Name _____ Date _____ Class _____

Lesson Outline LESSON 2

Thermal Energy Transfers

A. How is thermal energy transferred?

1. A car that has been outside on a sunny summer day will be _____ inside.

2. Thermal energy can be _____ from one object to another by _____, conduction, and convection.

B. Radiation

1. _____ is the transfer of thermal energy from one material to another by electromagnetic waves.

2. All objects, even ice cubes, radiate _____ energy.

3. The only way for thermal energy to travel from the _____ to Earth is through radiation; that is because radiation is the only way for thermal energy to travel through the _____ of empty space.

4. _____ occurs in solids, liquids, and gases.

C. Conduction

1. When particles that have different kinetic energies _____, the particles that have _____ kinetic energy transfer energy to particles that have _____ kinetic energy; in this way, the average kinetic energy, or _____, of the materials changes.

a. Because kinetic energy is being transferred, _____ energy is also being transferred.

b. _____ is the transfer of thermal energy between materials because of collisions between the particles.

c. Conduction does not stop until the _____ energy of all the particles that are in contact is _____.

2. A material through which thermal energy flows easily is called a(n) _____; a material through which thermal energy does not flow easily is called a(n) _____.

a. _____ are good thermal conductors because they have _____ that move easily, so they often collide with other particles and transfer _____ energy easily.

Lesson Outline continued

b. _____ are good thermal insulators because their electrons do not _____ easily, so compared with thermal conductors, few _____ occur between electrons and atoms of insulators.

3. _____ is the amount of thermal energy it takes to increase the temperature of 1 kg of a material by 1°C.

a. Thermal _____ have a(n) _____ specific heat compared with thermal _____, which have a low _____.

b. Water has a(n) _____ specific heat, which makes this liquid good for _____.

D. Thermal Expansion and Contraction

1. An increase in a material's volume when the temperature is increased is called _____; this occurs because particles spread out as their _____ energy increases.

2. A decrease in a material's volume when the temperature is decreased is called _____; this occurs because _____ get closer together as their kinetic energy decreases.

E. Convection

1. The transfer of thermal energy by the movement of particles from one part of a material to another is called _____; convection occurs in _____—liquids and gases.

2. Convection occurs, in part, because of differences in _____, due to thermal _____ and thermal contraction in different parts of the material.

3. The movement of fluids up and down in a cycle because of convection is called a(n) _____; these _____ cause patterns in Earth's climate.