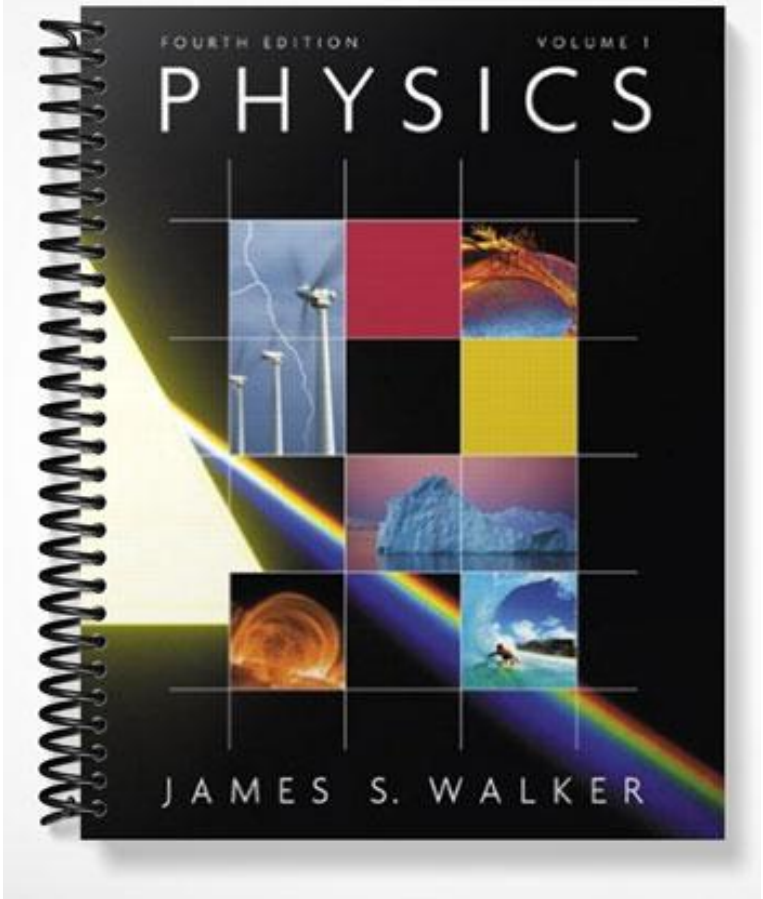
TEST BANK



***Physics*, 4e (Walker/Gatch)**
Chapter 2 One-Dimensional Kinematics

2.1 Conceptual Questions

1) Two cars are traveling at the same speed and hit the brakes at the same time. One car has double the deceleration of the other. By what factor does the time required to stop that car compare with that for the other car?
Answer: It takes half as long to stop.
Diff: 1 Var: 1 Page Ref: Sec. 2-5 & 2-6

2) Two cars are traveling at the same speed and hit the brakes at the same time. One car has double the deceleration of the other. By what factor does the distance required to stop that car compare with that for the other car?
Answer: It takes half the distance to stop.
Diff: 1 Var: 1 Page Ref: Sec. 2-5 & 2-6

3) Car A is traveling at twice the speed of car B. They both hit the brakes at the same time and undergo identical decelerations. How does the time required for car A to stop compare with that for car B?
Answer: Car A takes twice as long to stop.
Diff: 1 Var: 1 Page Ref: Sec. 2-5 & 2-6

4) Car A is traveling at twice the speed of car B. They both hit the brakes at the same time and undergo identical decelerations. How does the distance required for car A to stop compare with that for car B?
Answer: It takes four times the distance to stop.
Diff: 1 Var: 1 Page Ref: Sec. 2-5 & 2-6

5) A stone is thrown straight up. What is its acceleration on the way up?
Answer: 9.8 m/s^2 downward
Diff: 1 Var: 1 Page Ref: Sec. 2-7

6) A stone is thrown straight up. What is its acceleration on the way down?
Answer: 9.8 m/s^2 downward
Diff: 1 Var: 1 Page Ref: Sec. 2-7

7) A stone is thrown straight up. What is its acceleration at the highest point?
Answer: 9.8 m/s^2 downward
Diff: 1 Var: 1 Page Ref: Sec. 2-7

8) It is possible to have a zero acceleration, and still be moving.
Answer: TRUE
Diff: 1 Var: 1 Page Ref: Sec. 2-4

9) When the velocity and acceleration of an object have the same sign, the speed of the object increases.
Answer: TRUE
Diff: 1 Var: 1 Page Ref: Sec. 2-4

10) When the velocity and acceleration of an object have opposite signs, the speed of the object increases.
Answer: FALSE
Diff: 1 Var: 1 Page Ref: Sec. 2-4

11) The average velocity of a car traveling with a constant acceleration during a certain time interval is equal to the mean of the velocities at the beginning and end of that time interval.
Answer: TRUE
Diff: 1 Var: 1 Page Ref: Sec. 2-5 & 2-6

12) Free fall is the motion of an object subject only to the influence of gravity.
Answer: TRUE
Diff: 1 Var: 1 Page Ref: Sec. 2-7

13) An object is in free fall as soon as it is released, whether it is dropped from rest, thrown downward, or thrown upward.
Answer: TRUE
Diff: 1 Var: 1 Page Ref: Sec. 2-7

14) An object thrown downward does not experience free fall.
Answer: FALSE
Diff: 1 Var: 1 Page Ref: Sec. 2-7

15) An object thrown upward experiences free fall.
Answer: TRUE
Diff: 1 Var: 1 Page Ref: Sec. 2-7

16) Suppose that an object travels from one point in space to another. Make a comparison between the displacement and the distance traveled.
A) The displacement is either greater than or equal to the distance traveled.
B) The displacement is always equal to the distance traveled.
C) The displacement is either less than or equal to the distance traveled.
D) The displacement can be either greater than, smaller than, or equal to the distance traveled.
E) If the displacement is equal to zero, then the distance traveled will also equal zero.
Answer: C
Diff: 2 Var: 1 Page Ref: Sec. 2-1

17) Which statement below about the distance between the starting and ending positions and the displacement between the starting and ending positions is correct?
A) The distance between the starting and ending positions is twice the magnitude of the displacement between the starting and ending positions.
B) The distance between the starting and ending positions is equal to the magnitude of the displacement between the starting and ending positions.
C) The distance between the starting and ending positions is the negative of the magnitude of the displacement between the starting and ending positions.
D) The distance between the starting and ending positions is greater than the magnitude of the displacement between the starting and ending positions.
E) The distance between the starting and ending positions is less than the magnitude of the displacement between the starting and ending positions.
Answer: B
Diff: 2 Var: 1 Page Ref: Sec. 2-1

18) You drive 6.00 km at 50.0 km/h and then another 6.00 km at 90.0 km/h. Your average speed over the 12.0 km drive will be
A) greater than 70.0 km/h.
B) equal to 70.0 km/h.
C) less than 70.0 km/h.
D) exactly 38.0 km/h.
E) cannot be determined from the information given, must also know directions traveled
Answer: C
Diff: 1 Var: 1 Page Ref: Sec. 2-2

19) The slope of a line connecting two points on a position versus time graph gives
A) displacement.
B) instantaneous velocity.
C) average velocity.
D) instantaneous acceleration.
E) average acceleration.
Answer: C
Diff: 1 Var: 1 Page Ref: Sec. 2-2

20) Which statement is correct about the relationship between the average speed and the magnitude of the average velocity for any motion?
A) The average speed is always one-half the magnitude of the average velocity.
B) The average speed is always greater than or equal to the magnitude of the average velocity.
C) The average speed can be less than, greater than or equal to the magnitude of the average velocity.
D) The average speed is always less than or equal to the magnitude of the average velocity.
E) The average speed is always equal to the magnitude of the average velocity.
Answer: B
Diff: 2 Var: 1 Page Ref: Sec. 2-2

21) The slope of a tangent line at a given time value on a position versus time graph gives
A) displacement.
B) instantaneous velocity.
C) average velocity.
D) instantaneous acceleration.
E) average acceleration
Answer: B
Diff: 1 Var: 1 Page Ref: Sec. 2-3

22) When is the average velocity of an object equal to the instantaneous velocity?
A) always
B) never
C) only when the velocity is constant
D) only when the velocity is increasing at a constant rate
E) only when the velocity is decreasing at a constant rate
Answer: C
Diff: 2 Var: 1 Page Ref: Sec. 2-3

23) Which statement is correct about the relationship between the instantaneous speed and the magnitude of the instantaneous velocity?
A) The average speed can be less than, greater than or equal to the magnitude of the average velocity.
B) The instantaneous speed is always equal to the magnitude of the instantaneous velocity.
C) The average speed is always less than or equal to the magnitude of the average velocity.
D) The instantaneous speed is always greater than or equal to the magnitude of the instantaneous velocity.
E) The average speed is always one-half the magnitude of the average velocity.
Answer: B
Diff: 2 Var: 1 Page Ref: Sec. 2-3

24) Suppose that an object is moving with a constant velocity. Make a statement concerning its acceleration.
A) The acceleration must be constantly increasing.
B) The acceleration must be constantly decreasing.
C) The acceleration must be a constant non-zero value.
D) The acceleration must be equal to zero.
E) A statement cannot be made without additional information.
Answer: D
Diff: 1 Var: 1 Page Ref: Sec. 2-4

25) At a given instant, the acceleration of a certain particle is zero. This means that
A) the velocity is constant.
B) the velocity is increasing.
C) the velocity is decreasing.
D) the velocity is not changing at that instant.
E) the velocity is zero.
Answer: D
Diff: 1 Var: 1 Page Ref: Sec. 2-4

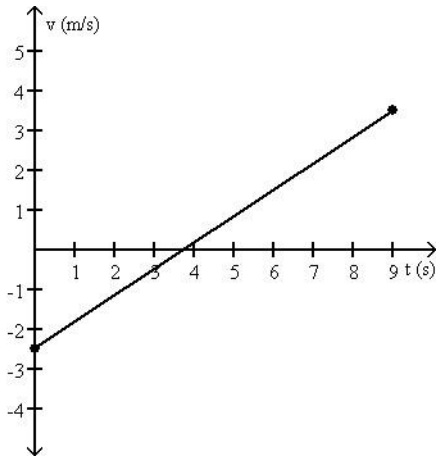
26) The slope of a line connecting two points on a velocity versus time graph gives
A) displacement.
B) instantaneous velocity.
C) average velocity.
D) instantaneous acceleration.
E) average acceleration.
Answer: E
Diff: 1 Var: 1 Page Ref: Sec. 2-4

27) The slope of a tangent line at a given time value on a velocity versus time graph gives
A) displacement.
B) instantaneous velocity.
C) average velocity.
D) instantaneous acceleration.
E) average acceleration.
Answer: D
Diff: 1 Var: 1 Page Ref: Sec. 2-4

28) Suppose that an object is moving with constant acceleration. Which of the following is an accurate statement concerning its motion?
A) In equal times its speed changes by equal amounts.
B) In equal times its velocity changes by equal amounts.
C) In equal times it moves equal distances.
D) The object is not moving; it is at rest.
E) A statement cannot be made without additional information.
Answer: B
Diff: 1 Var: 1 Page Ref: Sec. 2-4

29) During the time that the acceleration of a particle is constant, its velocity-vs.-time curve is
A) a straight line.
B) a parabola opening downward.
C) a parabola opening upward.
D) a parabola opening toward the left.
E) a parabola opening toward the right.
Answer: A
Diff: 1 Var: 1 Page Ref: Sec. 2-4

FIGURE 2-1



30) The motion of a particle is described in the velocity vs. time graph shown in **Figure 2-1**. We can say that its speed
A) increases.
B) decreases.
C) increases and then decreases.
D) decreases and then increases.
E) remains constant.
Answer: A
Diff: 1 Var: 1 Page Ref: Sec. 2-4

31) Suppose that a car traveling to the East (+*x* direction) begins to slow down as it approaches a traffic light. Make a statement concerning its acceleration.
A) The car is decelerating, and its acceleration is positive.
B) The car is decelerating, and its acceleration is negative.
C) The acceleration is zero.
D) A statement cannot be made using the information given.
Answer: B
Diff: 1 Var: 1 Page Ref: Sec. 2-4

32) Suppose that a car traveling to the West (-*x* direction) begins to slow down as it approaches a traffic light. Make a statement concerning its acceleration.
A) The car is decelerating, and its acceleration is positive.
B) The car is decelerating, and its acceleration is negative.
C) The acceleration is zero.
D) A statement cannot be made using the information given.
Answer: A
Diff: 2 Var: 1 Page Ref: Sec. 2-4

33) An object is moving with constant non-zero velocity in the +*x*-axis. The position versus time graph of this object is
A) a horizontal straight line.
B) a vertical straight line.
C) a straight line making an angle with the time axis.
D) a parabolic curve.
E) a hyperbolic curve.
Answer: C
Diff: 1 Var: 1 Page Ref: Sec. 2-5

34) An object is moving with constant non-zero acceleration in the +*x*-axis. The position versus time graph of this object is
A) a horizontal straight line.
B) a vertical straight line.
C) a straight line making an angle with the time axis.
D) a parabolic curve.
E) a hyperbolic curve.
Answer: D
Diff: 1 Var: 1 Page Ref: Sec. 2-5

35) An object is moving with constant non-zero velocity in the +*x*-axis. The velocity versus time graph of this object is
A) a horizontal straight line.
B) a vertical straight line.
C) a straight line making an angle with the time axis.
D) a parabolic curve.
E) a hyperbolic curve.
Answer: A
Diff: 1 Var: 1 Page Ref: Sec. 2-5

36) An object is moving with constant non-zero acceleration in the +*x*-axis. The velocity versus time graph of this object is
A) a horizontal straight line.
B) a vertical straight line.
C) a straight line making an angle with the time axis.
D) a parabolic curve.
E) a hyperbolic curve.
Answer: C
Diff: 1 Var: 1 Page Ref: Sec. 2-5

37) If the position versus time graph of an object is a horizontal line, the object is
A) moving with constant non-zero speed.
B) moving with constant non-zero acceleration.
C) at rest.
D) moving with infinite speed.
E) none of the above
Answer: C
Diff: 1 Var: 1 Page Ref: Sec. 2-5

38) If the velocity versus time graph of an object is a horizontal line, the object is
A) moving with constant non-zero speed.
B) moving with constant non-zero acceleration.
C) at rest.
D) moving with infinite speed.
E) none of the above
Answer: A
Diff: 1 Var: 1 Page Ref: Sec. 2-5

39) If the velocity versus time graph of an object is a straight line making an angle of 30 degrees with the time axis, the object is
A) moving with constant non-zero speed.
B) moving with constant non-zero acceleration.
C) at rest.
D) moving with infinite speed.
E) none of the above
Answer: B
Diff: 1 Var: 1 Page Ref: Sec. 2-5

40) The area under a curve in a velocity versus time graph gives
A) distance traveled.
B) displacement.
C) speed.
D) velocity.
E) acceleration.
Answer: B
Diff: 2 Var: 1 Page Ref: Sec. 2-5

41) A car moving initially with velocity v_0 with deceleration a comes to a full stop after traveling a distance d. We can say that the velocity of the car after traveling a distance $d/2$ is
A) greater than $v_0/2$.
B) equal than $v_0/2$.
C) smaller than $v_0/2$.
D) has no relationship to v_0.
Answer: A
Diff: 2 Var: 1 Page Ref: Sec. 2-5 & 2-6

42) A car traveling with velocity *v* is decelerated by a constant acceleration of magnitude *a*. It travels a distance *d* before coming to rest. If its initial velocity were doubled, the distance required to stop would
A) double as well.
B) decrease by a factor of two.
C) stay the same.
D) quadruple.
E) decrease by a factor of four.
Answer: D
Diff: 2 Var: 1 Page Ref: Sec. 2--6

43) A car traveling with velocity *v* is decelerated by a constant acceleration of magnitude *a*. It takes a time *t* to come to rest. If its initial velocity were doubled, the time required to stop would
A) double as well.
B) decrease by a factor of two.
C) stay the same.
D) quadruple.
E) decrease by a factor of four.
Answer: A
Diff: 2 Var: 1 Page Ref: Sec. 2-6

44) A stone is thrown straight up. When it reaches its highest point,
A) both its velocity and its acceleration are zero.
B) its velocity is zero and its acceleration is not zero.
C) its velocity is not zero and its acceleration is zero.
D) neither its velocity nor its acceleration is zero.
E) neither velocity nor acceleration can be determined without additional information.
Answer: B
Diff: 1 Var: 1 Page Ref: Sec. 2-7

45) Suppose a ball is thrown straight up, reaches a maximum height, then falls to its initial height. Make a statement about the direction of the velocity and acceleration as the ball is going up.
A) Both its velocity and its acceleration point upward.
B) Its velocity points upward and its acceleration points downward.
C) Its velocity points downward and its acceleration points upward.
D) Both its velocity and its acceleration points downward.
E) Neither velocity nor acceleration can be determined without additional information.
Answer: B
Diff: 1 Var: 1 Page Ref: Sec. 2-7

46) Two athletes jump straight up. John has twice the initial speed of Harry. Compared to Harry, John stays in the air
A) 0.50 times as long.
B) 1.41 times as long.
C) twice as long.
D) three times as long.
E) four times as long.
Answer: C
Diff: 1 Var: 1 Page Ref: Sec. 2-7

47) Two athletes jump straight up. John has twice the initial speed of Harry. Compared to Harry, John jumps
A) 0.50 times as long.
B) 1.41 times as long.
C) twice as long.
D) three times as long.
E) four times as long.
Answer: E
Diff: 1 Var: 1 Page Ref: Sec. 2-7

48) Two objects are dropped from a bridge, an interval of 1.0 s apart. During the time that both objects continue to fall, their separation
A) increases.
B) decreases.
C) stays constant.
D) increases at first, but then stays constant.
E) decreases at first, but then stays constant.
Answer: A
Diff: 1 Var: 1 Page Ref: Sec. 2-7

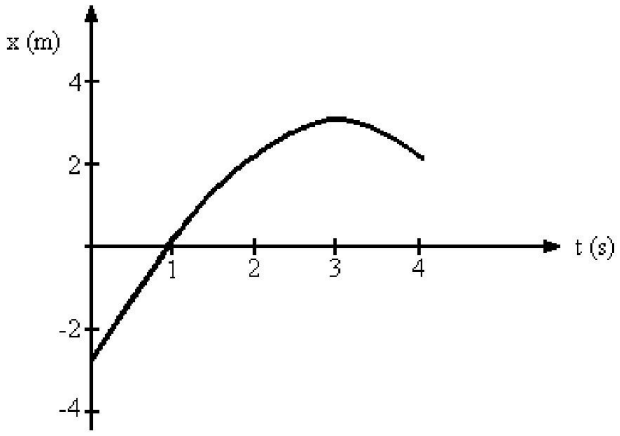
49) From the edge of a roof top you toss a green ball upwards with initial velocity v_0 and a blue ball downwards with the same initial velocity. When they reach the ground below,
A) the green ball will be moving faster than the blue ball.
B) the blue ball will be moving faster than the green ball.
C) the two balls will have the same speed.
Answer: C
Diff: 1 Var: 1 Page Ref: Sec. 2-7

50) You drop a stone from a bridge to the river below. After this stone has traveled a distance *d*, you drop a second stone. The distance between the two stones will always
A) increases.
B) decreases.
C) stays constant.
D) increases at first, but then stays constant.
E) decreases at first, but then stays constant.
Answer: A
Diff: 2 Var: 1 Page Ref: Sec. 2-7

2.2 Quantitative Problems

1) Arthur and Betty start walking toward each other when they are 100 m apart. Arthur has a speed of 3.0 m/s and Betty has a speed of 2.0 m/s. How long does it take for them to meet?
Answer: 20 seconds
Diff: 1 Var: 1 Page Ref: Sec. 2-2

FIGURE 2-2



2) **Figure 2-2** represents the position of a particle as it travels along the *x*-axis. What is the average speed of the particle between t = 2 s and t = 4 s?
Answer: 1 m/s
Diff: 1 Var: 1 Page Ref: Sec. 2-2

3) **Figure 2-2** represents the position of a particle as it travels along the *x*-axis. What is the average velocity of the particle between t = 0 s and t = 3 s?
Answer: 2 m/s
Diff: 1 Var: 1 Page Ref: Sec. 2-2

4) **Figure 2-2** represents the position of a particle as it travels along the *x*-axis. What is the average velocity of the particle between t = 2 s and t = 4 s?
Answer: 0 m/s
Diff: 1 Var: 1 Page Ref: Sec. 2-2

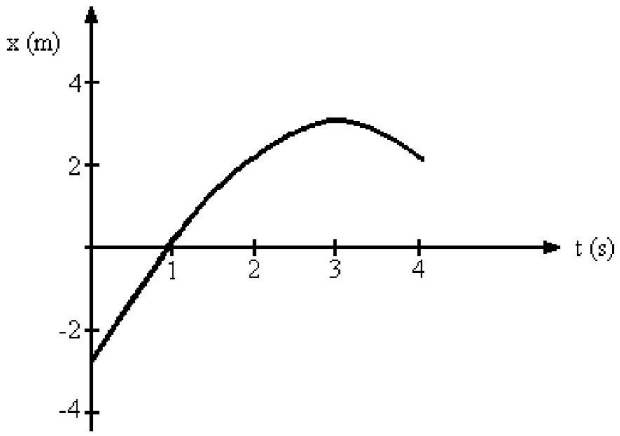
5) **Figure 2-2** represents the position of a particle as it travels along the *x*-axis. What is the average speed of the particle between t = 0 s and t = 3 s?
Answer: 2 m/s
Diff: 2 Var: 1 Page Ref: Sec. 2-2

6) Arthur and Betty start walking toward each other when they are 100 m apart. Arthur has a speed of 3.0 m/s and Betty has a speed of 2.0 m/s. Their dog, Spot, starts from Arthur's side at the same time and runs back and forth between them. By the time Arthur and Betty meet, what is Spot's displacement?
Answer: 60 m in the direction of Betty
Diff: 2 Var: 1 Page Ref: Sec. 2-2

7) Arthur and Betty start walking toward each other when they are 100 m apart. Arthur has a speed of 3.0 m/s and Betty has a speed of 2.0 m/s. Their dog, Spot, starts by Arthur's side at the same time and runs back and forth between them at 5.0 m/s. By the time Arthur and Betty meet, what distance has Spot run?
Answer: 100 m
Diff: 2 Var: 1 Page Ref: Sec. 2-2

8) The position of a particle as a function of time is given by $x(t) = (3.5 \text{ m/s})t - (5.0 \text{ m/s}^2)t^2$. What is the average velocity of the particle between t = 0.30 s and t = 0.40 s?
Answer: 0 m/s
Diff: 2 Var: 1 Page Ref: Sec. 2-2

FIGURE 2-3

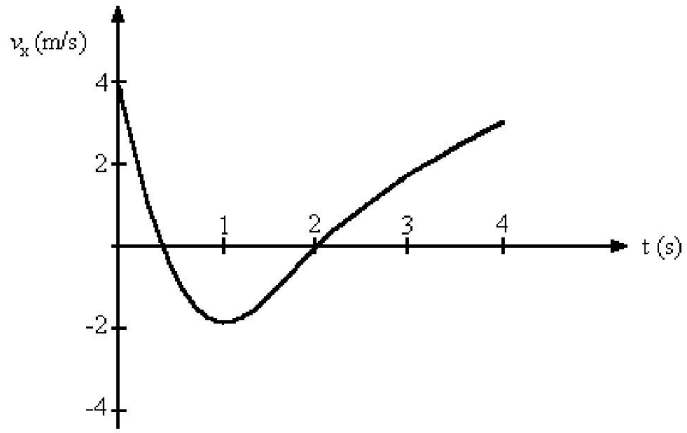


9) **Figure 2-3** represents the position of a particle as it travels along the *x*-axis. What is the magnitude of the instantaneous velocity of the particle when t = 1 s?
Answer: 3 m/s
Diff: 1 Var: 1 Page Ref: Sec. 2-3

10) A certain car can accelerate from 0 to 100 km/hr in 6.0 seconds. What is the average acceleration of that car in m/s^2?
Answer: 4.6 m/s^2
Diff: 1 Var: 1 Page Ref: Sec. 2-4

11) If a car accelerates at 4.0 m/s^2, how long will it take to reach a speed of 80 km/hr, starting from rest?
Answer: 5.6 seconds
Diff: 1 Var: 1 Page Ref: Sec. 2-4

FIGURE 2-4



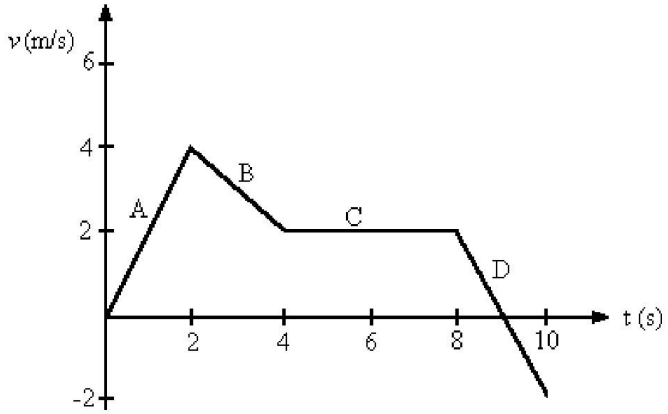
12) **Figure 2-4** represents the velocity of a particle as it travels along the *x*-axis. In what direction is the acceleration at t = 0.5 s?
Answer: in the negative *x* direction
Diff: 1 Var: 1 Page Ref: Sec. 2-4

13) **Figure 2-4** represents the velocity of a particle as it travels along the *x*-axis. In what direction is the acceleration at t = 3.0 s?
Answer: in the positive *x* direction
Diff: 1 Var: 1 Page Ref: Sec. 2-4

14) **Figure 2-4** represents the velocity of a particle as it travels along the *x*-axis. What is the average acceleration of the particle between t = 2 s and t = 4 s?
Answer: 1.5 m/s^2
Diff: 1 Var: 1 Page Ref: Sec. 2-4

15) **Figure 2-4** represents the velocity of a particle as it travels along the *x*-axis. At what value of t is the instantaneous acceleration equal to zero m/s^2?
Answer: At t = 1 s
Diff: 1 Var: 1 Page Ref: Sec. 2-4

FIGURE 2-5



16) **Figure 2-5** shows the velocity-versus-time graph for a basketball player traveling up and down the court in a straight-line path. Find the displacement of the player for each of the segments A, B, C and D.
Answer: A, 4 m; B, 6 m; C, 8 m; D, 0 m
Diff: 1 Var: 1 Page Ref: Sec. 2-4

17) A water rocket can reach a speed of 75 m/s in 0.050 seconds from launch. What is its average acceleration?
Answer: 1500 m/s^2
Diff: 2 Var: 1 Page Ref: Sec. 2-4

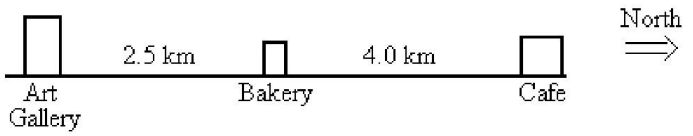
18) A car with good tires on a dry road can decelerate at about 5.0 m/s^2 when braking. Suppose a car is initially traveling at 55 mi/h.
(a.) How much time does it take the car to stop?
(b.) What is the stopping distance?
Answer: (a.) 4.9 s
(b.) 60 m
Diff: 1 Var: 1 Page Ref: Sec. 2-6

19) At the instant a traffic light turns green, a car that has been waiting at the intersection starts ahead with a constant acceleration of 2.00 m/s^2. At that moment a truck traveling with a constant velocity of 15.0 m/s overtakes and passes the car.
(a.) Calculate the time necessary for the car to reach the truck.
(b.) Calculate the distance beyond the traffic light that the car will pass the truck.
(c.) Determine the speed of the car when it passes the truck.
Answer: (a.) 15.0 s
(b.) 225 m
(c.) 30.0 m/s
Diff: 3 Var: 1 Page Ref: Sec. 2-6

20) A ball is thrown straight up with a speed of 30 m/s.
(a.) How long does it take the ball to reach the maximum height?
(b.) What is the maximum height reached by the ball?
(c.) What is its speed after 4.2 s?
Answer: (a.) 3.1 s
(b.) 46 m
(c.) 11 m/s
Diff: 1 Var: 1 Page Ref: Sec. 2.7

21) A foul ball is hit straight up into the air with a speed of 30.0 m/s.
(a.) Calculate the time required for the ball to rise to its maximum height.
(b.) Calculate the maximum height reached by the ball.
(c.) Determine the time at which the ball pass a point 25.0 m above the point of contact between the bat and ball.
(d.) Explain why there are two answers to part c.
Answer: (a.) 3.06 s
(b.) 45.9 m
(c.) 0.995 s and 5.13 s
(d.) One value for the ball traveling upward; one value for the ball traveling downward.
Diff: 3 Var: 1 Page Ref: Sec. 2.7

FIGURE 2-6



22) Refer to **Figure 2-6**. If you start from the Bakery, travel to the Cafe, and then to the Art Gallery, what is the distance you have traveled?
A) 6.5 km
B) 2.5 km
C) 10.5 km
D) 0 km
E) 1.5 km
Answer: C
Diff: 1 Var: 1 Page Ref: Sec. 2-1

23) Refer to **Figure 2-6**. If you start from the Bakery, travel to the Cafe, and then to the Art Gallery, what is the magnitude of your displacement?
A) 6.5 km
B) 2.5 km
C) 10.5 km
D) 9.0 km
E) 1.5 km
Answer: B
Diff: 1 Var: 1 Page Ref: Sec. 2-1

24) Refer to **Figure 2-6**. If you start from the Bakery, travel to the Cafe, and then to the Art Gallery, what is your displacement?
A) 6.5 km South
B) 2.5 km South
C) 10.5 km North
D) 9.0 km North
E) 1.5 km South
Answer: B
Diff: 2 Var: 1 Page Ref: Sec. 2-1

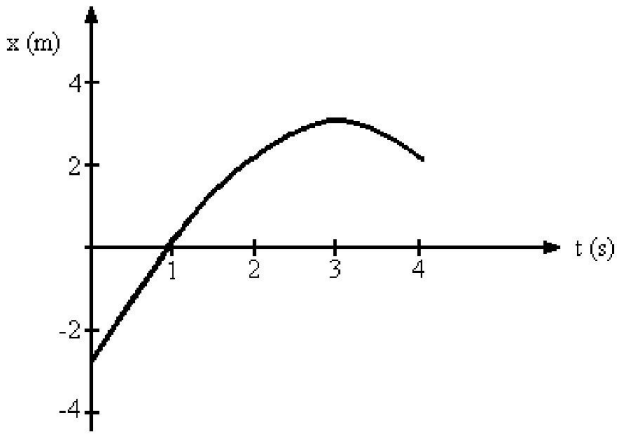
25) Refer to **Figure 2-6**. If you start from the Bakery, travel to the Art Gallery, and then to the Cafe, in 1.0 hour, what is your average speed?
A) 6.5 km/hr
B) 2.5 km/hr
C) 9.0 km/hr
D) 10.5 km/hr
E) 1.5 km/hr
Answer: C
Diff: 1 Var: 1 Page Ref: Sec. 2-2

26) A runner runs around a track consisting of two parallel lines 96 m long connected at the ends by two semicircles with a radius of 49 m. She completes one lap in 100 seconds. What is her average velocity?
A) 2.5 m/s
B) 5.0 m/s
C) 10 m/s
D) 0 m/s
E) 1.3 m/s
Answer: D
Diff: 1 Var: 1 Page Ref: Sec. 2-2

27) A car is making a 12-mile trip. It travels the first 6.0 miles at 30 miles per hour and the last 6.0 miles at 60 miles per hour. What is the car's average speed for the entire trip?
A) 20 mph
B) 35 mph
C) 40 mph
D) 45 mph
E) 50 mph
Answer: C
Diff: 1 Var: 1 Page Ref: Sec. 2-2

28) A car is making a 12-mile trip. It travels the first 8.0 miles at 30 miles per hour and the last 4.0 miles at 60 miles per hour. What is the car's average speed for the entire trip?
A) 36 mph
B) 40 mph
C) 44 mph
D) 48 mph
E) 52 mph
Answer: A
Diff: 1 Var: 1 Page Ref: Sec. 2-2

FIGURE 2-7

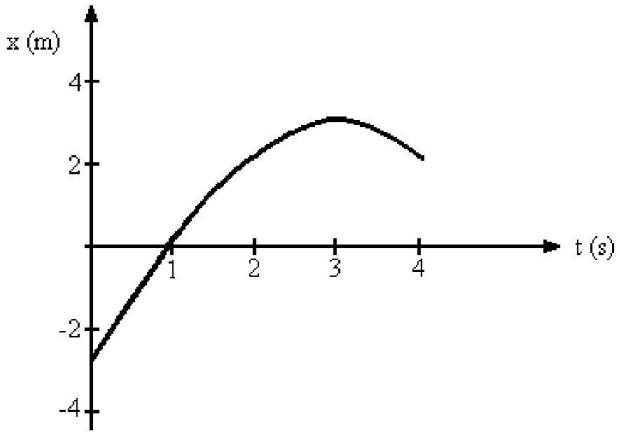


29) **Figure 2-7** represents the position of a particle as it travels along the *x*-axis. What is the magnitude of the average velocity of the particle between t = 1 s and t = 4 s?
A) 0.25 m/s
B) 0.50 m/s
C) 0.67 m/s
D) 1.0 m/s
E) 1.3 m/s
Answer: C
Diff: 1 Var: 1 Page Ref: Sec. 2-2

30) **Figure 2-7** represents the position of a particle as it travels along the *x*-axis. What is the average speed of the particle between t = 1 s and t = 4 s?
A) 1.0 m/s
B) 1.3 m/s
C) 0.67 m/s
D) 0.50 m/s
E) 0.25 m/s
Answer: B
Diff: 2 Var: 1 Page Ref: Sec. 2-2

31) A runner runs around a track consisting of two parallel lines 96 m long connected at the ends by two semicircles with a radius of 49 m. He completes one lap in 2.0 minutes. What is his average speed?
A) 1.6 m/s
B) 4.2 m/s
C) 2.9 m/s
D) 0 m/s
E) 2.1 m/s
Answer: B
Diff: 2 Var: 1 Page Ref: Sec. 2-2

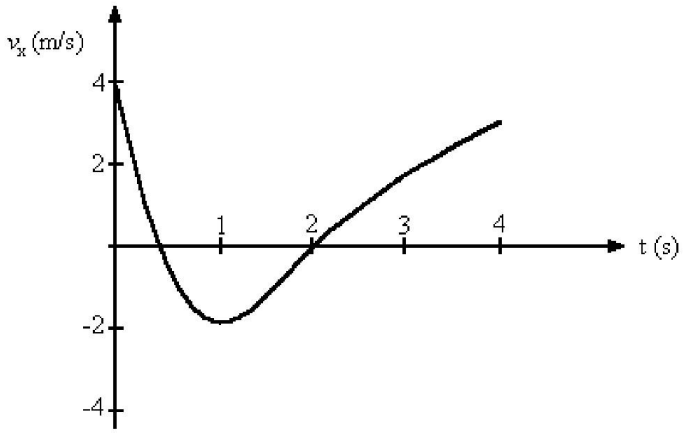
FIGURE 2-8



32) **Figure 2-8** represents the position of a particle as it travels along the *x*-axis. At what value of t is the speed of the particle equal to zero?
A) 0 s
B) 1 s
C) 2 s
D) 3 s
E) 4 s
Answer: D
Diff: 1 Var: 1 Page Ref: Sec. 2-3

33) **Figure 2-8** represents the position of a particle as it travels along the *x*-axis. How does the instantaneous speed of the particle when t = 2 s compare with its speed when t = 4 s?
A) The speed at t = 2 s is larger.
B) The speed at t = 2 s is smaller.
C) They are about equal.
D) The speed at t = 4 s is the negative of the speed at t = 2 s.
E) The speed at t = 2 s is the negative of the speed at t = 4 s.
Answer: C
Diff: 2 Var: 1 Page Ref: Sec. 2-3

FIGURE 2-9



34) **Figure 2-9** represents the velocity of a particle as it travels along the *x*-axis. What is the average acceleration of the particle between t = 1 second and t = 4 seconds?

A) 0.33 m/s^2

B) 1.7 m/s^2

C) 2.0 m/s^2

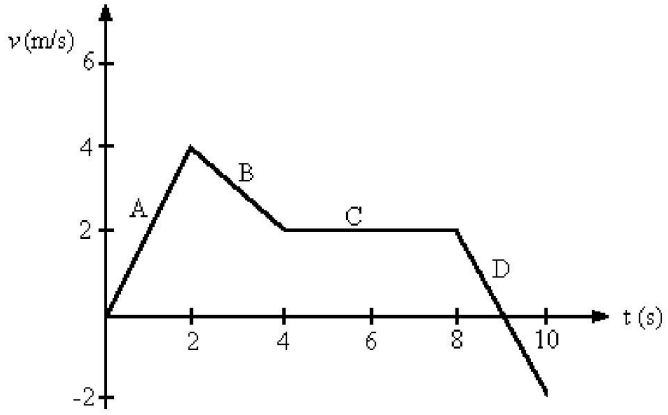
D) 2.5 m/s^2

E) 3.0 m/s^2

Answer: B

Diff: 1 Var: 1 Page Ref: Sec. 2-4

FIGURE 2-10



35) **Figure 2-10** shows the velocity-versus-time graph for a basketball player traveling up and down the court in a straight-line path. Find the net displacement of the player for the 10 s shown on the graph.

A) 20 m

B) 18 m

C) 16 m

D) 14 m

E) 12 m

Answer: B

Diff: 2 Var: 1 Page Ref: Sec. 2-4

36) **Figure 2-10** shows the velocity-versus-time graph for a basketball player traveling up and down the court in a straight-line path. Find the total distance run by the player in the 10 s shown in the graph.
A) 20 m
B) 18 m
C) 16 m
D) 14 m
E) 12 m
Answer: A
Diff: 2 Var: 1 Page Ref: Sec. 2-4

37) The velocity of a particle as a function of time is given by $v(t) = (2.3\ m/s) + (4.1\ m/s^2)t - (6.2\ m/s^3)t^2$. What is the average acceleration of the particle between t = 1.0 s and t = 2.0 s?
A) $-13\ m/s^2$
B) $-15\ m/s^2$
C) $13\ m/s^2$
D) $15\ m/s^2$
E) $0\ m/s^2$
Answer: B
Diff: 2 Var: 1 Page Ref: Sec. 2-4

38) A car starts from rest and accelerates at $6.00\ m/s^2$. How far does it travel in 3.00 s?
A) 9.00 m
B) 18.0 m
C) 27.0 m
D) 36.0 m
E) 54.0 m
Answer: C
Diff: 1 Var: 1 Page Ref: Sec. 2-5

39) A car is moving with a constant acceleration. At t = 5.0 s its velocity is 8.0 m/s and at t = 8.0 s its velocity is 12.0 m/s. What is the distance traveled in that interval of time?
A) 10 m
B) 20 m
C) 30 m
D) 40 m
E) 50 m
Answer: C
Diff: 2 Var: 1 Page Ref: Sec. 2-5

40) An airplane starts from rest and accelerates at 10.8 m/s^2. What is its speed at the end of a 400 m-long runway?
A) 37.0 m/s
B) 93.0 m/s
C) 65.7 m/s
D) 4320 m/s
E) 186 m/s
Answer: B
Diff: 2 Var: 1 Page Ref: Sec. 2-5

41) A car is moving with a speed of 32.0 m/s. The driver sees an accident ahead and slams on the brakes, giving the car a deceleration of 3.50 m/s^2. How far does the car travel after the driver put on the brakes before it comes to a stop?
A) 4.57 m
B) 9.14 m
C) 112 m
D) 146 m
E) 292 m
Answer: D
Diff: 2 Var: 1 Page Ref: Sec. 2-6

42) A car is traveling with a constant speed when the driver suddenly applies the brakes, giving the car a deceleration of 3.50 m/s^2. If the car comes to a stop in a distance of 30.0 m, what was the car's original speed?
A) 10.2 m/s
B) 14.5 m/s
C) 105 m/s
D) 210 m/s
E) 315 m/s
Answer: B
Diff: 2 Var: 1 Page Ref: Sec. 2-6

43) A car is traveling at 30.0 m/s when the driver suddenly applies the brakes, giving the car a constant deceleration. The car comes to a stop in a distance of 120.0 m. What was the deceleration of the car?
A) 3.75 m/s^2
B) 4.00 m/s^2
C) 4.25 m/s^2
D) 4.50 m/s^2
E) 4.75 m/s^2
Answer: A
Diff: 2 Var: 1 Page Ref: Sec. 2-6

44) A car is traveling with a constant speed when the driver suddenly applies the brakes, giving the car a deceleration of 3.50 m/s^2. The car comes to a stop in a distance of 34.0 m. What was the car's speed when it had traveled 17.0 m from the point where the brakes were applied?
A) 10.9 m/s
B) 14.5 m/s
C) 10.7 m/s
D) 21.0 m/s
E) 15.3 m/s
Answer: A
Diff: 3 Var: 5 Page Ref: Sec. 2-6

45) A car is traveling at 26.0 m/s when the driver suddenly applies the brakes, giving the car a constant deceleration. The car comes to a stop in a distance of 120.0 m. How fast was the car moving when it was 60.0 m past the point where the brakes were applied?
A) 22.5 m/s
B) 18.4 m/s
C) 15.0 m/s
D) 12.1 m/s
E) 9.20 m/s
Answer: B
Diff: 3 Var: 5 Page Ref: Sec. 2-6

46) A car is traveling at 26.0 m/s when the driver suddenly applies the brakes, giving the car a constant deceleration. The car comes to a stop in a distance of 120.0 m. How fast was the car moving when it was 30.0 m past the point where the brakes were applied?
A) 7.50 m/s
B) 15.0 m/s
C) 23.5 m/s
D) 22.5 m/s
E) 28.0 m/s
Answer: D
Diff: 3 Var: 5 Page Ref: Sec. 2-6

47) Car A is traveling at 22.0 m/s and car B at 29.0 m/s. Car A is 300 m behind car B when the driver of car A accelerates his car with an acceleration of 2.40 m/s^2. How long does it take car A to overtake car B?
A) 5.50 s
B) 12.6 s
C) 19.0 s
D) 316 s
E) Car A never overtakes car B.
Answer: C
Diff: 3 Var: 5 Page Ref: Sec. 2-6

48) In a relay race, runner A is carrying the baton and has a speed of 2.80 m/s. When he is 25.0 m behind the starting line, runner B starts from rest and accelerates at 0.0800 m/s^2. How long afterwards will A catch up with B to pass the baton to B?
A) 5.17 s
B) 10.5 s
C) 11.9 s
D) 20.4 s
E) Runner A never catches up.
Answer: B
Diff: 3 Var: 5 Page Ref: Sec. 2-6

49) In a relay race, runner A is carrying the baton and has a speed of 2.8 m/s. When he is 25 m behind the starting line, runner B starts from rest and accelerates at 0.080 m/s^2. How fast is B traveling when A overtakes her?
A) 0.10 m/s
B) 0.33 m/s
C) 0.84 m/s
D) 2.0 m/s
E) Runner A never catches up.
Answer: C
Diff: 3 Var: 5 Page Ref: Sec. 2-6

50) An object is thrown upwards with a speed of 14 m/s. How high above the projection point does it reach?
A) 5.0 m
B) 10 m
C) 15 m
D) 20 m
E) 25 m
Answer: B
Diff: 1 Var: 1 Page Ref: Sec. 2-7

51) An object is thrown upwards with a speed of 14 .0 m/s. How long does it take it to reach its maximum height?
A) 1.22 s
B) 1.43 s
C) 3.14 s
D) 4.15 s
E) 5.31 s
Answer: B
Diff: 1 Var: 1 Page Ref: Sec. 2-7

52) An object is thrown upwards with a speed of 14 m/s. How high above the projection point is it after 0.50 s?
A) 0 m
B) 2.9 m
C) 5.8 m
D) 7.0 m
E) 8.2 m
Answer: C
Diff: 1 Var: 1 Page Ref: Sec. 2-7

53) An object is dropped from a bridge. A second object is thrown downwards 1.00 s later. They both reach the water 20.0 m below at the same instant. What was the initial speed of the second object?
A) 4.91 m/s
B) 14.6 m/s
C) 9.90 m/s
D) 19.6 m/s
E) 21.3 m/s
Answer: B
Diff: 2 Var: 1 Page Ref: Sec. 2-7

54) To determine the height of a bridge above the water, a person drops a stone and measures the time it takes for it to hit the water. If the time is 2.3 s, what is the height of the bridge?
A) 10 m
B) 14 m
C) 26 m
D) 32 m
E) 52 m
Answer: C
Diff: 2 Var: 1 Page Ref: Sec. 2-7

55) To determine the height of a bridge above the water, a person drops a stone and measures the time it takes for it to hit the water. If the height of the bridge is 41 m, how long will it take for the stone to hit the water?
A) 2.3 s
B) 2.6 s
C) 2.9 s
D) 3.2 s
E) 3.6 s
Answer: C
Diff: 2 Var: 1 Page Ref: Sec. 2-7

56) An astronaut stands by the rim of a crater on the moon, where the acceleration of gravity is 1.62 m/s^2. To determine the depth of the crater, she drops a rock and measures the time it takes for it to hit the bottom. If the time is 6.3 s, what is the depth of the crater?
A) 10 m
B) 14 m
C) 26 m
D) 32 m
E) 38 m
Answer: D
Diff: 2 Var: 1 Page Ref: Sec. 2-7

57) An astronaut stands by the rim of a crater on the moon, where the acceleration of gravity is 1.62 m/s^2 To determine the depth of the crater, she drops a rock and measures the time it takes for it to hit the bottom. If the depth of the crater is 120 m, how long does it take for the rock to fall?
A) 3.04 s
B) 12.2 s
C) 29.3 s
D) 32.1 s
E) 37.5 s
Answer: B
Diff: 2 Var: 1 Page Ref: Sec. 2-7

58) An object is thrown upwards with a speed of 16 m/s. How long does it take it to reach a height of 7.0 m on the way up?
A) 0.52 s
B) 1.2 s
C) 2.4 s
D) 3.1 s
E) 4.2 s
Answer: A
Diff: 3 Var: 5 Page Ref: Sec. 2-7

59) An object is thrown upwards with a speed of 13 m/s. How long does it take to reach a height of 4.0 m above the projection point while descending?
A) 0.42 s
B) 1.2 s
C) 2.3 s
D) 3.1 s
E) 4.2 s
Answer: C
Diff: 3 Var: 5 Page Ref: Sec. 2-7

60) To determine the height of a flagpole, Abby throws a ball straight up and times it. She sees that the ball goes by the top of the pole after 0.5 s and then reaches the top of the pole again after a total elapsed time of 4.1 s. How high is the pole above the point where the ball was launched?
A) 10 m
B) 13 m
C) 16 m
D) 18 m
E) 26 m
Answer: A
Diff: 3 Var: 1 Page Ref: Sec. 2-7

61) Abby throws a ball straight up and times it. She sees that the ball goes by the top of a flagpole after 0.500 s and reaches the level of the top of the pole after a total elapsed time of 4.10 s. What was the speed of the ball at launch?
A) 11.3 m/s
B) 22.6 m/s
C) 33.9 m/s
D) 45.2 m/s
E) 48.3 m/s
Answer: B
Diff: 3 Var: 5 Page Ref: Sec. 2-7

62) Abby throws a ball straight up and times it. She sees that the ball goes by the top of a flagpole after 0.50 s and reaches the level of the top of the pole after a total elapsed time of 4.10 s. What was the speed of the ball at as it passed the top of the flagpole?
A) 6.40 m/s
B) 16.2 m/s
C) 17.6 m/s
D) 29.0 m/s
E) 33 m/s
Answer: C
Diff: 3 Var: 1 Page Ref: Sec. 2-7