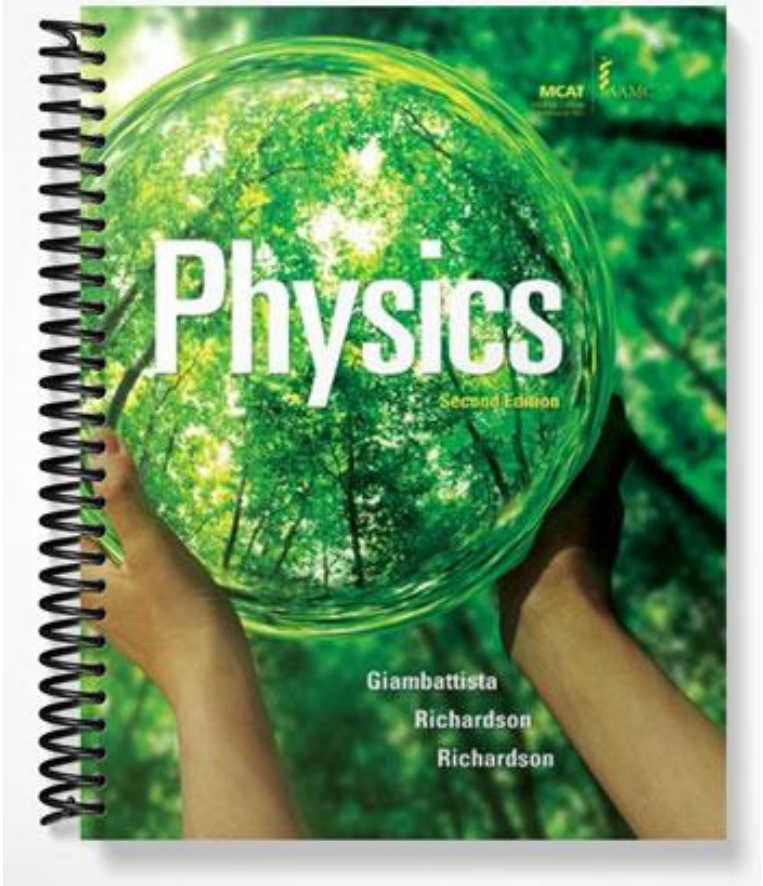
TEST BANK


MCAT
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Physics
Second Edition
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Chapter 02
Motion Along a Line

Multiple Choice Questions

1. Displacement is
A. the distance traveled from the first position to the final position.
B. the distance from the origin to the final position.
C. the change of the position vector from the first position to the final position.
D. the vector from the origin to the final position.

Section: 2.2 Position and Displacement

2. On a graph of v_x versus time, the area under the graph represents
A. the change in the x-component of the velocity.
B. the x-component of the displacement.
C. the x-component of the velocity.
D. the x-component of the acceleration.

Section: 2.2 Position and Displacement

3. On a graph of x versus time, the area under the graph represents
A. the change in the x-component of the velocity.
B. the x-component of the distance.
C. the x-component of the velocity.
D. the x-component of the acceleration.

Section: 2.2 Position and Displacement

4. If an object is located 20 m to the right of the origin at 1:00 PM and later the object is located 30 m to the right of the origin at 2:00 PM, then the displacement from 1:00 PM to 2:00 PM is
A. 50 m to the right.
B. 30 m to the right.
C. 25 m to the right.
D. 20 m to the right.
E. 10 m to the right.

Section: 2.2 Position and Displacement

5. A walker walks 30 m from the origin toward the EAST to point A. She then walks from point A 20 m more toward the EAST to point B. The walker's total displacement from the origin is
A. 50 m toward the EAST.
B. 30 m toward the WEST.
C. 20 m toward the WEST.
D. 10 m toward the EAST.
E. 10 m toward the WEST.

Section: 2.2 Position and Displacement

6. A runner runs 10 m from the origin toward the WEST to point A. He then runs from point A, 20 m more toward the WEST to point B. He then runs from point B, 30 m more toward the WEST to point C. The runner's total displacement from the origin to point C is
A. 60 m toward the WEST.
B. 50 m toward the WEST.
C. 20 m toward the WEST.
D. 10 m toward the WEST.
E. 0 m.

Section: 2.2 Position and Displacement

7. A walker starts at the origin at 1:00 PM and walks 3.0 km from the origin toward the WEST to point A. She arrives at point A at 2:30 PM. She then walks from point A, 2.0 km toward the WEST to point B and arrives at point B at 3:45 PM. The walker's average velocity for the entire trip is
A. 1.8 km/hr toward the EAST.
B. 1.8 km/hr toward the WEST.
C. 1.3 km/hr toward the WEST.
D. 1.3 km/hr toward the EAST.
E. 0.36 km/hr toward the WEST.

Section: 2.2 Position and Displacement

8. A vector A is directed along the positive x-axis and has a magnitude of 3.00 units. Vector B is directed along the negative x-axis and has a magnitude of 2.00 units. The magnitude and direction of the vector A + B is
A. 3.00 units in the positive x direction.
B. 1.00 unit in the positive x direction.
C. 3.00 units in the negative x direction.
D. 1.00 unit in the negative x direction.

Section: 2.2 Position and Displacement

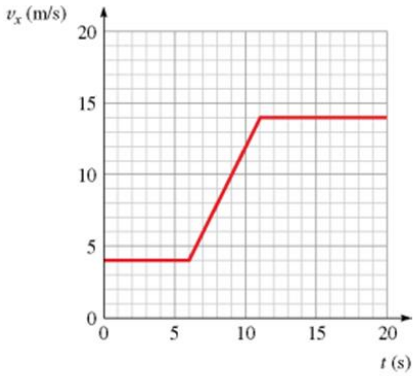
9. A vector A is directed along the positive x-axis and has a magnitude of 3.00 units. Vector B is directed along the negative x-axis and has a magnitude of 2.00 units. The magnitude and direction of the vector A - B is
A. 3.00 units in the positive x direction.
B. 1.00 unit in the negative x direction.
C. 3.00 units in the negative x direction.
D. 5.00 units in the positive x direction.

Section: 2.2 Position and Displacement

10. A vector A is directed along the positive x-axis and has a magnitude of 3.00 units. Vector B is directed along the negative x-axis and has a magnitude of 2.00 units. The magnitude and direction of the vector B – A is
A. 3.00 units in the positive x direction.
B. 1.00 unit in the positive x direction.
C. 3.00 units in the negative x direction.
D. 5.00 units in the negative x direction.

Section: 2.2 Position and Displacement

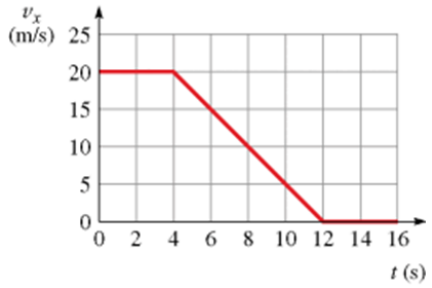
11. The figure is a graph of $v_x(t)$ for a car. Solve graphically for the distance traveled from t = 9 s to t = 15 s.



A. 75 m
B. 70 m
C. 84 m
D. 80 m

Section: 2.2 Position and Displacement

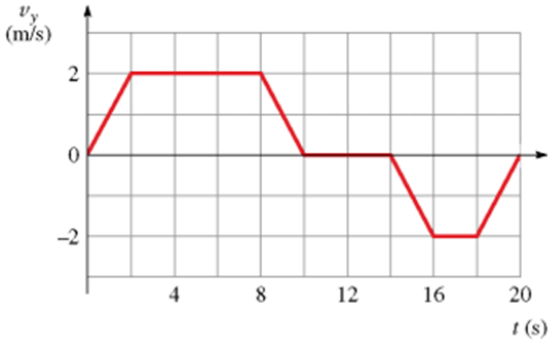
12. The graph shows the speedometer reading of a car as it comes to a stop along a straight-line path. How far does the car move between $t = 0$ s and $t = 16$ s?



A. 40 m
B. 140 m
C. 80 m
D. 160 m

Section: 2.2 Position and Displacement

13. The figure is a graph of the vertical velocity versus time for an elevator. Solve graphically for the height of the elevator above the starting point at $t = 20$ s.



A. 4.0 m
B. 16.0 m
C. 0.0 m
D. 8.0 m

Section: 2.2 Position and Displacement

14. The figure shows the graph of v_x versus time for an object moving along the x-axis. Solve graphically for the distance traveled from t = 9.0 s to t = 13.0 s.

A. 60 m
B. 84 m
C. 76 m
D. 80 m

Section: 2.2 Position and Displacement

15. On a graph of x versus time, the slope represents
A. the change in the x-component of the velocity.
B. the x-component of the displacement.
C. the x-component of the velocity.
D. the x-component of the acceleration.

Section: 2.3 Velocity: Rate of Change of Position

16. A car travels a distance of 100 km in 2.00 hours. It then travels an additional distance of 60.0 km in 1.00 hour. The average speed of the car for the entire trip is
A. 80.0 km/hr.
B. 60.0 km/hr.
C. 53.3 km/hr.
D. 50.0 km/hr.
E. 46.7 km/hr.

Section: 2.3 Velocity: Rate of Change of Position

17. A car travels at 50.0 km/hr for 2.00 hours. It then travels an additional distance of 40.0 km in 1.00 hour. The average speed of the car for the entire trip is
A. 61.0 km/hr.
B. 57.1 km/hr.
C. 53.3 km/hr.
D. 46.7 km/hr.
E. 30.0 km/hr.

Section: 2.3 Velocity: Rate of Change of Position

18. A car travels east at 50.0 km/hr for 2.00 hours. It then travels west 40.0 km in 1.00 hour. The average velocity of the car for the entire trip is
A. 20.0 km/hr.
B. 27.1 km/hr.
C. 38.3 km/hr.
D. 46.7 km/hr.
E. 30.0 km/hr.

Section: 2.3 Velocity: Rate of Change of Position

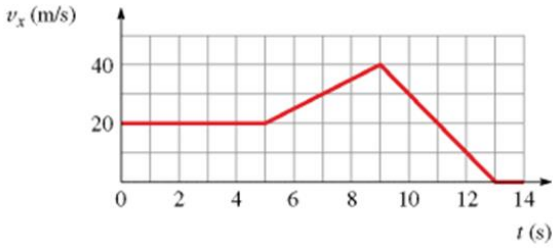
19. A motor cycle travels EAST at a speed of 12 m/s. The driver then reverses direction and goes WEST at 15 m/s. What is the change in velocity of the motor cycle?
A. 3.0 km/hr EAST
B. 27.0 km/hr EAST
C. 3.0 km/hr WEST
D. 27.0 km/hr WEST

Section: 2.3 Velocity: Rate of Change of Position

20. A car travels for 140 km at 70.0 km/hr. It then travels an additional distance of 60.0 km at 40.0 km/hr. The average speed is
A. 61.0 km/hr.
B. 57.1 km/hr.
C. 53.3 km/hr.
D. 46.7 km/hr.
E. 45.0 km/hr.

Section: 2.3 Velocity: Rate of Change of Position

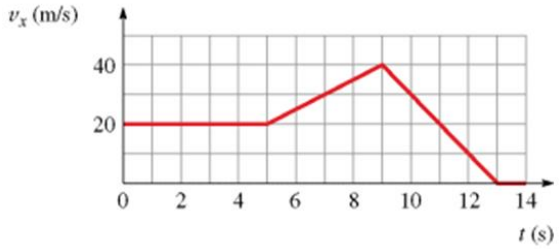
21. The graph shows v_x versus t for an object moving along straight line. What is the average velocity from $t = 0$ to $t = 11$ s?



A. 26 m/s^2
B. 36 m/s^2
C. 30 m/s^2
D. 23 m/s^2

Section: 2.3 Velocity: Rate of Change of Position

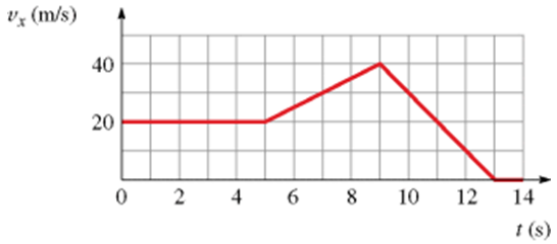
22. The figure shows the graph of v_x versus time for an object moving along the x-axis. Solve graphically for the distance traveled between t = 5.0 s and t = 9.0 s.



A. 110 m
B. 140 m
C. 100 m
D. 130 m

Section: 2.3 Velocity: Rate of Change of Position

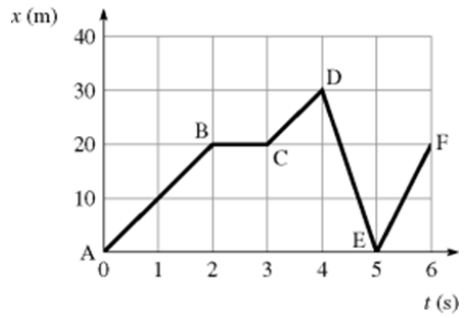
23. The graph shows v_x versus t for an object moving in a straight line. What is the average velocity from t = 0 s to t = 9 s?



A. 44 m/s^2
B. 32 m/s^2
C. 22 m/s^2
D. 27 m/s^2

Section: 2.3 Velocity: Rate of Change of Position

24. The figure is a graph of an object moving in a straight line. Solve graphically to determine which section of the path has the highest speed.



A. DE
B. EF
C. CD
D. AB

Section: 2.3 Velocity: Rate of Change of Position

25. A car traveling at 4.0 m/s has a constant acceleration of 2.0 m/s^2. After 3.0 seconds, the average velocity during the acceleration is
A. 5.0 m/s.
B. 7.0 m/s.
C. 9.0 m/s.
D. 11 m/s.
E. 13 m/s.

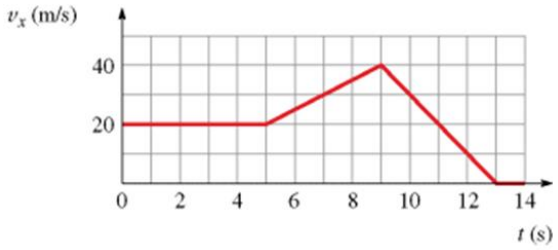
Section: 2.3 Velocity: Rate of Change of Position

26. The figure shows the speedometer readings as a car comes to a stop. Solve graphically for the acceleration at t = 7.0 s.

A. 2.5 m/s^2
B. -2.5 m/s^2
C. -2.0 m/s^2
D. 2.0 m/s^2

Section: 2.4 Acceleration: Rate of Change of Velocity

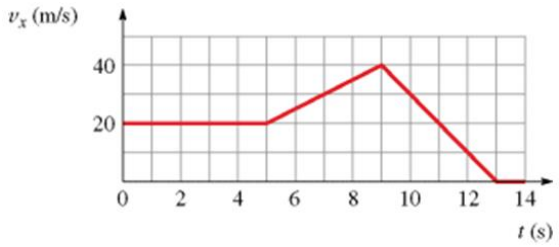
27. The graph shows v_x versus t for an object moving along straight line. What is the acceleration at t = 11 s?



A. -10 m/s^2
B. 10 m/s^2
C. 22 m/s^2
D. -22 m/s^2

Section: 2.4 Acceleration: Rate of Change of Velocity

28. The figure shows the graph of v_x versus time for an object moving along the x-axis. What is the acceleration at t = 3 s?



A. 4.0 m/s^2
B. 0.0 m/s^2
C. 1.5 m/s^2
D. 2.4 m/s^2

Section: 2.4 Acceleration: Rate of Change of Velocity

29. On a graph of v_x versus time, the slope represents
A. the change in the x-component of the velocity.
B. the x-component of the displacement.
C. the x-component of the velocity.
D. the x-component of the acceleration.

Section: 2.4 Acceleration: Rate of Change of Velocity

30. A car starts from rest at t = 0 and accelerates in a straight line with a constant acceleration until t = 3.0 s. The distance traveled between t = 1.0 s and t = 2.0 s is
A. four time the distance traveled during the first second.
B. three times the distance traveled during the first second.
C. two times the distance traveled during the first second.
D. the same as the distance traveled during the first second.

Section: 2.4 Acceleration: Rate of Change of Velocity

31. The area under an acceleration versus time graph gives
A. acceleration.
B. velocity.
C. displacement.
D. position.

Section: 2.4 Acceleration: Rate of Change of Velocity

32. If a ball is thrown downward in the absence of air resistance, what can be said about its acceleration?
A. its acceleration is constantly increasing
B. its acceleration is constantly decreasing
C. its acceleration is constant
D. its acceleration is zero

Section: 2.4 Acceleration: Rate of Change of Velocity

33. The area under an acceleration versus time graph gives
A. acceleration.
B. velocity.
C. displacement.
D. position.

Section: 2.4 Acceleration: Rate of Change of Velocity

34. A 4.0 kg mass has a velocity of 12 m/s to the WEST. The 4.0 kg mass undergoes an acceleration of 2.0 m/s^2 to the WEST for 3.0 sec. What is the velocity of the 4.0 kg mass at the end of the 3.0 sec interval?
A. 18 m/s to the WEST
B. 6.0 m/s to the WEST
C. 0.0 m/s
D. 6.0 m/s to the EAST
E. 18 m/s to the EAST

Section: 2.5 Motion Along a Line with Constant Acceleration

35. A 4.0 kg mass has a velocity of 10 m/s to the EAST. The 4.0 kg mass undergoes an acceleration of 4.0 m/s^2 to the WEST for 3.0 sec. What is the velocity of the 4.0 kg mass at the end of the 3.0 sec interval?
A. 22 m/s to the WEST
B. 2.0 m/s to the WEST
C. 0.0 m/s
D. 2.0 m/s to the EAST
E. 22 m/s to the EAST

Section: 2.5 Motion Along a Line with Constant Acceleration

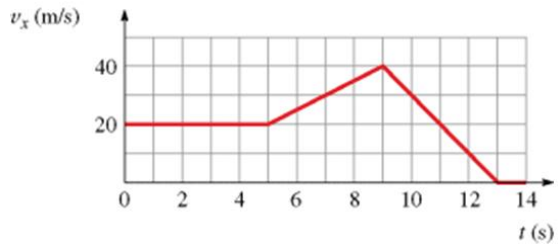
36. A car traveling at 3.0 m/s has a constant acceleration of 4.0 m/s^2. After 2.0 seconds, the velocity is
A. 5.0 m/s.
B. 7.0 m/s.
C. 9.0 m/s.
D. 11 m/s.
E. 13 m/s.

Section: 2.5 Motion Along a Line with Constant Acceleration

37. A car starts from rest and travels a distance of 100 m in 10 seconds. The acceleration of the car is
A. 1.0 m/s^2.
B. 2.0 m/s^2.
C. 2.5 m/s^2.
D. 3.0 m/s^2.
E. 3.5 m/s^2.

Section: 2.5 Motion Along a Line with Constant Acceleration

38. The figure shows the graph of v_x versus time for an object moving along the x-axis. Solve graphically for the acceleration at t = 8.0 s.



A. 4.0 m/s^2
B. 5.0 m/s^2
C. 0.5 m/s^2
D. 0.4 m/s^2

Section: 2.5 Motion Along a Line with Constant Acceleration

39. A car starts from rest and moves with a constant acceleration of 5.0 m/s^2. How long will it take to reach a speed of 45.0 m/s?
A. 3.0 s
B. 9.0 s
C. 5.0 s
D. 11 s

Section: 2.5 Motion Along a Line with Constant Acceleration

40. Which car has a westward acceleration?
A. a car moving west at constant speed
B. a car move east and speeding up
C. a car moving east and slowing down
D. a car moving west and slowing down

Section: 2.5 Motion Along a Line with Constant Acceleration

41. A car traveling at 4.0 m/s has a constant acceleration of 2.0 m/s^2. After 3.0 seconds, the distance traveled during the acceleration is
A. 21 m.
B. 17 m.
C. 10 m.
D. 13 m.
E. 9 m.

Section: 2.5 Motion Along a Line with Constant Acceleration

42. A boat is traveling at 4.0 m/s as it passes the starting line of a race. If the boat accelerates at 2.0 m/s^2 for 3.0 seconds, then the velocity the boat has after the 3.0 seconds is
A. 21 m/s.
B. 9.0 m/s.
C. 13 m/s.
D. 10 m/s.
E. 4.0 m/s.

Section: 2.5 Motion Along a Line with Constant Acceleration

43. A boat is traveling at 4.0 m/s as it passes the starting line of a race. If the boat accelerates at 1.0 m/s^2 for 6.0 seconds, then the distance the boat has traveled after 6.0 seconds is
A. 42 m.
B. 18 m.
C. 26 m.
D. 20 m.
E. 14 m.

Section: 2.5 Motion Along a Line with Constant Acceleration

44. A boat is traveling at 4.0 m/s as it passes the starting line of a race. If the boat accelerates at 1.0 m/s^2 for 6.0 seconds, then the average velocity of the boat for the 6.0 seconds is
A. 21 m/s.
B. 9.0 m/s.
C. 13 m/s.
D. 10 m/s.
E. 7.0 m/s.

Section: 2.5 Motion Along a Line with Constant Acceleration

45. A car starts from rest and travels a distance of 100 m in 20 seconds with a constant acceleration. The velocity of the car at the end of the 20-second interval is
A. 25 m/s.
B. 20 m/s.
C. 15 m/s.
D. 10 m/s.
E. 5.0 m/s.

Section: 2.5 Motion Along a Line with Constant Acceleration

46. A car starts from rest and travels a distance of 100 m in 15.0 seconds with a constant acceleration. The average velocity of the car for the 15-second interval is
A. 24.0 m/s.
B. 21.0 m/s.
C. 16.7 m/s.
D. 13.3 m/s.
E. 6.67 m/s.

Section: 2.5 Motion Along a Line with Constant Acceleration

47. A runner starts from rest and with an acceleration of 1.0 m/s^2 travels a distance of 10 meters. The time it takes the runner to cover the distance is
A. 6.3 s.
B. 5.7 s.
C. 5.0 s.
D. 4.5 s.
E. 3.8 s.

Section: 2.5 Motion Along a Line with Constant Acceleration

48. A runner starts from rest and with an acceleration of 2.0 m/s^2 travels a distance of 12 meters. The velocity of the runner at the end of the distance is
A. 3.4 m/s.
B. 5.7 m/s.
C. 6.9 m/s.
D. 7.5 m/s.
E. 8.1 m/s.

Section: 2.5 Motion Along a Line with Constant Acceleration

49. A car starting from rest travels a distance of 20.0 m with a constant acceleration of 2.0 m/s^2. The car then slows to a stop in 10.0 seconds with a constant negative acceleration. The distance traveled by the car is
A. 36 m.
B. 46 m.
C. 50 m.
D. 58 m.
E. 65 m.

Section: 2.5 Motion Along a Line with Constant Acceleration

50. A 3.0-kg ball is thrown vertically into the air with an initial velocity of 15 m/s. The maximum height of the ball is
A. 13 m.
B. 11 m.
C. 10 m.
D. 9.5 m.
E. 9.0 m.

Section: 2.7 Free Fall

51. A 3.0-kg ball is thrown vertically into the air with an initial velocity of 15.0 m/s. The time it takes the ball to reach its maximum height is
A. 0.8 s.
B. 0.9 s.
C. 1.2 s.
D. 1.3 s.
E. 1.5 s.

Section: 2.7 Free Fall

52. A 2.0-kg ball is thrown vertically into the air with an initial velocity of 10.0 m/s. The height of the ball when the velocity is 5.0 m/s is
A. 2.6 m.
B. 1.8 m.
C. 3.8 m.
D. 2.0 m.
E. 4.0 m.

Section: 2.7 Free Fall

53. A 2.00-kg ball is thrown vertically into the air. The height of the ball when the velocity is 5.00 m/s is 6.07 m. What is the initial velocity of the ball?
A. 8.50 m/s
B. 10.0 m/s
C. 11.2 m/s
D. 12.0 m/s
E. 14.5 m/s

Section: 2.7 Free Fall

54. When an object is released from rest and falls (where there is no friction), which of the following is true?
A. the velocity is constant
B. the acceleration is constant
C. the acceleration and velocity are constant
D. neither the acceleration nor velocity is constant

Section: 2.7 Free Fall

55. A rock is dropped down a well that is 90.0 m deep. How long before you hear the splash (the velocity of sound is 343 m/s)?
A. 3.26 s
B. 4.55 s
C. 0.262 s
D. 4.29 s

Section: 2.7 Free Fall

56. A ball is thrown upward at a velocity of 19.6 m/s. What is its velocity after 3.00 s?
A. 9.80 m/s up
B. zero
C. 19.6 down
D. 9.80 m/s down

Section: 2.7 Free Fall

57. A bullet shot straight up returns to its starting point in 10 s. What is the initial speed of the bullet?
A. 98 m/s
B. 49 m/s
C. 25 m/s
D. 9.8 m/s

Section: 2.7 Free Fall

58. A ball is thrown downward from the top of a building with an initial speed of 25 m/s. It hits the ground in 2.0 s. How high is the building?
A. 70 m
B. 50 m
C. 30 m
D. 20 m

Section: 2.7 Free Fall

59. A ball is thrown straight up with an initial speed of 30 m/s. What is its speed after 4.2 s?
A. 72 m/s
B. 42 m/s
C. 30 m/s
D. 11 m/s

Section: 2.7 Free Fall

60. A ball is thrown straight up with a speed of 30.0 m/s. What is the maximum height reached by the ball?
A. 132 m
B. 92.0 m
C. 46.0 m
D. 21.0 m

Section: 2.7 Free Fall

61. Human reaction time is usually greater than 0.10 s. If your friend holds a ruler between your fingers and releases it without warning, how far can you expect the ruler to fall before you catch it?
A. at least 3.0 cm
B. at least 4.9 cm
C. at least 6.8 cm
D. at least 9.8 cm

Section: 2.7 Free Fall

62. A ball is thrown straight up. What is its acceleration just before it reaches its highest point?
A. zero
B. slightly less then g
C. exactly g
D. slightly greater than g

Section: 2.7 Free Fall

63. Ball A is dropped from the top of a building. One second later, ball B is dropped from the same building. As time progresses, the distance between them
A. increases.
B. remains constant.
C. decreases.
D. cannot be determined from the given information.

Section: 2.7 Free Fall

64. A rock is thrown straight up and reaches a maximum height. Which of the following describes the motion at the maximum height?
A. the velocity is zero and the acceleration is zero
B. the velocity is maximum and the acceleration is zero
C. the acceleration is increasing and the velocity is zero
D. the acceleration is not changing and the velocity is zero

Section: 2.7 Free Fall

65. Two balls are thrown from the top of a building. One is thrown up and the other is thrown down, both with the same initial speed. What are their speeds when they hit the street?
A. they are traveling at the same speed
B. the one thrown down is traveling faster
C. the one thrown up is traveling faster
D. it depends on the height of the building

Section: 2.7 Free Fall

66. A ball is thrown straight up, reaches a maximum height, then falls to its initial height. As the ball is going up
A. both its velocity and its acceleration point downward.
B. its velocity points downward and its acceleration points upward.
C. its velocity points upward and its acceleration points downward.
D. both its velocity and its acceleration point upward.

Section: 2.7 Free Fall

67. A skydiver jumps from an airplane. When she reaches terminal velocity, her acceleration is
A. essentially zero.
B. in the upward direction.
C. approximately 9.8 m/s^2 downward.
D. constant upward.

Section: 2.7 Free Fall

68. A ball is thrown straight up. Ignore air resistance. While the ball is in the air its acceleration
A. increases.
B. is zero.
C. remains constant.
D. changes direction.

Section: 2.7 Free Fall