PHYSICS

XI – MOTION IN A STRAIGHT LINE

SECTION A

1. Priya starts from his home and walks 50 m towards north, then he turns towards east and walks 40 m and then reaches his school after moving 20 m towards south. Then his displacement from his home to school is

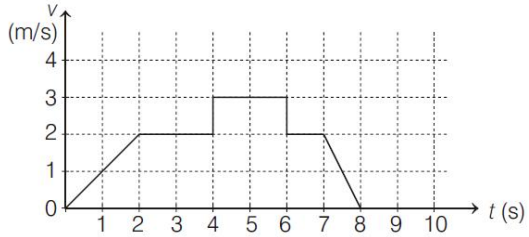
(1) 50 m

(2) 110 m

(3) 80 m

(4) 40 m

2. A particle starts from the origin at time t = 0 and moves along the positive X - axis. The graph of velocity with respect to time is shown in figure. What is the position of the particle at time t = 5 s?



(1) 6 m

(2) 3 m

(3) 10 m

(4) 9 m

3. Find the average velocity when a particle complete the circle of radius 1m in 10 s.

(1) 2 m/s

(2) 3.14 m/s

(3) 6.28 m/s

(4) zero

4. The position of a particle as a function of time t, is given by $x(t) = at + bt^2 - ct^3$, where a, b and c are constants. When the particle attains zero acceleration, then its velocity will be

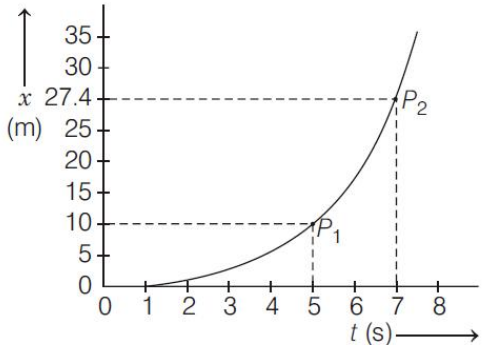
(1) $a + \frac{b^2}{2c}$

(2) $a + \frac{b^2}{4c}$

(3) $a + \frac{b^2}{3c}$

(4) $a + \frac{b^2}{c}$

5. In figure, displacement-time (x - t) graph given below, the average velocity between time t = 5 s and t = 7 s is



(1) 8 ms^{-1}

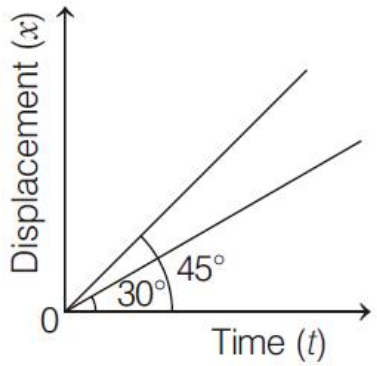
(2) 8.7 ms^{-1}

(3) 7.8 ms^{-1}

(4) 13.7 ms^{-1}

6. The displacement-time graph of two moving particles make angles of 30° and 45° with the X -axis. The ratio of their

velocities is



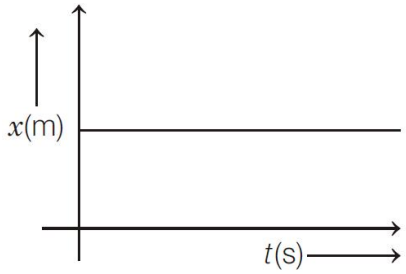
(1) 1: $\sqrt{3}$

(2) 1: 2

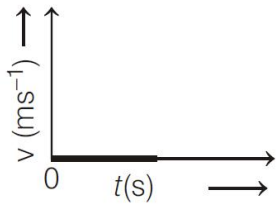
(3) 1:1

(4) $\sqrt{3}$: 2

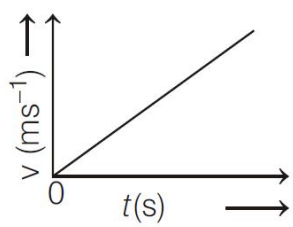
7. For the x-t graph given below, the v - t graph is shown correctly in



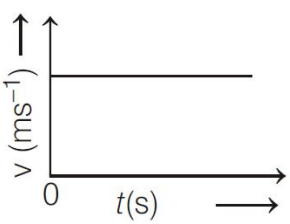
(1)



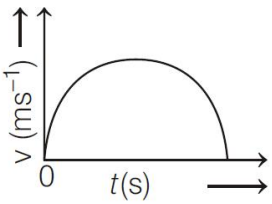
(2)



(3)



(4)



8. A car is moving on a straight road from A to B for first one-fourth distance with speed 40 m/s and the next half with speed 80 m/s and the last one-fourth with speed 120 m/s. Then, the average speed of the car will be

(1) 49.26 m/s

(2) 90.46 m/s

(3) 68.57 m/s

(4) 54.26 m/s

9. If an object is moving in a straight line, then

(1) the directional aspect of vector can be specified by + ve and - ve signs

(2) instantaneous speed at an instant is equal to the magnitude of the instantaneous velocity at that instant

(3) Both (a) and (b)

(4) Neither (a) nor (b)

10. Speeds of a particle at 3rd and 8th seconds are 20 m/s and 0 m/s respectively, then average acceleration between 3rd and 8th seconds will be

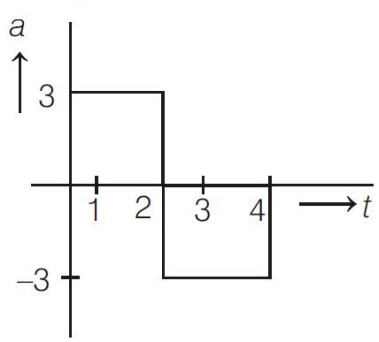
(1) 3 m / s^2

(2) 4 m/s^2

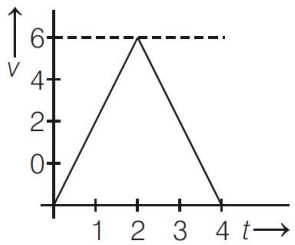
(3) 5 m/ s^2

(4) 6 m/s^2

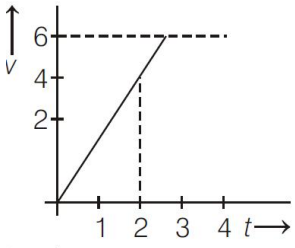
11. A particle starts from rest at t = 0 s and undergoes an acceleration a in ms^{-2} with time t in seconds which is shown in figure. Which one of the following plot represents velocity v in ms^{-1} versus time t in second?



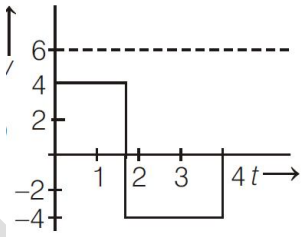
(1)



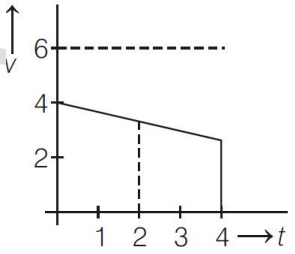
(2)



(3)



(4)



12. A car is moving with a velocity of 30 ms^{-1}. On applying the brakes, the velocity decreases to 15 ms^{-1} in 2 s. The acceleration of the car is

(1) + 7.5 ms^{-2}

(2) - 7.7 ms^{-2}

(3) - 7.5 ms^{-2}

(4) + 15 ms^{-2}

13. An object starts from rest and moves with uniform acceleration a. The final velocity of the particle in terms of the distance x covered by it is given as

(1) $\sqrt{2ax}$

(2) 2ax

(3) $\sqrt{\frac{ax}{2}}$

(4) $\sqrt{ax}$

14. The velocity of a particle at an instant is 15 ms^{-1}. After 5s, its velocity will become 25 ms^{-1}. The velocity at 4s, before the given instant will be

(1) 23 ms^{-1}

(2) 7 ms^{-1}

(3) 25 ms^{-1}

(4) 15 ms^{-1}

15. The object is released from rest under gravity at y = 0. The equation of motion which correctly expresses the above situation is

(1) $v = -9.8\ t\ ms^{-1}$

(2) $y = -4.9\ t^2\ m$

(3) $v^2 = -19.6\ y\ m^2\ s^{-2}$

(4) All of these

16. A ball is thrown vertically upwards with a velocity of 10 ms^{-1} from a building of height 100 m. The maximum height attained by the ball above the ground is (use g = 10 ms^{-2})

(1) 105 m

(2) 110 m

(3) 10 m

(4) 5 m

17. The displacement of a particle is given by $x(t) = (t - 2)^2$, where x is in metres and t in seconds. The distance covered by the particle in first 4 s is

(1) 8 m

(2) 4 m

(3) 12 m

(4) 16 m

18. At the instant a traffic light turns green, a car that has been waiting at a junction starts ahead with a constant acceleration of 3.2 ms^{-2}. At the same instant, a truck, travelling with a constant speed of 20 ms^{-1}, overtakes and passes the car. The distance from the starting point at which the car overtakes the truck is

(1) 200 m

(2) 250 m

(3) 300 m

(4) 225 m

19. From the top of a building of height 27.3m, a man throws a ball upwards, which strikes the ground after 16 s. The speed of ball with which it was thrown up is

(1) 63.5 ms^{-1}

(2) 70.8 ms^{-1}

(3) 76.8 ms^{-1}

(4) 80 ms^{-1}

20. A parachutist after bailing out falls through 50 m without friction. When parachute opens, it decelerates at 2 ms^{-2}. He reaches the ground with a speed of 3 ms^{-1}. The height at which he bailed out is nearly [g = 10 ms^{-2}]

(1) 225 m

(2) 256 m

(3) 298 m

(4) 327 m

21. An elevator whose floor to the ceiling distance is 2.50 m, starts ascending with a constant acceleration of 1.25 ms^{-2}. One second after the start, a bolt begins falling from the ceiling of elevator. The free fall time of the bolt is [g = 10 ms^{-2}]

(1) 3/2 s

(2) 1 s

(3) 2/3 s

(4) 3/4 s

22. A person driving a car with a speed of 72 km/h observes a boy crossing the road at a distance of 100 m from the car. Driver applies the brakes and retards the car with a retardation of 5 m/s2 and is just able to avoid this accident. The reaction

time of driver is

(1) 2.0 s

(2) 2.4 s

(3) 3.0 s

(4) 2. 8 s

23. A police van moving on a highway with a speed of 30 km/h and a thiefs car speeding away in same direction with speed is 192 km/h. Thief in the car fires bullet on police van. If muzzle speed of bullet is 150 m/s, then the speed with which bullet hits the w.r.t. police van is

(1) 145 m/s

(2) 130 m/s

(3) 115 m/s

(4) 105 m/s

24. If a particle start from rest the displacement of the particle in 1^{st} , 2^{nd} and 3^{rd} seconds is

(1) 1 : 3 : 5

(2) 1 : 2 : 3

(3) 1 : 4 : 9

(4) 1 : 4 : 8

25. An NCC parade is going at a uniform speed of 6 km/h through a place under a berry tree on which a bird is sitting at a height of 12.1 m. At a particular instant the bird drops a berry. Which cadet (give the distance from the tree at the instant) will receive the berry on his uniform?

(1) 3.62 m

(2) 4.12 m

(3) 2.62 m

(4) 5.32 m

26. A boy standing at the top of a tower of 20m height drops a stone. Assuming g = $10ms^{-2}$ the velocity with which it hits the ground is

(1) 10.0 m/s

(2) 20.0 m/s

(3) 40.0 m/s

(4) 5.0 m/s

27. From a 200 m high tower, one ball is thrown upwards with speed of 10 ms^{-1} and another is thrown vertically downwards at the same speeds simultaneously. The time difference of their reaching the ground
will be nearest to

(1) 12 s

(2) 6 s

(3) 2 s

(4) 1 s

28. Two stones are thrown from the top of a tower, one straight down with an initial speed u and the second straight up with the same speed u. When the two stones hit the ground, they will have speeds in the ratio

(1) 2 : 3

(2) 2 : 1

(3) 1 : 2

(4) 1 : 1

29. The water drops fall at regular intervals from a tap 5 m above the ground. The third drop is leaving the tap at an instant when the first drop touches the ground. How far above the ground is the second drop at that instant ? (Take g = 10 m/s^2)

(1) 1.25 m

(2) 2.50 m

(3) 3.75 m

(4) 5.00 m

30. A ball is dropped from the top of a tower of height 100 m and at the same time another ball is projected vertically upwards from ground with a velocity 25 ms^{-1}. Then the distance from the top of the tower, at which the two balls meet is

(1) 68.4 m

(2) 48.4 m

(3) 18.4 m

(4) 78.4 m

31. A juggler keeps on moving four balls in the air throwing the balls after intervals. When one ball leaves his hand (speed= 20 ms^{-1}) the position of other balls (height in m) will be (Take g = 10 ms^{-2})

(1) 10, 20, 10

(2) 15, 20, 15

(3) 5, 15, 20

(4) 5, 10, 20

32. A car is standing 800 m behind a bus, which is also at rest. The two start moving at the same instant but with different forward accelerations. The bus has acceleration 4 m/s^2 and the car has acceleration 8 m/s^2. The car will catch up with the bus after a time of :

(1) 20 s

(2) 10 s

(3) 5 s

(4) 15 s

33. A thief is running away on a straight road on a jeep moving with a speed of 9 m/s. A police man chases him on a motor cycle moving at a speed of 10 m/s. If the instantaneous separation of jeep from the motor cycle is 100 m, how long will it take for the policemen to catch the thief?

(1) 1 second

(2) 19 second

(3) 90 second

(4) 100 second

34. A bus is moving with a speed of 10 ms^{-1} on a straight road. A scooterist wishes to overtake the bus in 100 s. If the bus is at a distance of 1 km from the scooterist, with what speed should the scooterist chase the bus?

(1) 40 ms^{-1}

(2) 25 ms^{-1}

(3) 10 ms^{-1}

(4) 20 ms^{-1}

35. A ball is thrown vertically downward with a velocity of 20 m/s from the top of a tower. It hits the ground after some time

with a velocity of 80 m/s. The height of the tower is (g = 10 m/s^2)

(1) 300 m

(2) 360 m

(3) 340 m

(4) 320 m

SECTION B

36. A vehicle travels half the distance with speed v and the remaining distance with speed 2v. Its average speed is:

(1) $3v/4$

(2) $v/3$

(3) $2v/3$

(4) $4v/3$

37. A horizontal bridge is built across a river. A student standing on the bridge throws a small ball vertically upwards with a velocity 4 ms^{-1}. The ball strikes the water surface after 4 s. The height of bridge above water surface is (Take g =10 ms^{-2}):

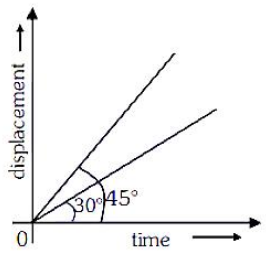
(1) 68 m

(2) 56 m

(3) 60 m

(4) 64 m

38. The displacement-time graphs of two moving particles make angles of 30° and 45° with the x-axis as shown in the figure. The ratio of their respective velocity is



(1) √3 : 1

(2) 1 : 1

(3) 1 : 2

(4) 1 : √3

39. By which velocity can a ball be projected vertically upwards if the distance covered by it in 5th second is twice the distance it covers in its 6th second? (g = 10 m/s²)

(1) 58.8 m/s

(2) 49 m/s

(3) 65 m/s

(4) 19.6 m/s

40. A stone is shot straight upward with a speed of 20 m/sec from a tower 200 m high. The speed with which it strikes the ground is approximately

(1) 60 m/sec

(2) 65 m/sec

(3) 70 m/sec

(4) 75 m/sec

41. From the top of a tower, a particle is thrown vertically downwards with a velocity of 10 m/s. The ratio of the distances, covered by it in the 3rd and 2nd seconds of the motion is (Take, g = 10 m/s²)

(1) 5 : 7
(2) 7 : 5
(3) 3 : 6
(4) 6 : 3

42. A body sliding on a smooth inclined plane requires 4 seconds to reach the bottom starting from rest at the top. How much time does it take to cover one-fourth distance starting from rest at the top?
(1) 1 s
(2) 2 s
(3) 4 s
(4) 16 s

43. If the displacement of a particle is zero, then what can we say about its distance covered
(a) It must be zero.
(b) It cannot be zero.
(c) It is negative.
(d) It may or may not be zero.

44. A stone is dropped from a certain height which can reach the ground in 5 s. If the stone is stopped after 3 s of its fall and then allowed to fall again, then the time taken by the stone to reach the ground for the remaining distance is:
(1) 3 s
(2) 4 s
(3) 2 s
(4) none of these

45. A ball is dropped from a high-rise platform at t = 0 starting from rest. After 6s another ball is thrown downwards from the same platform with a speed v. The two balls meet at t = 18s. What is the value of v? (Take, g = 10 ms^{-2})
(1) 60 ms^{-1}
(2) 75 ms^{-1}
(3) 55 ms^{-1}
(4) 40 ms^{-1}

46. Assertion (A): Displacement of a body may be zero when distance travelled by it is not zero.
Reason (R): The displacement is the longest distance between initial and final position.
(a) Both Assertion and Reason are true, and the Reason is the correct explanation of the Assertion.
(b) Both Assertion and Reason are true, but the Reason is not the correct explanation of the Assertion.
(c) Assertion is true, but Reason is false.
(d) Both Assertion and Reason are false.

47. A particle moves along a straight line such that its displacement at any time t is given by: $s = 2t + t^2 + 4t + 5$. The acceleration of the particle at t = 1s is:
(1) 18 m/s^2
(2) 32 m/s^2
(3) 24 m/s^2
(4) 14 m/s^2

48. A particle moves along x-axis as:

$x = 4(t - 2) + a(t - 2)^2$. Which of the following is true?

(a) The initial velocity of particle is 4

(b) The acceleration of particle is 2a

(c) The particle is at origin at t = 0

(d) None of these

49. A particle moves a distance x in time t according to equation $x = (t + 5)^{-1}$. The acceleration of particle is proportional to:

(1) $(\text{Velocity})^{2/3}$

(2) $(\text{Velocity})^{3/2}$

(3) $(\text{Distance})^2$

(4) $(\text{Distance})^{-2}$

50. A particle moves along a straight line such that its displacement at any time t is given by: $s = 3t^3 + 7t^2 + 14t + 5$. The acceleration of the particle at t = 1s is:

(1) 18 m/s^2

(2) 32 m/s^2

(3) 29 m/s^2

(4) 24 m/s^2

PHYSICS

XI – MOTION IN A STRAIGHT LINE

SECTION A

1.	1
2.	4
3.	4
4.	3
5.	2
6.	1
7.	1
8.	3
9.	3
10.	2
11.	1
12.	3
13.	1
14.	2
15.	4
16.	1
17.	1
18.	2
19.	3
20.	3
21.	3
22.	3
23.	4
24.	1
25.	3
26.	2
27.	3
28.	4
29.	3
30.	4
31.	2
32.	1
33.	4
34.	4
35.	1

SECTION B

36.	4
37.	4
38.	4
39.	3
40.	2
41.	2
42.	2
43.	4
44.	2
45.	2
46.	3
47.	4
48.	2
49.	2
50.	2