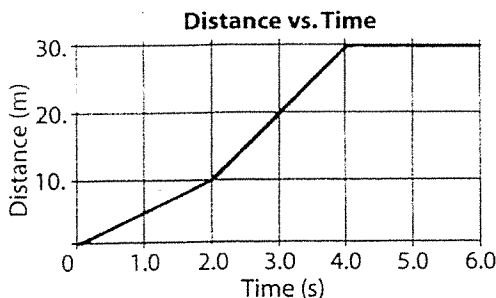# Review Questions

1. If a boy runs 125 meters north, and then 75 meters south, his total displacement is  (1) 50. m north  (2) 50. m south  (3) 200. m north  (4) 200. m south

2. A student walks 3 blocks south, 4 blocks west, and 3 blocks north. What is the displacement of the student?  (1) 10. blocks east  (2) 10. blocks west  (3) 4 blocks east  (4) 4 blocks west

3. A girl attempts to swim directly across a stream 15 meters wide. When she reaches the other side, she is 15 meters downstream. Determine the magnitude of her displacement.

4. What is the average speed of an object that travels 6.00 meters north in 2.00 seconds and then travels 3.00 meters east in 1.00 second?  (1) 9.00 m/s  (2) 0.333 m/s  (3) 3.00 m/s  (4) 4.24 m/s

5. A car is traveling at 60 kilometers per hour. Determine the time required for the car to travel 12 kilometers.

6. The graph below shows the relationship between the position of an object moving in a straight line and elapsed time. What is the speed of the object during the time interval $t = 2.0$ seconds to $t = 4.0$ seconds?



**Distance vs. Time**

(1) 0.0 m/s  (2) 5.0 m/s  (3) 7.5 m/s  (4) 10. m/s

7. A particle is accelerated uniformly from rest to a speed of 50. meters per second in 5.0 seconds. The average speed of the particle during this 5.0-second time interval is  (1) 5.0 m/s  (2) 10. m/s  (3) 25 m/s  (4) 50. m/s

8. Which statement best describes the movement of an object with zero acceleration?  (1) The object must be at rest.  (2) The object must be slowing down.  (3) The object may be speeding up.  (4) The object may be in motion.

9. A particle has a constant acceleration of 2.0 meters per second$^2$. Determine the time required for the particle to accelerate from 8.0 meters per second to 28 meters per second.

10. If an object is traveling east with a decreasing speed, the direction of the object's acceleration is  (1) north  (2) south  (3) east  (4) west

**Base your answers to questions 11 and 12 on the following graph, which represents the relationship between velocity and time of travel for four cars, A, B, C, and D, in straight-line motion.**
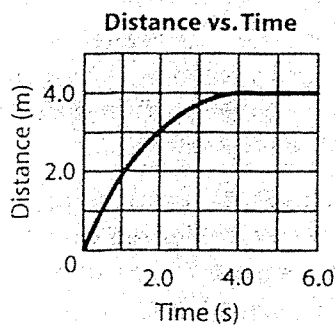


**Velocity vs. Time**
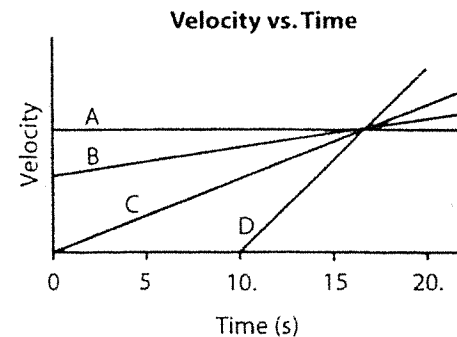
11. Which car has the greatest acceleration during the time interval 10. seconds to 15 seconds?

12. Which car travels the greatest distance during the time interval 0 second to 10. seconds?  (1) A only  (2) B only  (3) C only  (4) The distance traveled is the same for cars A, B, and C.

13. Starting from rest, an object rolls freely down a 10.-meter long incline in 2.0 seconds. The acceleration of the object is (1) 5.0 m/s  (3) 10. m/s  (2) 5.0 m/s$^2$  (4) 10. m/s$^2$

14. A car accelerates uniformly from rest at 3.2 meters per second$^2$. Determine the speed of the car when it has traveled a distance of 40. meters.

Base your answers to questions 15 through 20 on the following graph, which represents the relationship between speed and time for an object in straight-line motion.
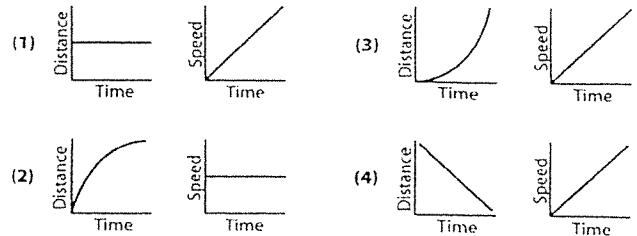
**Speed vs. Time**
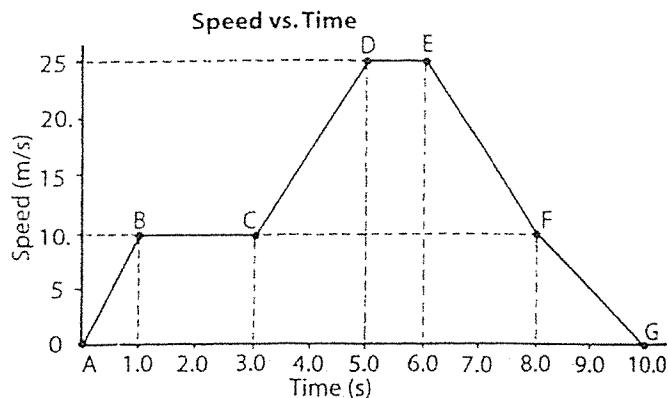
15. Determine the acceleration of the object during the time interval $t = 3.0$ seconds to $t = 5.0$ seconds.

16. Determine the average speed of the object during the time interval $t = 6.0$ seconds to $t = 8.0$ seconds.

17. Determine the total distance traveled by the object during the first 3.0 seconds.

18. During which interval is the object's acceleration greatest? (1) AB (2) CD (3) DE (4) EF

19. During the interval $t = 8.0$ seconds to $t = 10.0$ seconds, the speed of the object is (1) zero (2) increasing (3) decreasing (4) constant, but not zero

20. What is the maximum speed attained by the object during the 10.0 seconds of travel?

21. The graph below represents the relationship between distance and time of travel for an object moving in a straight line. Determine the instantaneous speed of the object at 1.5 seconds.
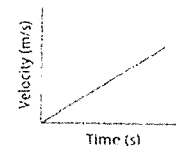
**Distance vs. Time**

22. A boat heads directly eastward across a river at 12 meters per second. If the current in the river is flowing at 5.0 meters per second due south, what is the magnitude of the boat's resultant velocity? (1) 7.0 m/s (2) 8.5 m/s (3) 13 m/s (4) 17 m/s

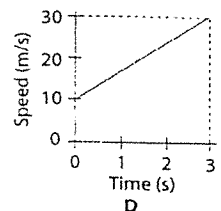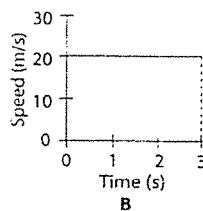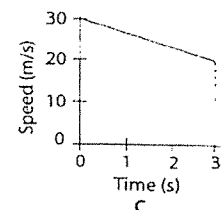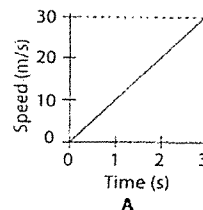23. Which pair of graphs represents the same motion?

24. The graph below represents the motion of a body moving along a straight line.

Which quantity related to the motion of the body is constant? (1) speed (2) velocity (3) acceleration (4) displacement
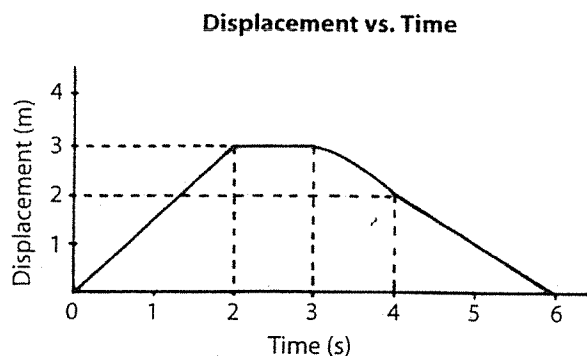
Base your answers to questions 25 through 29 on the following four graphs, which represent the relationship between speed and time for four different objects A, B, C, and D moving in a straight line.

25. Which object had a retarding force acting on it?

26. Which object was neither accelerating nor decelerating?

27. Which object traveled the greatest distance in the 3.0-second time interval?

**28.** Which object had the greatest acceleration?

**29.** Compared to the average speed of object A, the average speed of object D is (1) less (2) greater (3) the same

**30.** As the time required for a car to accelerate from rest to 27 meters per second decreases, the acceleration of the car (1) decreases (2) increases (3) remains the same

**31.** An object initially traveling at 20. meters per second west decelerates uniformly at 4.0 meters per second$^2$ for 2.0 seconds. The displacement of the object during these 2.0 seconds is (1) 32 m east (2) 32 m west (3) 48 m east (4) 48 m west

**32.** An object initially traveling at 20. meters per second south decelerates uniformly at 6.0 meters per second$^2$ and is displaced 25 meters. The final velocity of the object is (1) 26 m/s north (2) 26 m/s south (3) 10. m/s north (4) 10. m/s south

**33.** The time-rate of change of displacement is (1) acceleration (2) distance (3) speed (4) velocity

**Base your answers to questions 34 through 37 on the following graph, which represents the relationship between the displacement of an object and time.**
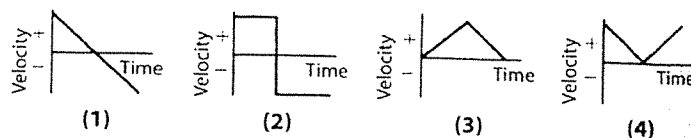
### Displacement vs. Time



**34.** How far is the object from the starting point at the end of 3 seconds?

**35.** During which time interval is the object at rest?

**36.** What is the average velocity of the object from $t = 0$ to $t = 3$ seconds? (1) 1 m/s (2) 2 m/s (3) 3 m/s (4) 0 m/s

**37.** During which time interval is the object accelerating?

**38.** Which is constant for a freely falling object near Earth's surface? (1) displacement (2) speed (3) velocity (4) acceleration

**39.** Which graph best represents the motion of an object falling from rest near Earth's surface? (Neglect air resistance.)
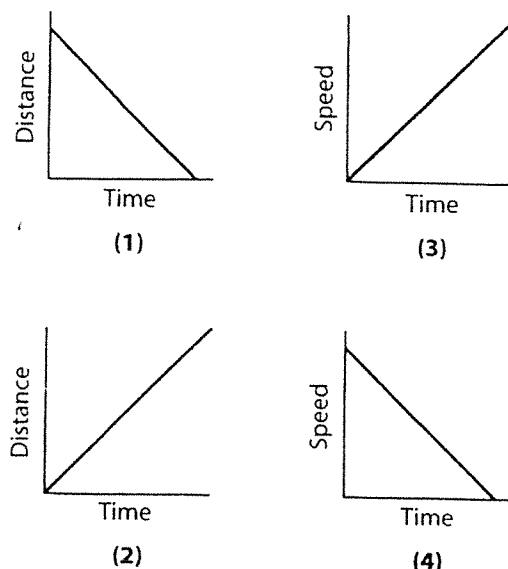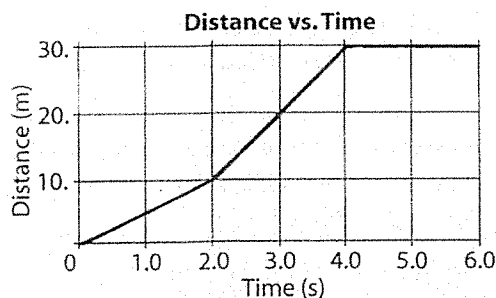


**40.** Approximately how far will an object near Earth's surface fall in 3.0 seconds? (1) 88 m (2) 44 m (3) 29 m (4) 9.8 m

**41.** An object starts from rest and falls freely near Earth's surface for 3.00 seconds. Determine the final speed of the object.

**42.** An object is thrown vertically upward from the surface of Earth. Which graph best represents the relationship between velocity and time for the object as it rises and then returns to Earth?

Name _Key_

Date _____

Review for Test: Motion Chapters 3 and 4

# Review Questions

1. If a boy runs 125 meters north, and then 75 meters south, his total displacement is (1) 50. m north (2) 50. m south (3) 200. m north (4) 200. m south

2. A student walks 3 blocks south, 4 blocks west, and 3 blocks north. What is the displacement of the student? (1) 10. blocks east (2) 10. blocks west (3) 4 blocks east (4) 4 blocks west

3. A girl attempts to swim directly across a stream 15 meters wide. When she reaches the other side, she is 15 meters downstream. Determine the magnitude of her displacement. $a^2 + b^2 = c^2$ $c = 21m$
$15_m^2 + 15_m^2 = c^2$

4. What is the average speed of an object that travels 6.00 meters north in 2.00 seconds and then travels 3.00 meters east in 1.00 second? (1) 9.00 m/s (2) 0.333 m/s (3) 3.00 m/s (4) 4.24 m/s

5. A car is traveling at 60 kilometers per hour. Determine the time required for the car to travel 12 kilometers. $\bar{v} = \frac{d}{t}$ $t = .2h$

6. The graph below shows the relationship between the position of an object moving in a straight line and elapsed time. What is the speed of the object during the time interval $t = 2.0$ seconds to $t = 4.0$ seconds?

**Distance vs. Time**



(1) 0.0 m/s (2) 5.0 m/s (3) 7.5 m/s (4) 10. m/s

7. A particle is accelerated uniformly from rest to a speed of 50. meters per second in 5.0 seconds. The average speed of the particle during this 5.0-second time interval is (1) 5.0 m/s (2) 10. m/s (3) 25 m/s (4) 50. m/s

8. Which statement best describes the movement of an object with zero acceleration? (1) The object must be at rest. (2) The object must be slowing down. (3) The object may be speeding up. (4) The object may be in motion.

9. A particle has a constant acceleration of 2.0 meters per second$^2$. Determine the time required for the particle to accelerate from 8.0 meters per second to 28 meters per second. $a = \frac{\Delta v}{t}$ $t = 10s$
$\frac{28m - 8m}{2}$

10. If an object is traveling east with a decreasing speed, the direction of the object's acceleration is (1) north (2) south (3) east (4) west

**Base your answers to questions 11 and 12 on the following graph, which represents the relationship between velocity and time of travel for four cars, A, B, C, and D, in straight-line motion.**

**Velocity vs. Time**
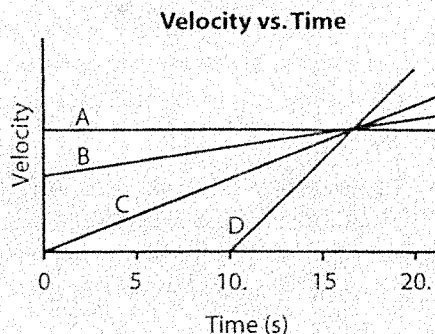


11. Which car has the greatest acceleration during the time interval 10. seconds to 15 seconds? D

12. Which car travels the greatest distance during the time interval 0 second to 10. seconds? (1) A only (2) B only (3) C only (4) The distance traveled is the same for cars A, B, and C.

13. Starting from rest, an object rolls freely down a 10.-meter long incline in 2.0 seconds. The acceleration of the object is (1) 5.0 m/s (3) 10. m/s (2) 5.0 m/s$^2$ (4) 10. m/s$^2$

14. A car accelerates uniformly from rest at 3.2 meters per second$^2$. Determine the speed of the car when it has traveled a distance of 40. meters.
$v_f^2 = v_i^2 + 2ad$ $v_f = 16 \frac{m}{s}$
$v_f^2 = 2\left(3.2\frac{m}{s^2}\right)(40.m)$

Base your answers to questions 15 through 20 on the following graph, which represents the relationship between speed and time for an object in straight-line motion.
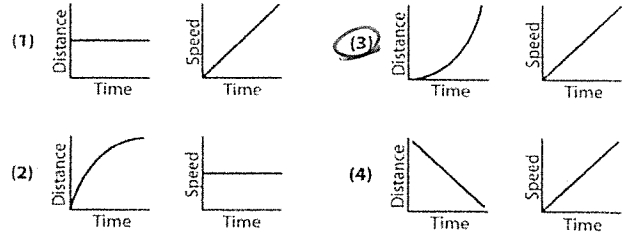
**Speed vs. Time**
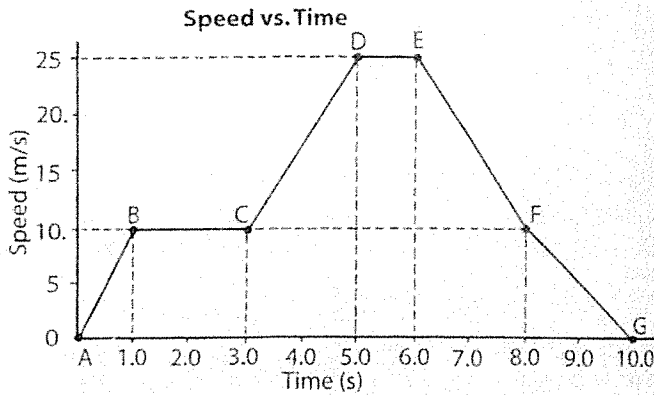


15. Determine the acceleration of the object during the time interval $t = 3.0$ seconds to $t = 5.0$ seconds.
    $a = \frac{\Delta v}{t} = \frac{25\frac{m}{s} - 10\frac{m}{s}}{2s} = 7.5 \, m/s^2$

16. Determine the average speed of the object during the time interval $t = 6.0$ seconds to $t = 8.0$ seconds.
    $\bar{v} = \frac{v_i + v_f}{2} = \frac{25\frac{m}{s} + 10\frac{m}{s}}{2} = 18 \, m/s$

17. Determine the total distance traveled by the object during the first 3.0 seconds. $25m$

18. During which interval is the object's acceleration greatest? (1) AB (2) CD (3) DE (4) EF

19. During the interval $t = 8.0$ seconds to $t = 10.0$ seconds, the speed of the object is (1) zero (2) increasing (3) decreasing (4) constant, but not zero

20. What is the maximum speed attained by the object during the 10.0 seconds of travel? $25m/s$

21. The graph below represents the relationship between distance and time of travel for an object moving in a straight line. Determine the instantaneous speed of the object at 1.5 seconds.

**Distance vs. Time**



Tangent Line
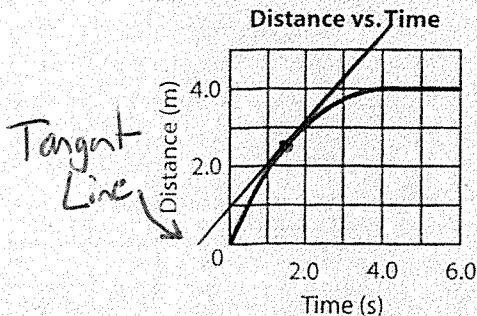
$\bar{v} = \frac{d}{t} = \frac{3m - 2m}{20s - 10s} = 1\frac{m}{s}$

22. A boat heads directly eastward across a river at 12 meters per second. If the current in the river is flowing at 5.0 meters per second due south, what is the magnitude of the boat's resultant velocity? (1) 7.0 m/s (2) 8.5 m/s (3) 13 m/s (4) 17 m/s

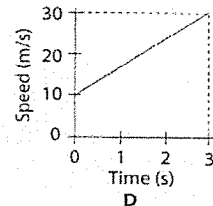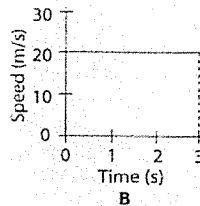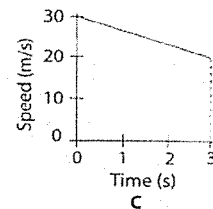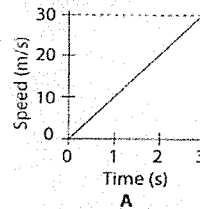23. Which pair of graphs represents the same motion?



24. The graph below represents the motion of a body moving along a straight line.
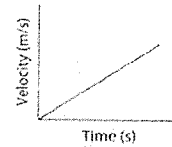


Which quantity related to the motion of the body is constant? (1) speed (2) velocity (3) acceleration (4) displacement

Base your answers to questions 25 through 29 on the following four graphs, which represent the relationship between speed and time for four different objects A, B, C, and D moving in a straight line.
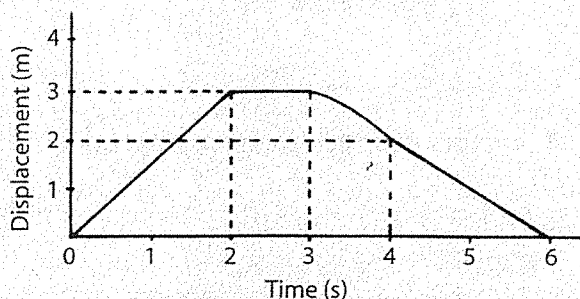


25. Which object had a retarding force acting on it? C

26. Which object was neither accelerating nor decelerating? B

27. Which object traveled the greatest distance in the 3.0-second time interval? C

**28.** Which object had the greatest acceleration? *A*

**29.** Compared to the average speed of object A, the average speed of object D is (1) less (2) greater (3) the same

**30.** As the time required for a car to accelerate from rest to 27 meters per second decreases, the acceleration of the car (1) decreases (2) increases (3) remains the same

**31.** An object initially traveling at 20. meters per second west decelerates uniformly at 4.0 meters per second$^2$ for 2.0 seconds. The displacement of the object during these 2.0 seconds is (1) 32 m east (2) 32 m west (3) 48 m east (4) 48 m west

**32.** An object initially traveling at 20. meters per second south decelerates uniformly at 6.0 meters per second$^2$ and is displaced 25 meters. The final velocity of the object is (1) 26 m/s north (2) 26 m/s south (3) 10. m/s north (4) 10. m/s south

**33.** The time-rate of change of displacement is (1) acceleration (2) distance (3) speed (4) velocity
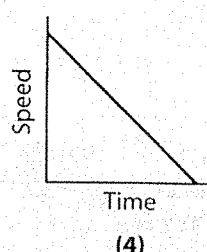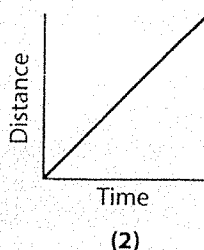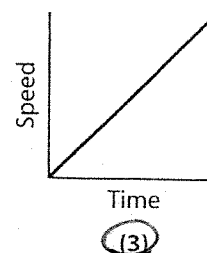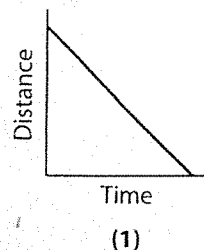
**Base your answers to questions 34 through 37 on the following graph, which represents the relationship between the displacement of an object and time.**

### Displacement vs. Time



**34.** How far is the object from the starting point at the end of 3 seconds? 3m

**35.** During which time interval is the object at rest? 2s to 3s

**36.** What is the average velocity of the object from $t = 0$ to $t = 3$ seconds? (1) 1 m/s (2) 2 m/s (3) 3 m/s (4) 0 m/s

**37.** During which time interval is the object accelerating?

**38.** Which is constant for a freely falling object near Earth's surface? (1) displacement (2) speed (3) velocity (4) acceleration

**39.** Which graph best represents the motion of an object falling from rest near Earth's surface? (Neglect air resistance.)



**40.** Approximately how far will an object near Earth's surface fall in 3.0 seconds? (1) 88 m (2) 44 m (3) 29 m (4) 9.8 m

**41.** An object starts from rest and falls freely near Earth's surface for 3.00 seconds. Determine the final speed of the object.
$$v_f = v_i + at$$
$$v_f = \left(9.81 \frac{m}{s^2}\right)(3.00 s) = 29.4 \frac{m}{s}$$

**42.** An object is thrown vertically upward from the surface of Earth. Which graph best represents the relationship between velocity and time for the object as it rises and then returns to Earth?