Date _____   Period _____   Name _____

ACCELERATED MOTION

Vocabulary Review

Write the term that correctly completes the statement. Use each term once.

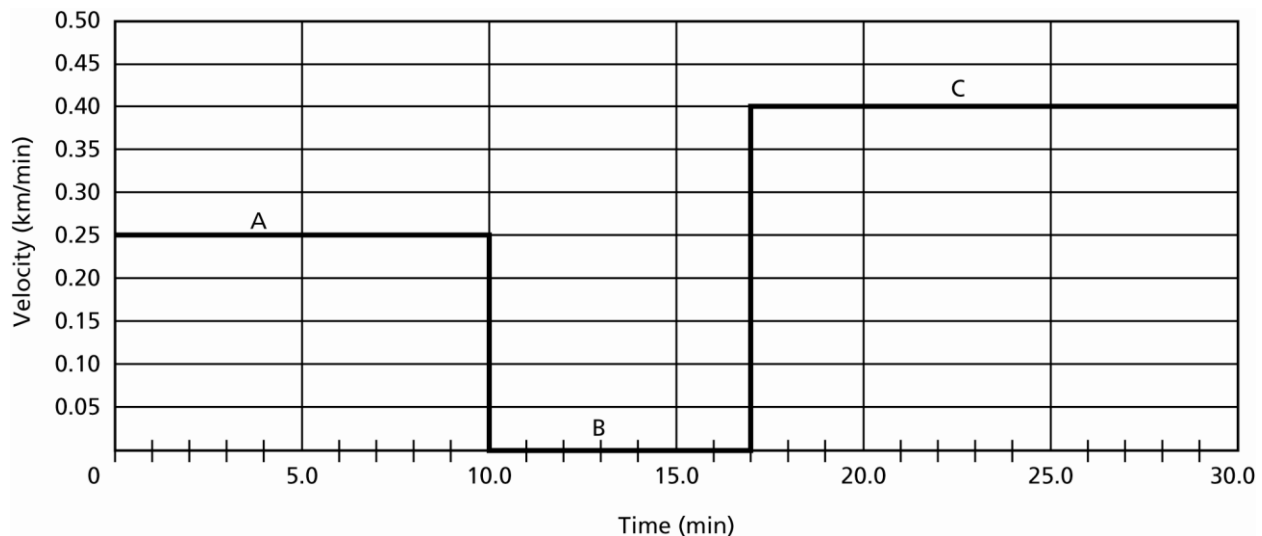| acceleration	average acceleration	instantaneous acceleration
free-fall acceleration	free fall	velocity-time graph

1. _____   A _____ shows how velocity is related to time.

2. _____   The change in velocity of an object at an instant of time is its _____ .

3. _____   The rate at which an object's velocity changes is its _____ .

4. _____   The motion of falling objects when air resistance is negligible is called _____ .

5. _____   The _____ of an object is the change in velocity during some measurable time interval divided by that time interval.

6. _____   The acceleration of an object in free fall that results from the influence of Earth's gravity is _____ .

SECTION 1 **Acceleration**

In your textbook, read about changing velocity and velocity-time graphs.

1. Refer to this velocity-time graph of a jogger to complete the two tables on the next page.

| Segment	v	Δt	Δx
A			
B			
C			

Δt	Distance Run	Displacement	Average Velocity

In your textbook, read about acceleration.

Circle the letter of the choice that best completes the statement or answers the question.

2. The slope of a tangent line on a velocity-time graph is the _____ .

    a. displacement   **c.** instantaneous acceleration

    b. velocity   **d.** free-fall acceleration

3. When acceleration and velocity vectors are pointing in opposite directions, the object is _____ .

    a. speeding up   **c.** moving at constant speed

    b. slowing down   **d.** not moving

4. If a runner accelerates from 2 m/s to 3 m/s in 4 s, her average acceleration is _____ .

    a. 4.0 m/s^2 **c.** 0.40 m/s^2

    b. 2.5 m/s^2 **d.** 0.25 m/s^2

5. The area under a velocity-time graph is equal to the object's _____ .

    a. stop time   **c.** displacement

    b. acceleration   **d.** average speed

6. The slope of a tangent line on a displacement-time graph is equal to the object's _____ .

    a. velocity   **c.** change in acceleration

    b. weight   **d.** displacement

The graph below shows the motion of five objects. Refer to the graph to answer questions 7–11.
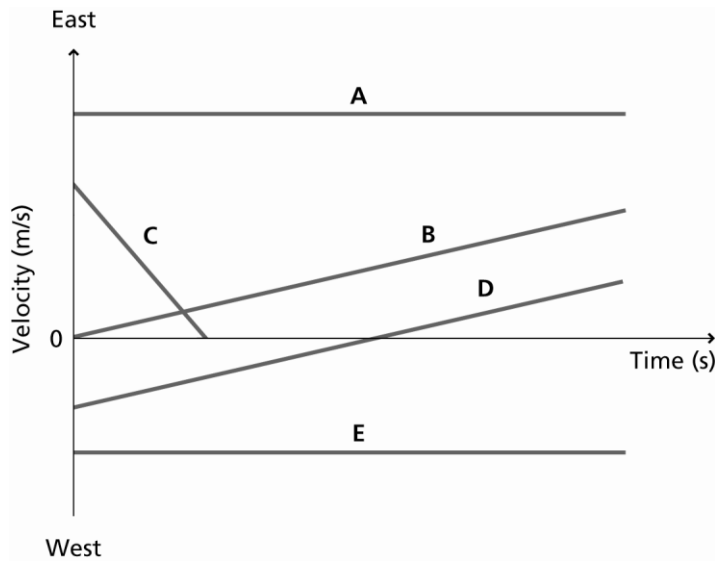
7. Which has the greater acceleration, Object A or B? How do you know?

_____

_____

8. Which of these objects has a negative acceleration? How do you know?

_____

_____

9. Which of these objects started its motion from rest? Which object comes to a complete stop? Explain your answers.

_____

_____

10. Object D crosses the axis while maintaining a constant positive acceleration. What does this indicate?

_____

_____

_____

11. Object A and Object E both have a constant velocity and acceleration of zero. What is different between these two?

_____

_____

_____

Chapter 3 • Accelerated Motion

3

SECTION 2 **Motion with Constant Acceleration**

In your textbook, read about velocity with average acceleration, position with constant acceleration, and an alternative expression for position, velocity, and time.

Complete the tables below. Fill in the values for the initial conditions and the variables. Write a question mark for the unknown variable in each table. If a variable or initial condition is not needed to answer the problem, write X. Write the equation you would use to answer each question. Then solve the problem and show your calculations.

1. A ball rolls past a mark on an incline at 0.40 m/s. If the ball has an average acceleration of 0.20 m/s^2, what is its velocity 3.0 s after it passes the mark?

Initial Conditions			Variables			Equation
Δt	x_f	v_f	$\bar{a}$	x_i	v_i	

2. A car initially traveling at 15 m/s accelerates at a constant rate of 4.5 m/s^2 over a distance of 45 m. How long does it take the car to cover this distance?

Initial Conditions			Variables			Equation
t_f	x_f	v_f	$\bar{a}$	x_i	v_i	

3. A car accelerates from 10.0 m/s to 15.0 m/s in 3.0 s. How far does the car travel?

Initial Conditions			Variables			Equation
t_f	x_f	v_f	$\bar{a}$	x_i	v_i	

4. A race car accelerates at 4.5 m/s² from rest. What is the car's velocity after it has traveled 35.0 m?

Initial Conditions			Variables			Equation
Δt	x_f	v_f	$\bar{a}$	x_i	v_i	

SECTION 3 **Free Fall**

In your textbook, read about free-fall acceleration.

For each statement below, write true *or rewrite the italicized part to make the statement true.*

1. _____ A feather does not fall in the same way as a pebble because of *gravity*.

2. _____ *Free fall* is the motion of a falling object when the air resistance is negligible.

3. _____ Galileo concluded that objects in free fall have *different* accelerations.

4. _____ Free-fall acceleration is *the same* for objects of different sizes.

5. _____ Free-fall acceleration is always *downward*.

6. _____ If you drop a rock, its speed after 3 s will be *19.6 m/s*.

7. _____ The decision to treat free-fall acceleration as positive or negative depends on the *coordinate system* you use.

8. _____ If you toss a ball up, it reaches its maximum height when its velocity is *zero*.

9. _____ If you toss a ball up, its acceleration at its maximum height is *zero*.

10. _____ If a tossed ball had no velocity or acceleration, it would *have no motion at all*.

The diagram below shows the positions of a ball that was thrown upward at time t_1. Refer to the diagram to answer questions 11–14.

○ t_3

○ t_4

○ t_2

○ t_5

○ t_1

11. Assume that the downward direction is positive. For each time shown on the diagram, determine whether the direction of the velocity is positive, negative, or zero, and whether the direction of the acceleration is positive, negative, or zero. Record your answers in the table using the symbols $+$, $-$, and 0.

Variable	Time				
	t_1	t_2	t_3	t_4	t_5
v					
a					

12. Still assuming that the downward direction is positive, rank the magnitudes of the velocities v_1, v_2, v_3, v_4, v_5 in decreasing order.

_____

13. Now assume that the downward direction is negative. For each time shown on the diagram, determine whether the direction of the velocity is positive, negative, or zero, and whether the direction of the acceleration is positive, negative, or zero. Record your answers in the table using the symbols $+$, $-$, and 0.

Variable	Time				
	t_1	t_2	t_3	t_4	t_5
v					
a					

14. Still assuming that the downward direction is negative, rank the magnitudes of the velocities v_1, v_2, v_3, v_4, v_5 in decreasing order.

_____