PHYSICS

BOOKS - UNIVERSAL BOOK DEPOT 1960 PHYSICS (HINGLISH)

MOTION IN ONE DIMENSION

Ordinary Thinking

1. A Body moves 6m north, 8m east and 10m vertically upwards, what is its resultant displacement from initial position

A. $10\sqrt{2}m$

B. $10m$

C. $\frac{10}{\sqrt{2}}m$

D. $10 \times 2m$

Answer: A

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2. A man goes 10 m towards North, then 20 m towards east then displacement is

A. 22.5 m

B. 25m

C. 25.5m

D. 30m

Answer: A

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3. A person moves 30m north and then 20 m towards east and finally $30\sqrt{2}$m in south-west direction. The displacement of the person from the

origin will be

A. 10m along north

B. 10m long south

C. 10m along wast

D. Zero

Answer: C

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4. An aeroplane flies 400 m north and 300m south and then flies 1200 m upwards then net displacement is

A. 1200 m

B. 1300m

C. 1400 m

D. 1500 m

Answer: A

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5. An athelete completes one round of a circular track of radius R in 40 seconds. What will be the displacement at the end of ` 2 min. 20 second ?

A. Zero

B. 2R

C. $2\pi R$

D. $7\pi R$

Answer: B

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6. A wheel of radius $1m$ rolls forward half a revolution on a horizontal ground. The magnitude of the displacement of the point of the wheel

initially on contact with the ground is.

A. 2π

B. $\sqrt{2}\pi$

C. $\sqrt{\pi^2+4}$

D. π

Answer: C

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Uniform Motion

1. A person travels along a straight road for the first half length with a velocity v_1 and the second half length with velocity v_2. What is the mean velocity of the person ?

A. $v_1 v_2$

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

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

D. $\frac{2v_1v_2}{v_1 + v_2}$

Answer: D

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2. The displacement-time graph for two particles A and B are straight lines inclined at angles of 30° and 60° with the time axis. The ratio of velocities of $V_A : V_B$ is

A. $1:2$

B. $1:\sqrt{3}$

C. $\sqrt{3}:1$

D. $1:3$

Answer: D

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3. A car travels from A to B at a speed of $20km/hr$ and returns at a speed of $30km/hr$. The average speed of the car for the whole journey is

A. $25km/hr$

B. $24km/hr$

C. $50km/hr$

D. $5km/hr$

Answer: B

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4. A boy walks to his school at a distance of $6km$ with constant speed of $2.5kmh^{-1}$ and walks back with a constant speed of $4kmh^{-1}$. What is avetage speed for the round trip in kmh^{-1} ?

A. $24/13$

B. $40/13$

C. 3

D. $1/2$

Answer: B

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5. A car travels the first half of a distance between two places at a speed of $30km/hr$ and the second half of the distance at $50km/hr$. The average speed of the car for the whole journey is

A. $42.5km/hr$

B. $40.0km/hr$

C. $36.5km/hr$

D. $35.0km/hr$

Answer: C

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6. One car moving on a staright road covers one-third of the distance with 20 $\frac{km}{hr}$ and the rest with 60 $\frac{km}{hr}$. The average speed is

A. $40km/hr$

B. $80km/hr$

C. $46\frac{2}{3}km/hr$

D. $36km/hr$

Answer: D

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7. A car moves for half of its time at $80km/h$ and for rest of time at $40km/h$. Total distance covered is $60km$. What is the average speed of

the car

A. $60k\frac{m}{h}$

B. $80km/h$

C. $120km/h$

D. $180km/h$

Answer: A

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8. A train has a speed of $60km/h$ for the first one hour and $40\frac{k}{h}$ for the next half hour. Its average speed in km/h is

A. 50

B. 53.33

C. 48

D. 70

Answer: B

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9. Which of the following is a one-dimensional motion ?

A. Landing of an aircraft

B. Earth revolving a round the sun

C. Motion of wheels of a moving trains

D. Train running on a straight track

Answer: D

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10. A $150m$ long train is moving with a uniform velocity of $45km/h$. The time taken by the train to cross a bridge of length 850 metres is.

A. 56 sec

B. 68 sec

C. 80 sec

D. 92 sec

Answer: C

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11. A particle is constrained to move on a straight line path. It returns to the starting point after 10 sec . The total distance covered by the particle during this time is 30 m . Which of the following statements about the motion of the particle is false

A. Displacement of the particle is zero

B. Average speed of the particle is $3m/s$

C. Displacement of the particle is 30m

D. Both (a) and (b)

Answer: C

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12. A particle moves along a semicircle of radius $10m$ in 5 seconds. The average velocity of the particle is

A. $2\pi ms^{-1}$

B. $4\pi ms^{-1}$

C. $2ms^{-1}$

D. $4ms^{-1}$

Answer: D

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13. A man walks on a straight road form his home to a market 2.5 km away with speed of 5 $\frac{km}{hr}$. Finding the market closed, he instantly turns

and walks back home with a speed of 7.5 $\frac{km}{hr}$. The average speed of the man over the intervel of time 0 to 40 min is equal to

A. $5km/h$

B. $\frac{25}{4}km/h$

C. $\frac{30}{4}km/h$

D. $\frac{45}{8}km/h$

Answer: D

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14. The ratio of the numerical values of the average velocity and average speed of a body is always.

A. Unity

B. Unity or less

C. Unity or more

D. Less than unity

Answer: B

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15. A person travels along a straight road for the first half length with a velocity v_1 and the second half length with velocity v_2. What is the mean velocity of the person ?

A. $\frac{2}{V} = \frac{1}{v_1} + \frac{1}{v_2}$

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

C. $V = \sqrt{v_1 v_2}$

D. $V = \sqrt{\frac{v_1}{v_2}}$

Answer: B

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16. If a car covers $\frac{2}{(5)^{th}}$ of the total distance with v_1 speed and $\frac{3}{(5)^{th}}$ distance with v_2. Then average speed is

A. $\frac{1}{2}\sqrt{v_1 v_2}$

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

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

D. $\frac{5v_1 v_2}{3v_1 + 2v_2}$

Answer: D

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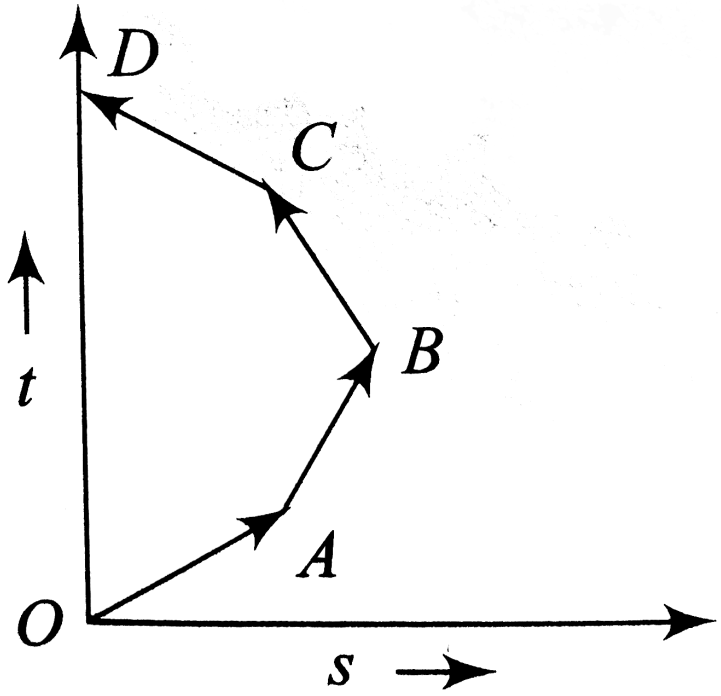

17.

Which of the following option is correct for the object having a staright line motion represented by the following graph?

A. The object moves with constantly increasing velocity from O to A and then it moves with constant velocity.

B. Velocity of the object increases uniformly

C. Average velocity is zero

D. The graph shown is impossible

Answer: C

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18. The numerical ratio of displacement to the distance covered is always

A. Less than one

B. Equal to one

C. Equal to or less than one

D. Equal to or greater than one

Answer: C

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19. A 100 m long train is moving with a uniform velocity of $45km/hr$. The time taken by the train to cross a bridge of length 1 km is

A. 58s

B. 68s

C. 8s

D. 88s

Answer: D

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20. A particle moves in straight line in same direction for 20 seconds with velocity $3m/s$ and the moves with velocity $4m/s$ for another 20 sec and finally moves with velocity $5m/s$ for next 20 seconds. What is the average velocity of the particle?

A. $3m/s$

B. $4m/s$

C. $5m/s$

D. Zero

Answer: B

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21. The correct statement from the following is

A. A body having zero velocity will not necessarily have zero acceleration

B. A body having zero velocity will necessarily have zero acceleration

C. A body having uniform speed can have only uniform acceleration

D. A body having non-uniform velocity will have zero acceleration

Answer: A

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22. A bullet fired into a fixed target loses half of its velocity after penetrating 3 cm . How much further it will penetrate before coming to

rest assuming that it faces constant resistance to motion?

A. $1.5cm$

B. $1.0cm$

C. $3.0cm$

D. $2.0cm$

Answer: B

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23. Two boys are standing at the ends A and B of a ground, where $AB = a$. The boy at B starts running in a direction perpendicular to AB with velocity v_1. The boy at A starts running simultaneously with velocity v and catches the other boy in a time t, where t is :

A. $a / \sqrt{v^2 + v_1^2}$

B. $\sqrt{a^2 / (v^2 - v_1^2)}$

C. $a/(v-v_1)$

D. $a/(v+v_1)$

Answer: B

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24. A car travels half the distance with a constant velocity of $40m/s$ and the remaining half with a constant velocity of $60m/s$. The average velocity of the car in m/s is

A. 40

B. 45

C. 48

D. 50

Answer: C

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Non Uniform Motion

1. A particle experiences a constant acceleration for 20 sec after starting from rest. If it travels distance S_1 in the first 10 sec and a distance S_2 in the next 10 sec, Then

A. $S_1 = S_2$

B. $S_1 = S_2/3$

C. $S_1 = S_2/2$

D. $S_1 = S_2/4$

Answer: B

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2. The displacement x of a particle along a straight line at time t is given by $x = a_0 + a_1 t + a_2 t^2$. The acceleration of the particle is

A. a_0

B. a_1

C. $2a_2$

D. a_2

Answer: C

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3. The co-ordinates of a moving particle at any time t are given by $x = ct^2$ and $y = bt^2$The speed of the particle is

A. $2t(a+b)$

B. $2t\sqrt{(a^2-b^2)}$

C. $t\sqrt{a^2+b^2}$

D. $2t\sqrt{(a^2+b^2)}$

Answer: D

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4. An electron starting from rest has a velocity that increase linearly with time that is $v = kt$, where$k = 2m/s^2$. What will be the distance covered in first $3\sec onds$ of its motion ?

A. 9m

B. 16m

C. 27m

D. 36m

Answer: A

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5. The displacement of a body is proporticonal to the cube of time elapsed. What is the nature of the acceleration of the body ?

A. Increasing with time

B. Decreasing with time

C. Constant but not zero

D. Zero

Answer: A

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6. The instantaneous velocity of a body can be measured

A. Graphically

B. Vectorially

C. By speedometer

D. None of these

Answer: A::C

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7. A body is moving from rest under constant acceleration and let S_1 be the displacement in the first $(p-1)$ sec and S_2 be the displacement in the first p sec. The displacement in $\left(p^2-p+1\right)$ sec. will be

A. S_1+S_2

B. $S_1 S_2$

C. S_1-S_2

D. S_1 / S_2

Answer: A

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8. A body under the action of several forces will have zero acceleration

A. When the body is very light

B. When the body is very heavy

C. When the body is a point body

D. When the vector sum of all the forces acting on it is zero

Answer: D

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9. A body starts from the origin and moves along the X-axis such that the velocity at any instant is given by $\left(4t^3 - 2t\right)$, where t is in sec and velocity in m/s. what is the acceleration of the particle when it is 2 m from the origin?

A. $28m / s^2$

B. $22m / s^2$

C. $12m / s^2$

D. $10m / s^2$

Answer: B

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10. The relation between time t and displacement x is $t = \alpha x^2 + \beta x$, where α and β are constants. The retardation is

A. $2\alpha v^3$

B. $2\beta v^3$

C. $2\alpha\beta v^3$

D. $2\beta^2 v^3$

Answer: A

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11. A point moves with uniform acceleration and v_1, v_2, and v_3 denote the average velocities in the three successive intervals of time t_1. t_2, and t_3 Which of the following Relations is correct?.

A. $(v_1 - v_2) : (v_2 - v_3) = (t_1 - t_2) : (t_2 + t_3)$

B. $(v_1 - v_2) : (v_2 - v_3) = (t_1 + t_2) : (t_2 + t_3)$

C. $(v_1 - v_2) : (v_2 - v_3) = (t_1 - t_2) : (t_1 - t_3)$

D. $(v_1 - v_2) : (v_2 - v_3) = (t_1 - t_2) : (t_2 - t_3)$

Answer: B

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12. The acceleration of a moving body can be found from

A. Area under velcity-time graph

B. Area under distance-time graph

C. Slope of the velocity-time graph

D. Slope of distance-time graph

Answer: C

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

A. $v = u + at^2$

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

C. $v = u + at$

D. $v = u$

Answer: B

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14. The initial velocity of the particle is $10m/\sec$ and its retardation is $2m/\sec^2$. The distance moved by the particle in 5th second of its motion is

A. 1m

B. 19m

C. 50m

D. 75m

Answer: A

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15. A motor car moving with a uniform speed of $20m/\sec$ comes to stop on the application of brakes after travelling a distance of 10m Its acceleration is

A. $20m/\sec^2$

B. $-20m/\sec^2$

C. $-40m/\sec^2$

D. $+2m/\sec^2$

Answer: B

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16. The velocity of a body moving with a uniform acceleration of $2m/\sec^2$ is $10m/\sec$. Its velocity after an interval of 4sec is

A. $12m/\sec$

B. $14m/\sec$

C. $16m/\sec$

D. $18m/\sec$

Answer: D

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17. A particle starting from rest travels a distance x in first 2 seconds and a distance y in next two seconds, then

A. $y = x$

B. $y = 2x$

C. $y = 3x$

D. $y = 4x$

Answer: C

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18. The initial velocity of a body moving along a straight lines is $7m/s$. It has a uniform acceleration of $4m/s^2$ the distance covered by the body in the 5^{th} second of its motion is-

A. 25 m

B. 35 m

C. 50m

D. 85m

Answer: A

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19. The velocity fo a body depends on time according to equation, $v = 2.0 + 0.1t^2$. The body is undergoing.

A. Uniform acceleration

B. uniform retardation

C. Non-uniform acceleration

D. Zero acceleration

Answer: C

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20. Which of the following four statements is false

A. A body can have zero velocity and still be accelerated

B. A body can have a constant velocity and still have a varying speed

C. A body can have a constant speed and still have a varying velocity

D. The direction of the velocity of a body can change when its acceleration is constant

Answer: B

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21. A particle moving with a uniform acceleration travels $24m$ and $64m$ in first two successive intervals of 4 seconds each. Its initial velocity is.

A. $1m/\sec$

B. $10m/\sec$

C. $5m/\sec$

D. $2m/\sec$

Answer: A

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22. The position of a particle moving in the xy plane at any time t is given by $x = (3t^2 - 6t)$ metres, $y = (t^2 - 2t)$ metres. Select the correct statement about the moving particle from the following

A. The acceleration of the particle is zero at $t = 0$ second

B. The velocity of the particle is zero at $t = 0$ second

C. The velocity of the particle is zero at $t = 1$ second

D. The velocity and acceleration of the particle are never zero

Answer: C

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23. If body having initial velocity zero is moving with uniform acceleration $8m/\sec^2$ the distance travelled by it in fifth second will be

A. 36 metres

B. 40 metres

C. 100 metres

D. Zero

Answer: A

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24. An alpha particle enters a hollow tube of 4m length with an initial speed of $1km/s$. It is accelerated in the tube and comes out of it with a speed of $9km/s$. The time for which it remains inside the tube is

A. $8 \times 10^{-3}s$

B. $80 \times 10^{-3}s$

C. $800 \times 10^{-3}s$

D. $8 \times 10^{-4}s$

Answer: D

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25. Two car A and B travelling in the same direction with velocities v_1 and $v_2(v_1 > v_2)$. When the car A is at a distance d ahead of the car B, the driver of the car A applied the brake producing a uniform retardation a. There wil be no collision when.

A. $d < \frac{(v_1 - v_2)^2}{2a}$

B. $d < \frac{v_1^2 - v_2^2}{2a}$

C. $d > \frac{(v_1 - v_2)^2}{2a}$

D. $d > \frac{v_1^2 - v_2^2}{2a}$

Answer: C

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26. An object of mass 10 kg is moving with an initial velocity of $10ms^{-1}$. A constant force acts for 4 s on the object giving it a speed of 2 m s^{-1} in

the opposite direction. Find the acceleration and force.

A. $3m/\sec^2$

B. $-3m/\sec^2$

C. $0.3m/\sec^2$

D. $-0.3m/\sec^2$

Answer: B

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27. A body starts from rest from the origin with an acceleration of $6m/s^2$ along the x-axis and $8m/s^2$ along the y-axis. Its distance from the origin after 4 seconds will be

A. 56 m

B. 64m

C. 80 m

D. 128m

Answer: C

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28. A car moving with a velocity of 10m/s can be stopped by the application of a constant force F In a distance of 20m. If the velocity of the car is 30m/s. It can be stopped by this force in

A. $\frac{20}{3}m$

B. $20m$

C. $60m$

D. $180m$

Answer: D

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29. The displacement of a particle is given by $y = a + bt + ct^2 - dt^4$. The initial velocity and acceleration are respectively.

A. $b, \ -4d$

B. $-b, 2c$

C. $b, 2c$

D. $2c, \ -4d$

Answer: C

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30. A car moving with a speed of $40km/h$ can be stopped by applying the brakes after at least 2 m. If the same car is moving with a speed of $80km/h$, what is the minimum stopping distance?

A. 8m

B. 2m

C. 4m

D. 6m

Answer: A

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31. An elevator car, whose floor to ceiling distance is equal to $2.7m$ starts ascending with constant acceleration of $1.2m/s^2$, 2 s after the start, a bolt begins falling from the ceiling of the car. The free fall time of the bolt is $(g = 9.8m/s^2)$

A. $\sqrt{0.54}s$

B. $\sqrt{6}s$

C. $0.7s$

D. $1s$

Answer: C

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32. The displacement is given by $x = 2t^2 + t + 5$, the acceleration at $t = 2s$ is

A. $4m/s^2$

B. $8m/s^2$

C. $10m/s^2$

D. $15m/s^2$

Answer: A

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33. Two trains travelling on the same track are approaching each other with equal speed of $40m/s$. The drivers of the trains beging to decelerate simultaneously when just ` 2.0 km apart. Assuming

deceleration to be uniform and equal the value to the deceleration to barely avoid collision should be .

A. $11.8m/s^2$

B. $11.0m/s^2$

C. $2.1m/s^2$

D. $0.8m/s^2$

Answer: D

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34. A body moves from rest with a constant acceleration of $5m/s^2$. Its instantaneous speed (in m/s) at the end of 10 sec is

A. 50

B. 5

C. 2

D. 0.5

Answer: A

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35. A boggy of uniformly moving train is suddenly detached from train and stops after covering some distance. The distance covered by the boggy and distance covered by the train in the same time has relation

A. Both will be equal

B. First will be half of second

C. First will be $1/4$ of second

D. No definite ratio

Answer: B

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36. A body starts from rest, what is the ratio of the distance travelled by the body during the 4th and 3rd s?

A. $\frac{7}{5}$

B. $\frac{5}{7}$

C. $\frac{7}{3}$

D. $\frac{3}{7}$

Answer: A

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37. The acceleration a in ms^{-2} of a particle is given by $a = 3t^2 + 2t + 2$, where t is the time. If the particle starts out with a velocity $v = 2ms^{-1}$ at $t = 0$, then find the velocity at the end of $2s$.

A. $12m/s$

B. $18m/s$

C. $27m/s$

D. $36m/s$

Answer: B

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38. A particle moves along a staight line such that its displacement at any time t is given by $s = t^3 - 6t^2 + 3t + 4m$. Find the velocity when the acceleration is 0.

A. $3ms^{-1}$

B. $-12ms^{-1}$

C. $42ms^{-1}$

D. $-9ms^{-1}$

Answer: D

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39. For a moving body at any instant of time

A. If the body is not moving, the acceleration is necessarily zero

B. If the body is slowing the retardation is negative

C. If the body is slowing, the distance is negative

D. If displacement, velocity and acceleration at that instant are known, we can find the displacement at any given time in future

Answer: D

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40. The x and y coordinates of a particle at any time t are given by $x = 7t + 4t^2$ and $y = 5t$, where x and t is seconds. The acceleration of particle at $t = 5$s is

A. Zero

B. $8m/s^2$

C. $20m/s^2$

D. $40m/s^2$

Answer: B

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41. The engine of a car produces acceleration $4m/s^2$ in the car. If this acr pulls another car of same mass, what will be the acceleration produced

A. $8m/s^2$

B. $2m/s^2$

C. $4m/s^2$

D. $\frac{1}{2}m/s^2$

Answer: B

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42. If a body starts from rest and travels 120 cm in the 6 second then what is the acceleration

A. $0.20m/s^2$

B. $0.0027m/s^2$

C. $0.218m/s^2$

D. $0.06m/s^2$

Answer: D

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43. If a car at rest, accelerates uniformly to a speed of $144km/h$ in $20s$, it covers a distance of

A. $20m$

B. $400m$

C. $1440m$

D. $2880m$

Answer: B

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

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

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

D. Zero

Answer: C

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45. A truck and a car are moving with equal velocity. On applying the brakes both will stop after certain distance, then

A. Truck will cover less distance before rest

B. Car will cover less distance before rest

C. Both will cover equal distance

D. None

Answer: B

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46. (a) If a train traveling at $72km/h$ is to be brought to rest in a distance of $200m$, find the deceleration.

(b) The velocity of a bullet is reduced from $200m/s$ to $100m/s$ while traveling through a wooden block of thickness $10cm$. Find the retardation (assuming it ti be uniform).

A. $20ms^{-2}$

B. $10ms^{-2}$

C. $2ms^{-2}$

D. $1ms^{-2}$

Answer: D

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47. The displacement of a particle starting from rest (at $t = 0$) is given by $s = 6t^2 - t^3$. The time in seconds at which the particle will attain zero velocity again, is

A. 2

B. 4

C. 6

D. 8

Answer: B

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48. What is the relation between displacement, time and acceleration in case of a body having uniform acceleration

A. $S = ut + \frac{1}{2}ft^2$

B. $S = (u + f)t$

C. $S = v^2 - 2fs$

D. None of these

Answer: A

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49. Two cars A and B are at rest at the origin O. If A starts with a uniform velocity of $20m/s$ and B starts in the same direction with a constant

acceleration of $2m/s^2$, then the cars will meet after time

A. 10 sec

B. 20 sec

C. 30 sec

D. 35 sec

Answer: B

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50. The motion of a particle is described by the equation $x = a + bt^2$ where $a = 15$ cm and $b = 3cm/s$. Its instantaneous velocity at time 3 sec will be

A. $36cm/\sec$

B. $18cm/\sec$

C. $16cm/\sec$

D. $32cm/\sec$

Answer: B

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51. A body travels for 15 second starting from rest with constant acceleration. If it travels distances S_1, S_2 and S_3 in the first five seconds, second five seconds and next five seconds respectively the relation between S_1, S_2 and $S_3$is

A. $S_1 = S_2 = S_3$

B. $5S_1 = 3S_2 = S_3$

C. $S_1 = \frac{1}{3}S_2 = \frac{1}{5}S_3$

D. $S_1 = \frac{1}{5}S_2 = \frac{1}{3}S_3$

Answer: C

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52. A body is moving according to the equation $x = at + bt^2 - ct^3$ where x = displacement and a,b and c are constants. The acceleration of the body is

A. $a + 2bt$

B. $2b + 6ct$

C. $2b - 6ct$

D. $3b - 6ct^2$

Answer: C

Watch Video Solution

53. A particle travels 10m in first 5 sec and 10 m in next 3 sec. Assuming constant acceleration what is the distance travelled in next 2 sec.

A. $8.3m$

B. $9.3m$

C. $10.3m$

D. None of above

Answer: A

Watch Video Solution

54. If the displacement of a particle is proportional to the square of time, then-

A. Uniform acceleration

B. Uniform velocity

C. Increasing acceleration

D. Decreasing velocity

Answer: A

Watch Video Solution

55. Acceleration of a particle changes when

A. Direction of velocity changes

B. Magnitude of velocity changes

C. Both of above

D. Speed changes

Answer: C

Watch Video Solution

56. The motion of a particle is described by the equation at $u = at$.The distance travelled by the particle in the first 4 seconds

A. 4a

B. 12a

C. 6a

D. 8a

Answer: D

Watch Video Solution

57. The relation $3t = \sqrt{3x} + 6$ describe the displacement of a particle in one direction where x is in metres and t in sec.

The displacement, when velocity is zero is

A. 24 metres

B. 12 metres

C. 5 metres

D. Zero

Answer: D

Watch Video Solution

58. A constant force acts on a body of mass 0.9 kg at rest for 10 s . If the body moves a distance of 250 m, the magnitude of the force is

A. $3N$

B. $3.5N$

C. $4.0N$

D. $4.5N$

Answer: D

Watch Video Solution

59. The average velocity of a body moving with uniform acceleration after travelling a distance of $3.06m$ is $0.34ms^{-1}$. If the change in velocity of the body is $0.18ms^{-1}$ during this time, its uniform acceleration is .

A. $0.01ms$

B. $0.02ms$

C. $0.03ms$

D. $0.04ms$

Answer: B

Watch Video Solution

60. Equation of displacement for any particle is $s = 3t^3 + 7t^2 + 14t8m.$

Its acceleration at time $t = 1$ sec is

A. $10m / s$

B. $16m / s$

C. $25m / s$

D. $32m / s$

Answer: D

Watch Video Solution

61. The position of a particle moving along the x-axis at certain times is given below $|:(t(s),0,1,2,3),(x(m),-2,0,6,16):|$ Which of the following describes the motion correctly?

A. Uniform, accelerated

B. Uniform, decelerated

C. Non-uniform, accelerated

D. There is not enough data for generalization

Answer: C

Watch Video Solution

62. consider the acceleration velocity and displacement of a tennis ball as it falls to the ground and bouces back. Derections of which of these changes in the process

A. Velocity only

B. Displacement and velocity

C. Acceleration, velocity and displacement

D. Displacement and acceleration

Answer: B

Watch Video Solution

63. The displacement of a particle moving in a straight line, is given by $s = 2t^2 + 2t + 4$ where s is in metres and t in seconds. The acceleration of the particle is.

A. $2m / s^2$

B. $4m / s^2$

C. $6m / s^2$

D. $8m / s^2$

Answer: B

Watch Video Solution

64. A body A starts from rest with an acceleration a_1. After 2 seconds, another body B starts from rest with an acceleration a_2. If they travel equal distances in the $5th$ second, after the start of A, then the ratio $a_1 : a_2$ is equal to :

A. $5:9$

B. $5:7$

C. $9:5$

D. $9:7$

Answer: A

Watch Video Solution

65. The velocity of a bullet is reduced from $200m/s$ to $100m/s$ while travelling through a wooden block of thickness $10cm$. The retardation,

assuming it to be uniform, will be.

A. $10 \times 10^4 m/s$

B. $12 \times 10^4 m/s$

C. $13.5 \times 10^4 m/s$

D. $15 \times 10^4 m/s$

Answer: D

Watch Video Solution

66. A body of 5kg is moving with a velocity of 20m/s. If a force of 100N is applied on it for 10 s in the same direction as its velocity, what will now be the velocity of the body?

A. $200m/s$

B. $220m/s$

C. $240m/s$

D. $260m/s$

Answer: B

Watch Video Solution

67. A particle starts from rest accelerates at $2m/s^2$ for $10s$ and then goes for constant speed for $30s$ and then decelerates at $4m/s^2$ till it stops. What is the distance travelled by it.

A. 750 m

B. 800m

C. 700 m

D. 850 m

Answer: A

Watch Video Solution

68. The engine of a motoecycle can produce a maximum acceleration of $5m/s^2$. Its brakes can produce a maximum retardation of $10m/s^2$. What is the minimum time in which the motorcycle can cover a distance of $1.5km$?

A. $30\,\sec$

B. $15\,\sec$

C. $10\,\sec$

D. $5\,\sec$

Answer: A

Watch Video Solution

69. The path of a particle moving under the influence of a force fixed in magnitude and direction is [

A. Straight line

B. Circle

C. Parabola

D. Ellipse

Answer: A

Watch Video Solution

70. A car, moving with a speed of $50km/hr$, can be stopped by brakes after at least $6m$. If the same car is moving at a speed of $100km/hr$, the minimum stopping distance is

A. 6m

B. 12 m

C. 18m

D. 24m

Answer: D

Watch Video Solution

71. A student is standing at a distance of 50 metres from a bus. As soon as the bus begins its motion (starts moving away from student) with an acceleration of $1ms^{-2}$, the student starts running towards the bus with a uniform velocity u . Assuming the motion to be along a straight road. The minimum value of u, so that the student is able to catch the bus is :

A. 5ms

B. 8ms

C. 10ms

D. 12ms

Answer: C

Watch Video Solution

72. A body A moves with a uniform acceleration a and zero initial velocity. Another body B, starts from the same point moves in the same direction with a constant velocity v. The two bodies meet after a time t. The value of t is

A. $\frac{2v}{a}$

B. $\frac{v}{a}$

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

D. $\sqrt{\frac{v}{2a}}$

Answer: A

Watch Video Solution

73. A particle moves along X-axis in such a way that its coordinate X varies with time t according to the equation $x = \left(2 - 5t + 6t^2\right)m$. The initial velocity of the particle is

A. $-5m/s$

B. $6m/s$

C. $-3m/s$

D. $3m/s$

Answer: A

Watch Video Solution

74. A car starts from rest and moves with uniform acceleration a on a straight road from time $t=0$ to $t=T$. After that, a constant deceleration brings it to rest. In this process the average speed of the car is

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

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

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

D. aT

Answer: C

Watch Video Solution

75. An object accelerates from rest to a velocity $27.5m/s$ in 10 sec then find distance covered by object in next 10 sec

A. 550m

B. 137.5m

C. 412.6m

D. 275m

Answer: C

Watch Video Solution

76. If the velocity of a particle is given by $v = (180 - 16x)^{\frac{1}{2}} \frac{m}{s}$, then its acceleration will be

A. Zero

B. $8m/s$

C. $-8m/s$

D. $4m/s$

Answer: C

Watch Video Solution

77. The displacement of a particle is proportional to the cube of time elapsed. How does the acceleration of the particle depends on time obtained

A. $a \propto t^2$

B. $a \propto 2t$

C. $a \propto t^3$

D. $a \propto t$

Answer: D

Watch Video Solution

78. Starting from rest, acceleration of a particle is $a = 2t(t-1)$. The velocity of the particle at $t = 5s$ is

A. $15m/\sec$

B. $25m/\sec$

C. $5m/\sec$

D. None of these

Answer: A

Watch Video Solution

79. A body is moving with uniform acceleration describes 40 m in the first 5 sec and 65 m in next 5 sec. Its initial velocity will be

A. $4m/s$

B. $2.5m/s$

C. $5.5m/s$

D. $11m/s$

Answer: C

Watch Video Solution

80. Speeds of two identical cars are u and 4u at at specific instant. The ratio of the respective distances in which the two cars are stopped from that instant is

A. $1:1$

B. $1:4$

C. $1:8$

D. $1:16$

Answer: D

Watch Video Solution

81. The displacement x of a particle varies with time t as $x = ae^{-\alpha t} + be^{\beta t}$. Where a, b, α and β positive constant.

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

Watch Video Solution

82. A car , starting from rest, accelerates at the rate f through a distance S then continues at constant speed for time t and then decelerates at the rate $\frac{f}{2}$ to come to rest . If the total distance traversed is $15S$, then

A. $S = \frac{1}{2}ft^2$

B. $S = \frac{1}{4}ft^2$

C. $S = \frac{1}{72}ft^2$

D. $S = \frac{1}{6}ft^2$

Answer: C

Watch Video Solution

83. A man is 45 m behind the bus when the bus starts acceleration from rest with acceleration $2.5\frac{m}{s^2}$. With what minimum velocity should man start running to catch the bus?

A. 12 m/s

B. 14m/s

C. 15m/s

D. 16m/s

Answer: C

Watch Video Solution

84. 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 2 a

C. The particle is at origin at t = 0

D. None of these

Answer: B

Watch Video Solution

85. A body starting from rest moves with constant acceleration. The ratio of distance covered by the body during the 5th sec to that covered in 5 sec is

A. $9/25$

B. $3/5$

C. $25/9$

D. $1/25$

Answer: A

Watch Video Solution

86. What determines the nature of the path followed by the particle

A. Speed

B. Velocity

C. Acceleration

D. None of these

Answer: D

Watch Video Solution

Relative Motion

1. Two trains, each $50m$ long, are travelling in opposite directions with velocities $10ms^{-1}$ and $15ms^{-1}$. The time of their crossing each other is.

A. 2s

B. 4s

C. $2\sqrt{3}s$

D. $4\sqrt{3}s$

Answer: B

Watch Video Solution

2. A 120 m long train is moving in a direction with speed 20 m/s . A traing B moving with 30 m/s in the opposite direction and 130 m long crosses the first train in a time

A. 6s

B. 36s

C. 38s

D. None of these

Answer: D

Watch Video Solution

3. A 210 meter long train is moving due north at a of 25 m/s. a small bird is flying due south a little above the train with speed 5 m/s. The time taken by the bird to cross the train is

A. 6s

B. 7s

C. 9s

D. 10s

Answer: B

Watch Video Solution

4. A police jeep is chasing with, velocity of $45km/h$ a thief in another jeep moving with velocity $153km/h$. Police fires a bullet with muzzle velocity of $180m/s$. The velocity it will strike the car of the thief is.

A. $150m/s$

B. $27m/s$

C. $450m/s$

D. $250m/s$

Answer: A

Watch Video Solution

5. A boat crosses a river with a velocity of $8\frac{km}{h}$. If the resulting velocity of boat is $10\frac{km}{h}$ then the velocity of river water is

A. $10km/hr$

B. $8km/hr$

C. $6km/hr$

D. $4km/hr$

Answer: C

Watch Video Solution

6. A train of $150m$ length is going toward north direction at a speed of $10ms^{-1}$. A parrot flies at a speed of $5ms^{-1}$ toward south direction parallel to the railway track. The time taken by the parrot to cross the train is equal to.

A. 12sec

B. 8sec

C. 15sec

D. 10sec

Answer: D

Watch Video Solution

7. A boat is moving with a velocity $3\hat{i} + 4\hat{j}$ with respect to ground. The water in the river is moving with a velocity $-3\hat{i} - 4\hat{j}$ with respect to ground. The relative velocity of the boat with respect to water is.

A. $-6\hat{i}-8\hat{j}$

B. $6\hat{i}+8\hat{j}$

C. $8\hat{i}$

D. $6\hat{i}$

Answer: B

Watch Video Solution

8. The distance between two particles is decreasing at the rate of 6 m/sec. If these particles travel with same speeds and in the same direction, then the separation increase at the rate of 4 m/sec. The particles have speed as

A. $5m/\sec, 1m/\sec$

B. $4\frac{m}{\sec}, 1m/\sec$

C. $4m/\sec, 2m/\sec$

D. $5m/\sec, 2m/\sec$

Answer: A

Watch Video Solution

9. A boat moves with speed of 5 km/h relative to water in a river flowing with a speed of 3 km/h and having a width of 1 km. The minimum time taken around a round trip is

A. 5 min

B. 60 min

C. 20 min

D. 30 min

Answer: D

Watch Video Solution

10. For a body moving with relativistic speed, if the velocity is doubled, then

A. Its linear momentum is doubled

B. Its linear momentum will be less than double

C. Its linear momentum will be more than double

D. Its linear momentum remains unchanged

Answer: C

Watch Video Solution

11. A river is flowing from west to east with a speed of $5m/\min$. A man can swim in still water with a velocity $10m/\min$. In which direction should the man swim so as to take the shortest possible path to go to the south.

A. 30° with downstream

B. 60° with downstream

C. 120° with downstream

D. South

Answer: C

Watch Video Solution

12. A train is moving due east and a car is moving due north with equal speeds. A passenger in the train finds that the car is moving towards

A. East-north direction

B. West-north direction

C. South-east direction

D. None of these

Answer: B

Watch Video Solution

13. An express train is moving with a velocity v_1. Its driver finds another train is movig on the same track in the same direction with velocity v_2. To escape collision, driver applies a retardation a on the train. The minimum time of escaping collision be

A. $t = \frac{v_1 - v_2}{a}$

B. $t_1 = \frac{v_1^2 - v_2^2}{2}$

C. None

D. Both

Answer: A

Watch Video Solution

Motion Under Gravity

1. A stone falls from a ballon that id descending at a uniform rate of 12m/s. The displacement of the stone from the point of release after 10 sec is

A. 490 m

B. 510m

C. 610 m

D. 725m

Answer: C

Watch Video Solution

2. A ball is dropped on the floor from a height of 10m. It rebounds to a height of 2.5 m if the ball is in contact with floor for 0.01 s then the average acceleration during contact is nearly

A. $2100 m / \sec^2$ downwards

B. $2100m/\sec^2$ upwards

C. $1400m/\sec^2$

D. $700m/\sec^2$

Answer: B

Watch Video Solution

3. A body X is projected upwards with a velocity of $98ms^{-1}$, after 4s, a second body Y is also projected upwards with the same initial velocity . Two bodies will meet after

A. 6sec

B. 8sec

C. 10sec

D. 12sec

Answer: D

Watch Video Solution

4. Two bodies of different masses m_a and m_b are dropped from two different heights a and b. The ratio of the time taken by the two to cover these distances are

A. a: b

B. b :a

C. $\sqrt{a} : \sqrt{b}$

D. $a^2 : b^2$

Answer: C

Watch Video Solution

5. A body falls freely from rest. It covers as much distance in the last second of its motion as covered in the first three seconds. The body has fallen for a time of :

A. 3s

B. 5s

C. 7s

D. 9s

Answer: B

Watch Video Solution

6. A stone is dropped into water from a bridge 44.1 m above the water. Another stone is thrown vertically downward 1 sec later. Both strike the water simultaneously. What was the initial speed of the second stone

A. $12.25m/s$

B. $14.75m/s$

C. $16.23m/s$

D. $17.15m/s$

Answer: A

Watch Video Solution

7. An iron ball and a wooden ball of the same radius are released from the same height in vacuum. They take the same time to reach the ground. The reason for this is

A. Acceleration due to gravity in vacuum is same irrespective of the size and mass of the body

B. Acceleration due to gravity in vacuum depends upon the mass of the body

C. There is no acceleration due to gravity in vacuum

D. In vacuum there is a resistance offered to the motion of the body and this resistance depends upon the mass of the body

Answer: A

Watch Video Solution

8. A body is thrown vertically upwards. If air resistance is to be taken into account, then the time during which the body rises is.

A. Equal to the time of fall

B. Less than the time of fall

C. Greater than the time of fall

D. Twice the time of fall

Answer: B

Watch Video Solution

9. A ball P is dropped vertically and another ball Q is thrown horizontally with the same velocities from the same height and at the same time. If air resistance is neglected, then

A. Ball Q reaches the ground first

B. Ball Q reaches the ground first

C. Both reach the ground at the same time

D. The respective masses of the two balls will decide the time

Answer: C

Watch Video Solution

10. A body released from a great height, falls freely towards the earth. Another body is released from the same height exactly one second later. Then the separation between two bodies, two seconds after the release fo second body is.

A. $4.9m$

B. $9.8m$

C. $19.6m$

D. $24.5m$

Answer: D

Watch Video Solution

11. An object is projected upwards with a velocity of $100m/s$. It will strike the ground after (approximately)

A. 10sec

B. 20sec

C. 15sec

D. 5sec

Answer: B

Watch Video Solution

12. A stone dropped from the top of the tower touches the ground in 4 sec. The height of the tower is about

A. 80 m

B. 40m

C. 20m

D. 160m

Answer: A

Watch Video Solution

13. A body is released from the top of a tower of height h. It takes t sec to reach the ground. Where will be the ball after time $\frac{t}{2}$ sec?

A. At $h/2$ from the ground

B. At $h/4$ from the ground

C. Depends upon mass and volume of the body

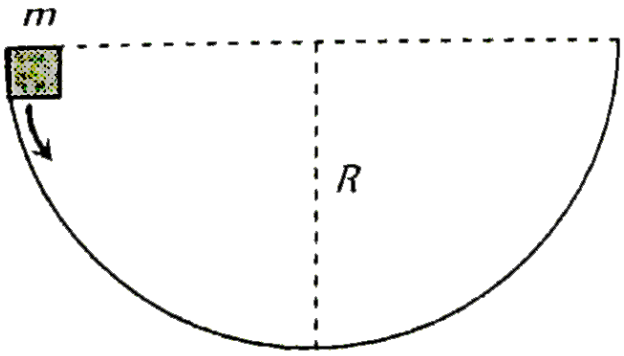
D. At $3h/4$ from the ground

Answer: D

Watch Video Solution

14. A mass m slips along the wall of a semispherical surface of radius R .

The velocity at the bottom of the surface is



A. $\sqrt{Rg}$

B. $\sqrt{2Rg}$

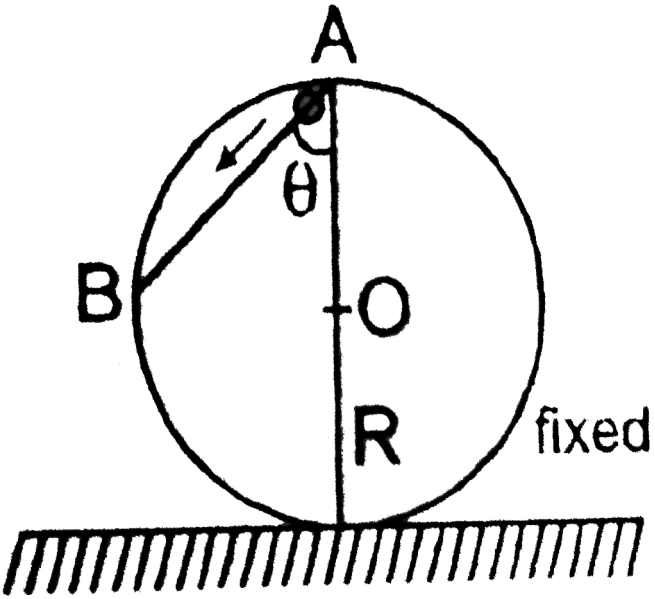
C. $2\sqrt{\pi Rg}$

D. $\sqrt{\pi Rg}$

Answer: B

Watch Video Solution

15. A frictionless wire is fixed between A and B inside of a hollow sphere of radius R as shown. A bead slips along the wire starting from the rest at point A. The time taken by the bead to slip from A to B will be



A. $\dfrac{2\sqrt{gR}}{g\cos\theta}$

B. $2\sqrt{gR}.\ \dfrac{\cos\theta}{g}$

C. $2\sqrt{\dfrac{R}{g}}$

D. $\dfrac{gR}{\sqrt{g\cos\theta}}$

Answer: C

Watch Video Solution

16. A body is slipping from an inclined plane of height h and length l . If the angle of inclination is θ , the time taken by the body to come from the top to the bottom of this inclined plane is

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

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

C. $\frac{1}{\sin\theta}\sqrt{\frac{2h}{g}}$

D. $\sin\theta\sqrt{\frac{2h}{g}}$

Answer: C

Watch Video Solution

17. A particle is projected up with an initial velocity of $80 ft / \sec$. The ball will be at a height of 96ft from the ground after

A. 2.0 and 3.0 sec

B. Only at 3.0 sec

C. Only at 2.0 sec

D. After 1 and 2 sec

Answer: A

Watch Video Solution

18. A body falls from rest, its velocity at the end of first second is $(g = 32 ft / \sec)$

A. $16 ft / \sec$

B. $32 ft / \sec$

C. $64 ft / \sec$

D. $24ft/\sec$

Answer: B

Watch Video Solution

19. A stone is thrown vertically upwards with an initial speed u from the top of a tower, reaches the ground with a speed $3u$. The height of the tower is :

A. $3u^2/g$

B. $4u^2/g$

C. $6u^2/g$

D. $9u^2/g$

Answer: B

Watch Video Solution

20. Two stones of different masses are dropped simultaneously from the top of a building

A. Smaller stone hit the ground earlier

B. Larger stone hit the ground earlier

C. Both stones reach the ground simultaneously

D. Which of the stones reach the ground earlier depends on the

Answer: C

Watch Video Solution

21. A body thrown with an initial speed of $96ft/\sec$ reaches the ground after $\left(g = 32ft/\sec^2\right)$

A. 3sec

B. 6sec

C. 12sec

D. 8 sec

Answer: B

Watch Video Solution

22. A stone is dropped from a certain height which can reach the ground in $5s$. It is stopped after $3s$ of its fall and then it is again released. The total time taken by the stone to reach the ground will be .

A. 2sec

B. 3sec

C. 4sec

D. None of these

Answer: C

Watch Video Solution

23. A man in a balloon rising vertically with an acceleration fo $4.9ms^{-2}$ released a ball $2\sec onds$ after the balloon is let of from the ground. The greatest height above the ground reached by the ball is:

A. $14.7m$

B. $19.6m$

C. $9.8m$

D. $24.5m$

Answer: A

Watch Video Solution

24. A particle is dropped under gravity from rest from a height $h\left(g = 9.8m/\sec^2\right)$ and it travels a distance $9h/25$ in the last second, the height h is.

A. 100m

B. 122.5m

C. 145m

D. 167.5m

Answer: B

Watch Video Solution

25. A balloon is at a height of 81 m and is ascending upwards with a velocity of 12 m/s . A body of 2kg weight is dropped from it. If $g = 10m/s^2$, the body will reach the surface of the earth in

A. 1.5s

B. 4.025s

C. 5.4 s

D. 7.75s

Answer: C

Watch Video Solution

26. An aeroplane is moving with a velocity u. It drops a packet from a height h. The time t taken by the packet in reaching the ground will be

A. $\sqrt{\left(\frac{2g}{h}\right)}$

B. $\sqrt{\left(\frac{2u}{g}\right)}$

C. $\sqrt{\left(\frac{h}{2g}\right)}$

D. $\sqrt{\left(\frac{2h}{g}\right)}$

Answer: D

Watch Video Solution

27. Water drops fall at regular intervals from a tap 5 m above the ground. The third drop is leaving the tap, the instant the first drop touches the

ground. How far above the ground is the second drop at that instant. $(g = 10ms^{-2})$

A. $2.50m$

B. $3.75m$

C. $4.00m$

D. $1.25m$

Answer: B

Watch Video Solution

28. A ball is thrown vertically upwards from the top of a tower at $4.9ms^{-1}$. It strikes the pond near the base of the tower after 3 seconds . The height of the tower is

A. $73.5m$

B. $4.41m$

C. $29.4m$

D. None of these

Answer: C

Watch Video Solution

29. An aeroplane is moving with horizontal velocity u at height h . The velocity of a packet dropped from it on the earth's surface will be (g is acceleration due to gravity)

A. $\sqrt{u^2 + 2gh}$

B. $\sqrt{2gh}$

C. $2gh$

D. $\sqrt{u^2 - 2gh}$

Answer: A

Watch Video Solution

30. A rocket is fired upward from the earth's surface such that it creates an acceleration of 19.6 m/sec . If after 5 sec its engine is switched off, the maximum height of the rocket from earth's surface would be

A. 2.45 m

B. 490m

C. 980 m

D. 735m

Answer: D

Watch Video Solution

31. A bullet is fired with a speed of 1000 m/sec in order to penetrate a target situated at 100 m away. If $g = 10m/s^2$, the gun should be aimed

A. Directly towards the targest

B. 5 cm above the target

C. 10 m above the target

D. 15 cm above the target

Answer: B

Watch Video Solution

32. A body starts to fall freely under gravity. The distances covered by it in first, second and third second are in ratio

A. $1:3:5$

B. $1:2:5$

C. $1:4:9$

D. $1:5:9$

Answer: A

Watch Video Solution

33. P, Q and R are three balloons ascending with velocities U, 4U and 8U respectively. If stones of the same mass be dropped from each, when they are at the same height, then

A. They reach the ground at the same time

B. Stone from P reaches the ground first

C. Stone from R reaches the ground first

D. Stone from Q reaches the ground first

Answer: B

Watch Video Solution

34. A body is projected up with a speed u and the time taken by it is T to reach the maximum height H. Pich out the correct statement

A. It reaches $H/2$ in $T/2$ sec

B. It acquires velocity $u/2$ in $T/2$ sec

C. Its velocity is $u/2$ at $H/2$

D. same velocity at $2T$

Answer: B

Watch Video Solution

35. A body falling for 2 seconds covers a distance S equal to that covered in next second. Taking $g = 10m/s^2$, $S =$

A. $30m$

B. $10m$

C. $60m$

D. $20m$

Answer: A

Watch Video Solution

36. A body dropped from a height h with an initial speed zero, strikes the ground with a velocity $3k\frac{m}{h}$. Another body of same mass is dropped from the same height h with an initial speed $-u' = 4km/h$. Find the final velocity of second body with which it strikes the ground

A. $3km/h$

B. $4k\frac{m}{h}$

C. $5km/h$

D. $12km/h$

Answer: C

Watch Video Solution

37. A ball of mass m_1 and another ball of mass m_2 are dropped from equal height. If the time taken by the balls are t_1 and t_2, respectively, then

A. $t_1 = \frac{t_2}{2}$

B. $t_1 = t_2$

C. $t_1 = 4t_2$

D. $t_1 = \frac{t_2}{4}$

Answer: B

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38. With what velocity a ball be projected vertically so that the distance covered by it in 5^{th} second is twice the distance it covers in its 6^{th} second $(g = 10m/s^2)$

A. $58m/s$

B. $49m/s$

C. $65m/s$

D. $19.6m/s$

Answer: C

Watch Video Solution

39. A body sliding on a smooth inclined plane requires $4s$ to reach the bottom, starting from rest at the at the top. How much time does it take to cover ont-foruth the distance startion from rest at the top?

A. 1s

B. 2s

C. 4s

D. 16s

Answer: B

Watch Video Solution

40. A ball is dropped downwards. After 1 second another ball is dropped downwards from the same point. What is the distance between them after 3 seconds

A. 25m

B. 20m

C. 50m

D. 9.8m

Answer: A

Watch Video Solution

41. A stone is thrown with an initial speed of ' 4.9 ms^(-1)' from a bridge in vertical upward direction. If falls down in water after 2 seconds. The height of the bridge is.

A. $4.9m$

B. $9.8m$

C. $19.8m$

D. $24.7m$

Answer: B

Watch Video Solution

42. 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

A. $60m/\sec$

B. $65m/\sec$

C. $70m/\sec$

D. $75m/\sec$

Answer: B

Watch Video Solution

43. A body freely falling from the rest has velocity v after it falls through a height h the distance it has to fall down for its velocity to become double is

A. 2h

B. 4h

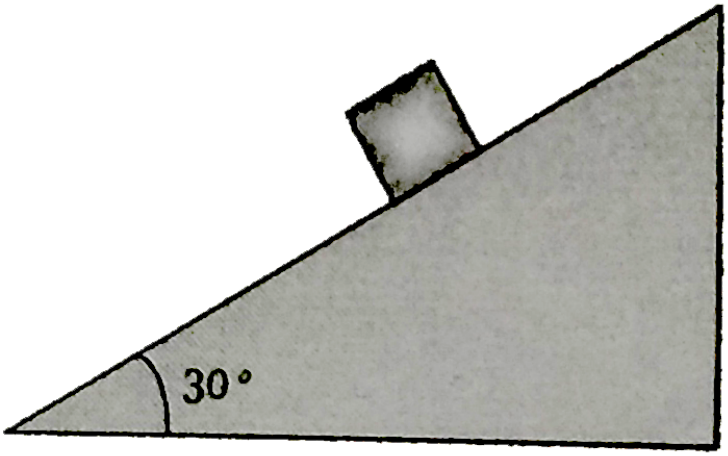
C. 6h

D. 8h

Answer: B

Watch Video Solution

44. The time taken by a block of wood (initially at rest) to slide down a smooth inclined plane 9.8 m long (angle of inclination is 30°) is



A. $\frac{1}{2}\sec$

B. $2\sec$

C. $4\sec$

D. $1\sec$

Answer: B

Watch Video Solution

45. The velocity with which a body stricks the ground is always equal to the velocity with which it was projected upwards.' is the statement true ?

On what principle is ist based ?

A. $v = 0$

B. $v = 2u$

C. $v = 0.5u$

D. $v = u$

Answer: D

Watch Video Solution

46. A body projected vertically upwards with a velocity u returns to the starting point in 4 seconds. If $g = 10m/\sec$, the value of u is

A. $5m/\sec$

B. $10m/\sec$

C. $15m/\sec$

D. $20m/\sec$

Answer: D

Watch Video Solution

47. Time taken by an object falling from rest to cover the height of h_1 and h_2 is respectively t_1 and t_2 then the ratio of t_1 to t_2 is

A. $h_1 : h_2$

B. $\sqrt{h_1} : \sqrt{h_2}$

C. $h_1 : 2h_2$

D. $2h : h$

Answer: B

Watch Video Solution

48. A body is thrown vertically up from the ground. It reaches a maximum height of 100 m in 5 sec . After what time it will reach the ground from

the maximum height position

A. $1.2\,\text{sec}$

B. $5\,\text{sec}$

C. $10\,\text{sec}$

D. $25\,\text{sec}$

Answer: B

Watch Video Solution

49. A body thrown vertically upwards with an initial valocity u reaches maximum height in 6 s. The ratio of the distances traveled by the body in the first second the seventh second is

A. $1:1$

B. $11:1$

C. $1:2$

D. $1:11$

Answer: B

Watch Video Solution

50. A stone is thrown vertically upwards. When stone is at a height half of its maximum height, its speed is $10ms^{-1}$, then the maximum height attained by the stone is ($g = 10ms^{-2}$)

A. 8m

B. 10m

C. 12m

D. 16m

Answer: B

Watch Video Solution

51. A body, thrown upwards with some velocity, reaches the maximum height of 20 m . Another body with double the mass thrown up, with double initial velocity will reach a maximum height of

A. 200m

B. 16m

C. 80m

D. 40m

Answer: C

Watch Video Solution

52. A balloon starts rising from the ground with an acceleration of $1.25ms^{-2}$. After 8 seconds, a stone is released from the balloon. After releasing, the stone will:

A. Reach the ground in 4 second

B. Begin to move down after being released

C. Have a displacement of 50 m

D. Cover a distance of 40 m in reaching the ground

Answer: A

Watch Video Solution

53. A body is thrown vertically upwards with a velocity u . Find the true statement from the following

A. Both velocity and acceleration are zero at its highest point

B. Velocity is maximum and acceleration is zero at the highest point

C. Velocity is maximum and acceleration is g downwards at its highest point

D. Velocity is zero at the highest point and maximum height reached is $u^2 / 2g$

Answer: D

Watch Video Solution

54. A man throws a ball vertically upward and it rises through 20 m and returns to his hands. What was the initial velocity (u) of the ball and for how much time (T) it remained in the air $\left[g = 10m/s^2\right]$

A. $u = 10m/s, T = 2s$

B. $u = 10m/s, T = 4s$

C. $u = 20m/s, T = 2s$

D. $u = 20m/s, T = 4s$

Answer: D

Watch Video Solution

55. A particle when thrown, moves such that it passes from same height at 2 and 10 seconds, then this height h is :

A. g

B. 2g

C. 5g

D. 10g

Answer: D

Watch Video Solution

56. Three different objects of masses m_1, m_2 and m_2 are allowed to fall from rest and from the same point O along three different frictionless paths. The speeds of three objects on reaching the ground will be:

A. $m_1 : m_2 : m_3$

B. $m_1 : 2m_2 : 3m_3$

C. $1:1:1$

D. $\frac{1}{m_1}:\frac{1}{m_2}:\frac{1}{m_3}$

Answer: C

Watch Video Solution

57. From the top of a tower, a particle is thrown vertically downwards with a velocity of $10m/s$. The ratio of the distances, covered by it in the $3rd$ and $2nd$ seconds of the motion is $\left(\text{Take} g = 10m/s^2\right)$.

A. $5:7$

B. $7:5$

C. $3:6$

D. $6:3$

Answer: B

Watch Video Solution

58. Two balls A and B of same masses are thrown from the top of the building A. Thrown upward with velocity V and B, thrown downward with velocity V, then

A. Velocity of A is more than B at the ground

B. Velocity of B is more than A at the ground

C. Both A & B strike the ground with same velocity

D. None of these

Answer: C

Watch Video Solution

59. A ball is dropped from top of a tower of 100 m height. Simultaneously another ball was thrown upward from bottom of the tower with a speed of $50m/s\left(g = 10m/s^2\right)$. They will cross each other after

A. 1s

B. 2s

C. 3s

D. 4s

Answer: B

Watch Video Solution

60. A cricket ball is thrown up with a speed of 19.6 m/s. The maximum height it can reach is (take g= 9.8 m/s^2)

A. $9.8m$

B. $19.6m$

C. $29.4m$

D. $39.2m$

Answer: B

Watch Video Solution

61. Balls are thrown vertically upwards in such a way that the next ball is thorwn when the previous one is at the maximum height. If the maximum hieght is $5m$, the number of balls thrown per minute will be

A. 120

B. 80

C. 60

D. 40

Answer: C

Watch Video Solution

62. A body falling from a high mimaret travels 40 meters in the last 2 seconds of its fall to ground. Height of minaret in meters is (take $g = 10\frac{m}{s^2}$)

A. 60

B. 45

C. 80

D. 50

Answer: B

Watch Video Solution

63. A body falls from a height $h = 200m$ (at New Delhi). The ratio of distance travelled in each $2\sec$ during $t = 0$ to $t = 6$ seconds of the journey is.

A. $1:4:9$

B. $1:2:4$

C. $1:3:5$

D. $1:2:3$

Answer: C

Watch Video Solution

64. A man drops a ball downside from the roof of a tower of height 400 metres. At the same time another ball is thrown upside with a velocity $50\text{meter}/\sec$ from the surface of the tower, then they will meet at which height from the surface of the tower.

A. 100 meters

B. 320 meters

C. 80 meters

D. 140 meters

Answer: C

Watch Video Solution

65. Two balls are dropped from heights h and $2h$ respectively from the earth surface. The ratio of time of these balls to reach the earth is.

A. $1:\sqrt{2}$

B. $\sqrt{2}:1$

C. $2:1$

D. $1:4$

Answer: A

Watch Video Solution

66. The acceleration due to gravity on the planet A is 9 times the acceleration due to gravity on planet B. A man jumps to a height of $2m$ on the surface of A. What is the height of jump by the same person on the planet B?

A. 18m

B. 6m

C. $\frac{2}{3}m$

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

Answer: A

Watch Video Solution

67. A body falls from rest in the gravitational field of the earth. The distance travelled in the fifth second of its motion is $\left(g = 10m/s^2\right)$

A. 25m

B. 45m

C. 90 m

D. 125m

Answer: B

Watch Video Solution

68. If a body is thrown up with the velocity of 15 m/s then maximum height attained by the body is $(g = 10m/s)$

A. $11.25m$

B. $16.2m$

C. $24.5m$

D. $7.62m$

Answer: A

Watch Video Solution

69. balloon is rising vertically up with a velocity of 29 m/s. A stone is dropped from it and it reaches the ground in 10 seconds. The height of the balloon when the stone was dropped from it is $\left(g = 9.8\frac{m}{s^2}\right)$

A. 100m

B. 200m

C. 400m

D. 150m

Answer: B

Watch Video Solution

70. A ball is released from the top of a tower of height $hmeters$. It takes T seconds to reach the ground . What is the position of the ball at $\frac{T}{3}\sec ond$

A. $h/9$ meters from the ground

B. $7h/9$ meters from the ground

C. $8h/9$ meters from the ground

D. $17h/18$ meters from the ground

Answer: C

Watch Video Solution

71. Two balls A and B of same size are dropped from the same point under gravity. The mass of A is greater than that of B.If the air resistance acting on each ball is same, then

A. Heavy ball

B. Light ball

C. Both simultaneously

D. Will depends upon the density of the balls

Answer: C

Watch Video Solution

72. A packet is dropped from a balloon which is going upwards with the velocity $12m/s$. The velocity of the packet after 2 seconds will be

A. $-12m/s$

B. $12m/s$

C. $-7.6m/s$

D. $7.6m/s$

Answer: C

Watch Video Solution

73. If a freely falling body travels in the last second, a distance equal to the distance travelled by it in the first three second, the time of the travel is

A. 6sec

B. 5sec

C. 4sec

D. 3sec

Answer: B

Watch Video Solution

74. The effective acceleration of a body, when thrown upwards with acceleration a will be :

A. $\sqrt{a-g^2}$

B. $\sqrt{a^2+g^2}$

C. $(a-g)$

D. $(a+g)$

Answer: C

Watch Video Solution

75. A body is thrown vertically upward with velocity u. The distance traveled by it in the fifth and the sixth second are equal. The velocity u is

given by

A. $24.5m/s$

B. $49.0m/s$

C. $73.5m/s$

D. $98.0m/s$

Answer: B

Watch Video Solution

76. A body, thrown upward with some velocity reaches the maximum height of $50m$. Another body with double the mass thrown up with double the initial velocity will reach a maximum height of

A. $100m$

B. $200m$

C. $300m$

D. $400m$

Answer: B

Watch Video Solution

77. A parachutist after bailing out falls 50 m without friction. When parachute opens, it decelerates at $2m/s^2$ he reaches the ground with a speed of $3m/s$ at what height did he bail out ?

A. 293m

B. 111 m

C. 91m

D. 182m

Answer: A

Watch Video Solution

78. Three particles A, B and C are thrown from the top of a tower with the same speed. A is thrown up, B is thrown down and C is horizontally. They hit the ground with speeds $v_A, v_B \text{ and } v_C$ respectively then,

A. $V_A = V_B = V_C$

B. $V_A = V_B > V_C$

C. $V_B > V_C > V_A$

D. $V_A > V_B = V_C$

Answer: A

Watch Video Solution

79. From the top of a tower two stones, whose masses are in the ratio 1 : 2 are thrown one straight up with an initial speed u and the second straight down with the same speed u . Then, neglecting air resistance

A. The heavier stone hits the ground with a higher speed

B. The lighter stone hits the ground with a higher speed

C. Both the stones will have the same speed when they hit the ground.

D. The speed can't be determined with the given data

Answer: C

Watch Video Solution

80. When a ball is thrown up vertically with velocity v_0, it reaches a maximum height of h. If one wishes to triple the maximum height then the ball should be thrown with velocity

A. $\sqrt{3}V_0$

B. $3V_0$

C. $9V_0$

D. $3/2V_0$

Answer: A

Watch Video Solution

81. An object start sliding on a frictionless inclined plane and from same height another object start falling freely

A. Both will reach with same speed

B. Both will reach with same acceleration

C. Both will reach in same time

D. None of above

Answer: A

Watch Video Solution

Critical Thinking

1. A particle moving in a straight line covers half the distance with speed of $3m/s$. The half of the distance is covered in two equal intervals with speed of $4.5m/s$ and $7.5m/s$ respectively. The average speed of the particle during this motion is :

A. $4.0m/s$

B. $5.0m/s$

C. $5.5m/s$

D. $4.8m/s$

Answer: A

Watch Video Solution

2. The acceleration of a particle is increasing linearly 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. $v_0 t + \frac{1}{3} b t^3$

C. $v_0 t + \frac{1}{6} b t^3$

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

Answer: C

Watch Video Solution

3. The motion of a body is given by the equation $dv/dt = 6 - 3v$, where v is in m//s. If the body was at rest at $t = 0$

(i) the terminal speed is $2m/s$

(ii) the magnitude of the initial acceleration is $6m/s^2$

(iii) The speed varies with time as $v = 2\left(1 - e^{-3t}\right) m/s$

(iv) The speed is $1m/s$, when the acceleration is half initial value

Watch Video Solution

4. A particle of mass m moves on the $x - a\xi s$ as follows : it starts from rest at $t = 0$, from the point $x = 0$, and comes to rest at $t = l$ at the point $x = 1$. No other information is available about its motion at intermediate times $(0 < t < l)$. If α denotes the instantaneous accelartion of the particle , then :

A. α cannot remain positive for all t in the interval $0 \leq t \leq t$

B. $|\alpha|$ cannot excedd 2 at any point in its path

C. $|\alpha|$ must be ≥ 4 at some point or points in its path

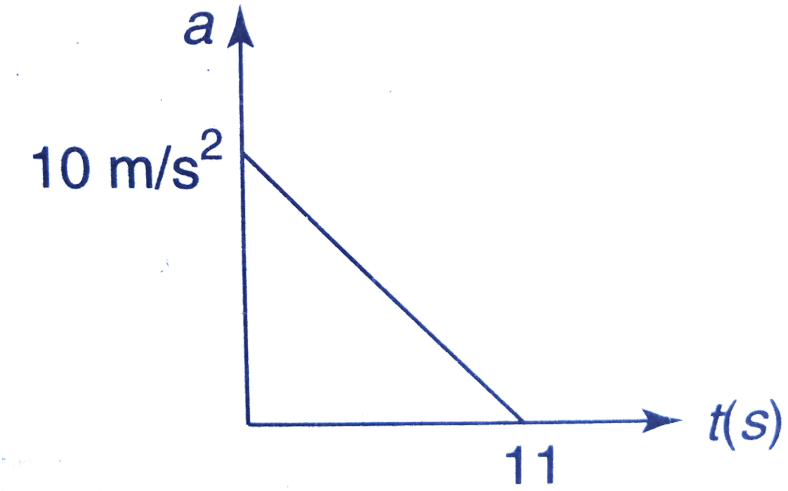
D. α must change sign during the motion but no other assertion can be made with the formation given

Answer: A::B::D

Watch Video Solution

5. A particle starting from rest. Its acceleration (a) versus time (t) is as shown in the figure.

The maximum speed of the particle will be.



A. $110m/s$

B. $55m/s$

C. $550m/s$

D. $660m/s$

Answer: A::D

Watch Video Solution

6. 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 (a) the maximum velocity reached and (b) the total distance travelled.

A. $\left(\frac{\alpha^2+\beta^2}{\alpha\beta}\right)t$

B. $\left(\frac{\alpha^2-\beta^2}{\alpha\beta}\right)t$

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

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

Answer: B

Watch Video Solution

7. A stone dropped from a building of height h and it reaches after t second on the earth. From the same building if two stones are thrown (one upwards and other downwards) with the same speed and they reach the earth surface after t_1 and t_2 seconds, respectively, then

A. $t = t_1 - t_2$

B. $t = \frac{t_1 + t_2}{2}$

C. $t = \sqrt{t_1 t_2}$

D. $t = t_1^2 t_2^2$

Answer: C

Watch Video Solution

8. A ball is projected upwards from a height h above the surface of the earth with velocity v. The time at which the ball strikes the ground is

A. $\frac{v}{g} + \frac{2hg}{\sqrt{2}}$

B. $\frac{v}{g}\left[1 - \sqrt{1 + \frac{2h}{g}}\right]$

C. $\frac{v}{g}\left[1 + \sqrt{1 + \frac{2gh}{v^2}}\right]$

D. $\frac{v}{g}\left[1 + \sqrt{v^2 + \frac{2g}{h}}\right]$

Answer: C

Watch Video Solution

9. A particle is dropped from certain height. The time taken by it to fall through successive distance of 1 m each will be

A. All equal, being equal to $\sqrt{2/g}$ second

B. In the ratio of the square roots of the integers 1,2,3...

C. In the ratio of the difference in the square roots of the integers i.e.

$$\sqrt{1}, (\sqrt{2}-\sqrt{1}), (\sqrt{3}-\sqrt{2}), (\sqrt{4}-\sqrt{3})...$$

D. In the ratio of the reciprocal of the square roots of the integers i.e.,

$$\frac{1}{\sqrt{1}}, \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{4}}$$

Answer: C

Watch Video Solution

10. A man throws ball with the same speed vertically upwards one after the other at an interval of 2 seconds. What should be the speed of the throw so that more than two ball are in the sky at any time (Given $g = 10\frac{m}{2^2}$)

A. At least $0.8m/s$

B. Any speed less than $19.6m/s$

C. Only with speed $19.6m/s$

D. More than $19.6m/s$

Answer: D

Watch Video Solution

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

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

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

C. $(u - gt)t$

D. utd

Answer: A

Watch Video Solution

12. A particle starts sliding down a frictionless inclined plane. If S_n is the distance travelled by it from time $t = n - 1\,\text{sec}$, to $t = n\,\text{sec}$, the ratio $\frac{S_n}{s_{n+1}}$ is

A. $\frac{2n-1}{2n}$

B. $\frac{2n+1}{2n-1}$

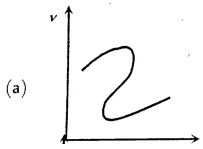
C. $\frac{2n-1}{2n+1}$

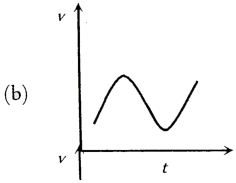
D. $\frac{2n}{2n+1}$

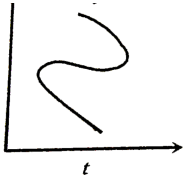
Answer: C

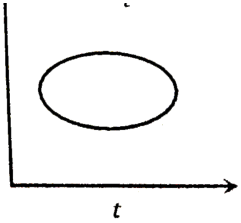
Watch Video Solution

13. Which of the following velocity-time graphs shows a realistic situation for a body in motion ?

A. 

B. 

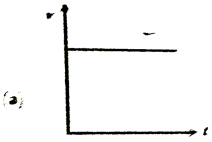
C. 

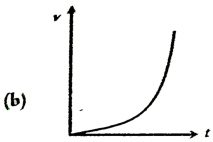
D. 

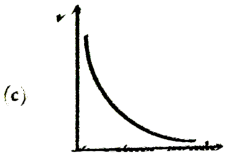
Answer: B

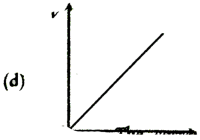
Watch Video Solution

14. Which of the following velocity-time graphs $(v - tgraph)$ represent uniform motion

A. 

B. 

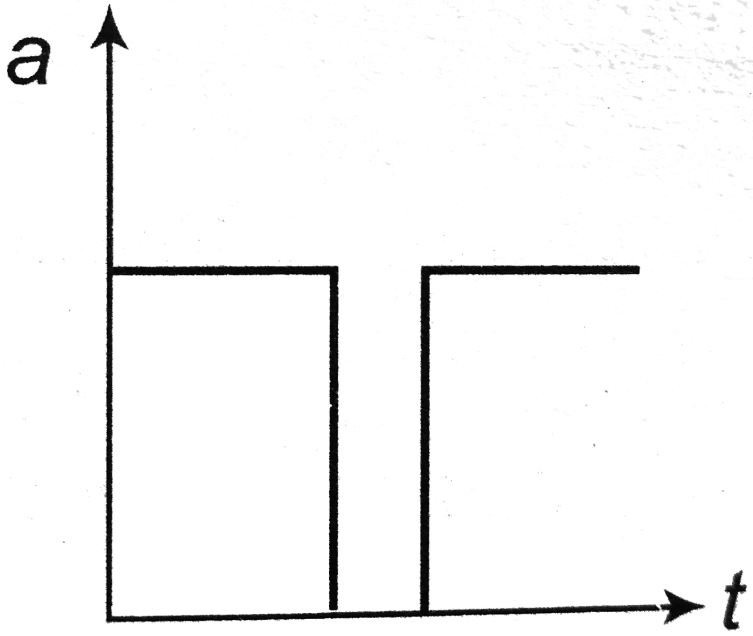
C. 

D. 

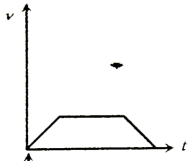
Answer: A

Watch Video Solution

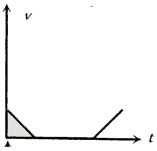
15. Acceleration-time graph of a body is shown. The corresponding velocity-time graph of the same body is.

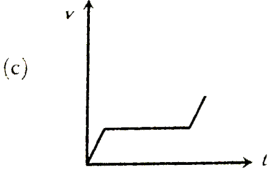


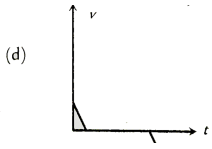
A. (a)



B. (b)



C. 

D. 

Answer: C

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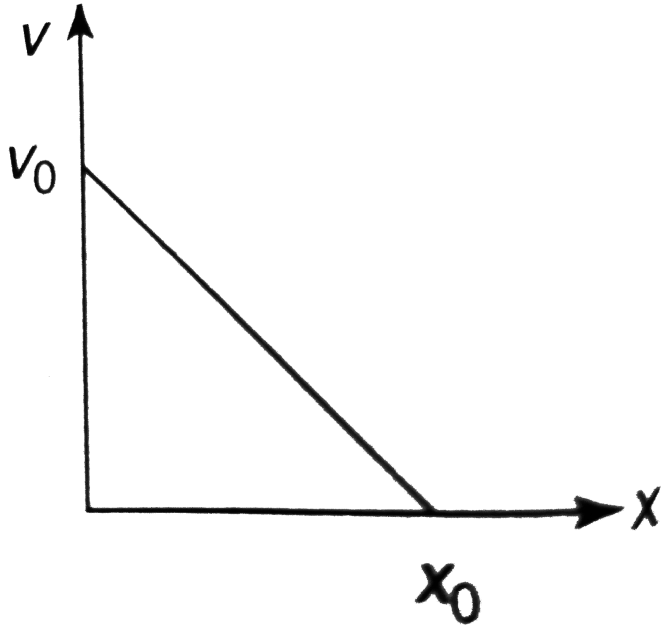
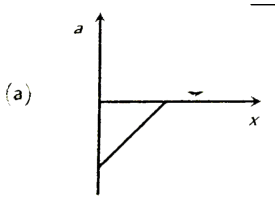
16. The given graph shows the variation of velocity with displacement. Which one of the graphs given below correctly represents the variation

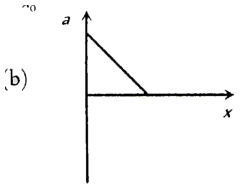
of acceleration with displacement ?



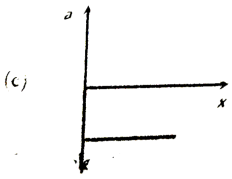
A.

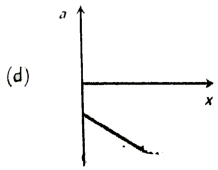


B.



C.





D.

Answer: A

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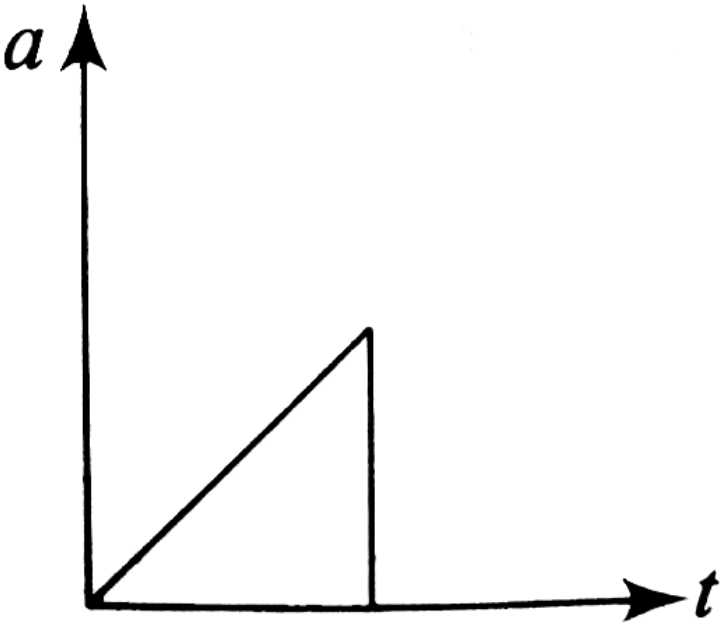
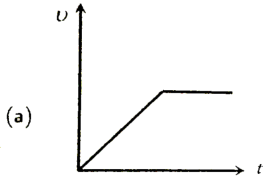


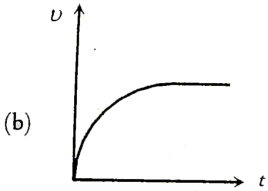
17.

The acceleration time graph of a body is shown below the most probable velocity time graph of the body is

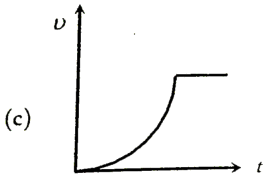
A.



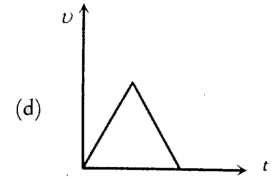
B.



C.



D.



Answer: C

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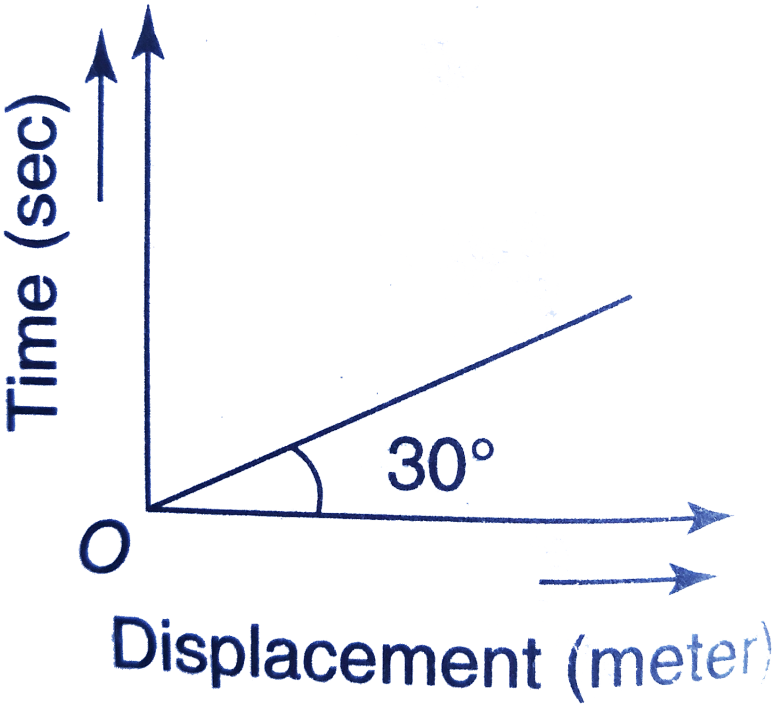
18. From the following displacement-time graph find out the velocity of a moving body.



A. $\frac{1}{\sqrt{3}} m/s$

B. $3m/s$

C. $\sqrt{3}m/s$

D. $\frac{1}{3}$

Answer: C

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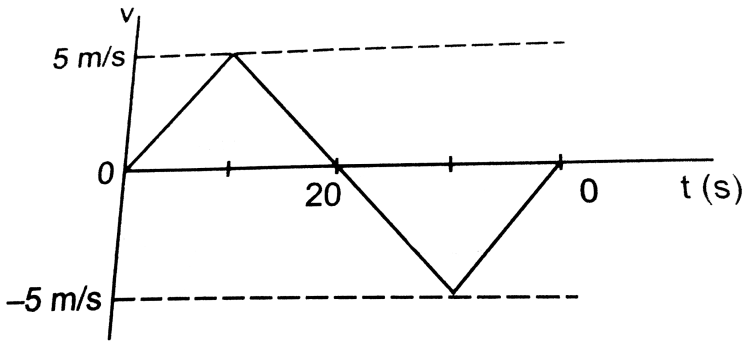
19. From the velocity time plot shown in figure find the distance travelled by the particle dureing the first 40 seconds. Also find the average velocity during this period.



A. 0

B. $2.5ms$

C. $5ms$

D. $2ms$

Answer: A

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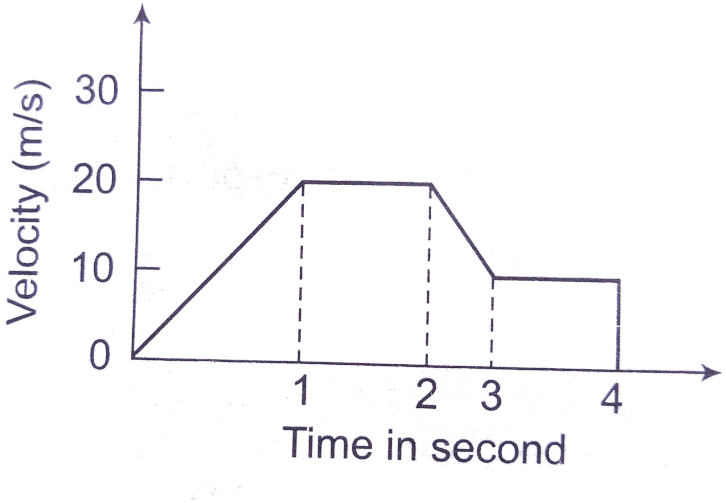
Graphical Questions

1. The variation of velocity of a particle with time moving along a straight line is illustrated in the following figure. The distance travelled by the particle in four seconds is.



A. 60m

B. 55m

C. 25m

D. 30m

Answer: B

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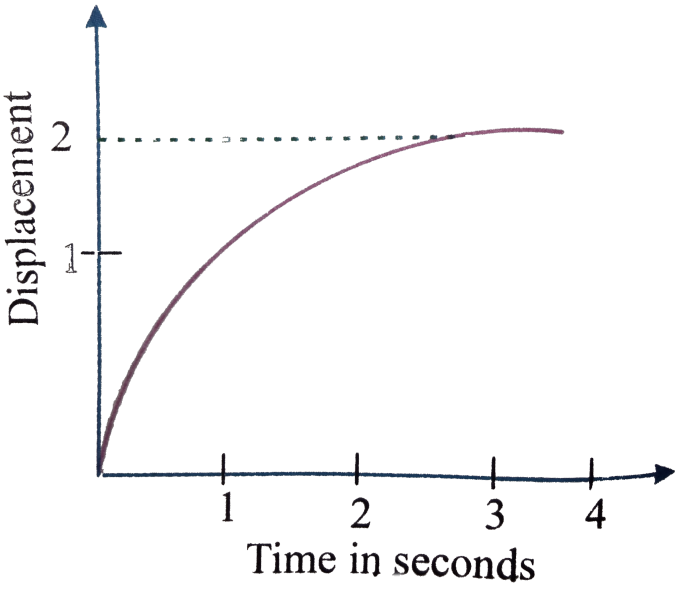

2.

The displacement of a particle as a function of time is shown in the figure. The figure shows that

A. The particle starts with certain velocity but the motion is retarded and finally the particle stops

B. The velocity of the particle is constant throughout

C. The acceleration of the particle is constant throughout.

D. The particle starts with constant velocity, then motion is accelerated and finally the particle moves with another constant velocity

Answer: A

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3. A ball is thrown vertically upwards. Which of the following graph/graphs represent velocity time graph of the ball during its flight (air resistance is neglected).

A. A

B. B

C. C

D. D

Answer: D

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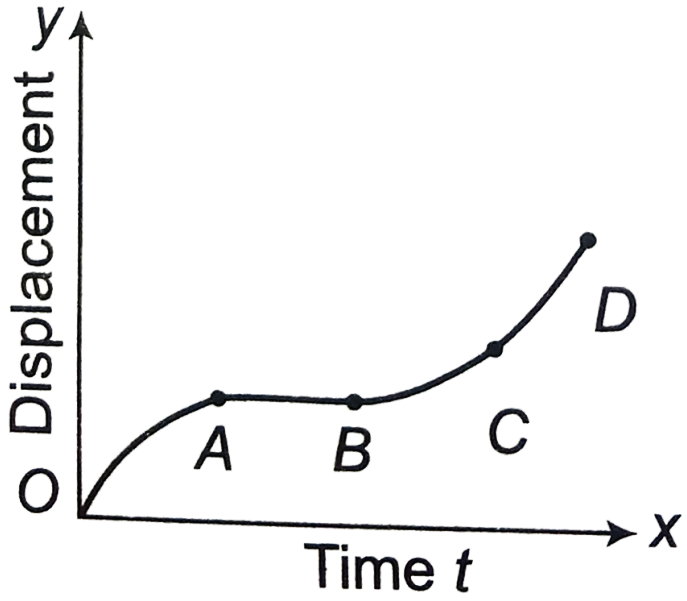
4. The graph between the displacement x and time t for a particle moving in a straight line is shown in the figure. During the interval OA, AB, BC and CD the acceleration of the particle is

OA, AB, BC, CD



A. $\begin{matrix} OA & AB & BC & CD \\ + & 0 & + & + \end{matrix}$

B.

OA	AB	BC	CD
$-$	0	$+$	0

C.

OA	AB	BC	CD
$+$	0	$-$	$+$

D.

OA	AB	BC	CD
$-$	0	$-$	0

Answer: B

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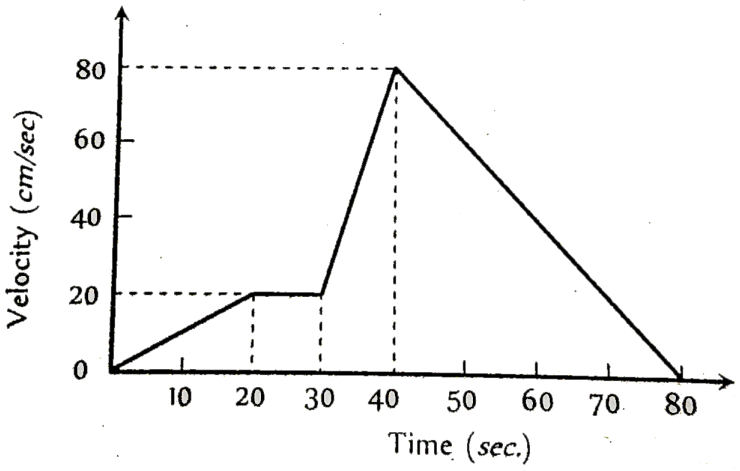
5. The $v-t$ graph of a moving object is given in figure. The maximum acceleration is



A. $1cm/\sec c^2$

B. $2cm/\sec^2$

C. $3cm/\sec^2$

D. $6cm/\sec^2$

Answer: D

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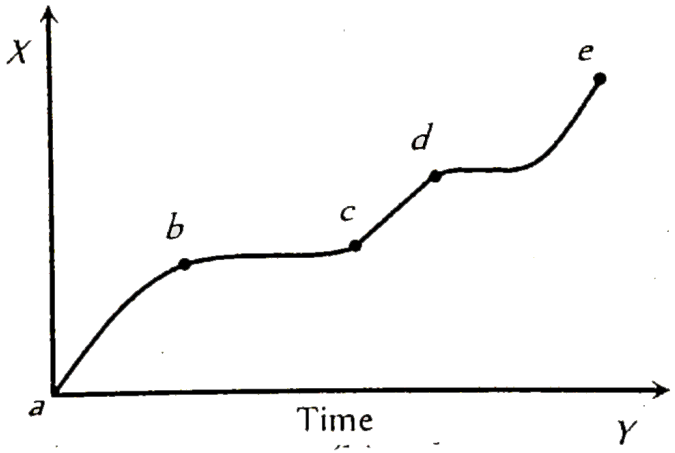
6. The displacement versus time graph for a body moving in a straight line is shown in figure. Which of the following regions represents the motion when no force is acting on the body



A. ab

B. bc

C. cd

D. de

Answer: C

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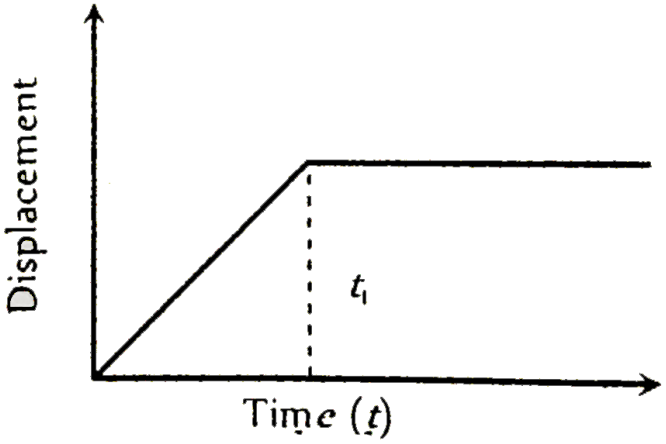
7. The x -t graph shown in figure represents



A. the particle is continuously going along positive x direction

B. the particle is at rest

C. the velocity increases upto time t_1 and then becomes constant

D. the particle moves at a constant velocity upto time t_1 and then stops

Answer: D

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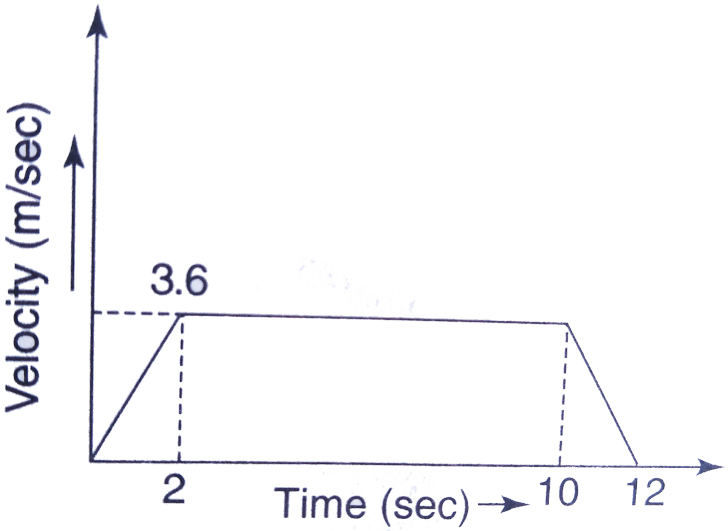
8. A lift is going up. The variation in the speed of the lift is as given in the graph in the graph. What is the height to which the lift takes the

passengers ?



A. $3.6m$

B. $28.8m$

C. $36.0m$

D. Cannot be calculated from the above graph

Answer: C

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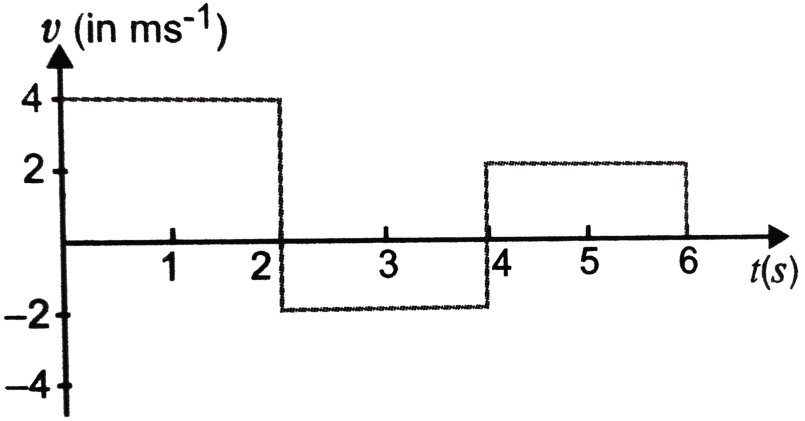
9. The velocity-time graph of a body moving in a straight line is shown in Fig. Find the displacement and the distance travelled by the body in $6\,\text{sec}\,onds.$



A. $8m, 16m$

B. $16m, 8m$

C. $16m, 16m$

D. $8m, 8m$

Answer: A

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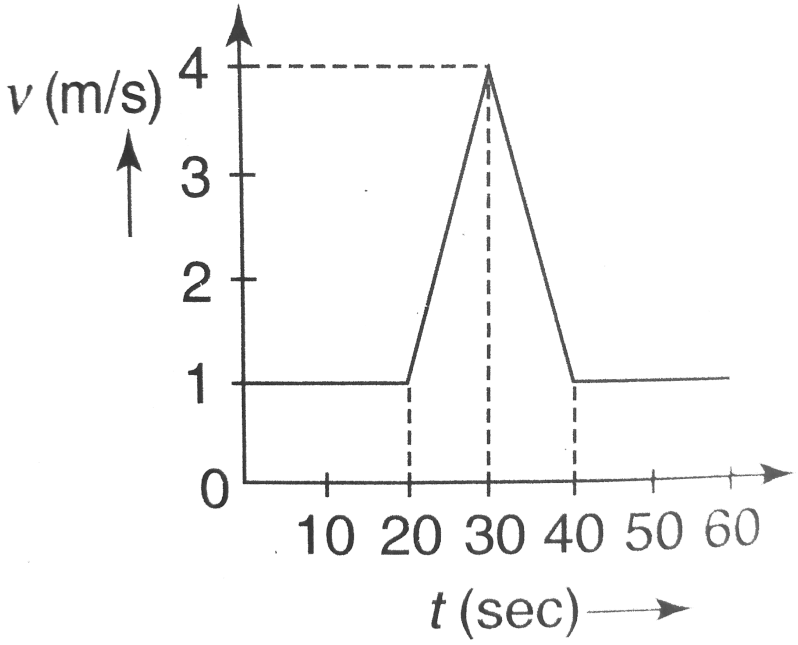
10. Velocity-time graph for a moving object is shown in the figure. Total displacement of the object during the time interval when there is non-zero acceleration and retardation is.



A. 60m

B. 50m

C. 30m

D. 40m

Answer: B

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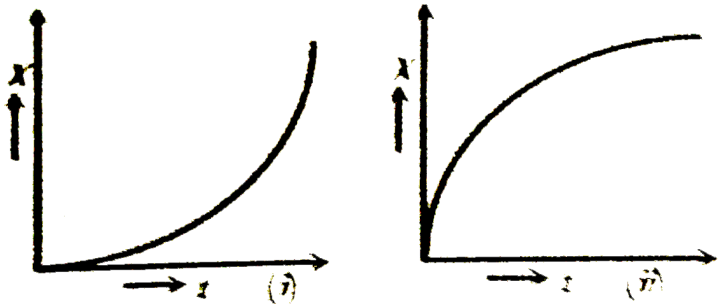
11. Figures (i) and (ii) below show the displacement-time graphs of two particles moving along the x -axis. We can say that



A. Both the particles are having a uniformly accelerated motion

B. Both the particles are having a uniformly retarded motion

C. Particle (i) is having a uniformly accelerated motion while particle (ii) is having a uniformly retarded motion

D. Particle (i) is having a uniformly retarded motion while particle (ii) is having a uniformly accelerated motion

Answer: C

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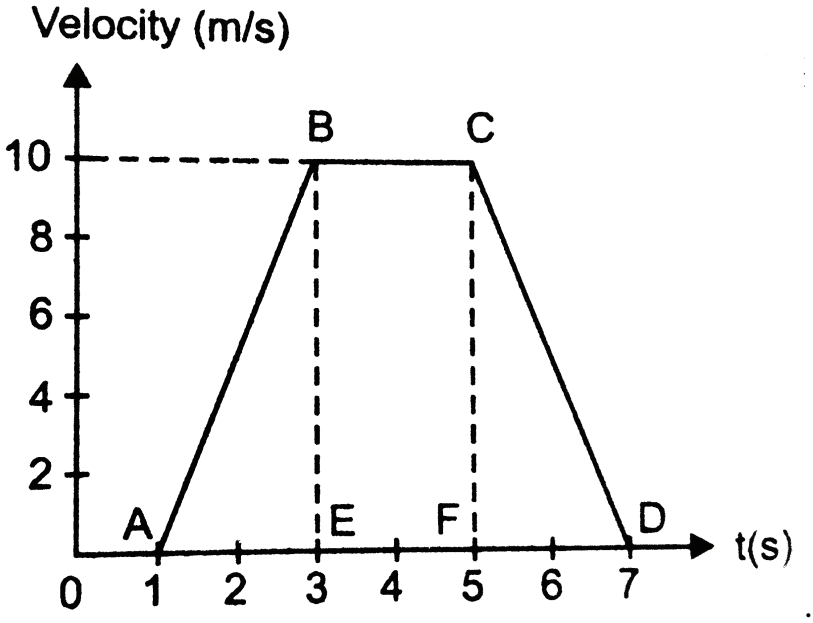
12. For the velocity time graph shown in Fig. 2 (CF).14, the distance covered by the body in last two seconds of its what fraction if the total distance covered by it in all the seven seconds?



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

B. $\frac{1}{4}$

C. $\frac{1}{3}$

D. $\frac{2}{3}$

Answer: B

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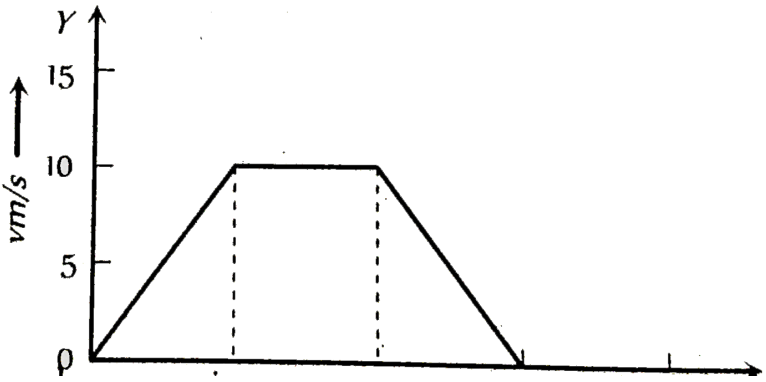
13. In the following graph, distance travelled by the body in metres is



A. 200

B. 250

C. 300

D. 400

Answer: A

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14. Velocity-time curve for a body projected vertically upwards is

A. Parabola

B. Ellipse

C. Hyperbola

D. Straight line

Answer: D

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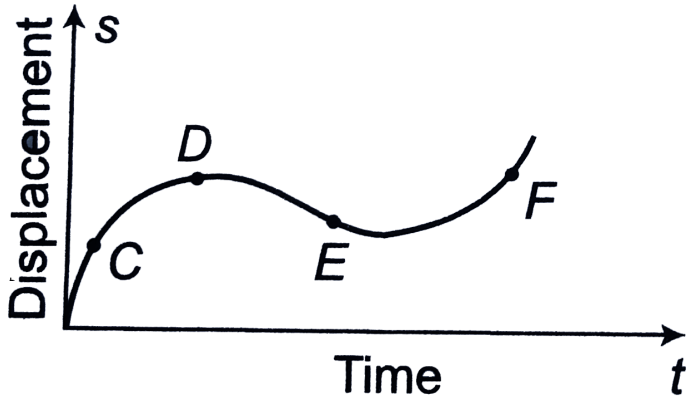
15. The displacement-time graph of moving particle is shown below



The instantaneous velocity of the particle in negative at the point

A. D

B. F

C. C

D. E

Answer: D

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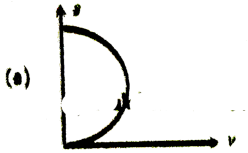
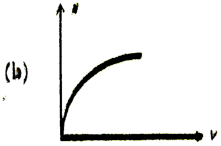
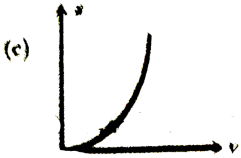
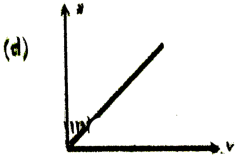
16. An object is moving with a uniform acceleration which is parallel to its instantaneous direction of motion. The dispalcement (s)-velocity (v) graph of this object is.

A. 

B. 

C. 

D. 

Answer: C

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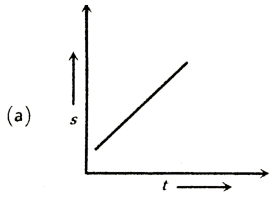
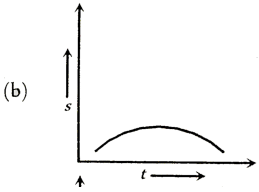
17. Which of the following graph represents uniform motion

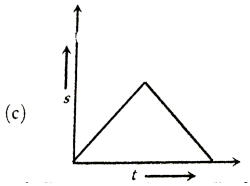
A.



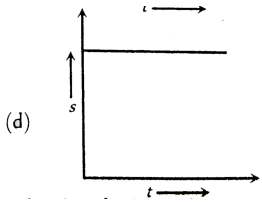
B.



C.



D.



Answer: A

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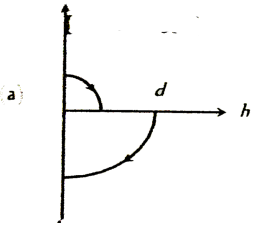
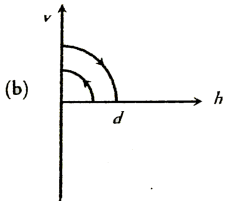
18. A ball is dropped vertically from a height d above the ground . It hits the ground and bounces up vertically to a height $(d)/(2)$. $Neg \leq ct \in g \subset sequentmotion$ and $airresis\tan ce, itsvelocity$ v$varieswiththeheighth$` above the ground as

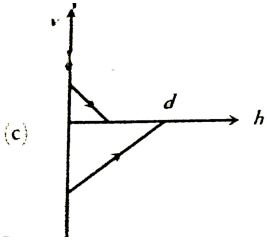
A.



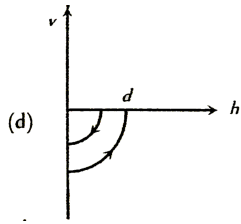
B.



C.



D.



Answer: A

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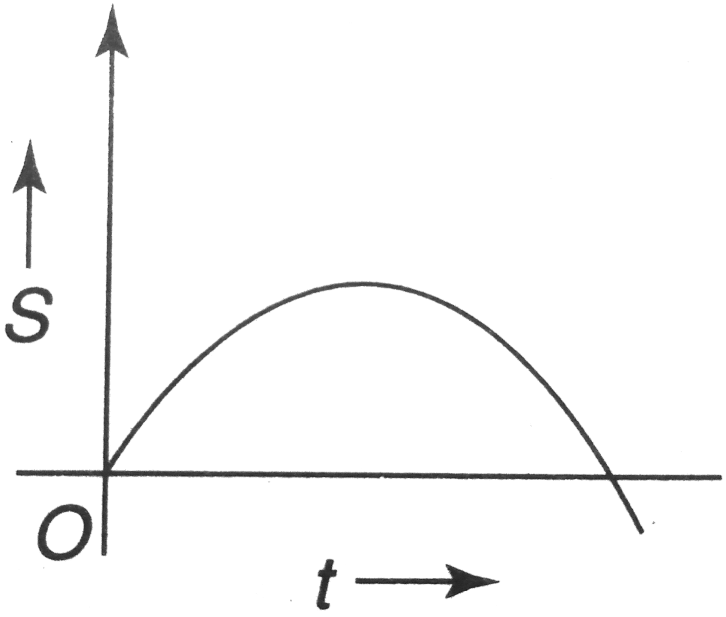
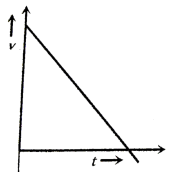
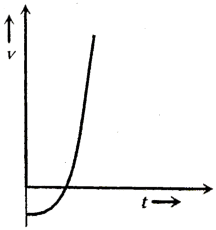
19. The graph of displacement versus time is shown. Its corresponding velocity-time graph will be.

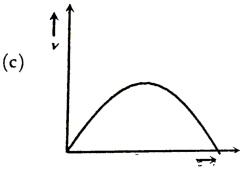


A. 

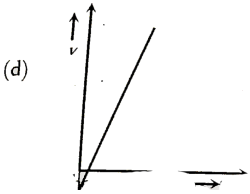
B.



C.



D.



Answer: A

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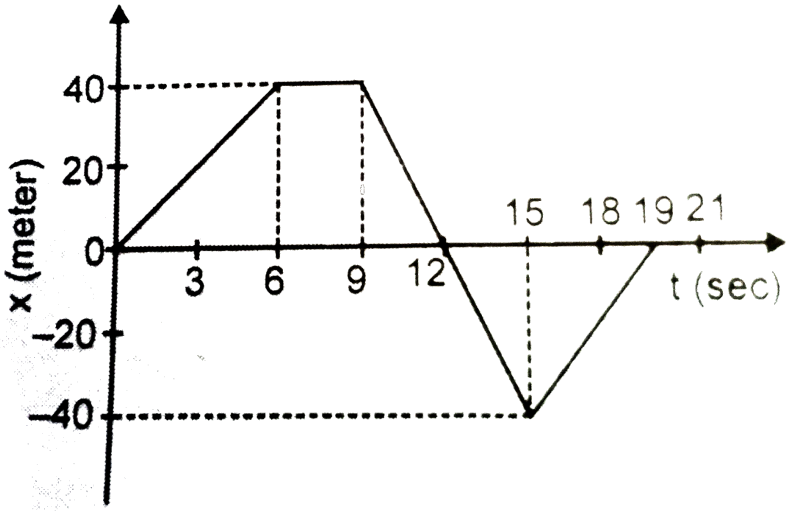
20. A train moves from one station to another in two hours time. Its speed during the motion is shown in the graph Calculate



(i) Maximum acceleration during the journey.

(ii) Distance covered during the time interval from 0.75 hour to 1 hour

A. $140 kmhr$

B. $60 kmhr$

C. $100 kmhr$

D. $120 kmhr$

Answer: B

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21. The area under acceleration-time graph gives

A. Distance travelled

B. Change in acceleration

C. Force acting

D. Change in velocity

Answer: D

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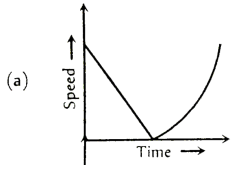
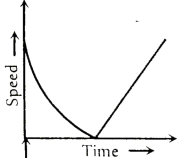
22. A ball is thrown vertically upwards. Which of the following plots represent the speed graph of the ball during its flight if the air resistence is not ignored?

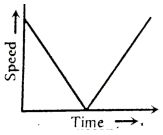
A.



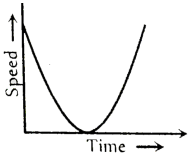
B. (b)



C. (c)



D. (d)



Answer: C

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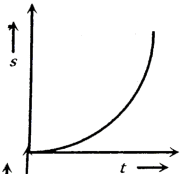
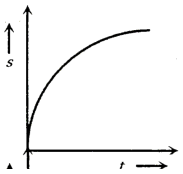
23. Which graph represents the uniform acceleration

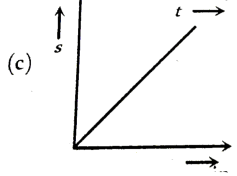
A. (a)



B. (b)



C.



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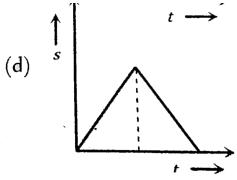

Answer: A

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Assertion Reason

1. Statement I: A body can have acceleration even if its velocity is zero at a given instant .

Statement II: A body is momentarily at rest when it reverses its direction of velocity.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

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2. Assertion: Two balls of different masses are thrown vertically upward with same speed. They will pass through their point of projection in the downward direction with the same speed.

Reason: The maximum height and downward velocity attained at the point of projection are independent of the mass of the ball.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

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3. Assertion : If the displacement of the body is zero, the distance covered by it may not be zero.

Reason : Displacement is a vector quantity and distance is a scalar quantity.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

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4. Assertion: The average velocity of the object over an interval of time is either smaller then or equal to the average speed of the object over the same interval.

Reason: Velocity is a vector quantity and speed s a scalar quantity.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

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5. Assertion: An object can have constant speed but variable velocity.

Reason: Speed is a scalar but velocity is a vector quantity.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

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6. Statement-I : The speed of a body can be negative.

Statement-II : If the body is moving in the opposite direction of positive motion, then its speed is negative.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: D

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7. Statement-1 : The position-time graph of a uniform motion in one dimension of a body can have negative slope.

Statement-2 : When the speed of body decreases with time, the position-time graph of the moving body has negative slope.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: C

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8. A positive acceleration of a body can be associated with a slowing down` of the body.

Acceleration is a vector quantity.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

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9. Assertion: A negative acceleration of a body can be associated with a 'speeding up' of the body.

Reason: Increase in speed of a moving body is independent of its direction of motion.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

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10. When a body is subjected to a uniform acceleration, it always moves in a straight line.

Straight line motion is the natural tendency of the body.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer:

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11. Statement 1: Rocket in flight is not an illustration of projectile .

Statement 2: Rocket takes flight due to combustion of fuel and does not move under the gravity effect alone.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

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12. Assertion: The average speed of a body over a given interval of time is equal to the average velocity of the body in the same interval of time if a body moves in a straight line in one direction.

Reason: Because in this case distance travelled by a body is equal to the displacement of the body.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

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13. Assertion : Position-time graph of a stationary object is a straight line parallel to time axis.

Reason : For a stationary object, position does not change with time.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

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14. Assertion: The slope of displacement-time graph of a body moving with high velocity is steeper than the slope of displacement-time graph of a body with low velocity.

Reason: Slope of displacement-time graph = Velocity of the body.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

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15. Assertion : Distance-time graph of the motion of a body having uniformly accelerated motion is a straight line inclined to the time axis.

Reason : Distance travelled by a body having uniformly accelerated motion is directly proportional to the square of the time taken.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true

Answer:

Watch Video Solution

16. Assertion: A body having non zero acceleration can have a constant velocity.

Reason: Acceleration is the rate of change of velocity.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true

Answer:

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17. Assertion: A body,whatever its motion, is always at rest in a frame of reference which is fixed to the body itself.

Reason: The relative velocity of a body with respect to itself is zero.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

Watch Video Solution

18. Assertion: Displacement of a body may be zero when distance travelled by it is not zero.

Reason: The displacement is the longest distance between initial and final position.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: C

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19. Assertion : The equation of motion can be applied only if acceleration is along the direction of velocity and is constant.

Reason : If the acceleration of a body is constant then its motion is known as uniform motion.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: D

Watch Video Solution

20. Assertion : A bus moving due north takes a turn and starts moving towards east with same speed. There will be no change in the velocity of bus.

Reason : Velocity is a vector-quantity.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true

Answer:

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21. Statement-1 : The relative velocity between any two bodies moving in opposite direction is equal to sum of the velocities of two bodies.

Statement-2 : Sometimes relative velocity between two bodies is equal to difference in velocities of the two.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

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22. Assertion : The displacement-time graph of a body moving with uniform acceleration is a straight line.

Reason : The displacement is proportional to time for uniformly accelerated motion.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: D

Watch Video Solution

23. Assertion : Velocity-time graph for an object in uniform motion along a straight path is a straight line parallel to the time axis.

Reason : In uniform motion of an object velocity increases as the square of time elapsed.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: C

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24. Assertion : A body may be accelerated even when it is moving uniformly.

Reason : When direction of motion of the body is changing then body may have acceleration

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true

Answer:

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25. Assertion : A body falling freely may do so with constant velocity.

Reason : The body falls freely, when acceleration of a body is equal to acceleration due to gravity.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true

Answer:

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26. Assertion: The displacement of a body is vector sum of the area under velocity-time graph.

Reason: Displacement is a vector quantity.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

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27. Assertion : The position-time graph of a body moving uniformly is a straight line parallel to position-axis.

Reason : The slope of position-time graph in a uniform motion gives the velocity of an object.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true

Answer:

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28. Assertion : The average speed of an object may be equal to arithmetic mean of individual speed.

Reason : Average speed is equal to total distance travelled per total time taken.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

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29. Assertion : The average and instantaneous velocities have same value in a uniform motion.

Reason : In uniform motion, the velocity of an object increases uniformly

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: C

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30. Assertion : The speedometer of an automobile measure the average speed of the automobile.

Reason : Average velocity is equal to total displacement per total time taken.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true

Answer:

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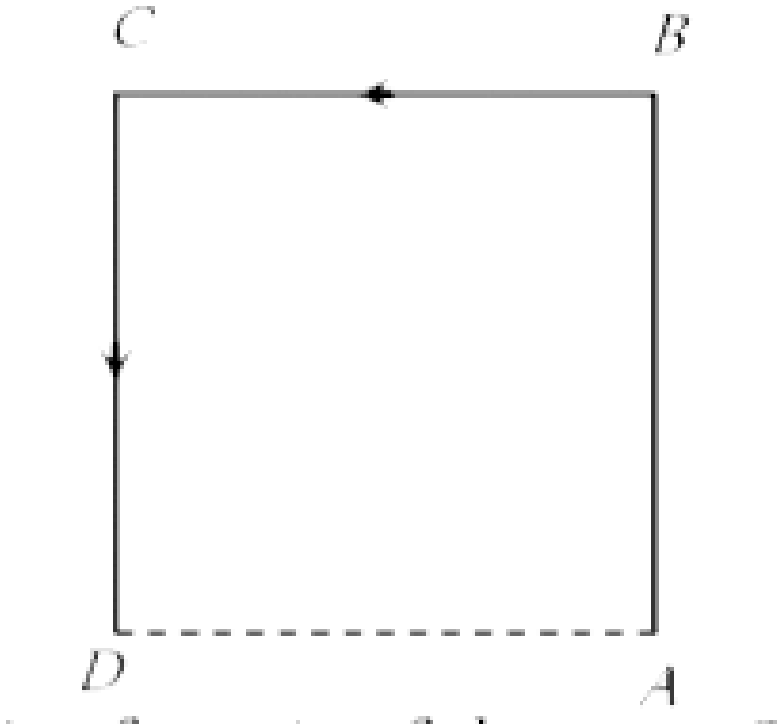
Motion In One Dimension

1. A particle moves along the side AB, BC, CD of a square of side 25 m with a velocity of $15ms^{-1}$Its average velocity is



A. $15ms^{-1}$

B. $10ms^{-1}$

C. $7.5ms^{-1}$

D. $5ms^{-1}$

Answer: D

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2. A body has V, 2 2 and 3v in first 2/3 of distance S, second 1/3 of S and third 1/3 of s respectively. Its average speed wil be

A. V

B. 2V

C. $\frac{18}{11}V$

D. $\frac{11}{18}V$

Answer: C

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3. A body covers one-third of its jurney with speed v_1, next one-third with speed v_2 and last one-third with speed v_3. Calcuate the average dpeed of the during the entire journey.

A. $\frac{v_1v_2 + v_2v_3 + v_3v_1}{v_1 + v_2 + v_3}$

B. $\frac{v_1 + v_2 + v_3}{3}$

C. $\frac{v_1v_2v_3}{v_1v_2 + v_2v_3 + v_3v_1}$

D. $\frac{3v_1v_2v_3}{v_1v_2 + v_2v_3 + v_3v_1}$

Answer: D

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4. The displacement of the particle varies with time according to the relation $x = \frac{k}{b}\left[1 - e^{-ht}\right]$. Then the velocity of the particle is

A. $k\left(e^{-bt}\right)$

B. $\frac{k}{b^2 e^{-bt} 0}$

C. kbe^{-bt}

D. None of these

Answer: A

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5. The acceleration of a particle starting from rest, varies with time according to the relation $A = -a\omega \sin megat.$. The displacement of this particle at a time t will be

A. $-\frac{1}{2}\left(a\omega^2 \sin \omega t\right) t^2$

B. $a\omega \sin \omega t$

C. $a\omega \cos \omega t$

D. $a\frac{\sin \omega t}{\omega} - at$

Answer: D

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6. . If the velocity of a particle is (10 + 2 t 2) m/s , then the average acceleration of the particle between 2s and 5s is

A. $2m / s^2$

B. $4m / s^2$

C. $12m / s^2$

D. $14m / s^2$

Answer: D

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7. . A bullet moving with a velocity of 200 cm / s penetrates a wooden block and comes to rest after traversing 4 cm inside it. What velocity is

needed for travelling distance of 9cm in same block

A. 100 m/s

B. 136.2 cm/s

C. 300 cm/s

D. 250 cm/s

Answer: C

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8. A thief is running away on a straight road in a moving with a speed of $9ms^{-1}$. A policeman chases him on a motor cycle moving at a speed of $10ms^{-1}$. If the instantaneous separation of the jeep from the motor cycle is $100m$, how long will it take for the policeman to catch the thief ?.

A. 1s

B. 19s

C. 90s

D. 100s

Answer: D

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9. A car A is travelling on a straight level road with a uniform speed of 60 km/h. It is followed by another car B which in moving with a speed of 70 km/h. When the distance between then is 2.5km, the car B is given a deceleration of $20\frac{km}{h^2}$. After how much time will B catch up with A

A. 1 hr

B. 1/2 hr

C. 1/4 hr

D. 1/8 hr

Answer: B

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10. The speed of a body moving with uniform acceleration is u. This speed is doubled while covering a distance S. When it covers an additional distance S, its speed would become

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11. Two trains one of length 100m and another of length 125 m, are moving in mutually opposite directions along parallel lines, meet each other. Each with speed 10 m/s. If their acceleration are $0.3\frac{m}{s^2}$ and $0.2\frac{m}{s^2}$ respectively, then the time they take to pass each other will be

A. $\sqrt{3}u$

B. $\sqrt{5}u$

C. $\sqrt{11}u$

D. $\sqrt{7}u$

Answer: B

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12. A particle starts from rest with uniform acceleration a. Its velocity after 'n' second is 'v'. The displacement of the body in the last two second is

A. 5 s

B. 10 s

C. 15 s

D. 20 s

Answer: D

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13. A point mass starts moving in a straight line with constant acceleration. After time t_0 the acceleration changes its sign, remaining the same in magnitude. Determine the time T from the beginning of motion in which the point mass returns to the initial position.

A. $\frac{2v(n+1)}{n}$

B. $\frac{v(n+1)}{n}$

C. $\frac{2v(n+1)}{n}$

D. $\frac{2v(n+1)}{n}$

Answer: B

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14. A particle is moving in a straight line and passes through a point O with a velocity of $6ms^{-1}$ The particle moves with a constant retardation of $2ms^{-2}$ for 4 s and there after moves with constant velocity. How long after leaving O does the particle return to O

A. $\sqrt{2t}$

B. $\left(2+\sqrt{2}\right)t$

C. $\frac{t}{\sqrt{2}}$

D. Can not perdicted unless accelerationis given

Answer: B

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15. A bird flies for 4 seconds with a velocity of $|t-2|m/\sec.$ In a straight line, where $t=$ time in seconds. It covers a distance of

A. 2 m

B. 8 s

C. Never

D. 4 s

Answer: B

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16. A particle is projected with velocity V_0along axis x . The deceleration on the particle is proportional to the square of the distance from the origin i.e., $a = \omega x^2$. distance at which the particle stops is

A. 2 m

B. 4 m

C. 6 m

D. 8 m

Answer: D

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17. A body is projected vertically up with a velocity v and after some time it returns to the point from which it was projected. The average velocity and average speed of the body for the total time of flight are

A. $\sqrt{\frac{3v_0}{2\alpha}}$

B. $\left(\frac{3v_0}{2\alpha}\right)^{\frac{1}{2}}$

C. $\sqrt{\frac{3v_0^2}{2\alpha}}$

D. $\left(\frac{3v_0^2}{2\alpha}\right)^{\frac{1}{3}}$

Answer: B

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18. A stone is dropped from a height h. Simultaneously, another stone is thrown up from the ground which reaches a height 4 h. The two stones cross each other after time

A. $\vec{v}/2 \text{and} v/2$

B. 0 and v / 2

C. 0 and 0

D. $\vec{v}/2 \text{and} 0$

Answer: A

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19. Four marbles are dropped from the top of a tower one after the other with an interval of one second. The first one reaches the ground after 4 seconds . When the first one reaches the ground the distance between the first and second, the second and third and the third and forth will be respectively

A. $\sqrt{\frac{h}{8g}}$

B. $\sqrt{8gh}$

C. $\sqrt{2gh}$

D. $\sqrt{\frac{h}{2g}}$

Answer: A

Watch Video Solution

20. Four marbles are dropped from the top of a tower one after the other with an interval of one second. The first one reaches the ground after 4 seconds . When the first one reaches the ground the distance between the first and second, the second and third and the third and forth will be respectively

A. 35, 25 and 15 m

B. 30, 20 and 10 m

C. 20, 10 and 5 m

D. 40, 30 and 20 m

Answer: A

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21. Two bodies are thrown simultaneously from a tower with same initial velocity v_0: one vertically upwards, the other vertically downwards. The distance between the two bodies after time t is

A. $4\sqrt{\frac{h}{g}}$

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

C. $\sqrt{\frac{2h}{g}}$

D. $\sqrt{\frac{h}{g}}$

Answer: B

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22. A body falls freely from the top of a tower. It covers 36 % of the total height in the last second before striking the ground level. The height of the tower is

A. $2v_0t + \frac{1}{2}gt^2$

B. $2v_0t$

C. $v_0t + \frac{1}{2}gt^2$

D. v_0t

Answer: D

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23. A body is vertically upwards. If t_1 and t_2 are the times at which it is height h above the point of projection while ascending and descending, respectively, find (a) the velocity of projection and height h, (b) the maximum height reached by the body and (c) the velocity of the body at height $h/2$.

A. gt_1

B. gt_2

C. $g(t_1 + t_2)$

D. $\frac{g(t_1 + t_2)}{2}$

Answer: D

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24. A projectile is fired vertically upwards with an initial velocity u . After an interval of T seconds a second projectile is fired vertically upwards, also with initial velocity u .

A. They meet at time $t = \frac{u}{g}$ and at a height $\frac{u^2}{2g} + \frac{gT^2}{8}$

B. They meet at time $t = \frac{u}{g} + \frac{T}{2}$ and at a height $\frac{u^2}{2g} + \frac{gT^2}{8}$

C. They meet at time $t = \frac{u}{g} + \frac{T}{2}$ and at a height $\frac{u^2}{2g} - \frac{gT^2}{8}$

D. They never meet

Answer: C

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