radiator systems, and electric heating systems. A **forced-air system** is the most common type used for heating. It uses a furnace to heat the air, and then a fan blows the hot air through the ducts to the rooms throughout a home. A **radiator system** is a closed metal container that contains hot water or steam, which is transferred to the

surrounding air by conduction; this heated air moves through each room and warms it up by convection. Finally, in an **electric heating system**, coils heated by electricity are placed in floors and walls to heat the surrounding air by conduction.

The sun's energy can also be used as a supplemental energy source for a home. Two types of systems use the sun's energy. **Passive solar heating** is when radiant energy from the sun is transferred to a room through the windows. **Active solar heating** is a system that uses solar collectors that absorb radiant energy from the sun.



Heat behaves in a predictable way, which has led to the development of specific scientific laws. **Thermodynamics** studies the relationship between thermal energy, heat, and work. The **first law of thermodynamics** states that adding heat or doing work increases the energy of a system. The energy decreases if a system does not work or heat is removed. Therefore, energy must be conserved when heat is added to or removed from a system. The **second law of thermodynamics** states that heat can't flow from a cool object to a warm object unless work is done. The second law looks at the natural direction in which heat flows.

Review:

1. What is a forced-air system?
2. What is thermodynamics?
3. Explain the first law of thermodynamics.