PHYSICS

AAKASH INSTITUTE ENGLISH

MOTION IN A STRAIGHT LINE

Example

1. What is the state of a person sitting in a moving bus w.r.t. a person standing at the bus stand and why?

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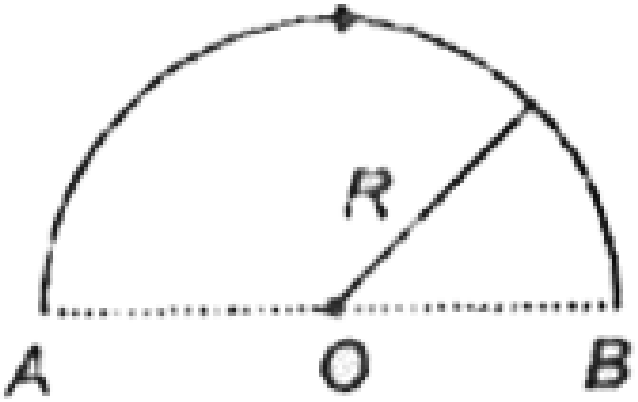
2. A person walks along a semicircular path from A to B as shown in the figure given below.



Calculate the distance and displacement traversed by the person.

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3. If the distance covered by a particle is zero, what will be its displacement?

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4. Displacement of a person moving from A to B along a semicircular path of radius R is 100 m. What is the distance travelled by him ?

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5. Draw the position-time graph of a stationary object.

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6. Draw the x-t graph of an object in uniform motion.

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7. An object was at x = 50 m at t = 0, then it starts moving uniformly towards origin at time t = 5 s. It is at origin. Draw the position versus time (x-t) graph for the object under this situation.

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8. Ram covers a distance of 100 km with variable speed. During the first half of his journey his speed was 20 km/h and during the

rest of his journey his speed was 40 km/h. Calculate the average speed of Ram during the whole course of his motion.

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9. What is the significance of average velocity or average speed?

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10. Distinguish between average speed and average velocity.

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11. What is the difference between average velocity and instantaneous velocity?

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12. The displacement x of an object is given as a function of time $x = 2t + 3t^2$

Calculate the instantaneous velocity of the object at t = 2 s

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13. Draw the position-time graph of an object moving with positive accceleration.

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14. The velocity of an object changes from 50 m/s to 60 m/s in 20 seconds. What is the average acceleration of the object over that interval?

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15. Draw the velocity-time graph of an object whose speed is increasing at uniform rate but moving with negative acceleration.

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16. A car was movig at a rate of $18kmh^{-1}$. When the brakes were applied, it comes to rest in a distance of 100 m. Calculate the retardation produced by the brakes.

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17. The velocity of an object is changing with time and relation is given by the following equation.

$v = 2t + 3t^2$

Calculate the position of the object from the origin at t = 2 s.

Assume particle to be at origin at t = 0

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18. An object is thrwon vertically upwards with a velocity of 60 m/s. After what time it strike the ground ? Use $g = 10m/s^2$.

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19. Is it possible, that a body is moving with negative acceleration still speeding up? Given reason for your answer.

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20. Two trains having lengths 120 m and 100 m running in the opposite directions with velocities 40 km/h and 50 km/h. In what time they will completely cross each other?

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Try Yourself

1. What is required to specify the position of an object?

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2. A say that B is in motion. But C says that B is at rest. Is this possible ?

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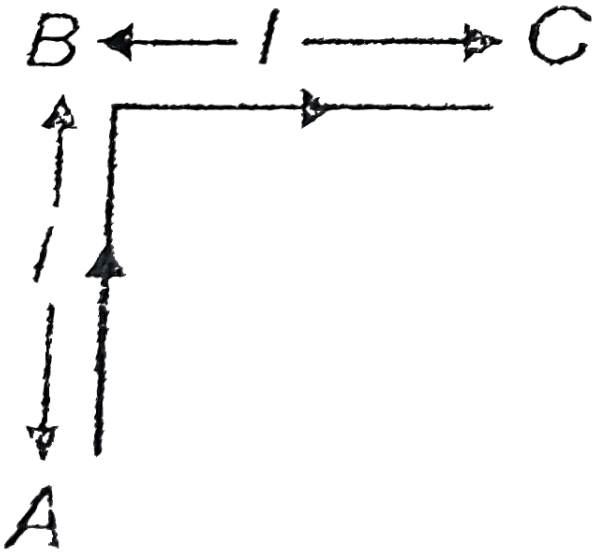
3. A particle travels along the path ABC, as shown in the figure given below, AB = BC = l, calculate the path length and displacement of the particle



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4. What is the ratio of displacement to the path length traversed by an object, if the object comes back to its initial position?

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5. A boy moves 400 m towards north, 300 m towards west and again 400 m towards south. Calculate the displacement of the boy from the initial position.

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6. Explain with the help of an example, if the displacement of a particle is zero, then it is not necessary that the distance traversed by it is also zero.

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7. Is displacement a scalar or a vector quantity?

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8. What is the S.I. unit of displacement ?

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9. What is the slope of x-t graph of a stationary object?

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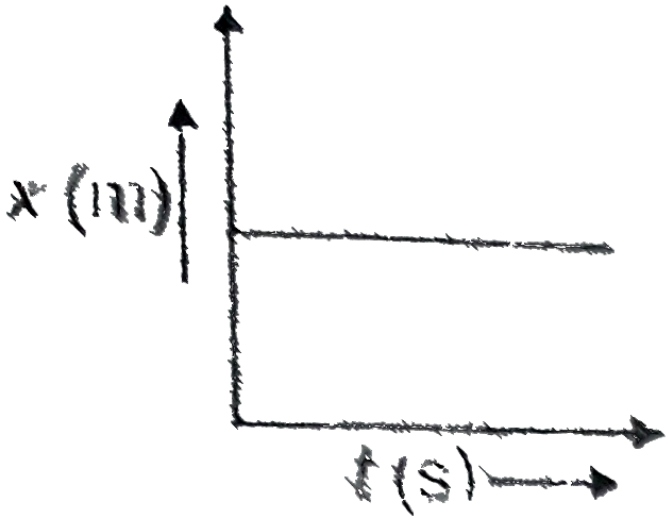
10. The position-time graph of an object is given below. What is the velocity of the object?



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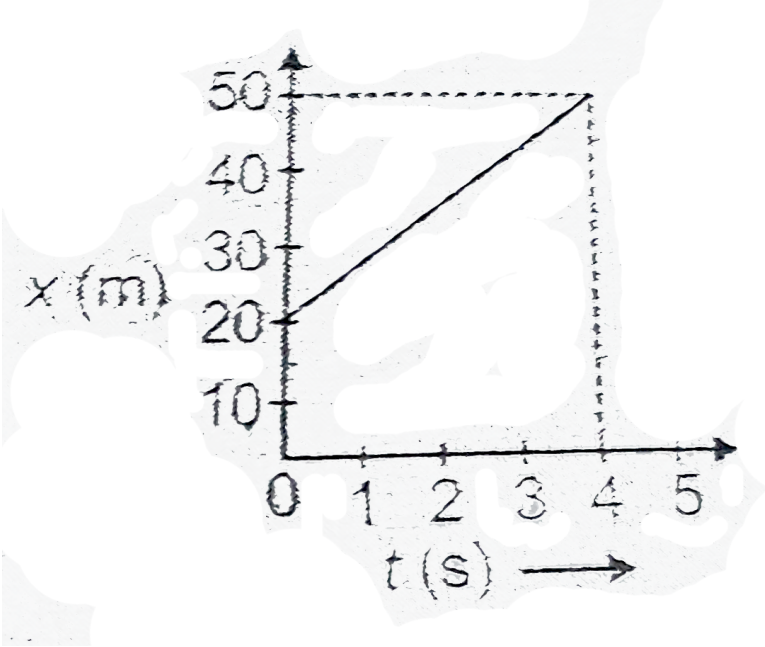
11. The position-time graph of an object is given below. What is the velocity of the object?



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12. The x-t graph of an object is a straight line inclined to time-axis. What does this statement indicate ?

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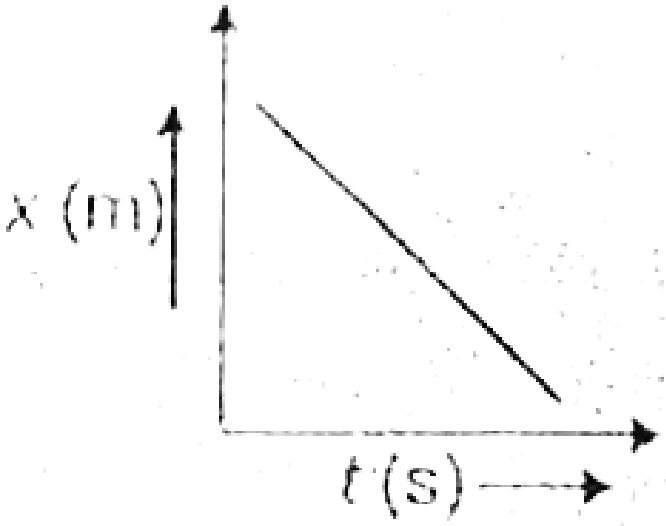
13. The position - time $(x - t)$ graph of an object in uniform motion is shown below, the velocity of object is



A. Positive

B. Negative

C. Zero

D. None of these

Answer: B

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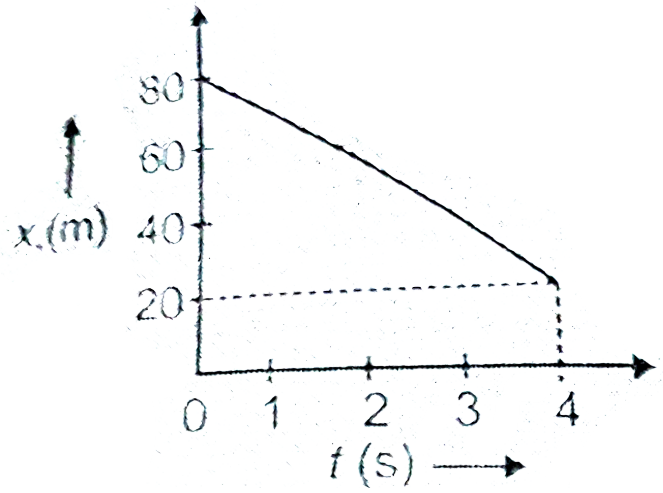
14. The position-time (x-t) graph of an object in uniform motion is shown below. Calculate the

velocity with which the object is moving.



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15. What is the average velocity of the object during its course of motion, if its initial and final positions are same?

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16. If the displacement of an object during its motion is 100 m in a time interval of 20 s, then calculate the average velocity of the object with which it was moving through out his journey.

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17. An object travels 20 m in 10 s. What is the average speed of the object ?

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18. SI unit of velocity is

(i) m/s

(ii) m / s^2

(iii) m

(iv) s

A. m/s

B. m / s^2

C. m

D. s

Answer:

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19. Under what condition the magnitude of average velocity is equal to the average speed ?

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20. A boy swims in a 100 m long pool. He covers 60 m with a velocity of 20 m/s and

covers the rest of the distance with a velocity of 10 m/s. Calculate the average velocity of the boy.

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21. If the object is moving with uniform velocity in a given interval of time, then the average velocity and instantaneous velocity are equal, why?

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22. A particle moves with a uniform velocity of 50 m/s for 20 min. What is the velocity of particle at t = 2 min ?

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23. The displacement s of an object is given as a function of time t

$s = 5t^2 + 9t$

Calculate the instantaneous velocity of object at t = 0.

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24. The displacement s of an object is given as a function of time t by the following equation $s = 2t + 5t^2 + 3t^3$. Calculate the instantaneous velocity of the object at t = 1 s.

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25. If the velocity of an object is increasing and changing at a uniform rate then the acceleration of the object is:

A. Positive

B. Zero

C. Negative

D. Not defined

Answer: Positive.

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26. Draw the position-time graph of a moving object, moving with zero acceleration.

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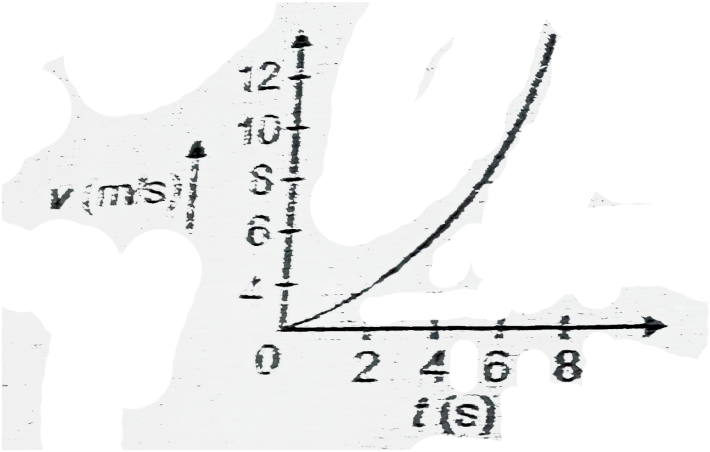
27. The velocity-time graph of an object is given below. Calculate the average acceleration of the object in the time interval of 4 s to 6 s.



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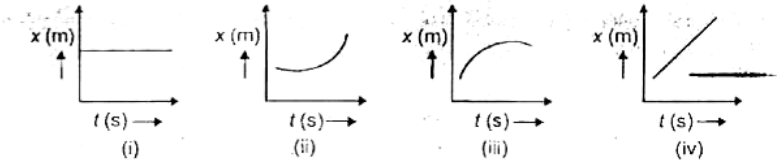
28. Which of the following x - t graphs shows an object moving with negative acceleration?



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29. Draw the position-time graph of an object moving with positive accceleration.

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30. Draw the velocity-time graph of an object moving with uniform negative acceleration.

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31. A body starting from rest has an acceleration of $5m/s^2$. Calculate the distance travelled by it in 4^{th} second.

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32. How can you determine the displacement and the acceleration of an object from its velocity-time graph?

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33. The relation between the acceleration and time for an object is given below. Calculate the velocity with which the object is moving at t = 1 s.

$a = 3t - 4t^2$

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34. If the relation between acceleration and time for an object is given by

$a = 2t + 4t^2$

Calculate the position of object from the origin at t = 4 s.

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35. A ball is thrown vertically upward. What is the magnitude of velocity at the highest point

?

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36. A ball is thrown vertically upward with a velocity of 20 m/s. Calculate the maximum height attain by the ball.

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37. A ball thrown up, what its velocity and acceleration at the top?

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38. A stone is dropped from the top of a tower. If it hits the ground after 10 seconds, what is the height of the tower?

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39. A train of length 120 m travels at a speed of 57 km/h. In what time it will pass a man who is walking at 3 km/h in the opposite direction?

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40. Two objects A and B are walking with speed 6 km/h and 10 km/h respectively in the same direction. Find the relative displacement of B w.r.t. A after 4 hours.

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Exercise

1. A particle moves along a circular path of radius R. The distance and displacement of a particle after one completer revolution is

A. $0, 2\pi r$

B. $2\pi r, 0$

C. $0, \pi r$

D. $\pi r, 0$

Answer: B

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2. A particle starts from the origin, goes along x-axis to the point (10 m, 0) and then returns along. The same line to the point (-10 m, 0). The distance and displacement of the particle during the trip are

A. 20 m, 0

B. 30 m, 10 m

C. $30m, \ -10m$

D. $20m, \ -10m$

Answer: C

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3. A person starts walking and comes back to its initial position after 2 h, then which of the following quantity is zero?

A. Path length

B. Average speed

C. Displacement

D. Time

Answer: C

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4. A car is moving on a straight road covers one third of the distance with a speed of 30 km/h and the rest with a speed of 50 km/h. The average speed of the car is

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5. A car travels half of the distance with constant velocity 100 km/h and another half

with a constant velocity of 60 km/h along a straight line. The average velocity of the car is

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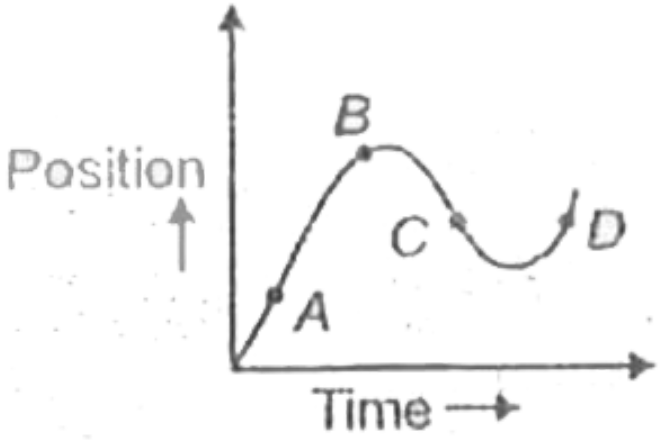
6. The position- time graph of a moving particle is shown. The instantaneous velocity of the particle is negative at the point



A. A

B. B

C. C

D. D

Answer: C

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7. The position-time graphs of two cars A and B are straight lines making angles

30° and 60° with the time axis respectively.

The ratio of velocity of A and B is

A. $1:\sqrt{3}$

B. $1:3$

C. $\sqrt{3}:1$

D. $3:1$

Answer: B

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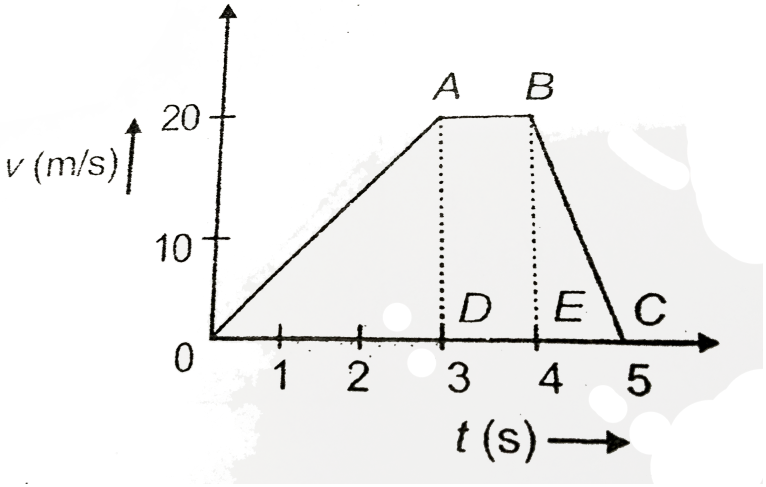
8. The variation of velocity of a particle moving along a straight line is as shown in the figure given below. The distance travelled by the particle in 5 s is



A. 60 m

B. 30 m

C. 40 s

D. 50 m

Answer: A

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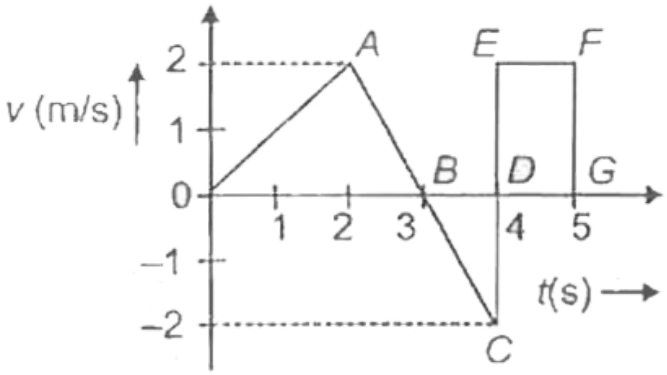
9. The velocity - time graph of a particle moving along a straight line is shown in the figure given below

The displacement of the particle in 5 second is



A. 0.5 m

B. 1 m

C. 2 m

D. 4 m

Answer: D

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10. The ratio of velocity of two objects A and B is $1:3$. It the position-time graph of object A is inclined to time axis at 30°, then the position-time graph of object B is inclined to time axis at

A. 0°

B. 90°

C. 30°

D. 60°

Answer: D

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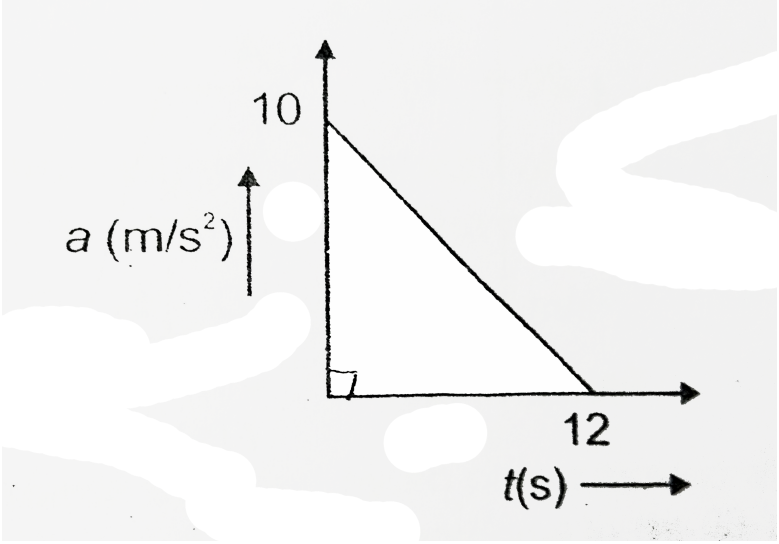
11. A particle starting from rest undergoes a rectilinear motion with acceleration a. The variation of a with time t is shown below. The maximum velocity attained by the particle

during its motion is



A. 120 m/s

B. 60 m/s

C. 22 m/s

D. 80 m/s

Answer: B

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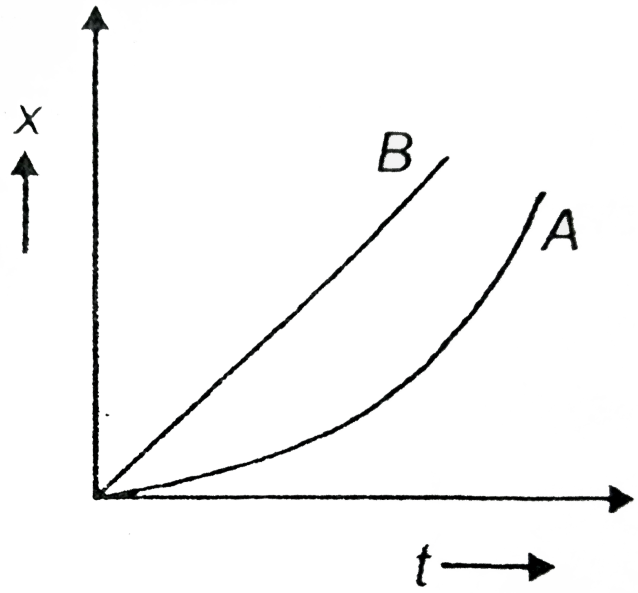
12. The displacement-time graph of two moving objects A and B are shown in the figure given below. Which of the following is incorrect?



A. B is moving with constant velocity

B. A is moving with increasing speed

C. B is moving with non - zero constant acceleration

D. Acceleration of A may be constant

Answer: C

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13. A body moving with uniform retardation covers 3 km before its speed is reduced to half of its initial value. It comes to rest in another distance of

A. 1 km

B. 2 km

C. 3 km

D. $\frac{1}{2}$ km

Answer: A

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14. A ball is thrown vertically upward with a velocity u from the top of a tower. If it strikes the ground with velocity 3u, the time taken by the ball to reach the ground is

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15. The displacement of a body is given by $s = \frac{1}{2}gt^2$ where g is acceleration due to

gravity. The velocity of the body at any time t is

A. $\frac{gt^3}{6}$

B. $\frac{gt^2}{2}$

C. gt

D. $\frac{gt}{2}$

Answer: C

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16. A ball is thrown vertically upward from the top of a tower with a speed of 100 m/s. It strikes the pond near the base of the tower after 25 second. The height of the tower is

A. 500 m

B. 125 m

C. 625 m

D. 425 m

Answer: C

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17. A ball falls freely from rest. The ratio of the distance travelled in first, second, third and fourth second is

A. $4:3:2:1$

B. $7:5:3:1$

C. $1:2:3:4$

D. $1:3:5:7$

Answer: D

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18. A ball is thrown vertically upward attains a maximum height of 45 m. The time after which velocity of the ball become equal to half the velocity of projection ? (use g = 10 m / s^2)

A. 2 s

B. 1.5 s

C. 1 s

D. 0.5 s

Answer: B

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19. A car travelling with a velocity of 80 km/h slowed down to 40 km/h in 10s. The retardation is

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20. A person driving a car with a speed 72 km/h suddenly sees a boy crossing the road. If

the distance moved by car, before the person applies brakes is 5 m, the reaction time of the person is

A. 0.5 s

B. 0.10 s

C. 10 s

D. 0.25 s

Answer: D

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21. Two cars are moving is one a same line dimension in opposite direction with the same speed v. The relative velocity of two cars w.r.t. each other is

A. 2 v

B. v

C. $\frac{v}{2}$

D. Zero

Answer: A

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22. Two objects A and B are moving with velocities v_A and v_B respectively in the same direction. The magnitude of relative velocity of A w.r.t. B is

A. $v_A - v_B$

B. $v_A + v_B$

C. $v_B - v_A$

D. v_A / v_B

Answer: A

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23. Two objects A and B are moving with velocities v_A and v_B respectively in the same direction. The magnitude of relative velocity of A w.r.t. B is

A. $v_A - v_B$

B. $v_A + v_B$

C. $v_A . v_B$

D. v_A / v_B

Answer: B

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24. The relative velocity of two objects A and B is 10 m/s. If the velocity of object A is 40 m/s then the velocity with which B is moving is (assume both objects are moving in same direction)

A. 10 m/s

B. 40 m/s

C. 30 m/s

D. 15 m/s

Answer: C

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25. Two train are moving in a straight line in the same direction with a speed of 80 km/h. The relative velocity of one trains w.r.t. each other is

A. 80 km/h

B. 40 km/h

C. Zero

D. 160 km/h

Answer: C

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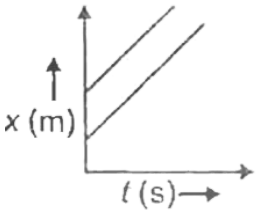
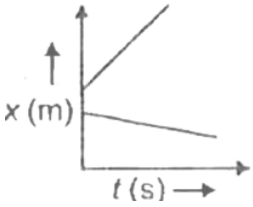
26. Which one of the following represents displacement-time graph of two objects A and B moving with zero relative velocity?

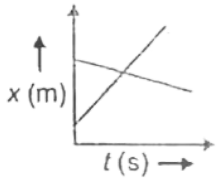
A.



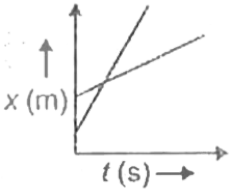
B.



C.



D.



Answer: A

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27. A boat takes 2 hours to travel 8 km and back in still water lake. With water velocity of $4kmh^{-1}$, time taken for going upstream of 8 km and coming back is

A. 2 hour

B. 2 hour 40 minute

C. 3 hour

D. 3 hour 40 minute

Answer: B

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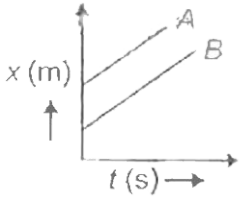
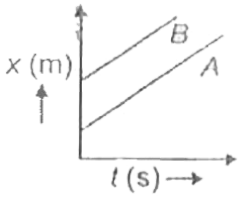
28. Two objects A and B are moving with velocities v_A and v_B respectively along positive x-axis. If $v_A < v_B$ then, which of the following position-time graphs is correctly showing the velocity of A and B ?

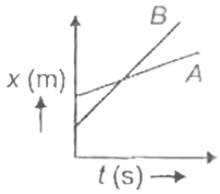
A.



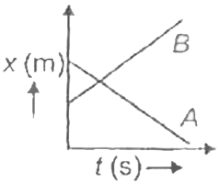
B.



C.



D.



Answer: C

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29. A car leaves station X for station Y every 10 min. The distance between X and Y is $60km$. The car travels at speed $60km/h$. A

man drives a car from Y towards X at speed $60km/h$. If he starts at the moment when first car leaves station X, how many cars would he meet om route?

A. 10

B. 11

C. 12

D. 23

Answer: D

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Assignment Section A

1. A body in one dimensional motion has zero speed at an instant. At that instant, it must have

A. Zero velocity

B. Zero acceleration

C. Non-zero velocity

D. Non-zero acceleration

Answer: A

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2. A particle is moving along a circle such that it completes one revolution in 40 seconds. In 2 minuts 20 seconds, the ratio $\frac{|\text{displacement}|}{\text{distance}}$ is distance

A. Zero

B. $\frac{1}{7}$

C. $\frac{2}{7}$

D. $\frac{1}{11}$

Answer: D

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3. Consider the motion of the tip of the second hand of a clock. In one minute (R be the length of second hand), its

A. Displacement is $2\pi R$

B. Distance covered is 2R

C. Displacement is zero

D. Distance covered is zero

Answer: C

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4. The position of a body moving along x-axis at time t is given by $x = \left(t^2 - 4t + 6\right)m$. The velocity of the body at time t = 3s is

A. 2 m/s

B. 2.5 m/s

C. 3 m/s

D. 5 m/s

Answer: A

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5. If a particle is moving along straight line with increasing speed, then

A. Its acceleration is negative

B. Its acceleration may be decreasing

C. Its acceleration is positive

D. Both (2) & (3)

Answer: B

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6. At any instant, the velocity and acceleration of a particle moving along a straight line are v and a. The speed of the particle is increasing if

A. $v > 0, a > 0$

B. $v < 0, a > 0$

C. $v > 0, a < 0$

D. $v > 0, a = 0$

Answer: A

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7. A particle moves along x-axis with speed $6m/s$ for the first half distance of a journey and the second half distance with a speed

$3m/s$. The average speed in the total journey is

A. $5m/s$

B. $4.5m/s$

C. $4m/s$

D. $2m/s$

Answer: C

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8. If magnitude of average speed and average velocity over a time interval are same, then

A. The particle must move with zero acceleration

B. The particle must move with non-zero acceleration

C. The particle must be at rest

D. The particle must move in a straight line without turning back

Answer: D

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9. If v is the velocity of a body moving along x-axis, then acceleration of body is

A. $\frac{dv}{dx}$

B. $v\frac{dv}{dx}$

C. $x\frac{du}{dx}$

D. $v\frac{dx}{dv}$

Answer: B

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10. If a body is moving with constant speed, then its acceleration

A. Must be zero

B. May be variable

C. May be uniform

D. Both (2) & (3)

Answer: B

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11. Velocity of a body is variable when

A. Its speed may be constant

B. Its acceleration may be constant

C. Its average acceleration may be constant

D. All of these

Answer: D

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12. An object is moving with variable speed, then

A. Its velocity may be zero

B. its velocity must be variable

C. Its acceleration may be zero

D. Its velocity must be constant

Answer: B

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13. The position of a particle moving along x-axis is given by $x = 10t - 2t^2$. Then the time (t) at which it will momentily come to rest is

A. Zero

B. 2.5 s

C. 5 s

D. 10 s

Answer: B

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14. A car moves with speed $60km/h$ for 1 hour in east direction and with same speed for 30 min in south direction. The displacement of car from initial posilion is

A. 60 km

B. $30\sqrt{3}km$

C. $30\sqrt{5}km$

D. $60\sqrt{2}km$

Answer: C

Watch Video Solution

15. A person travels along a straight road for the first $\frac{t}{3}$ time with a speed v_1 and for next $\frac{2t}{3}$ time with a speed v_2. Then the mean speed v is given by

A. $v = \frac{v_1 + 2v_2}{3}$

B. $\frac{1}{v} = \frac{1}{3v_1} + \frac{2}{3v_2}$

C. $v = \frac{1}{3}\sqrt{2v_1 v_2}$

D. $v = \sqrt{\frac{3v_2}{2v_1}}$

Answer: A

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16. If the displacement of a particle varies with time as $x = 5t^2 + 7t$.

Then find its velocity.

Watch Video Solution

17. A particle starts moving with acceleration $2m/s^2$. Distance travelled by it in 5^{th} half second is

A. 1.25 m

B. 2.25 m

C. 6.25 m

D. 30.25 m

Answer: B

Watch Video Solution

18. The two ends of a train moving with constant acceleration pass a certain point with velocities u and 3u. The velocity with which the middle point of the train passes the same point is

A. 2u

B. $\frac{3}{2}u$

C. $\sqrt{5}u$

D. $\sqrt{10}u$

Answer: C

Watch Video Solution

19. The initial velocity of a particle is u (at t = 0) and the acceleration f is given by $f = \alpha t$. Which of the following relation is valid?

A. $v = u + \alpha t^{3/2}$

B. $v = u + \frac{\alpha t^2}{2}$

C. $v = u + \frac{2}{5}\alpha t^{5/2}$

D. $v = u + 3\alpha t^{5/2}$

Answer:

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20. The position of a particle moving along x-axis at time t is given by x = A sin ωt, where A and ω are positive constant. Select correct option. [Here a = acceleration]

A. $a = Ax$

B. $a = -\omega^2 x$

C. $a = A\omega x$

D. $a = \omega^2 x A$

Answer: B

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21. A particle moves in a straight line and its position x at time t is given by $x^2 = 2 + t$. Its acceleration is given by :-

A. $\frac{-2}{x^3}$

B. $-\frac{1}{4x^3}$

C. $-\frac{1}{4x^2}$

D. $\frac{1}{x^2}$

Answer: B

Watch Video Solution

22. A body is projected vertically upward direction from the surface of earth. If upward direction is taken as positive, then acceleration of body during its upward and downward journey are respectively

A. Positive, negative

B. Negative, negative

C. Positive, positive

D. Negative, positive

Answer: B

 Watch Video Solution

23. A particle start moving from rest state along a straight line under the action of a constant force and travel distance x in first 5 seconds. The distance travelled by it in next five seconds will be

A. x

B. 2x

C. 3x

D. s

Answer: C

Watch Video Solution

24. A body is projected vertically upward with speed 40m/s. The distance travelled by body in

the last second of upward journey is [take $g = 9.8\frac{m}{s^2}$ and neglect of air resistance]:-

A. 4.9 m

B. 9.8 m

C. 12.4 m

D. 19.6 m

Answer: A

Watch Video Solution

25. A body is moving with variable acceleartion (a) along a straight line. The average acceleration of body in time interval t_1 to t_2 is :-

A. $\frac{a[t_2 + t_1]}{2}$

B. $\frac{a[t_2 - t_1]}{2}$

C. $\frac{\int_{t_1}^{t_2} a dt}{t_2 + t_1}$

D. $\frac{\int_{t_1}^{t_2} a dt}{t_2 - t_1}$

Answer: D

Watch Video Solution

26. A body is projected vertically upward with speed $10m/s$ and other at same time with same speed in downward direction from the top of a tower. The magnitude of acceleration of first body w.r.t. second is {take $g = 10m/s^2$}

A. Zero

B. $10m/s^2$

C. $5m/s^2$

D. $20m/s^2$

Answer: A

Watch Video Solution

27. The position of a particle moving along x-axis given by $x = \left(-2t^3 - 3t^2 + 5 \right) m$. The acceleration of particle at the instant its velocity becomes zero is

A. $12m / s^2$

B. $-12m / s^2$

C. $-6m / s^2$

D. Zero

Answer: C

Watch Video Solution

28. A car travelling at a speed of 30 km per hour is brought to rest in 8 metres by applying brakes. If the same car is travelling at 60 km per hour, it can be brought tor est with the same braking force at a distance of

A. 64 m

B. 32 m

C. 16 m

D. 4 m

Answer: B

 Watch Video Solution

29. A particle is thrown with any velocity vertically upward, the distance travelled by the particle in first second of its decent is

A. g

B. $\frac{g}{2}$

C. $\frac{g}{4}$

D. Cannot be calculated

Answer: B

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30. A body is thrown vertically upwards and takes 5 seconds to reach maximum height. The

distance travelled by the body will be same in

:-

A. 1^{st} and 10^{th} second

B. 2^{st} and 8^{th} second

C. 4^{st} and 6^{th} second

D. Both (2) & (3)

Answer: A

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31. The ball is dropped from a bridge $122.5m$ above a river, After the ball has been falling for 2 s, a second ball is thrown straight down after it. What must its initial velocity be so that both hit the water at the same time ?

A. 49 m/s

B. 55.5 m/s

C. 26.1 m/s

D. 9.8 m/s

Answer: C

Watch Video Solution

32. A balloon starts rising from ground from rest with an upward acceleration $2m/s^2$. Just after 1 s, a stone is dropped from it. The time taken by stone to strike the ground is nearly

A. 0.3 s

B. 0.7 s

C. 1 s

D. 1.4 s

Answer: B

Watch Video Solution

33. A boy throws balls into air at regular interval of 2 second. The next ball is thrown when the velocity of first ball is zero. How high do the ball rise above his hand? [Take $g = 9.8m/s^2$]

A. 4.9 m

B. 9.8 m

C. 19.6 m

D. 29.4 m

Answer: C

Watch Video Solution

34. A ball is projected vertically up such that it passes thorugh a fixed point after a time t_1 and t_2 respectively. Find

a. The height at which the point is located with respect to the point of projeciton

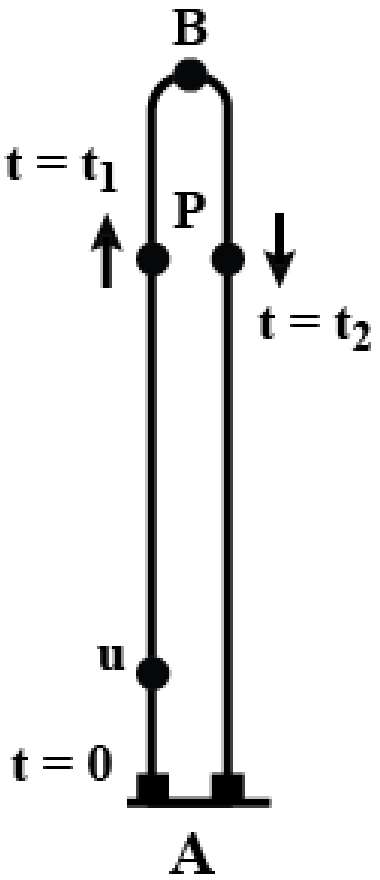
b. The speed of projection of the ball.

c. The velocity the ball at the time of passing through point P.

d. (i) The maximum height reached by the balll relative to the point of projection A (ii) maximum height reached by the ball relative to point P under consideration.

e. The average speed and average velocity of the ball during the motion from A to P for

the time t_1 and t_2 respectively.



A. $g[t_2 - t_1]$

B. $\frac{g[t_1 + t_2]}{2}$

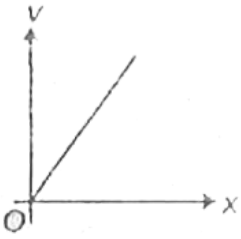
C. $\frac{g[t_2 - t_1]}{2}$

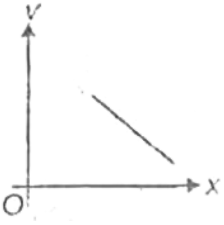
D. $g[t_1 + t_2]$

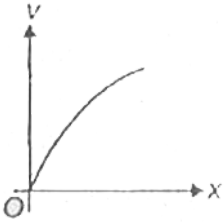
Answer: B

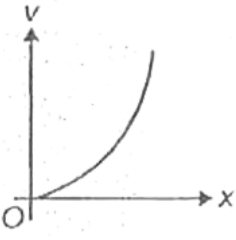
Watch Video Solution

35. For a body moving with uniform acceleration along straight line, the variation of its velocity (v) with position (x) is best represented by

A. 

B. 

C. 

D. 

Answer: C

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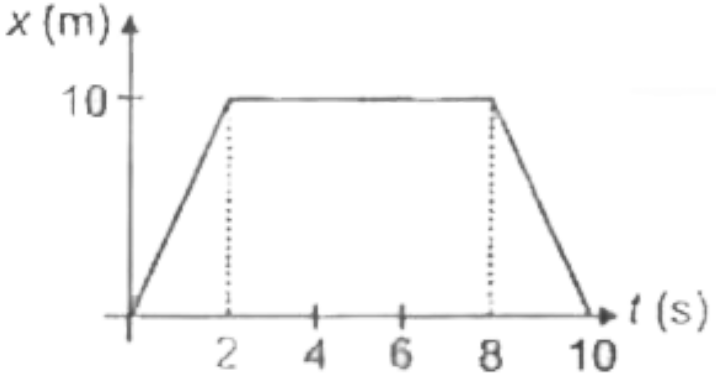
36. The position - time graph for a particle moving along a straight line is shown in figure. The total distance travelled by it in time t = 0 to t = 10 s is



A. Zero

B. 10 m

C. 20 m

D. 80 m

Answer: C

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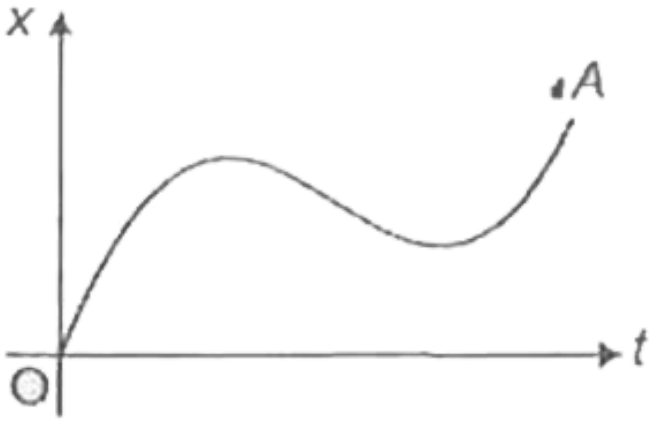
37. The position - time graph for a body moving along a straight line between O and A is shown in figure. During its motion between

O and A, how many time body comes to rest?



A. Zero

B. 1 times

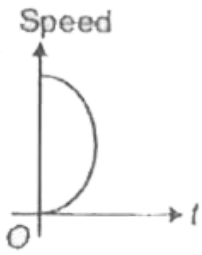
C. 2 times

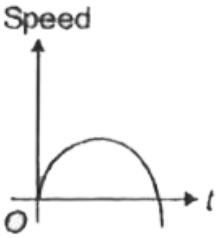
D. 3 times

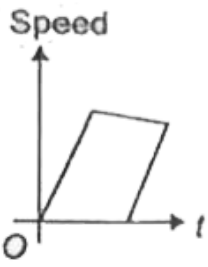
Answer: C

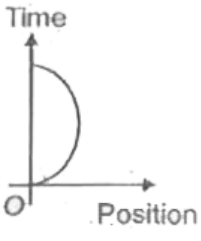
Watch Video Solution

38. Which of the following graph for a body moving along a straight line is possible ?

A. 

B. 

C. 

D. 

Answer: D

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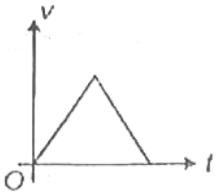
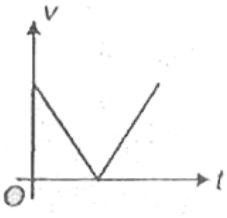
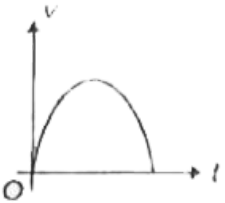
39. A body is projected vertically upward from ground. If we neglect the effect of air, then

which one of the following is the best representation of variation of speed (v) with time (t)?

A. 

B. 

C. 

D. 

Answer: B

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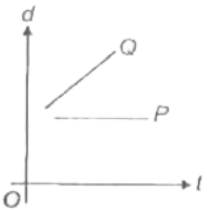
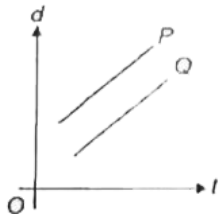
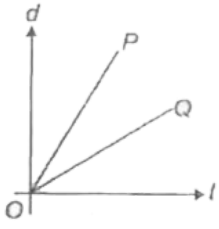
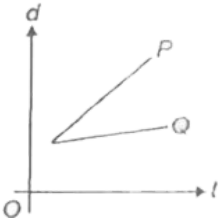
40. Which of the following position-time graphs correctly represents two moving objects A and B with zero relative velocity ?

A. 

B. 

C. 

D. 

Answer: B

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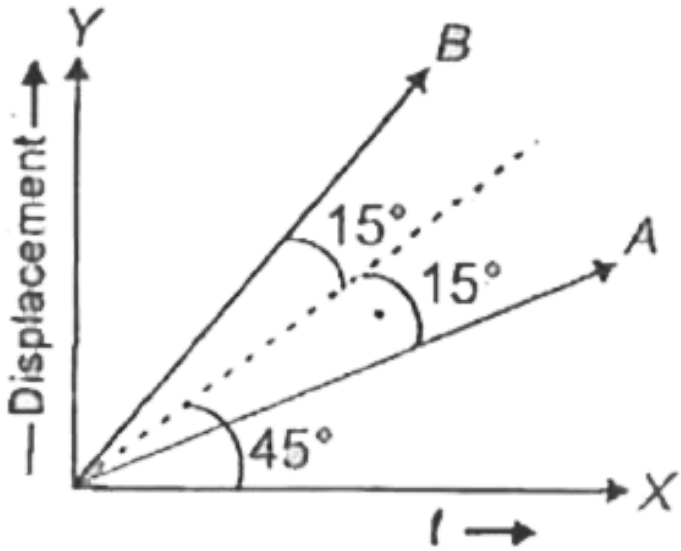
41. The displacement - time graph for two particles A and B is as follows. The ratio $\frac{v_A}{v_B}$ is



A. $1:2$

B. $1:\sqrt{3}$

C. $\sqrt{3}:1$

D. $1:3$

Answer: D

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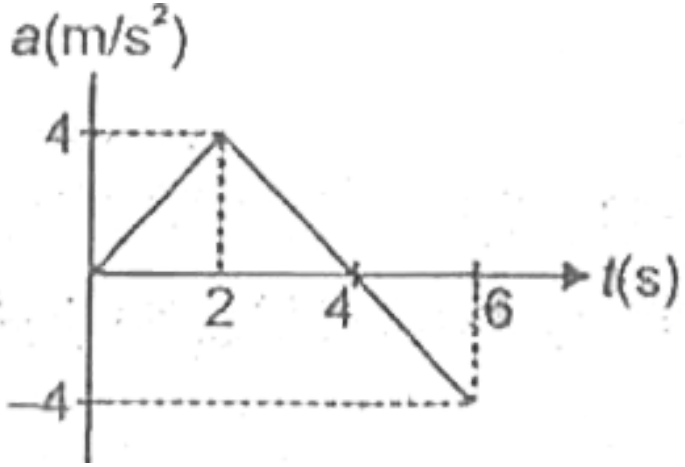
42. For the acceleration - time (a - t) graph shown in figure, the change in velocity of particle from t = 0 to t = 6 s is



A. 10 m/s

B. 4 m/s

C. 12 m/s

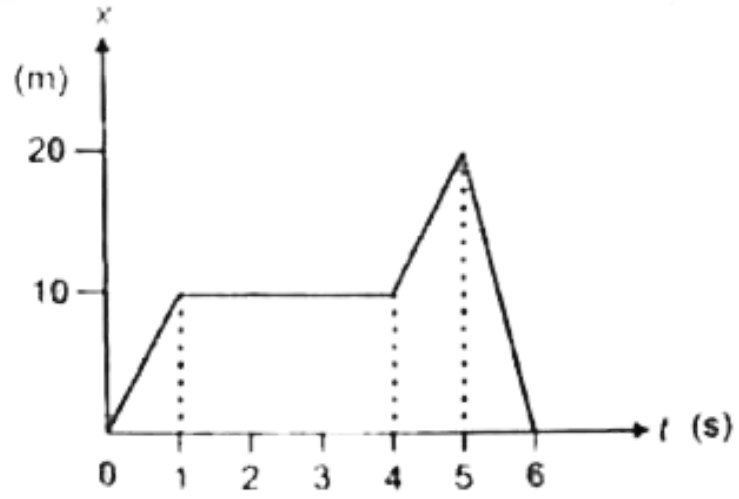
D. 8 m/s

Answer: B

Watch Video Solution

43. Figure shows the graph of x - coordinate of a particle moving along x - axis as a function of time. Average velocity during t = 0 to 6 s and instantaneous velocity at t = 3 s respectively,

will be



A. $10m/s, 0$

B. $60m/s, 0$

C. $0, 0$

D. $0, 10m/s$

Answer: C

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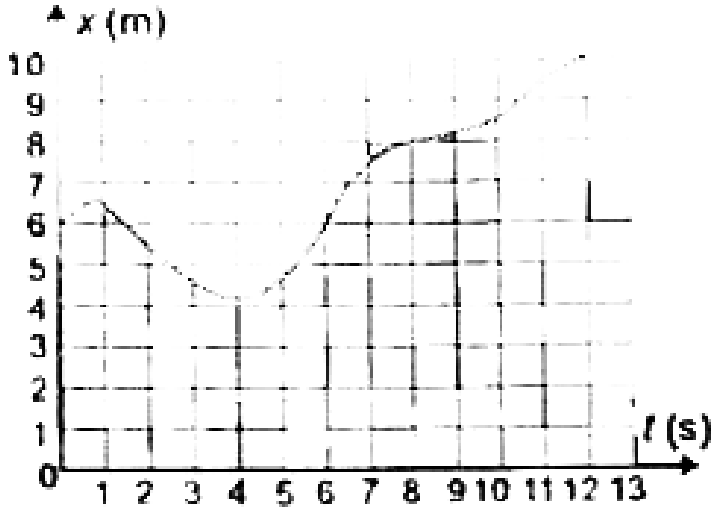
44. Position - time graph for a particle is shown in figure. Starting from t = 0, at what time t, the average velocity is zer?



A. 1 s

B. 3 s

C. 6 s

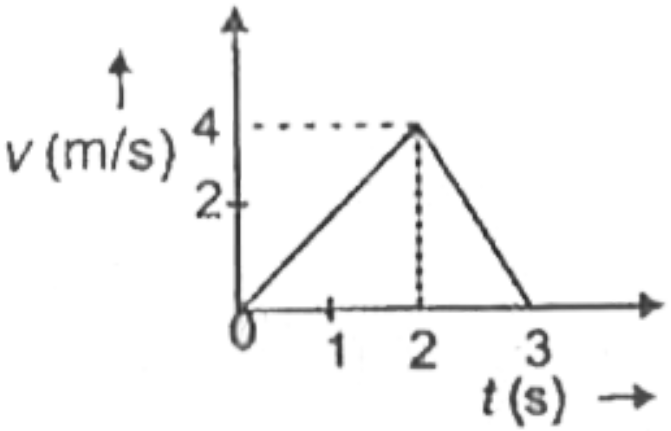
D. 7 s

Answer: C

Watch Video Solution

45. The velocity versus time graph of a body moving in a straight line is as shown in the

figure below



A. The distance covered by the body in 0 to 2s is 8m

B. The acceleration of the body in 0 to 2s is $4ms^{-2}$

C. The accelerationof the body in 2 to 3s is

$4ms^{-2}$

D. The distance moved by the body during

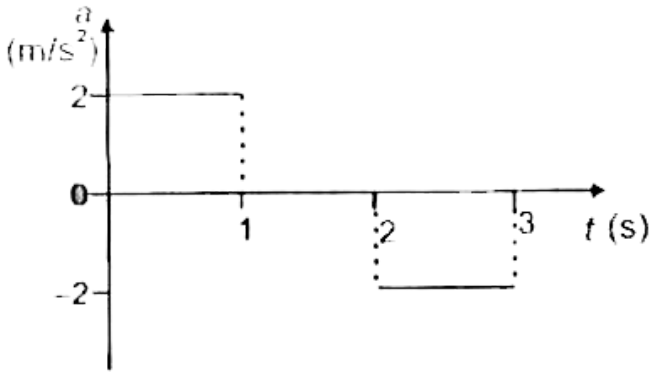
0 to 3 is 6 m

Answer: D

Watch Video Solution

46. Acceleration - time graph for a particle is given in figure. If it starts motion at t = 0,

distance travelled in 3 s will be ,br>



A. 4 m

B. 2 m

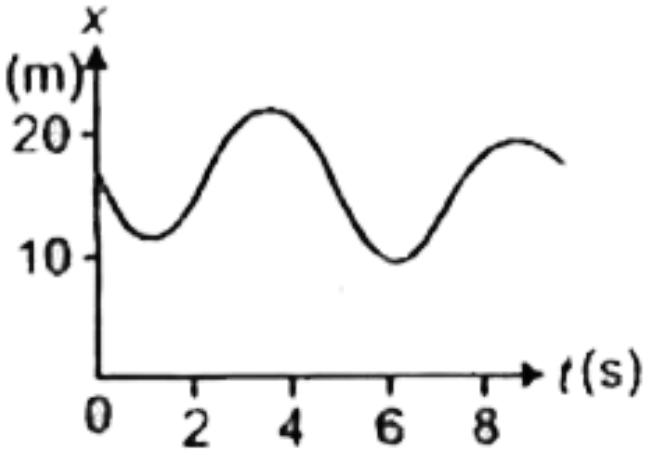
C. 0

D. 6 m

Answer: A

Watch Video Solution

47. Figure shows the position of a particle moving on the x - axis as a function of time



A. The particle has come to rest 4 times

B. The velocity at t = 8 s is negative

C. The velocity remains positive for t = 2 s to t = 6 s

D. The particle moves with constant velocity.

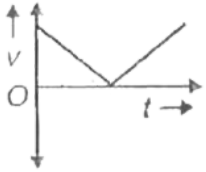
Answer: A

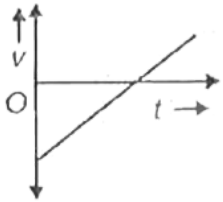
Watch Video Solution

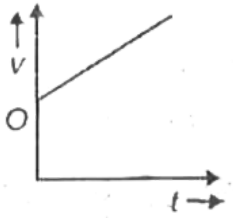
48. A particle moves along x - axis in such a way that its x - co - ordinate varies with time

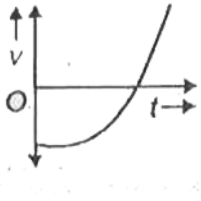
according to the equation $x = 4 - 2t + t^2$.

The speed of the particle will vary with time as

A. 

B. 

C. 

D. 

Answer: B

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49. Two balls are projected upward simultaneously with speeds 40 m/s and 60 m/s. Relative position (x) of second ball w.r.t. first ball at time t = 5 s is [Neglect air resistance].

A. 20 m

B. 80 m

C. 100 m

D. 120 m

Answer: C

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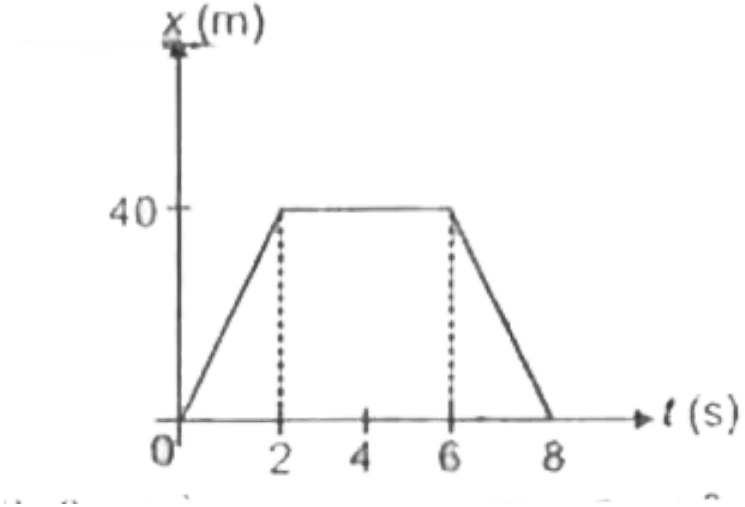
50. The position (x) of a particle moving along x - axis veries with time (t) as shown in figure. The average acceleration of particle in time

interval t = 0 to t = 8 s is



A. $3m/s^2$

B. $-5m/s^2$

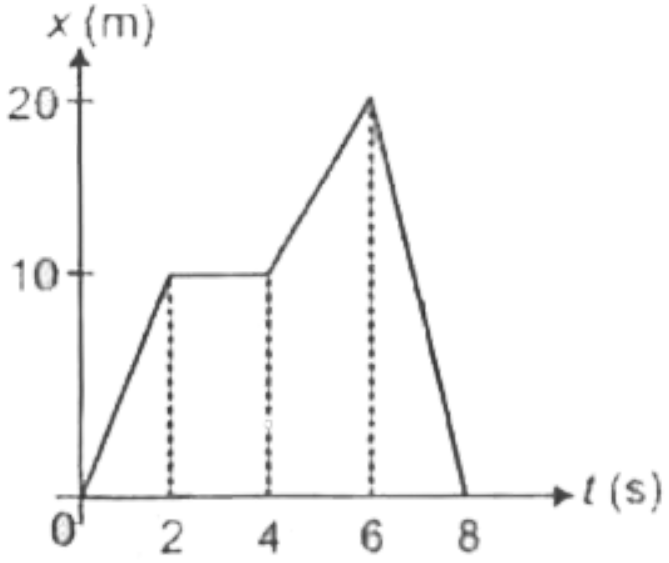
C. $-4m/s^2$

D. $2.5m/s^2$

Answer: B

Watch Video Solution

51. The position (x) - time (t) graph for a particle moving along a straight line is shown in figure. The average speed of particle in time interval t = 0 to t = 8 s is



A. Zero

B. 5 m/s

C. 7.5 m/s

D. 9.7 m/s

Answer: B

 Watch Video Solution

52. A ball is dropped from a height h above ground. Neglect the air resistance, its velocity

(v) varies with its height (y) above the ground

as :-

A. $\sqrt{2g(h-y)}$

B. $\sqrt{2gh}$

C. $\sqrt{2gy}$

D. $\sqrt{2g(h+y)}$

Answer: A

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53. A train of 150 m length is going towards north direction at a speed of 10 m/s. A bird flies at a speed of 5 m/s towards south direction parallel to the railway track. The time taken by the bird to cross the train is equal to

A. 10 s

B. 15 s

C. 30 s

D. 12 s.

Answer: A

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54. Two cars are moving in the same direction with the same speed $30km/hr$. They are separated by a distance of $5km$, the speed of a car moving in the opposite direction of it meets these two cars at an interval of 4 minutes, will be.

A. 30 km/h

B. 25 km/h

C. 40 km/h

D. 45 km/h

Answer: D

Watch Video Solution

55. Two cars A and B are moving in same direction with velocities 30 m/s and 20 m/s. When car A is at a distance d behind the car B, the driver of the car A applies brakes producing uniform retardation of $2m/s^2$. There will be no collision when :-

A. $d < 2.5m$

B. $d > 125m$

C. $d > 25m$

D. $d < 125m$

Answer: C

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56. Two trains each of length 100 m moving parallel towards each other at speed 72km/h

and 36km/h respectively. In how much time will they cross each other?

A. 4.5 s

B. 6.67 s

C. 3.5 s

D. 7.25 s

Answer: B

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57. A ball is dropped from the top of a building of height 80 m. At same instant another ball is thrown upwards with speed 50 m/s from the bottom of the building. The time at which balls will meet is

A. 1.6 s

B. 5 s

C. 8 s

D. 10 s

Answer: A

Watch Video Solution

58. A particle move with velocity v_1 for time t_1 and v_2 for time t_2 along a straight line. The magntidue of its average acceleration is

A. $\frac{v_2 - v_1}{t_1 - t_2}$

B. $\frac{v_2 - v_1}{t_1 + t_2}$

C. $\frac{v_2 - t_1}{t_2 - t_1}$

D. $\frac{v_1 + v_2}{t_1 - t_2}$

Answer: B

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Assignment Section B

1. If average velocity of particle moving on a straight line is zero in a time interval, then

A. Acceleration of particle may be zero

B. Velocity of particle must be zero at an instant

C. Velocity of particle may be never zero in the interval

D. Average speed of particle may be zero in the interval

Answer: B

Watch Video Solution

2. A car moving with speed v on a straight road can be stopped with in distance d on applying brakes. If same car is moving with

speed 3v and brakes provide half retardation, then car will stop after travelling distance

A. 6d

B. 3d

C. 9d

D. 18d

Answer: D

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3. The intial velocity of a particle moving along x axis is u (at t = 0 and x = 0) and its acceleration a is given by a = kx. Which of the following equation is correct between its velocity (v) and position (x)?

A. $v^2 = y^2 = 2kx$

B. $v^2 = u^2 + 2kx^2$

C. $v^2 = u^2 + kx^2$

D. $v^2 + u^2 = 2kx$

Answer: C

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4. The velocity v of a body moving along a straight line varies with time t as $v = 2t^2e^{-t}$, where v is in m/s and t is in second. The acceleration of body is zero at t =

A. 0

B. 2 s

C. 3

D. Both (1) & (2)

Answer: D

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5. The relation between position (x) and time (t) are given below for a particle moving along a straight line. Which of the following equation represents uniformly accelerated motion? [where α and β are positive constants]

A. $\beta x = \alpha t + \alpha\beta$

B. $\alpha x = \beta + t$

C. $xt = \alpha\beta$

D. $\alpha t = \sqrt{\beta + x}$

Answer: D

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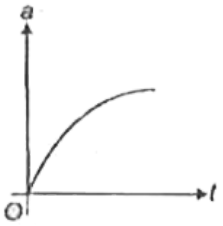
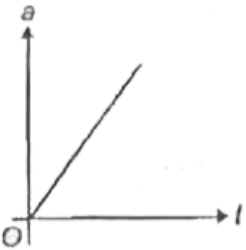
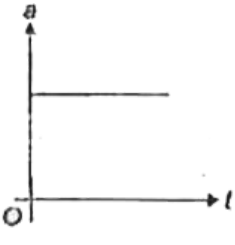
6. The velocity v of a particle moving along x - axis varies with ist position (x) as $v = \alpha\sqrt{x}$, where α is a constant. Which of the following

graph represents the variation of its acceleration (a) with time (t)?

A. 

B. 

C. 

D. 

Answer: C

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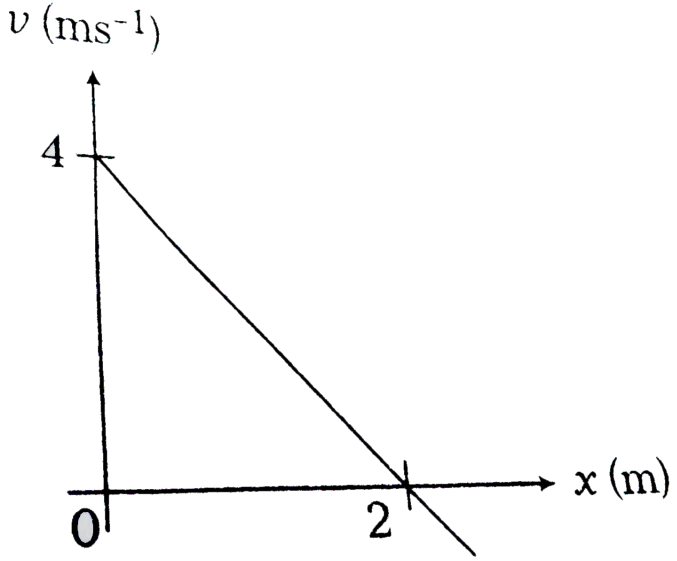
7. The velocity (v) of a particle moving along X-axis varies with its position x as shown in figure. The acceleration (a) of particle varies

with position (x) as



A. $a^2 = x + 3$

B. $a = 2x^2 + 4$

C. $2a = 3x + 5$

D. $a = 4x - 8$

Answer: D

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8. A ball is dropped from an elevator moving upward with acceleration 'a' by a boy standing in it. The acceleration of ball with respect to [Take upward direction positive]

A. Boy is - g

B. Boy is $-(g+a)$

C. Ground is $-g$

D. Both (2) & (3)

Answer: D

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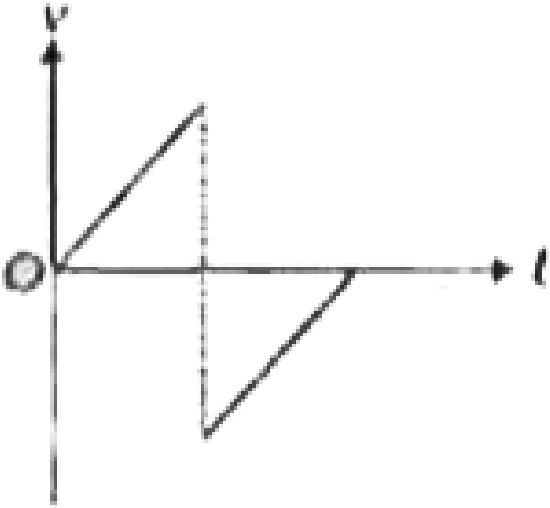
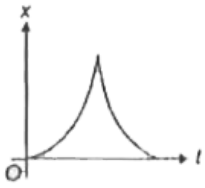
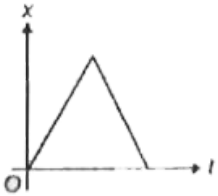
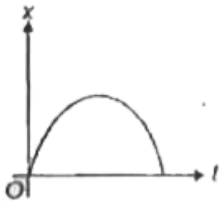
9. The velocity (v) - time (t) graph for a particle moving along x - axis is shown in the figure. The corresponding position (x) - time (t) is

best represented by



A. 

B. 

C. 

D. 

Answer: A

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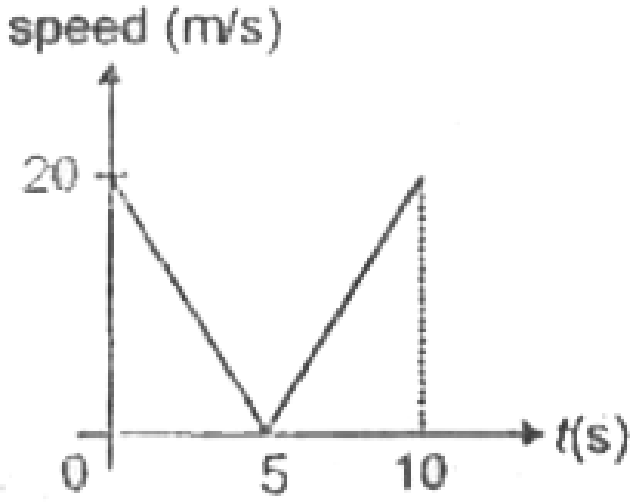
10. The speed - time graph for a body moving along a straight line is shown in figure. The

average acceleration of body may be



A. 0

B. $4m/s^2$

C. $-4m/s^2$

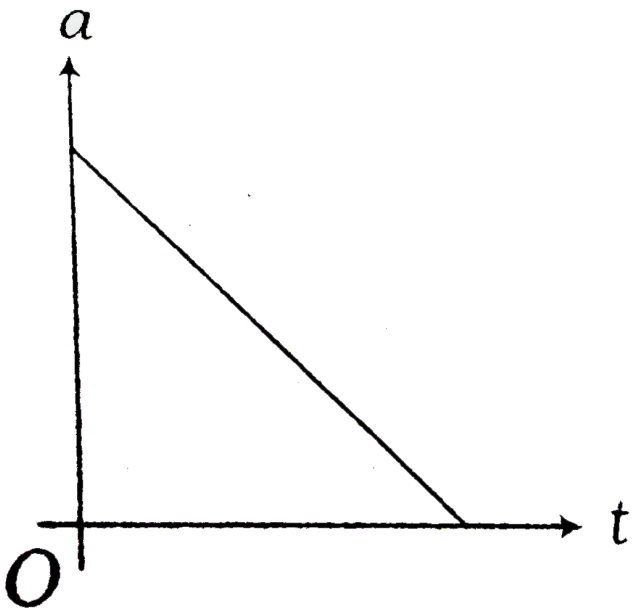
D. All of these

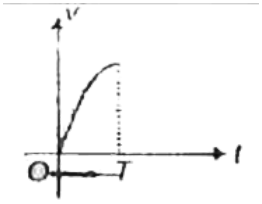
Answer: D

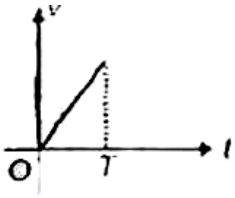
Watch Video Solution

11. The acceleration (a)-time(t) graph for a particle moving along a straight from rest is shown in figure. Which of the following graph is the best representation of its velocity (v)

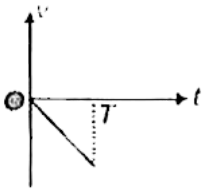
with time (t) ?



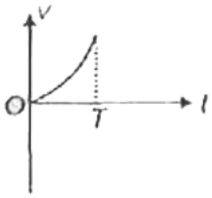
A. 

B. 

C.



D.



Answer: A

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12. A ball is thrown upward with speed 10 m/s from the top to the tower reaches the ground

with a speed 20 m/s. The height of the tower is [Take $g = 10m/s^2$]

A. 10 m

B. 15 m

C. 20 m

D. 25 m

Answer: B

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13. A ball dropped from the top of tower falls first half height of tower in 10 s. The total time spend by ball in air is $\left[\text{Take } \ g = 10m/s^2\right]$

A. 14.14 s

B. 15.25 s

C. 12.36 s

D. 17.36 s

Answer: A

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14. An object thrown verticallly up from the ground passes the height 5 m twice in an interval of 10 s. What is its time of flight?

A. $\sqrt{28}s$

B. $\sqrt{86}s$

C. $\sqrt{104}s$

D. $\sqrt{72}s$

Answer: C

Watch Video Solution

15. A particle is thrown vertically upwards. If its velocity is half of the maximum height is $20m/s$, then maximum height attained by it is

A. 35 m

B. 15 m

C. 25 m

D. 40 m

Answer: D

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16. A particle starts with initial speed u and retardation a to come to rest in time T. The time taken to cover first half of the total path travelled is

A. $\frac{T}{\sqrt{2}}$

B. $T\left(1-\frac{1}{\sqrt{2}}\right)$

C. $\frac{T}{2}$

D. $\frac{3T}{4}$

Answer: B

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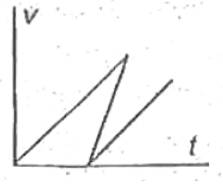
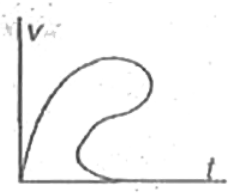
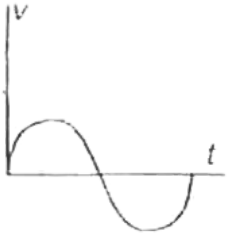
17. Which of the following speed - time (v - t) graphs is physically not possible?

A. 

B. 

C. 

D. All of these

Answer: D

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18. A particle travels half the distance of a straight journey with a speed 5 m/s. The remaining part of the distance is covered with speed 6 m/s for half the remaining time, and with speed 4 m/s for the other half of the remaining time. The average speed of the particle is

A. 3 m/s

B. 4 m/s

C. 3/4 m/s

D. 5 m/s

Answer: B

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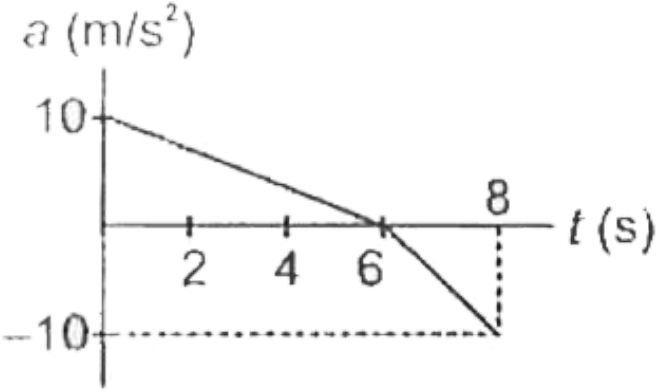
19. The acceleration - time graph for a particle moving along x - axis is shown in figure, If the initial velocity of particle is $-5m/s$, the

velocity at t = 8 s is



A. $+15m/s$

B. $+20m/s$

C. $-15m/s$

D. $-20m/s$

Answer: A

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20. A body falling a vertically up with initial velocity 52 m/s from the ground passes twice a point at h height above at an interval of 10 s. The height h is $(g = 10m/s^2)$

A. 22 m

B. 10.2 m

C. 11.2 m

D. 15 m/s

Answer: B

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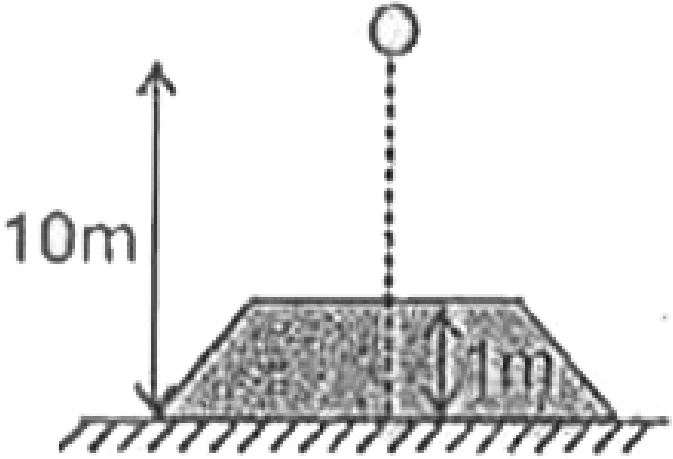
21. A body falling from a vertical height of 10 m pierces through a distance of 1 m in sand. It faces and average retardation in sand. It faces an average retardation in sand equal to (g =

acceleration due to gravity)



A. g

B. 9 g

C. 100 g

D. 1000 g

Answer: B

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22. When a particle is thrown vertically upwards, its velocity at one third of its maximum height is $10\sqrt{2}m/s$. The maximum height attained by it is

A. $20\sqrt{2}m$

B. $30m$

C. 15 m

D. 12.8 m

Answer: C

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23. A body is dropped from a height H. The time taken to cover second half of the journey is

A. $2\sqrt{\frac{2H}{g}}$

B. $\sqrt{\frac{H}{g}}$

C. $\sqrt{\frac{H}{g}}(\sqrt{2}-1)$

D. $\sqrt{\frac{2H}{g}} \times \frac{1}{\left(\sqrt{2}-1\right)}$

Answer: C

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24. A stone dropped form the top of a tower is found to travel $(5/9)$ of the height of tower during last second of its fall. The time of fall is :

A. 2 s

B. 3 s

C. 4 s

D. 5 s

Answer: B

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25. The velocity of a body depends on time according to the equation $v = \frac{t^2}{10} + 20$. The

body is undergoing

A. Uniform acceleration

B. Uniform retardation

C. Non - uniform acceleration

D. Zero acceleration

Answer: C

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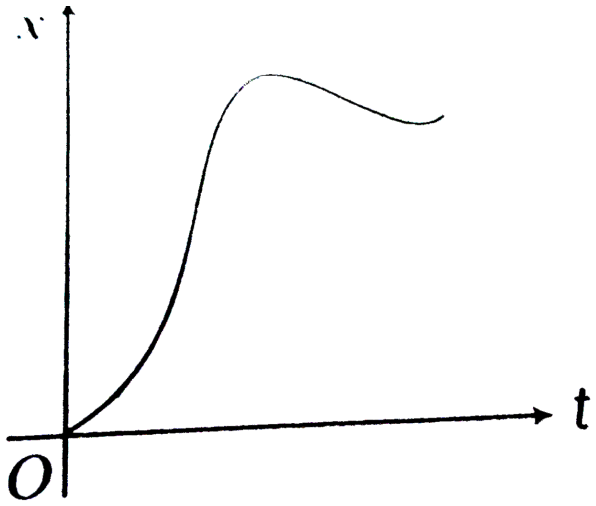
26. The displacement (x)-time (t) graph of a particle is shown in figure. Which of the following is correct ?



A. Particle starts with zero velocity and variable acceleration

B. Particle starts with non - zero velocity and variable acceleration

C. Particle starts with zero velocity and uniform acceleration

D. Particle starts with non - zero velocity and uniform acceleration

Answer: A

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27. A stone thrown upward with a speed u from the top of a tower reaches the ground with a velocity 4u. The height of the tower is

A. $\frac{15u^2}{2g}$

B. $\frac{7u^2}{2g}$

C. $\frac{16u^2}{g}$

D. Zero

Answer: A

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28. If magnitude of average speed and average velocity over a time interval are same, then

A. Particle must move with zero acceleration

B. Particle must move with uniform acceleration

C. Particle must be at rest

D. Particle must move in a straight line without turning back

Answer: D

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29. A body is dropped from a certain height h (h is very large) and second bodyis thrown downward with velocity of 5 m/s simultaneouly. What will be difference in heights of the two bodies after 3 s?

A. 5 m

B. 10 m

C. 15 m

D. 20 m

Answer: C

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30. Ball A is thrown up vertically with speed $10\frac{m}{s}$. At the same instant another ball B is released from rest at height h. At time t, the speed of A relative to B is

A. 10

B. $10 - 2gt$

C. $\sqrt{10^2 - 2gh}$

D. $10 - gt$

Answer: A

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31. A body starts from origin and moves along x - axis so that its position at any instant is

$x = 4t^2 - 12t$ where t is in second. What is the acceleration of particle?

A. $4m / s^2$

B. $8m / s^2$

C. $24m / s^2$

D. $0m / s^2$

Answer: B

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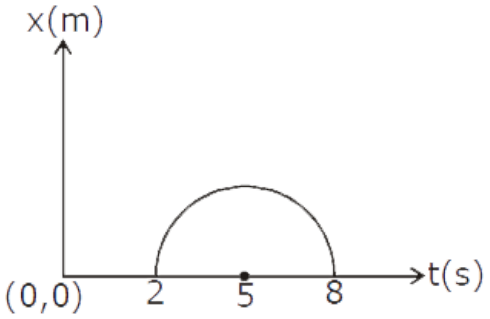
32. Position time graph of a particle moving along straight line is shown which is in the form of semicircle starting from t = 2 to t = 8 s. Select correct statement



A. Velocity of particle between t = 0 to t = 2 s is positive

B. Velocity of particle is opposite to acceleration between t = 2 to t = 5 s

C. Velocity of particle is opposite to acceleration between t = 5 to t = 8 s

D. Acceleration of particle is positive between $t_1 = 2s$ to $t_2 = 5s$ while it is negative between $t_1 = 5s$ to $t_2 = 8s$

Answer: B

Watch Video Solution

33. Two bodies starts moving from same point along straight line with velocities $v_1 = 6m/s \text{ and } v_2 = 10m/s$ simultaneously. After what time the separation becomes 40 m ?

A. 6 s

B. 8 s

C. 12 s

D. 10 s

Answer: D

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Assignment Section C

1. Two cars P and Q start from a point at the same time in a straight line and their positions are represented by $X_P(t) = at + bt^2$ and $X_Q(t) = ft - t^2$. At what time do the cars have the same velocity ?

A. $\frac{a-f}{1+b}$

B. $\frac{a+f}{2(b-1)}$

C. $\frac{a+f}{2(1+b)}$

D. $\frac{f-a}{2(1+b)}$

Answer: D

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2. If the velocity of a particle is $v = At + Bt^2$, where A and B are constants, then the distance travelled by it between 1s and 2s is

A. $\frac{A}{2} + \frac{B}{3}$

B. $\frac{3}{2}A + 4B$

C. $3A + 7B$

D. $\frac{3}{2}A + \frac{7}{3}B$

Answer: D

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3. A particle of unit mass undergoes one-dimensional motion such that its velocity varies according to

$v(x) = \beta x^{-2n}$

where β and n are constant and x is the position of the particle. The acceleration of the particle as a function of x is given by.

A. $-2n\beta^2 e^{-4n+1}$

B. $-2n\beta^2 x^{-2n-1}$

C. $-2n\beta^2 x^{-4n-1}$

D. $-2\beta^2 m^{-2n+1}$

Answer: C

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4. A stone falls freely under gravity. It covers distances h_1, h_2 and h_3 in the first 5 s, the next 5 s and the next 5 s respectively. The relation between h_1, h_2 and h_3 is

A. $h_1 = \frac{h_2}{3} = \frac{h_3}{5}$

B. $h_2 = 3h_1$ and $h_3 = 3h_2$

C. $h_1 = h_2 = h_3$

D. $h_1 = 2h_2 = 3h_3$

Answer: A

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5. The motion of a particle along a straight line is described by equation

$x = 8 + 12t - t^3$

where, x is in meter and t in sec. The retardation of the particle when its velocity becomes zero, is

A. $6ms^{-2}$

B. $12ms^{-2}$

C. $24ms^{-2}$

D. Zero

Answer: B

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

A. $5.0m/s$

B. $10.0m/s$

C. $20.0m/s$

D. $40.0m/s$

Answer: C

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7. A particle covers half of its total distance with speed v_1 and the rest half distance with speed v_2. Its average speed during the complete journey is :

A. $\frac{v_1^2 v_2^2}{v_1^2 + v_2^2}$

B. $\frac{v_1 + v_2}{2}$

C. $\frac{v_1 v_2}{v_1 + v_2}$

D. $\frac{2v_1 v_2}{v_1 + v_2}$

Answer: D

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8. A ball is dropped from a high rise platform at $t = 0$ starting from rest. After $6s$, another ball is thrwon downwards from the same platform with a speed v. The two balls meet at

$t = 18s$. What is the value of v?

(Take $g = 10ms^{-2}$)

A. $60m/s$

B. $75m/s$

C. $55m/s$

D. $40m/s$

Answer: B

Watch Video Solution

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

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

B. $(\text{Distance})^{2}$

C. $(\text{Distance})^{-2}$

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

Answer: A

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10. A bus is moving with a speed of $10ms^{-1}$ 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 scooteritst with what speed should the scooterist chase the bus?

A. $40ms^{-1}$

B. $25ms^{-1}$

C. $10ms^{-1}$

D. $20ms^{-1}$

Answer: D

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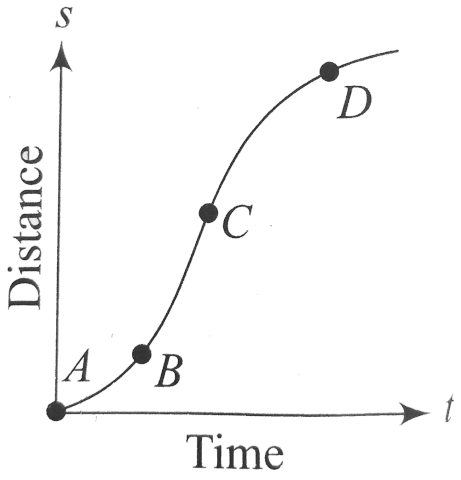
11. A particle shows distance-time curve as given in this figure. The maximum instantaneous velocity of the particle is around the point.



(a) B (b) C (c) D (d) A

A. A

B. B

C. C

D. D

Answer: C

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12. A particle moves in a straight line with a constant acceleration. Its velocity changes from $20ms^{-1}$ to $35ms^{-1}$ while passing through a distance $150m$ in t seconds. The value of t is.

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13. The distance travelled by a particle starting from rest and moving with an acceleration $3ms^{-2}$, in the $5th$ second is.

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14. A particle moving along x-axis has acceleration f, at time t, given $f = f_0\left(1 - \frac{t}{T}\right)$, where f_0 and T are constants. The particle at t = 0 has zero

velocity. When f = 0, the particle's velocity (v_x) is

A. $\frac{1}{2} f_0 T$

B. $f_0 T$

C. $\frac{1}{2} f_0 T^2$

D. $f_0 T^2$

Answer: A

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15. A car moves from X to Y with a uniform speed v_u and returns to X with a uniform speed v_d. The average speed for this round trip is :

(a) $\frac{2v_dv_u}{v_d+v_u}$ (b) $\sqrt{v_u u_d}$ (c) $\frac{v_dv_u}{v_d+v_u}$ (d) $\frac{v_u+v_d}{2}$

A. $\frac{V_u+V_d}{2}$

B. $\frac{2V_aV_d}{V_d+V_a}$

C. $\sqrt{V_aV_d}$

D. $\frac{V_d+V_a}{V_d+V_a}$

Answer: B

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16. The position x of a particle w.r.t. time t along x-axis is given by a $x = 9t^2 - t^3$, where x is in metre and t in sec. What will be the position of this particle when it achieves maximum speed along the +x direction ?

A. 24 m

B. 32 m

C. 54 m

D. 81 m

Answer: C

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17. A particle moves along a straight line. At a time t (in seconds) the distance x (in meter) of the particle is given by $x = \frac{1}{3}t^3 + 3t^2 - 7t$. How long would the particle travel before coming to rest ?

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18. Two bodies A (of mass $1kg$) and B (of mass $3kg$) are dropped from heights of $16m$ and $25m$. Respectively. The ratio of the time taken to reach the ground is :

(a) $\frac{5}{4}$ (b) $\frac{12}{5}$ (c) $\frac{5}{12}$ (d) $\frac{4}{5}$

A. $\frac{5}{4}$

B. $\frac{12}{5}$

C. $\frac{5}{12}$

D. $\frac{4}{5}$

Answer: D

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19. The displacement x of a particle varies with time t as $x = ae^{-\alpha t} + be^{\beta t}$, where a, b,$\alpha$ and β are positive constants. The velocity of the particle will

A. Go on decreasing with time

B. Be independent of α and β

C. Drop to zero when $\alpha = \beta$

D. Go on increasing with time

Answer: D

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20. A ball is thrown vertically up ward. It has a speed of 10m/sec when it has reached one half of its maximum height. How high does the ball rise? Take $g = 10m/s^2$ -

A. 15 m

B. 10 m

C. 20 m

D. 5 m

Answer: B

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21. The displacement 'x' (in meter) of a particle of mass 'm' (in kg) moving in one dimension under the action of a force is released to time

't' (in sec) by $t^2 = \sqrt{x} + 2$. The displacement of the particle when its velocity is zero will be.

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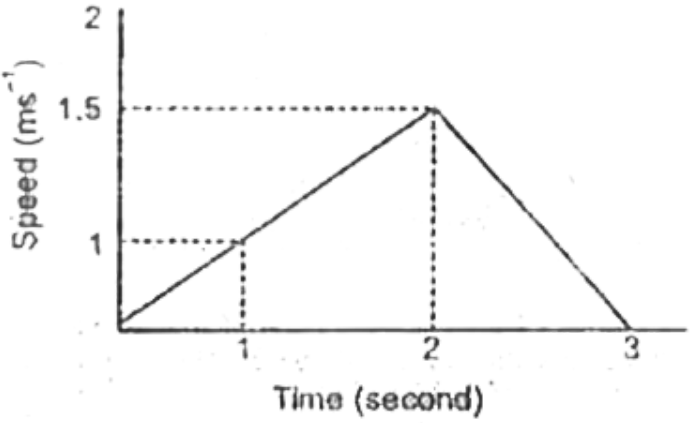
22. The speed - time graph of a particle moving along a solid curve is shown below. The distance traversed by the particle from t = 0 to

t = 3 is



A. $\frac{9}{2}m$

B. $\frac{9}{4}m$

C. $\frac{10}{3}m$

D. $\frac{10}{5}m$

Answer: B

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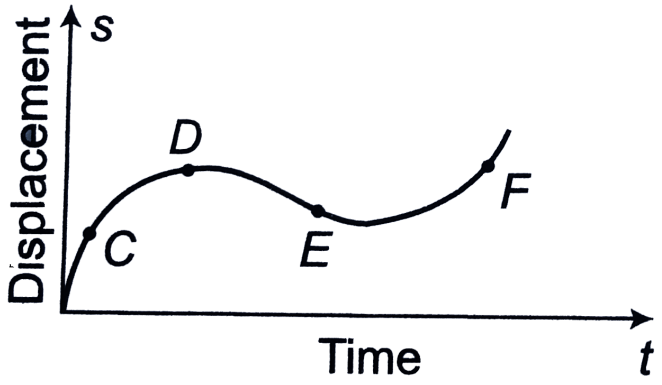
23. The displacement-time graph of moving particle is shown below



The instantaneous velocity of the particle is negative at the point

A. E

B. F

C. C

D. D

Answer: A

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24. Two bodies A (of mass $1kg$) and B (of mass $3kg$) are dropped from heights of $16m$ and $25m$. Respectively. The ratio of the time

taken to reach the ground is :

(a) $\frac{5}{4}$ (b) $\frac{12}{5}$ (c) $\frac{5}{12}$ (d) $\frac{4}{5}$

A. $\frac{4}{5}$

B. $\frac{5}{4}$

C. $\frac{12}{5}$

D. $\frac{5}{12}$

Answer: A

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25. A particle moving along x-axis has acceleration f, at time t, given $f = f_0\left(1 - \frac{t}{T}\right)$, where f_0 and T are constants. The particle at t = 0 has zero velocity. When f = 0, the particle's velocity (v_x) is

A. $\frac{1}{2} f_0 T$

B. $f_0 T^2$

C. $\frac{1}{2} f_0 T$

D. $f_0 T$

Answer: C

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26. A ball is dropped from a high rise platform at $t = 0$ starting from rest. After $6s$, another ball is thrwon downwards from the same platform with a speed v. The two balls meet at $t = 18s$. What is the value of v?

(Take $g = 10ms^{-2}$)

A. $60m/s$

B. $75m/s$

C. $55m/s$

D. $40m/s$

Answer: B

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27. The velocity of train increases uniformly from 20 km/h to 60 km/h in 4 hour. The distance travelled by the train during this period is

A. 160 km

B. 180 km

C. 100 km

D. 120 km

Answer: A

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28. A particle moves along a straight line such that its displacement at any time t is given by

$s = \left(t^3 - 6t^2 + 3t + 4\right)m$

The velocity when the acceleration is zero, is

A. $3m / s$

B. $42m / s$

C. $-9m / s$

D. $-15m / s$

Answer: D

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29. A car accelerates from rest at a constant rate α for some time, after which it decelerates at a constant rate β, to come to rest. If the total time elapsed is t seconds. Then evalute the maximum velocity aquired by the car is

A. $\frac{(\alpha^2 - \beta^2)t}{\alpha\beta}$

B. $\frac{(\alpha^2 + \beta^2)t}{\alpha\beta}$

C. $\frac{(\alpha + \beta)t}{\alpha\beta}$

D. $\frac{\alpha\beta t}{\alpha + \beta}$

Answer: D

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30. Water drops fall at regular intervals from a tap which is 5 m above the ground. The third drop is leaving the tap at the instant the first drop touches the ground. How above the ground is the second drop at that instant ?

A. 3.75 m

B. 4.00 m

C. 1.25 m

D. 2.50 m

Answer: A

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31. The acceleration of a particle is increasing linerly with time t as bt. The particle starts from the origin with an initial velocity v_0. The distance travelled by the particle in time t will be

A. $v_0 t + \frac{1}{3} b t^2$

B. $v_0 t + \frac{1}{2} b t^2$

C. $v_0 t + \frac{1}{6} b t^2$

D. $v_0 t + \frac{1}{3} b t^3$

Answer: C

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32. If a car, initially at rest, accelerates uniformly to a speed of $50 m s^{-1}$ in $25 s$, distance travelled by it is

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33. The position x of a particle varies with time t as $x = at^2 - bt^3$. The acceleration at time t of the particle will be equal to zero, where (t) is equal to .`

A. $\frac{a}{3b}$

B. Zero

C. $\frac{2a}{3b}$

D. $\frac{a}{b}$

Answer: A

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34. Motion of particle is given by equation

$s = \left(5t^3 + 3t^2 + 8t + 17\right)m$

The value of acceleration of the particle at t = 2 s is

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35. If a ball is thrown vertically upwards with speed u, the distance coverd during the last t second of its ascent is

A. ut

B. $\frac{1}{2}gt^2$

C. $ut - \frac{1}{2}gt^2$

D. $(u + gt)t$

Answer: B

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36. A man throws balls with same speed vertically upwards one after the other at an interval of 2 s. What should be the speed of throw so that more than two balls are in the sky at any time?

A. More than 19.6 m/s

B. At least 9.8 m/s

C. Any speed less than 19.6 m/s

D. Only with speed 19.6 m/s

Answer: A

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Assignment Section D

1. A : It is not possible to have constant velocity and variable acceleration.

R : Accelerated body cannot have constant velocity.

A. If both Assertion & Reason are true and the reason is the correct explanation of

the assertion, then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion, then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement, then mark (4).

Answer: 1

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2. A : The direction of velocity of an object can be reversed with constant acceleration.

R : A ball projected upward reverse its direction under the effect of gravity.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation

of the assertion, then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement, then mark (4).

Answer: 2

Watch Video Solution

3. A : When the velocity of an object is zero at an instant, the acceleration need not be zero at that instant.

R : In motion under gravity, the velocity of body is zero at the top - most point.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation

of the assertion, then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement, then mark (4).

Answer: 4

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4. A : A body moving with decreasing speed may have increasing acceleration.

R : The speed of body decreases, when acceleration of body is opposite to velocity.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion, then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement, then mark (4).

Answer: 1

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5. A : for a moving particle distance can never be negative or zero.

R : Distance is a scalar quantity and never decreases with time for moving object.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion, then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement, then mark (4).

Answer: 1

 Watch Video Solution

6. A : If speed of a particle is never zero than it may have zero averag speed.

R : The average speed of a moving object in a closed path is zero.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion, then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement, then mark (4).

Answer: 4

Watch Video Solution

7. A : The magntidue of average velocity in an interval can never be greater than average speed in that interval.

R : For a moving object distance traveled $\geq|\text{Displacement}|$

A. If both Assertion & Reason are true and the reason is the correct explanation of

the assertion, then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion, then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement, then mark (4).

Answer: 1

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8. A : The area under acceleration - time graph is equal to velocity of object.

R : For an object moving with constant acceleration, position - time graph is a straight line.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion, then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement, then mark (4).

Answer: 4

Watch Video Solution

9. A : The motion of body projected under the effect of gravity without air resistance is uniformly accelerated motion.

R : If a body is projected upward or downwards, then the distance of acceleration is downward

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion, then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement, then mark (4).

Answer: 2

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10. A : The relative acceleration of two objects moving under the effect of gravity, only is always zero, irrespective of direction of motion.

R : The acceleration of object moving under the effect of gravity have acceleration always in downward direction and is independent from size and mass of object.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion, then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement, then mark (4).

Answer: 1

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11. A : In the presence of air resistance, if the ball is thrown vertically upwards then time of ascent is less than the time of descent.

R : Force due to air friction always acts opposite to the motion of the body.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation

of the assertion, then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement, then mark (4).

Answer: 1

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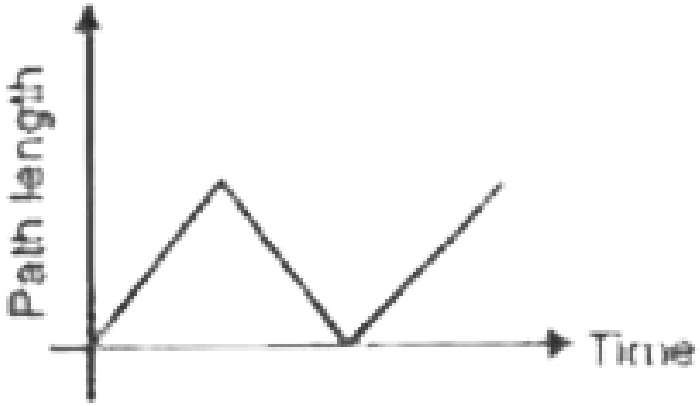
12. A : The following graph can't exist actually



R :Total path length never decreases with time.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion, then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement, then mark (4).

Answer: 1

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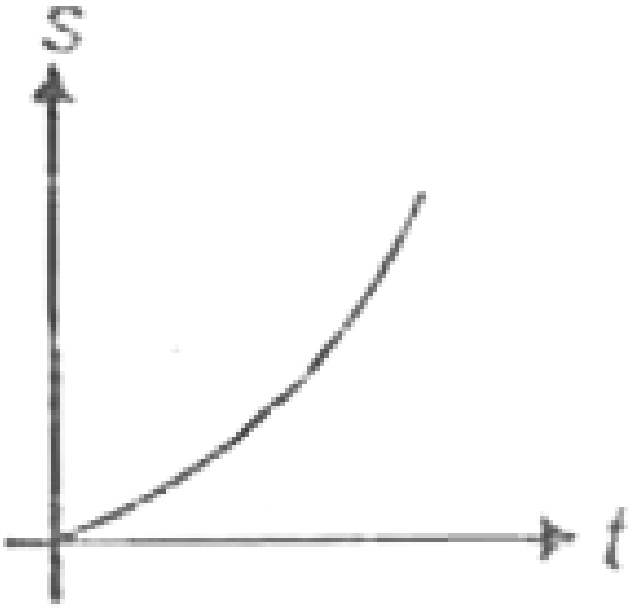
13. A : The displacement (s) time graph shown in the figure represents an accelerated motion.



R : Slope of graph increases with time.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion, then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement, then mark (4).

Answer: 1

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14. A : Average velocity can be zero, but average speed of a moving body can not be zero in any finite time interval.

R : For a moving body displacement can be zero but distance can never be zero.

A. If both Assertion & Reason are true and the reason is the correct explanation of

the assertion, then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion, then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement, then mark (4).

Answer: 1

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15. A : For a particle moving in a straight line, its acceleration must be either parallel or antiparallel to velocity.

R : A body moving along a curved path may have constant acceleration.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion, then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement, then mark (4).

Answer: 2

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