Name _____ Class _____ Date _____

Section 16.2 Heat and Thermodynamics

(pages 479–483)

This section discusses three kinds of thermal energy transfer and introduces the first, second, and third laws of thermodynamics.

Reading Strategy (page 479)

Build Vocabulary As you read this section, add definitions and examples to complete the table. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Transfer of Thermal Energy	
Definitions	**Examples**
Conduction: transfer of thermal energy with no net transfer of matter	Frying pan handle heats up
Convection:	
Radiation:	

Conduction (pages 479–480)

1. The transfer of thermal energy with no overall transfer of matter is called _____.
2. Why is conduction slower in gases than in liquids and solids? _____

_____

_____

3. Is the following sentence true or false? Conduction is faster in metals than in other solids because metals have free electrons that transfer thermal energy. _____
4. Circle the letter of each sentence that is true about conduction.
   a. Thermal energy is transferred without transfer of matter.
   b. Matter is transferred great distances during conduction.
   c. Conduction can occur between materials that are not touching.
   d. In most solids, conduction takes place as particles vibrate in place.
5. Complete the table about conduction.

Conduction		
Type of Material	**Quality of Conduction**	**Two Examples**
	Conducts thermal energy well	Copper;
Thermal insulator		Wood;

Convection (pages 480–481)

6. The transfer of thermal energy when particles of a fluid move from one place to another is called _____.
7. Why is temperature higher at the bottom of an oven? _____
8. When a fluid circulates in a loop as it alternately heats up and cools down, a(n) _____ occurs.
9. Give three examples of convection currents in nature. _____

Radiation (page 481)

10. The transfer of energy by waves moving through space is called _____.
11. Circle the letter of each sentence that is true about radiation.
    a. Energy is transferred by waves.
    b. All objects radiate energy.
    c. The amount of energy radiated from an object decreases as its temperature increases.
    d. The farther away you are from a radiating object, the less radiation you receive.

Thermodynamics (pages 482–483)

12. Thermodynamics is the study of conversions between _____ and other forms of energy.
13. Is the following sentence true or false? Energy cannot be created or destroyed, but it can be converted into different forms. _____
14. Thermal energy flows spontaneously from _____ objects to _____ ones.
15. According to the second law of thermodynamics, what must happen for thermal energy to flow from a colder object to a hotter object? _____
16. Thermal energy that is not converted into work is called _____.
17. Is the following sentence true or false? Scientists have created a heat engine with 100 percent efficiency by reducing the temperature of the outside environment to absolute zero. _____
18. Is the following sentence true or false? Matter can be cooled to absolute zero. _____