Physicsaholics

Exercise

### Kinematics-1D

(Physicsaholics)

Exercise-1

(Objective Type: Single Correct)

Level-1

Q 1. A bird flies for 4s with a velocity of | t – 2 | m/s in a straight line, where t = time in seconds. It covers a distance of

(A) 2 m   (B) 4 m   (C) 6 m   (D) 8 m

Q 2. The position of a particle along x-axis at time t is given by $x = 1 + t - t^2$. The distance travelled by the particle in first 2 seconds is

(A) 1m   (B) 2m   (C) 2.5 m   (D) 3m

Q 3. A body is released from the top or a tower. The body covers a distance of 24.5 m in the last second of its motion. The height of tower is

(A) 59.8 m   (B) 44.1m   (C) 39.2 m   (D) 49 m

Q 4. The velocity-time graph of a linear motion is shown in figure. The displacement from the origin after 8 sec. is
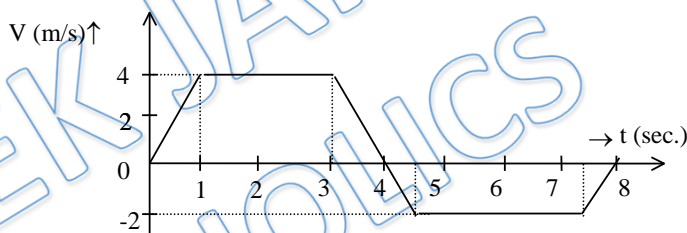
(A) 5 m   (B) 16 m   (C) 8 m   (D) 6 m

Q 5. In 1.0 sec. a particle goes from point A to point B moving in a semicircle of radius 1.0 m. The magnitude of average velocity is :

(A) 3.14 m/sec   (B) 2.0 m/sec   (C) 1.0 m/sec   (D) zero

Q 6. The motion of a body depends on time according to the equation $\frac{dv}{dt} = 6.0 - 3v$, where v is speed in m/s and t is time in second. If the body was at rest at t = 0 which of the following statements is correct?

(A) The speed of the body approaches 2 m/s after long time

(B) The speed varies linearly with time

(C) The acceleration remains constant

(D) The initial acceleration is zero

Q 7. If a body starts from rest and travels 120 cm in the 6th second, with constant acceleration then what is the acceleration :

(A) 0.20 m/s^2 (B) 0.027 m/s^2 (C) 0.218 m/s^2 (D) 0.03 m/s^2

Q 8. A man drives a car from Y towards X at speed 60km/h. A car leaves station X for station Y every 10 mm. The distance between X and Y is 60 km. The car travels at speed 60 km/h. A man drives a car from Y towards X at speed 60 km/h. If he starts at the moment when first car leaves station X, how many cars would he meet on route?

(a) 20   (b) 7   (c) 10   (d) 5

Q 9. Two particles are released from the same height at an interval of 1 s. How long after the first particle begins to fall will the two particles be 10 m apart? (g = 10 m/s^2)

(A) 1.5 s   (B) 2 s   (C) 1.25 s   (D) 2.5 s

Q 10. A body starts from rest and is uniformly accelerated for 30 s. The distance travelled in the first 10 s is x_1, next 10 s is x_2 and the last 10 s is x_3. Then $x_1 : x_2 : x_3$ is the same as :-

(A) 1 : 2 : 4   (B) 1 : 2 : 5   (C) 1 : 3 : 5   (D) 1 : 3 : 9

Q 11. A particle is released from a tower of height 3h. The ratio of times to fall equal heights h, i.e., $t_1:t_2:t_3$ is

(A) $\sqrt{3} : \sqrt{2} : 1$ (B) 3: 2: 1

(C) 9: 4: 1   (D) 1: ($\sqrt{2}$-1): ($\sqrt{3}-\sqrt{2}$)

Q 12. A ball is projected upwards from the foot of a tower. The ball crosses the top of the tower twice after an interval of 6s and the ball reaches the ground after 12s. The height of the tower is (g = 10 m/s^2)

(A) 120 m   (B) 135 m   (C) 175 m   (D) 80 m

Q 13. A particle has an initial velocity of 9 m/s due east and a constant acceleration of 2 m/s^2 due west. The distance covered by the particle in the fifth second of its motion is :-

(A) 0   (B) 0.5 m   (C) 2 m   (D) none of these

Q 14. From the top of a tower, a stone is thrown up and reaches the ground in time t_1. A second stone is thrown down with the same speed and reaches the ground in time t_2. A third stone is released from rest and reaches the ground in time t_3.

(A) $t_3 = \frac{1}{2}(t_1+t_2)$ (B) $t_3 = \sqrt{t_1 t_2}$ (C) $\frac{1}{t_3} = \frac{1}{t_2} - \frac{1}{t_1}$ (D) $t_3^2 = t_1^2 - t_2^2$

Q 15. A juggler maintains four balls in motion, each of them to rise a height of 20 m from his hand. What time interval should he maintain, for the proper distance between them. (g = 10 m/s^2)

(A) 3 s   (B) 3/2 s   (C) 1 s   (D) 2 s

Q 16. A ball dropped from the top of a building passes past a window of height h in time t. If its speeds at the top and the bottom edges of the window are denoted by v_1 and v_2 respectively, which of the following set of equations are correct?
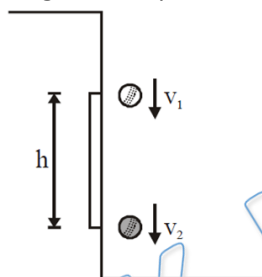
(A) $v_2 - v_1 = gt$ and $(v_2 - v_1)t = h$
(B) $v_2 - v_1 = gt$ and $(v_2 + v_1)t = 2h$
(C) $v_2 + v_1 = gt$ and $(v_2 - v_1)t = h$
(D) None of the above.

Q 17. The acceleration vector along x–axis of a particle having initial speed v_0 changes with distance as $a = \sqrt{x}$ .The distance covered by the particle, when its speed becomes twice that of initial speed is:–

(A) $\left(\frac{9}{4}v_0\right)^{\frac{4}{3}}$ (B) $\left(\frac{3}{2}v_0\right)^{\frac{4}{3}}$ (C) $\left(\frac{2}{3}v_0\right)^{\frac{4}{3}}$ (D) $2v_0$

Q 18. A balloon starts rising from the ground with an acceleration of 1.25 m/s^2. After 8 s, a stone is released from the balloon. The stone will
(A) cover a distance of 40 m
(B) have a displacement of 50 m
(C) reach the ground in 4 s
(D) begin to move down after being released

Q 19. A body falls freely from rest. It covers as much distance in the last second of its motion as covered in the first three seconds. The body has fallen for a time of :
(A) 3 s   (B) 5 s   (C) 7 s   (D) 9 s

Q 20. A bullet, moving with a velocity of 200 cm/s penetrates a wooden block and comes to rest after traversing 4 cm inside it. What velocity is needed for traversing a distance of 6 cm in the same block
(A) 104.3 cm/s   (B) 136.2 cm/s   (C) 244.9 cm/s   (D) 272.7 cm/s

Q 21. A ball is thrown vertically upward with initial velocity 30 m/sec. What will be its position vector at time t = 5 sec taking origin at the point of projection, vertical up as positive y-axis and horizontal as x-axis:-

(A) (0, 25)   (B) (0, 20)   (C) (0, 45)   (D) (0, 5)

Q 22. If s = $2t^3 + 3t^2 + 2t + 8$ then the time at which acceleration is zero, is :-

(A) $t = \dfrac{1}{2}$ (B) t = 2   (C) $t = \dfrac{1}{2\sqrt{2}}$ (D) Never

Q 23. A stone is thrown vertically upward with an initial velocity v_0. The distance travelled in time $4v_0/3g$ is

(A) $\dfrac{2v_0^2}{g}$ (B) $\dfrac{v_0^2}{2g}$ (C) $\dfrac{4v_0^2}{3g}$ (D) $\dfrac{5v_0^2}{9g}$

Q 24. For a particle moving in a straight line the position of the particle at time (t) is given by $x = \dfrac{t^3}{6} - t^2 - 9t + 18 \text{m}$. What is the velocity of the particle when its acceleration is zero :-

(A) 18 m/s   (B) −9 m/s   (C) −11 m/s   (D) 6 m/s

Q 25. A particle is moving along y axis with equation given by y = $\dfrac{C}{6} t^6$ (where C is a positive constant). The relation between the acceleration (a) and the velocity (v) of the particle at t = 5 s is

(A) 5a = v   (B) a = 5v   (C) a = $\sqrt{v}$ (D) a = v

Q 26. Velocity of a particle varies with time as v = 4t. The displacement of particle between t = 2 to t = 4 sec, is :-

(A) 12 m   (B) 36 m   (C) 24 m   (D) 6 m

Q 27. A particle moves along a straight line such that at time t its displacement from a fixed point O on the line is $3t^2 - 2$. The velocity of the particle when t = 2 is:

(A) 8 ms^{-1} (B) 4 ms^{-1} (C) 12 ms^{-1} (D) 0

Q 28. The displacement of a particle in a straight line motion is given by s = 1+ 10t − 5t^2. The correct representation of the motion is

(C)

S

t

(D)

S

t
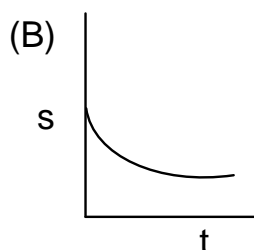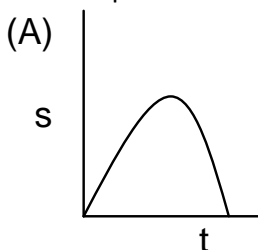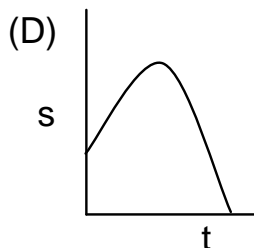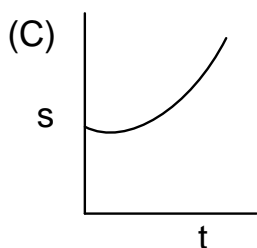
Q 29. The acceleration time graph of a particle moving in a straight line is as shown in figure. The velocity of the particle at time t = 0 is 2 m/s. The velocity after 2s will be:
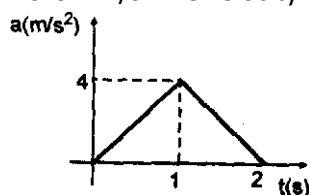
(A) 6 m/s　　　　(B) 4 m/s　　　　(C) 2 m/s　　　　(D) 8 m/s

Q 30. A point mass moves with velocity v = (5t–t^2) ms^{-1} in a straight line. Find the distance travelled (i.e. $\int v dt$) in fourth second.

(A) $\dfrac{31}{6}$ m　　　　(B) $\dfrac{29}{6}$ m　　　　(C) $\dfrac{37}{6}$ m　　　　(D) None of these

Q 31. The graph shown is a plot of position versus time. For which labeled region is the velocity positive and the acceleration negative?
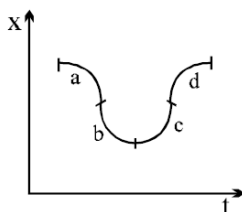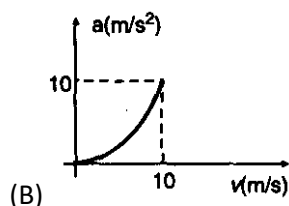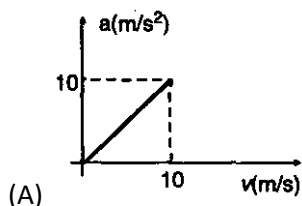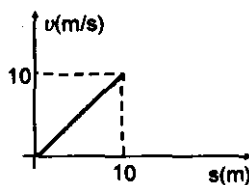

(A) a　　　　(B) b　　　　(C) c　　　　(D) d

Q 32. A rocket is projected vertically upwards, whose time velocity graph is shown in. The maximum height reached by the rocket is –
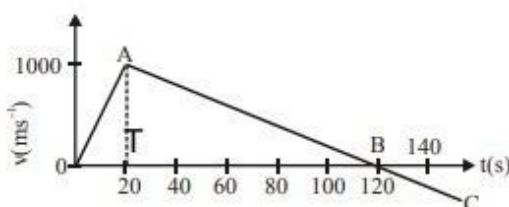

(A) 1 km　　　　(B)10km　　　　(C) 20km　　　　(D) 60km

Q 33. Velocity versus displacement graph of a particle moving in a straight line is shown in figure. Corresponding acceleration versus velocity graph will be:

(A)

(B)

(C)

(D)
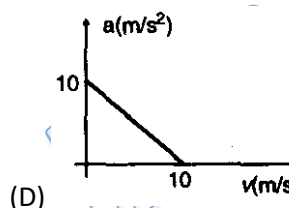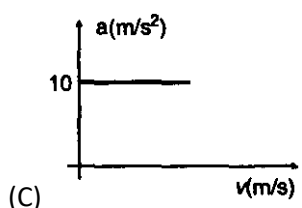
Q 34. A car starts moving along a line starting from rest first with acceleration $a = 2$ m/s², then with uniform velocity and finally decelerating at the same rate and comes to rest. The total time of motion is 10 s. The average speed during the time is 3.2 m/s. How long does the car moved uniformly?
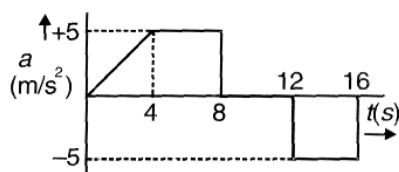
(A) 4 s   (B) 6 s   (C) 5 s   (D) 3 s

Q 35. A particle is moving along a straight line such that square of its velocity varies with time as shown in the figure. What is the acceleration of the particle at $t = 4$ s?
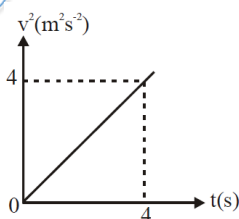
(A) 4 m/s²   (B) 1/4 m/s²   (C) 1/2 m/s²   (D) 0

Q 36. The acceleration of a train between two stations 2 km apart is shown in the figure. The maximum speed of the train is

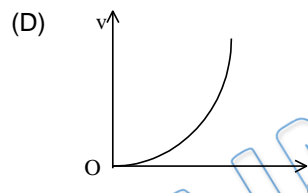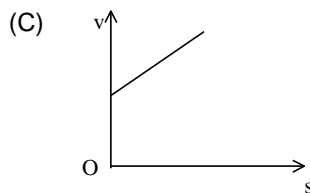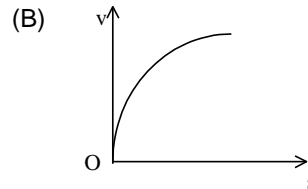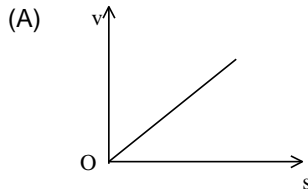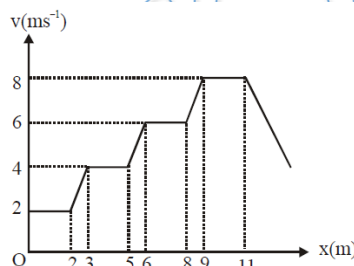(A) 60 m/s   (B) 30 m/s   (C) 120 m/s   (D) 90 m/s

Q 37. A body starts from rest moves along a straight line with constant acceleration. The variation of speed v with distance s is given by graph

(A)

(B)

(C)

(D)

Q 38. The velocity of a particle that moves in the positive x-direction varies with its position as shown in figure. The acceleration of the particle when x = 5.5 m is-
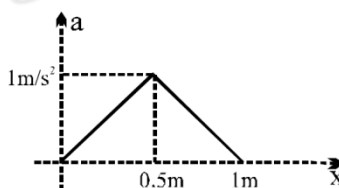

(A) 0   (B) 5 ms^{-2} (C) 10 ms^{-2} (D) 20 ms^{-2}

Q 39. A body initially at rest, starts moving along x-axis in such a way so that its acceleration vs displacement plot is as shown in figure. The maximum velocity of particle is :-

(A) 1 m/s   (B) 6 m/s   (C) 2 m/s   (D) none

Q 40. A particle starts its motion from rest and moves with constant acceleration for time t_1 and then it retards with constant rate for time t_2 until it comes to rest. Then the ratio of maximum speed and average speed during the complete motion will be

(A) 2 : 1   (B) 1 : 2   (C) $t_1 : t_2$ (D) $t_2 : t_1$

Answer Key

Q.1) B	Q.2) C	Q.3) B	Q.4) A	Q.5) B
Q.6) A	Q.7) C	Q.8) B	Q.9) A	Q.10) C
Q.11) D	Q.12) B	Q.13) B	Q.14) B	Q.15) C
Q.16) B	Q.17) B	Q.18) C	Q.19) B	Q.20) C
Q.21) A	Q.22) D	Q.23) D	Q.24) C	Q.25) D
Q.26) C	Q.27) C	Q.28) D	Q.29) A	Q.30) A
Q.31) D	Q.32) D	Q.33) C	Q.34) B	Q.35) B
Q.36) B	Q.37) B	Q.38) C	Q.39) A	Q.40) A