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Chapter 6

STUDY GUIDE

Use with Text Pages 152–161

Thermal Energy on the Move

In each of the following statements, a term has been scrambled. Unscramble the term and write it on the line provided.

_____ 1. The transfer of energy through matter by direct contact of particles is called *docniotucn.*

_____ 2. Conduction can take place in solids, liquids, and *sages.*

_____ 3. The transfer of energy by the movement of matter is called *vecconniot.*

_____ 4. Any material that can flow is *lufdi.*

_____ 5. Any material that allows heat to pass through it easily is a *roconcutd.*

_____ 6. The type of heat transfer that does not require matter is *iadraniot.*

_____ 7. Radiation is the transfer of energy in the form of *vaews.*

_____ 8. Any material that does not allow heat to pass through it easily is an *roinsulta.*

_____ 9. Many conductors, such as silver and copper, are *lemtas.*

_____ 10. Energy that travels by radiation is often called *darinta greeny.*

_____ 11. Insulators, such as wood and air, are poor conductors of *thea.*

_____ 12. The transfer of thermal energy by convection and conduction both require *atterm.*

On the lines provided, explain the differences between conduction, convection, and radiation. Use the information in the exercise above to help you. Write your answers in complete sentences.

_____

_____

_____

_____

_____

_____

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Use with Text Pages 162–165

Using Heat to Stay Warm

Use the terms in the box to fill in the blanks.

active	convection	heating systems	radiator	solar energy
conduction	free	passive	solar collector	thermal energy

1. A device with a large surface area designed to heat the air near it by conduction is a(n) _____.
2. A forced-air heating system uses _____ to heat all the air in a room.
3. Energy from the sun is _____.
4. Using solar energy is especially appealing because it is _____.
5. A device on a building that absorbs radiant energy from the sun is a(n) _____.
6. Most _____ use fuel or electricity as a source of energy.
7. A house with large windows on its south side and few windows on its other sides probably uses a(n) _____ solar heating system.
8. Solar collectors are used in buildings that have _____ solar heating systems.
9. Fuel burned in a stove or fireplace transfers thermal energy to the surrounding air by _____, convection, and radiation.
10. Before solar energy can be used as a source of heat, it must be changed to _____.

The terms in each group are related. Write a sentence that uses all of the terms in each group in a way that shows how they are related. Underline each word in your sentences.

1. radiant energy, solar collector, active solar heating system

_____

_____

2. heating system, radiator, conduction

_____

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Use with Text Pages 166–171

Using Heat to Do Work

Match each term in Column II with its description in Column I. Write the letter of the correct term in the space provided.

Column I	Column II
_____ 1. rapid burning	a. internal combustion engine
_____ 2. device that moves thermal energy from one location and transfers it to another location at a different temperature	b. external combustion engine
_____ 3. burns fuel on the outside	c. combustion
_____ 4. device that converts thermal energy into mechanical energy	d. heat engine
_____ 5. burns fuels inside chambers called cylinders	e. heat pump
_____ 6. two-way heat mover	f. heat mover
_____ 7. movement of a piston up or down	g. stroke

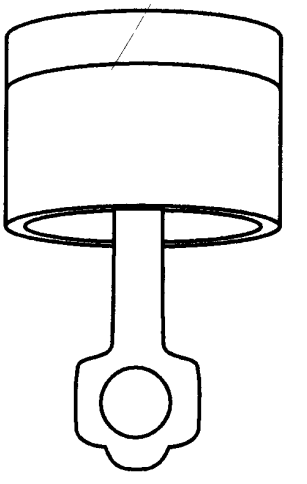
The steps of the four-stroke cycle of a gasoline engine are described below. Use the terms compression stroke, power stroke, exhaust stroke, or intake stroke to correctly label each step. Write your labels in the blanks.

_____ 1. The piston moves downward and draws a fuel-air mixture into the cylinder through the intake valve.

_____ 2. The intake valve closes. The piston moves up squeezing the fuel-air mixture into a smaller space.

_____ 3. A spark produced by a spark plug ignites the fuel-air mixture. Hot gases expand, forcing the piston down.

_____ 4. The piston moves up again, compressing the waste products from the burning of the fuel-air mixture. The waste products leave the cylinder through a valve.



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Use with Text Pages 172–174

Energy from the Oceans

Use the words in the box to fill in the blanks.

condense	heat engines	oxygen
thermal	efficiency	increase
radiant	tropical	electricity
mechanical	temperatures	vaporize

Because the oceans have large surface areas and great depth, they have the ability to absorb _____ energy from the sun and store it as _____ energy. The _____ energy of the moving water of tides can also be used to rotate turbines to generate _____.

In _____ or subtropical regions, there can be more than 20°C difference between the warm surface waters and cold bottom waters. Ocean thermal energy conversion (OTEC) is a process that uses _____ to convert differences in the thermal energy of ocean water at different _____ into mechanical energy to drive turbines. One type of OTEC engine uses heat from warm surface waters to _____ a working fluid with a low boiling point. In some engines, ammonia vapor drives a turbine which is connected to a generator. After the ammonia vapor passes through the turbine, it transfers heat to colder ocean water causing the ammonia to _____.

One drawback to OTEC plants is that they now operate at low _____ because they require great amounts of energy to pump large amounts of water from ocean depths. However, improved designs will likely _____ their efficiency. Another concern of OTEC systems is that the pumping of large amounts of cold water to the surface may affect the dissolved _____ and nutrient levels of the marine environment.