

**Section 16.1 Thermal Energy and Matter** (pages 474–478)

This section defines heat and describes how work, temperature, and thermal energy are related to heat. Thermal expansion and contraction of materials is discussed, and uses of a calorimeter are explained.

**Reading Strategy** (page 474)

<b>Thermal Energy and Matter</b>	
Which has more thermal energy, a cup of tea or a pitcher of juice?	
Why did Rumford conclude that heat is not a form of matter? (Fig. 1)	
How is specific heat related to temperature? (Fig. 3)	

**Work and Heat** (page 474)

- Heat is the transfer of thermal energy from one object to another as the result of a difference in \_\_\_\_\_.
- Circle the letter of each sentence that is true about heat.
  - Heat is a fluid that flows between particles of matter.
  - Heat flows spontaneously from hot objects to cold objects.
  - Friction produces heat.
  - The transfer of thermal energy from one object to another is heat.

**Temperature** (page 475)

- What is temperature?
- True or false? On the Celsius scale, the reference points for temperature are the freezing and boiling points of water.
- Circle the letter of each sentence that explains what happens when an object heats up.
  - Its particles move faster, on average.
  - The average kinetic energy of its particles decreases.
  - Its mass increases.
  - Its temperature increases.

**Thermal Energy** (page 475)

- What is thermal energy?
- Thermal energy depends upon the \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ of an object.
- true or false? Two substances can be the same temperature and have different thermal energies.