

NAME _____

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Chapter 4

STUDY GUIDE

Projectile and Circular Motion

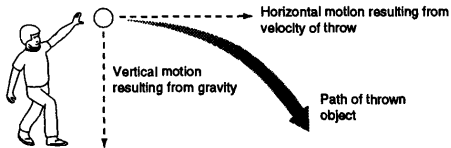
Use with Text Pages 100–107

Determine whether the italicized term makes each statement true or false. If the statement is true, write the word "true" in the blank. If the statement is false, write in the blank the term that makes the statement true.

- true 1. Anything that is thrown or shot through the air is called a *projectile*.
- curved 2. Because of Earth's gravitational pull and their own inertia, projectiles travel in a *straight* path.
- horizontal 3. Motion parallel to Earth's surface is *vertical* motion.
- true 4. Motion perpendicular to Earth's surface is *vertical* motion.
- gravity 5. Objects fall toward Earth at a rate of 9.8 m/s^2 because of *centripetal* force.
- true 6. Acceleration is a change in *motion*.
- center 7. The word centripetal means "toward the *outside*."
- centripetal 8. Acceleration toward the center of a curved or circular path is called *gravitational* acceleration.
- true 9. Centripetal force is a force that causes a moving object to move in a *curved* or *circular* path.
- true 10. An orbiting space shuttle and its contents are in *freefall* around Earth.
- acceleration 11. A change in the speed or direction of an object is called *inertia*.

Answer the following question with complete sentences.

12. Why do objects that are thrown or shot follow a curved path? When an object is thrown or shot, the force from your hand or the gun makes the object move forward. The object is given horizontal motion. After that, gravity begins to pull the object downward, giving the object vertical motion. Gravity exerts an unbalanced force on the object, changing the direction of the object's path from forward to forward and downward, or curved.
13. Draw a diagram below to illustrate your answer for question 12.



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Sending Up Satellites

Determine whether the italicized term makes each statement true or false. If the statement is true, write the word "true" in the space provided. If the statement is false, write in the blank the term that makes the statement true.

- true 1. *Artificial* satellites are human-made devices that orbit Earth for specific purposes.
- natural 2. Earth's moon is an *artificial* satellite.
- horizontally 3. Isaac Newton originated the idea of launching a satellite by blasting it *vertically* from a mountain top.
- true 4. Most modern satellites are lifted to their desired orbiting heights by multistage *rocket* systems.
- true 5. The speed necessary for a satellite to stay in a circular orbit is about 8 km/s , or about $29\,000 \text{ km/hr}$.
- 1957 6. The former Soviet Union launched the first artificial Earth satellite in *1980*.
- true 7. Most communication and weather satellites are *geostationary* satellites.
- motionless 8. Geostationary satellites appear to be *moving* high above a given location because they are placed in orbit with a speed that matches the movement of Earth as it spins on its axis.
- true 9. Many satellites are used by the military to monitor actions in other countries because they can *photograph* tiny details.
- gravity 10. Air resistance gradually causes most orbiting satellites to lose energy allowing the Earth's *rotation* to pull them lower.
- true 11. As a satellite moves through the denser part of Earth's atmosphere, it usually burns up in the extreme *heat* generated by atmospheric friction.

Chapter 4

Use with Text Pages 110–116

STUDY GUIDE

● Action and Reaction

Choose the term from the list below that is best described by each statement. Write the term to the left of each statement.

Newton's second law of motion
conservation of momentum
Newton's third law of motion

reaction
momentum
velocity

mass
action

Newton's third law of motion

1. When one object exerts a force on a second object, the second object exerts a force that is equal in size and opposite in direction.

reactionconservation of momentum

3. The total amount of momentum of a group of objects does not change unless outside forces act on the objects.

Newton's second law of motion

4. A net force acting on an object causes the object to accelerate in the direction of the force.

action

5. Air rushing out of the neck of a balloon causes the balloon to move. The air that comes from the balloon is an example of a(n) ____ force.

momentum

6. In the equation $p = m \times v$, p represents ____.

velocity

7. Momentum has direction because ____ has direction.

mass

8. Momentum is a property a moving object has because of its ____ and velocity.

Think for a minute about Newton's third law of motion. Can you remember any event when you experienced this law? If so, draw a diagram below to show the action-reaction forces. If you can't remember an event that you experienced, try to think up one and draw it below.

Accept all reasonable diagrams.

Chapter 5

Use with Text Pages 124–133

STUDY GUIDE

● Energy and Work

Match the items in Column I with the terms or phrases in Column II. Write the letter of the correct term or phrase in the blank on the left.

Column I

- d 1. work
f 2. energy
a 3. mechanical energy
c 4. potential energy
e 5. kinetic energy
b 6. law of conservation of energy

Column II

- a. total amount of kinetic and potential energy in a system
b. energy may change from one form to another, but it cannot be created or destroyed under ordinary conditions
c. stored energy
d. transfer of energy through motion
e. energy in the form of motion
f. the ability to cause change

Use the definitions of kinetic energy and potential energy to decide what kind of energy each example listed below has. Write KE for kinetic energy and PE for potential energy.

Kinetic energy is energy in the form of motion. Potential energy is stored energy. The amount of potential energy in a sample of matter depends on its position or condition.

- KE 1. a moving skateboard
PE 2. a rock at the edge of a cliff
PE 3. a glass of milk
PE 4. gasoline
KE 5. a basketball passing through the hoop
PE 6. a dry cell of a battery
PE 7. an acorn hanging from an oak tree
KE 8. a person climbing a ladder
PE 9. a piece of celery
KE 10. blowing wind

Complete the chart below by listing each of the examples of potential energy above in the correct column.

Gravitational Potential Energy	Chemical Potential Energy
rock at the end of the cliff	glass of milk
an acorn hanging from an oak tree	gasoline
	dry cell
	a piece of celery

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Chapter 5
STUDY GUIDE

Use with Text Pages 134-137

● Temperature and Heat

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

- _____ temperature 1. A measure of the average kinetic energy of the particles in a sample of matter is an object's *penitarerute*.
- _____ thermal energy 2. The total energy of the particles in a material is *matherl genrey*.
- _____ heat energy 3. Energy that flows from something with a higher temperature to something with a lower temperature is *eah gyener*.
- _____ potential energy 4. Thermal energy includes both kinetic energy and *toplaiten nrygee*.
- _____ kinetic energy 5. As the temperature of a material increases, the particles move faster and their average *cleinik rengey* becomes greater.

For each group of three terms, write a sentence that explains how the terms are related. Underline the terms in your sentences. Answers will vary. Be sure students include all of the necessary characteristics and use complete sentences.

1. thermal energy, particles, energy
Thermal energy is the total energy (kinetic and potential) of the particles in a material.
2. temperature, particles, kinetic energy
Temperature is a measure of the average kinetic energy of the particles that make up a sample of matter.
3. heat energy, temperature, flow
Heat energy is the flow of energy from something with a higher temperature to something with a lower temperature.
4. joules, heat, work
Heat and work are measured in units called joules.
5. thermal energy, kinetic energy, potential energy
Thermal energy is a measure of the kinetic energy and the potential energy of the particles in a material.

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Chapter 5
STUDY GUIDE

Use with Text Pages 138-140

● Thermal Pollution: Waste You Can't See

Write the vocabulary term from this section that best completes each statement in the space provided.

1. When waste thermal energy significantly changes the temperature of the environment, it is called thermal pollution.
2. In some factories, water is cooled by fans or by evaporation before being released into the environment by cooling towers.

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

temperature	25°C	buildings	pollution	heat	plants
factories	hours	raising	ocean	species	fish
arunals	lake	increases	equipment	thermal	

Thermal pollution is a problem caused when waste thermal energy raises the temperature of the environment. Power plants and factories use water to cool their buildings and equipment. Dumping this water, after raising the temperature, into a nearby river, lake, or ocean adds heat and may cause problems for plants and animals. Animals especially sensitive to increases in water temperature are fish. Some species of fish will die within hours in water warmer than 25°C.

Chapter 5

Use with Text Pages 141–144

STUDY GUIDE

● Measuring Thermal Energy

In the blank, write the term that best completes each statement.

- The amount of energy it takes to raise the temperature of 1 kilogram of a material 1 Celsius degree is called specific heat.
- Another term used for specific heat is heat capacity.
- Specific heat is measured in joules per kilogram per degree Celsius.
- Specific heat can be used to measure changes in thermal energy.
- Thermal energy is the total energy of the particles that make up a material.
- In the equation $Q = m \times \Delta T \times C_p$, the symbol Δ means change.
- A measure of the average kinetic energy of the particles in a sample of matter determines the matter's temperature.
- The transfer of energy from something at a higher temperature to something at a lower temperature is called heat.
- In the equation $Q = m \times \Delta T \times C_p$, the change in thermal energy is shown by Q.
- Heat always flows from higher to lower temperatures.
- Work and heat both involve transfers of energy.

Chapter 6

Use with Text Pages 152–161

STUDY GUIDE

● 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.

- | | |
|-----------------------|---|
| <u>conduction</u> | 1. The transfer of energy through matter by direct contact of particles is called <i>doctiotuch</i> . |
| <u>gases</u> | 2. Conduction can take place in solids, liquids, and sages. |
| <u>convection</u> | 3. The transfer of energy by the movement of matter is called <i>teccomiot</i> . |
| <u>fluid</u> | 4. Any material that can flow is <i>lufdi</i> . |
| <u>conductor</u> | 5. Any material that allows heat to pass through it easily is a <i>roconcutd</i> . |
| <u>radiation</u> | 6. The type of heat transfer that does not require matter is <i>iadranitoc</i> . |
| <u>waves</u> | 7. Radiation is the transfer of energy in the form of <i>vaews</i> . |
| <u>insulator</u> | 8. Any material that does not allow heat to pass through it easily is an <i>roinsulta</i> . |
| <u>metals</u> | 9. Many conductors, such as silver and copper, are <i>lemtas</i> . |
| <u>radiant energy</u> | 10. Energy that travels by radiation is often called <i>darinta greeney</i> . |
| <u>heat</u> | 11. Insulators, such as wood and air, are poor conductors of <i>thea</i> . |
| <u>matter</u> | 12. The transfer of thermal energy by convection and conduction both require <i>atterm</i> . |

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.

Answers will vary. Check to make sure that students' answers are

written in complete sentences.
