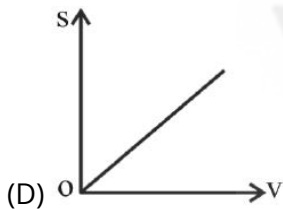
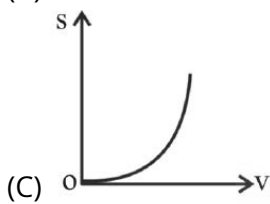
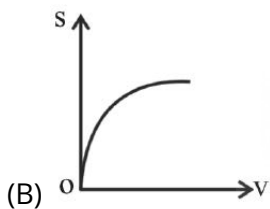
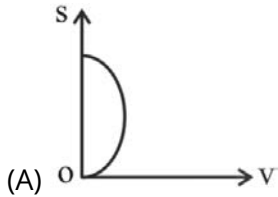


Q1 An object is moving with a uniform acceleration which is parallel to its instantaneous direction of motion. The displacement (s) - velocity (v) graph of this object is _____



Q2 A particle starts its motion from rest under the action of a constant force. If the distance covered in first 10s is S_1 and that covered in the first 20 s is S_2 , then

- (A) $s_2 = 2s_1$ (B) $s_2 = 3s_1$
 (C) $s_2 = 4s_1$ (D) $s_2 = s_1$

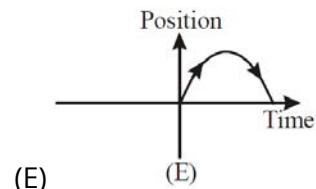
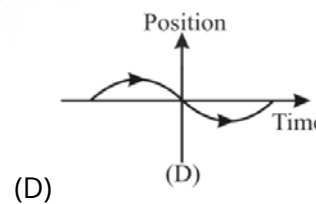
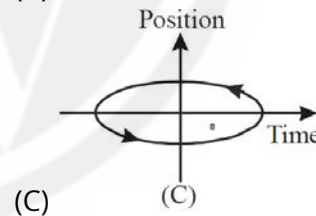
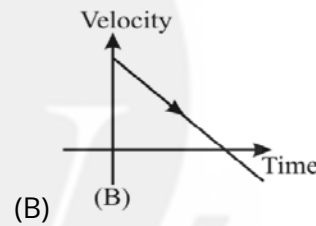
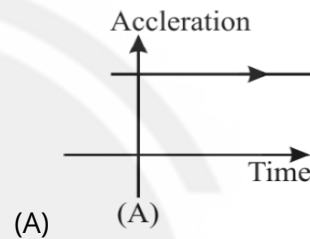
Q3 An athlete runs exactly once around a circular track of length 500 m. The runner's displacement in the race is

- (A) 50m (B) 5 m
 (C) 0.5m (D) 0m

Q4 A body is travelling east with a speed of 9 m/s and with an acceleration of 2 m/s² acting west on it. The displacement of the body during the 5th second of its motion is

- (A) 0.25 m (B) 0.5 m
 (C) 0.75 m (D) zero

Q5 The graph which cannot possibly represent one-dimensional motion is



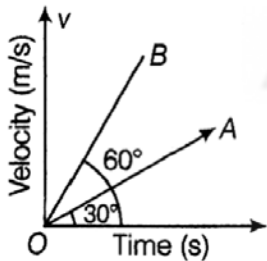
- Q6** A toy cyclist completes one round of a square track of side 2m in 40s. What will be the displacement at the end of 3 min?
 (A) 52m (B) zero
 (C) 16m (D) $2\sqrt{2}m$
 (E) $4\sqrt{2}m$
- Q7** Two cars A and B are moving with same speed of 45 km/h along same direction. If a third car C coming from the opposite direction with a speed of 36 km/h meets two cars in interval of 5 min, the distance of separation of two cars A and B should be (in km)
 (A) 6.75 (B) 7.25
 (C) 5.55 (D) 8.35
- Q8** The reaction time for a car driver is 0.9 s. If the car travelling initially with 36 km h^{-2} is stopped by the driver after observing a signal by the deceleration of 5 ms^{-2} , the total distance travelled by the car before coming to rest is
 (A) 19 m (B) 9 m
 (C) 10 m (D) 28 m
- Q9** The position x of a particle varies with time (t) as $x = A t^2 - B t^2$. The acceleration at time t of the particle will be equal to zero. What is the value of t ?
 (A) $2A/3B$ (B) A/B
 (C) $A/3B$ (D) Zero
- Q10** body of mass m moving along a straight line covers half the distance with a speed of 2 ms^{-1} . The remaining half of the distance is covered in two equal time intervals with a speed of 3 ms^{-1} and 5 ms^{-1} respectively. The average speed of the particle for the entire journey is
 (A) $3/8 \text{ m}^{-1}$ (B) $8/3 \text{ ms}^{-1}$
 (C) $4/3 \text{ m/s}^{-1}$ (D) $16/3 \text{ ms}^{-1}$
- Q11** A body starts from rest with an acceleration a_1 . After two seconds another body B starts from rest with an acceleration a_2 . If they travel equal distances in fifth second after the starts of A, the ratio $a_1 : a_2$ will be equal to:
 (A) 9 : 5 (B) 5 : 7
 (C) 5 : 9 (D) 7 : 9
- Q12** A person is running with a uniform velocity towards a flyover. He takes 5 s to reach the flyover from a reference point and takes 50 s to cross the flyover from the same reference point. If the length of the flyover is 1000 m then his velocity in nearly
 (A) 83.1 kmph (B) 80.0 kmph
 (C) 75.4 kmph (D) 85.2 kmph
- Q13** A cyclist starting from rest moves with uniform acceleration and covers 120 m in 10s. Then his acceleration in ms^{-2} is
 (A) 5 (B) 1.5
 (C) 2.4 (D) 3
- Q14** An object travelling at a speed of 36 kmph comes to rest in a distance of 200 m after the brakes were applied. The retardation produced by the brakes is ---
 (A) 0.25 ms^{-2} (B) 0.2 ms^{-2}
 (C) 0.15 ms^{-2} (D) 0.10 ms^{-2}
- Q15** particle is at $x = 0$ when $t = 0$. It moves along x -axis with a velocity given by $v = 5\sqrt{x}$. Find the acceleration of this particle ____
 (A) 8.5 ms^{-2} (B) 12.5 ms^{-2}
 (C) 10.5 ms^{-2} (D) 11.5 ms^{-2}
- Q16** An object having a velocity 5 m/s is accelerated at the rate 2 m/s^2 for 6 s. Find the distance travelled during the period of acceleration
 (A) 60 m (B) 25 m
 (C) 36 m (D) 66 m



- Q17** A 175 m long train is travelling along a straight track with a velocity 72 kmph. A bird is flying parallel to the train in the opposite direction with a velocity 18 kmph. The time taken by the bird to cross the train is
 (A) 35 s (B) 27 s
 (C) 11.6 s (D) 7 s

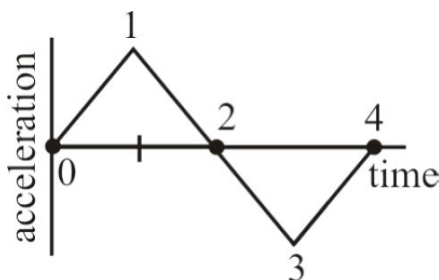
- Q18** A car moving with a velocity 6.25 ms^{-1} is decelerated with $2.5\sqrt{v} \text{ ms}^{-2}$ (v is instantaneous velocity). Time taken by the card to come to rest is.
 (A) 2s (B) 3s
 (C) 2.5s (D) 4s

- Q19** The velocity-time graph of two bodies A and B are shown below.



Then, the ratio of their acceleration a_A/a_B will be-

- (A) $\sqrt{3} : 1$ (B) $1 : \sqrt{3}$
 (C) $3 : 1$ (D) $1 : 3$
- Q20** Acceleration-time graph of a body moving in a straight line is as shown. The body started its motion from rest.



At which point is the body moving with the largest speed?

- (A) 1 (B) 2
 (C) 3 (D) 4

- Q21** A bullet enters in a piece of wood with velocity v_0 and the resistive force acting on the bullet in the wood is proportional to $v^{1/3}$. If the total distance travelled by the bullet is proportional to $(v_0)^\beta$ then the value of β is
 (A) $2/3$ (B) $5/3$
 (C) $4/3$ (D) $-1/3$

- Q22** The motion of a particle is represented by the equation $s = 8t^3 - 2t^2 + 6t + 7$. Find the velocity of the particle at the end of 2 seconds in m s^{-1} .
 (A) 108 (B) 57
 (C) 94 (D) 41

- Q23** A racing car accelerates on a straight road from rest to a speed of 50 m/s in 25s. Assuming uniform acceleration of the car throughout, the distance covered in this time will be
 (A) 625m (B) 1250 m
 (C) 2500m (D) 50 m

- Q24** A police van moving on a highway with a speed of 30 km h^{-1} fires a bullet at a thief's car speeding away in the same direction with a speed of 192 km h^{-1} . If the muzzle speed of the bullet is 150 ms^{-1} , with what speed does the bullet hit the thief's car?
 (A) 90 ms^{-1} (B) 105 ms^{-1}
 (C) 110 ms^{-1} (D) 120 ms^{-1}

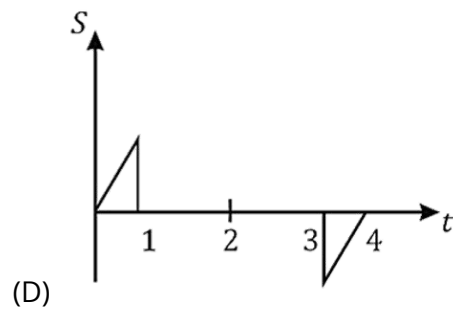
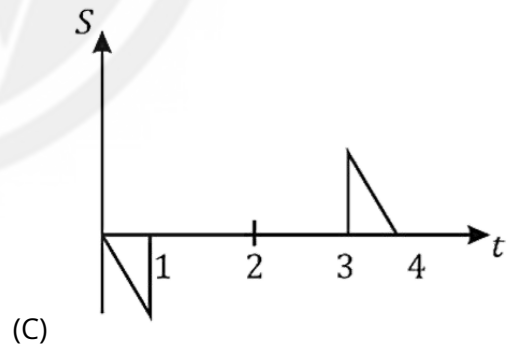
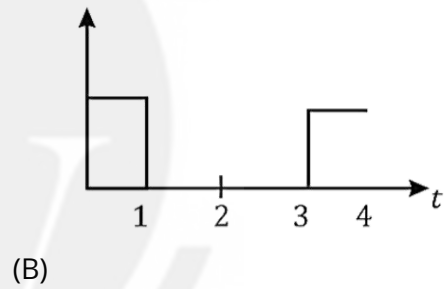
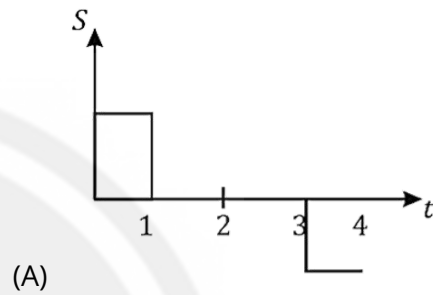
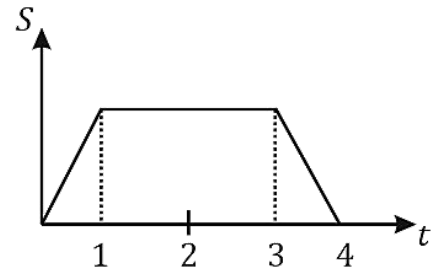
- Q25** A bullet on penetrating 30 cm into its target loses its velocity by 50%. What additional distance will it penetrate into the target before it comes to rest?
 (A) 30 cm (B) 20 cm
 (C) 10 cm (D) 5 cm



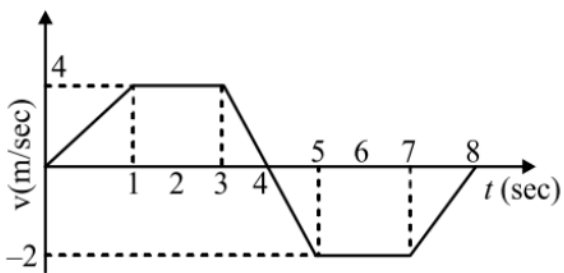
- Q26** The position x of a particle varies with time as $x = at^2 - bt^3$. The acceleration of the particle is zero at time t which will be equal to
- (A) $\frac{2a}{3b}$ (B) $\frac{b}{a}$
 (C) $\frac{a}{3b}$ (D) Zero

- Q27** A ball is dropped from the top of 80 m high tower. If after 2 sec of fall the gravity ($g = 10\text{m/s}^2$) disappears, Then time taken to reach ground since the gravity disappeared is
- (A) 3 sec (B) 4 sec
 (C) 5 sec (D) 2 sec

- Q28** The Displacement time graph of a body moving along a straight line is as shown in figure. Which of the following graphs represents the velocity-time graph for the motion of that body

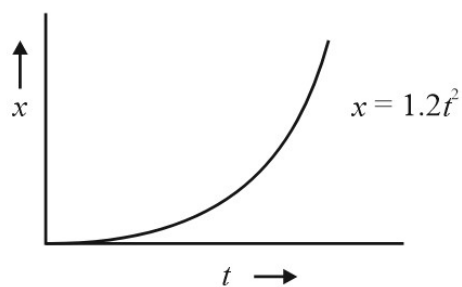


Q29 The $v - t$ graph of a linear motion is shown in adjoining figure. The distance from origin after 8 seconds is



- (A) 18 meters
- (B) 16 meters
- (C) 8 meters
- (D) 6 meters

Q30 Given figure shows the distance-time graph of the motion of a car. It follows from the graph that the car is



- (A) At rest
- (B) In uniform motion
- (C) In non-uniform acceleration
- (D) uniformly accelerated

Q31 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 $u=2 \text{ ms}^{-1}$ at $t=0$, then the velocity at the end of 2 seconds is

- (A) 12 ms^{-1}
- (B) 18 ms^{-1}
- (C) 27 ms^{-1}
- (D) 36 ms^{-1}



Answer Key

Q1 C
Q2 C
Q3 D
Q4 D
Q5 C
Q6 E
Q7 A
Q8 A
Q9 C
Q10 B
Q11 C
Q12 B
Q13 C
Q14 A
Q15 B
Q16 D

Q17 D
Q18 A
Q19 D
Q20 B
Q21 B
Q22 C
Q23 A
Q24 B
Q25 C
Q26 C
Q27 A
Q28 A
Q29 D
Q30 D
Q31 B



Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

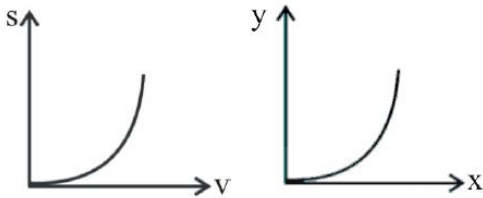
From Newton's third equation of motion,

$$v^2 - u^2 = 2as$$

$$v^2 = 2as \quad [u = 0]$$

We know,

Parabola equation, $x^2 = 2ay$



Video Solution:



Q2 Text Solution:

Particle starts motion from rest, $u = 0$

Let, acceleration = a m/s², time $t_1 = 10$ sec

velocity after 10 second = v_1 m/s

$$\text{So, } v_1 = u + at_1$$

$$v_1 = 0 + a \times 10$$

$$v_1 = 10a \text{ m/s}$$

$$\text{and } v_1^2 = u^2 + 2as_1$$

$$(10a)^2 = 0 + 2as_1$$

$$s_1 = \frac{100a^2}{2a} = 50a$$

Velocity after $t_2 = 20$ second

$$v_2 = u + at_2$$

$$v_2 = 0 + a \times 20$$

$$v_2 = 20a$$

$$\text{and } v_2^2 = u^2 + 2as_2$$

$$(20a)^2 = 0 + 2as_2$$

$$s_2 = s_1 = \frac{100a^2}{2a} = 50a$$

$$\text{So, } \frac{s_1}{s_2} = \frac{50a}{200a}$$

$$\frac{s_1}{s_2} = \frac{1}{4}$$

$$s_2 = 4s_1$$

Video Solution:



Q3 Text Solution:

Displacement is known as the distance between initial position and final position. In a circular

track, the initial and final position of the athlete is same. The total distance covered is 500 m, but the net displacement is zero. So, total displacement is zero.

Video Solution:



Q4 Text Solution:

Given,

$u = 9 \text{ m/s}$ east direction

$a = 2 \text{ m/s}^2$ west direction

Distance covered in t th second (retardation)

$$s_t = u - \frac{1}{2}a(2t - 1) \quad \{\because s_t = 5 \text{ sec}\}$$

$$s_5 = 9 - \frac{1}{2} \times 2(2 \times 5 - 1) = 9 - (10 - 1)$$

$$s_5 = 0$$

Video Solution:



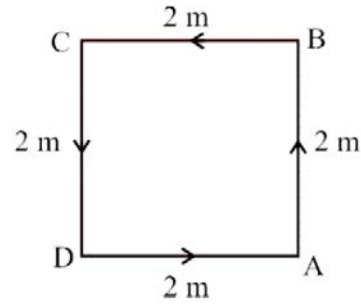
Q5 Text Solution:

In one dimension motion, At $t = 0$, the body must at one position in graph. Hence option c has two positions in the graph at $t = 0$, it will be correct option.

Video Solution:



Q6 Text Solution:



In 3 min. the cyclist will make
 $= \frac{3 \times 60}{40} = 4.5$ round

So, In four round, cyclist displacement equals to zero.

But in half round cyclist will be diagonally opposite from where he started, so the displacement will be

$$AC^2 = AB^2 + BC^2$$

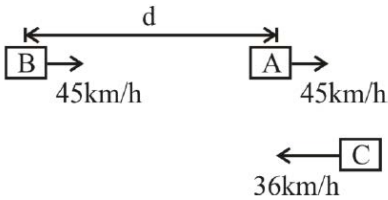
$$AC = \sqrt{2^2 + 2^2}$$

$$AC = 2\sqrt{2} \text{ m}$$

Video Solution:



Q7 Text Solution:



d will always remain constant car A & B have same velocity

Velocity of car w. r. to A & B,

$$V_{C/A} = V_{C/B} = 45 + 36 = 81 \text{ km/h}$$

$$= 81 \times \left(\frac{5}{18}\right) \text{ m/s}$$

$$= \frac{45}{2} \text{ m/s}$$

Distance between A and B = Velocity of approach \times Time difference in meeting A and B

$$d = \frac{45 \times 5 \times 60}{2} = 6750 \text{ m} = 6.75 \text{ km}$$

Video Solution:



Q8 Text Solution:

Given data,

$$u = 36 \text{ km/h} = 36 \times \frac{5}{18} = 10 \text{ m/s}$$

$$t = 0.9 \text{ sec}$$

$$s_1 = ut = 10 \times 0.9 = 9 \text{ m} \Rightarrow s_1 = 9 \text{ m}$$

For deceleration, $v = u + gt$

$$0 = 10 - 5t_1$$

$$t_1 = 2 \text{ sec}$$

\ Distance travelled after deceleration,

$$s_2 = ut_1 - \frac{1}{2}at_1^2$$

$$\text{Or } s_2 = 10 \times 2 - \frac{1}{2} \times 5 \times 2^2$$

$$\text{Or } s_2 = 20 - 10$$

$$\therefore s_2 = 10 \text{ m}$$

Video Solution:



Q9 Text Solution:

Given that,

$$x = At^2 - Bt^3$$

$$(v) = \frac{dx}{dt} = 2At - 3Bt^2$$

$$\text{Acceleration } (a) = \frac{d^2x}{dt^2} = \frac{d}{dt} (2At - 3Bt^2)$$

$$a = 2A - 6Bt$$

$$\text{Put } a = 0$$

$$2A = 6Bt$$

$$t = \frac{2A}{6B}$$

$$t = \frac{A}{3B}$$

Video Solution:



Q10 Text Solution:

Suppose that total distance travelled by the body is $2s$.

Given that s distance is travelled by $2m/s$.

Time taken by the body to travel first half distance

$$t_1 = s/2$$

And let t_2 be the time taken by the body to cover remaining half distance $3m/s$ and $5m/s$

So, distance (s) = $3t_2 + 5t_2 = 8t_2$

$$t_2 = \frac{s}{8}$$

$$V_{avg} = \frac{\text{Total distance travelled}}{\text{Total time taken}}$$

$$= \frac{2s}{t_1 + 2t_2}$$

$$= \frac{2s}{\frac{s}{2} + 2 \cdot \frac{s}{8}} = \frac{2s}{\frac{s}{2} + \frac{s}{4}}$$

$$V_{avg} = \frac{8}{3} \text{ m/s}$$

Video Solution:



Q11 Text Solution:

Given that,

Initial velocity $u = 0$

Distance covered in n th second after starting from rest -

$$s_n = u + \frac{a}{2}(2n - 1)$$

For A: $n = 5$

$$S_5 = \frac{a_1}{2}(2 \times 5 - 1) = \frac{9}{2}a_1 \quad (\because u = 0)$$

For B: $n = 3$

$$S_3 = \frac{a_2}{2}(2 \times 3 - 1) = \frac{5}{2}a_2$$

According to question, $S_5 = S_3$

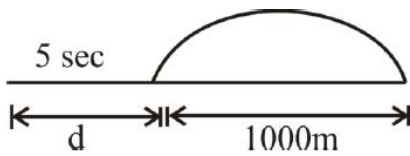
$$\frac{9}{2}a_1 = \frac{5}{2}a_2$$

$$a_1 : a_2 = 5 : 9$$

Video Solution:



Q12 Text Solution:



$$\text{Velocity} = \frac{\text{Displacement}}{\text{Time}}$$

$$v = \frac{d}{5}$$

$$d = 5v$$

$$v = \frac{d+1000}{50}$$

$$v = \frac{5v+1000}{50}$$

$$50v = 5v + 1000$$

$$v = \frac{1000}{45}$$

$$v = 22.22 \times \frac{18}{5} \text{ kmph}$$

$$v = 80 \text{ kmph}$$

Video Solution:



Q13 Text Solution:

Given, Initial Velocity (u) = 0

Total Distance covered (s) = 120m

Total time (t) = 10s

Acceleration (a) = ?

From Newton's Law of motion,

$$s = ut + \frac{1}{2}at^2$$

$$120 = 0 \times 10 + \frac{1}{2} \times a \times 10^2$$

$$120 = 50a$$

$$a = \frac{120}{50} = 2.4 \text{ m/sec}^2$$

Video Solution:



Q14 Text Solution:

Given that,

$$u = 36 \text{ km/h} = 36 \times \frac{5}{18} = 10 \text{ ms}^{-1}$$

$$s = 200 \text{ m}$$

$$v = 0$$

$$a = ?$$

By third law of Motion-

$$v^2 - u^2 = 2as$$

$$0^2 - (10)^2 = 2 \times a \times 200$$

$$-100 = 400a$$

$$a = \frac{-100}{400} = -0.25$$

Retardation is = 0.25 ms^{-2}

Video Solution:



Q15 Text Solution:

We know that

Acceleration = derivative of speed with respect to time

Therefore,

$$a = \frac{dv}{dt}$$

$$a = \frac{dv}{dx} \times \frac{dx}{dt}$$

$$a = d(5\sqrt{x})/dx \times \frac{dx}{dt}$$

$$a = \frac{5}{2\sqrt{x}} \times v \quad \left(v = 5\sqrt{x} \right)$$

$$a = \left(\frac{5}{2\sqrt{x}} \right) \times 5\sqrt{x}$$

$$a = \frac{5}{2} \times 5 = \frac{25}{2} = 12.5 \text{ m/s}^2$$

Therefore, acceleration is 12.5 m/s^2

Video Solution:



Q16 Text Solution:

Given $u = 5 \text{ m/s}$, $a = 2 \text{ m/s}^2$, $t = 6 \text{ s}$

$$s = ut + \frac{1}{2}at^2$$

$$s = 5 \times 6 + \frac{1}{2} \times 2 \times 6^2$$

$$s = 66 \text{ m}$$

Video Solution:



Q17 Text Solution:

Velocity of bird = 18 km/h

Velocity of train = 72 km/h

Length of train = 175 m

Velocity of bird with respect to train (v)
 $= 18 + 72 = 90 \text{ km/h} \times \frac{5}{18} = 25 \text{ ms}^{-1}$

Length to be covered by bird with respect to train to

cross the train (s) = 175 m

Hence, time taken by bird to cross the train

$$t = \frac{s}{v} = \frac{175}{25} = 7 \text{ sec}$$

Video Solution:



Q18 Text Solution:

Given that, initial velocity of car, $u = 6.25 \text{ m/s}$

$a = 2.5\sqrt{v} \text{ m/s}^2$ deceleration

Time taken by car to come at rest = ?

So, acceleration $a = \frac{dv}{dt} = -2.5\sqrt{v}$

$$\frac{dv}{\sqrt{v}} = -2.5dt$$

Now on integrating both side w.r.t 't'

$$\int_{6.25}^0 \frac{dv}{\sqrt{v}} = -2.5 \int dt$$

$$[2\sqrt{v}]_{6.25}^0 = -2.5t$$

$$2(\sqrt{0} - \sqrt{6.25}) = -2.5t$$

$$-2\sqrt{6.25} = -2.5t$$

$$t = \frac{2 \times 2.5}{2.5}$$

$$t = 2 \text{ s}$$

Video Solution:



Q19 Text Solution:

Acceleration = Slope of velocity - time graph

$$\text{Thus, } \frac{a_A}{a_B} = \frac{\text{Slope of } v-t \text{ graph for } A}{\text{Slope of } v-t \text{ graph for } B}$$

$$= \frac{\tan 30^\circ}{\tan 60^\circ}$$

$$\frac{a_A}{a_B} = \frac{1/\sqrt{3}}{\sqrt{3}} = \frac{1}{3} \Rightarrow a_A : a_B = 1 : 3$$

Video Solution:



Q20 Text Solution:

According to the acceleration - time graph, speed = area under acceleration - time graph.

As given in the graph area is maximum for point 0 to 2.

Therefore,

At point 2, the body moves with the largest speed.

Video Solution:



Q21 Text Solution:

Given,

$$\text{Resistive force } (F_r) \propto v^{\frac{1}{3}}$$

$$F_r = kv^{\frac{1}{3}} \Rightarrow -m \cdot a = kv_0^{\frac{1}{3}}$$

$$a = \frac{-k}{m} v_0^{\frac{1}{3}}$$

$$\therefore v^2 = u^2 + 2as$$

$$2as = v^2 - u^2$$

$$2 \times \frac{-k}{m} v_0^{\frac{1}{3}} \cdot s = 0 - v_0^2$$

$$s = \frac{m}{2k} v_0^{(2-\frac{1}{3})} \Rightarrow s = \frac{m}{2k} v_0^{\frac{5}{3}}$$

$$s \propto v_0^{\frac{5}{3}}$$

If the total distance,

$$s \propto v_0^\beta$$

comparing equation (i), then β value $5/3$.

Video Solution:



Q22 Text Solution:

$$\text{Given } s = 8t^3 - 2t^2 + 6t + 7$$

$$\text{Velocity } (v) = \frac{ds}{dt} = 24t^2 - 4t + 6$$

$$V_{(t=2)} = 24 \times 4 - 4 \times 2 + 6$$

$$= 94\text{m/s}$$

Video Solution:



Q23 Text Solution:

Given that,

Initial velocity (u) = 0

Final velocity (v) = 50 m/sec

$t = 25$ second

$v = u + at$

$50 = 0 + a \times 25$

$a = 2\text{m/sec}^2$

Distance covered (s) = $ut + \frac{1}{2}at^2$

$s = 0 \times 25 + \frac{1}{2} \times 2 \times (25)^2$

$s = 625$ m

Video Solution:**Q24 Text Solution:**

Given that,

Speed of the police van (v_{police})
 $= 30\text{km/h} = 30 \times \frac{5}{18} = 8.33$ m/s

The muzzle speed of the bullet (v_{bullet}) = 150 m/s

Speed of the thief's car (v_{thief}) = 192 km/h

$= 192 \times \frac{5}{18} = 53.33$ m/s

The bullet is fired from a moving van, therefore resultant speed can be obtained as:

$= 150 + 8.33$

$= 158.33$ m/s

Both the vehicle are moving in the same direction.

So, velocity of the bullet hits the thief's car is,

$V_{\text{relative}} = v_{\text{bullet}} - v_{\text{thief}}$

$= 158.33 - 53.33$

$= 105$ m/s

Video Solution:

Q25 Text Solution:

For First part of penetration, by equation of motion

$$\left(\frac{v}{2}\right)^2 - \left(v\right)^2 = 2a(30 \times 10^{-2}) \text{ or } a =$$

$$-\frac{3v^2}{8(30 \times 10^{-2})}$$

For latter part of penetration, by equation of motion

$$0 - \left(\frac{v}{2}\right)^2 = 2ax \text{ or } x = -\frac{v^2}{8a}$$

$$x = -\frac{v^2}{8} \left(\frac{8(30 \times 10^{-2})}{-3v^2}\right) = 10 \times 10^{-2} \text{ m} = 10$$

cm

Video Solution:



Q26 Text Solution:

Given $x = at^2 - bt^3$

Velocity,

$$v = \frac{dx}{dt} = \frac{d}{dt}(at^2 - bt^3) = 2at - 3bt^2$$

Acceleration,

$$a = \frac{dv}{dt} = \frac{d}{dt}(2at - 3bt^2) = 2a - 6bt$$

When $a = 0$ then

$$0 = 2a - 6bt \text{ or } t = \frac{a}{3b}$$

Video Solution:



Q27 Text Solution:

In figure, represents the top of the tower and C its base. A ball is dropped from A and after 2 s of fall, the gravity is appears. In figure, it is denoted by B.

Distance travelled by the ball in 2s ($u = 0$)

$$h = \frac{1}{2}gt^2 = \frac{1}{2}(10\text{m/s}^2)(2\text{s})^2 = 20\text{m}$$

Velocity attained by the ball in 2s is

$$v = gt = (10\text{m/s}^2)(2\text{s}) = 20\text{m/s}$$

time taken by the ball to reach the ground since the gravity disappeared is

$$t = \frac{(80\text{m}-h)}{v} = \frac{80\text{m}-20\text{m}}{20\text{m/s}} = \frac{60\text{m}}{20\text{m/s}} = 3\text{s}$$

Video Solution:



Q28 Text Solution:

to 1 s, Soc t, so velocity is constant. Between t interval 1 s to 3 s, S is constant, so velocity is zero. Between time interval 3 s to 4 s, S decreases with t, i.e., velocity constant but opposite to the previous direction. Hence the option (a) is correct

Video Solution:



Q29 Text Solution:

dis tan ce = area under v – t graph

Video Solution:



Q30 Text Solution:

Since $x = 1.2t^2$ which is in form $x = \frac{1}{2}at^2$
Thus the motion is uniformly accelerated.

Video Solution:



Q31 Text Solution:

$$a = \frac{dv}{dt} = 3t^2 + 2t + 2$$

Given,

$$\text{or } dv = (3t^2 + 2t + 2)dt$$

Integrating both sides, we get

$$\int_u^i dv = \int_0^t (3t^2 + 2t + 2)dt \text{ or } v - u$$

$$= \left(\frac{3t^3}{3} + \frac{2t^2}{2} + 2t \right)_0^t$$

$$\text{or } v = u + t^3 + t^2 + 2t$$

$$\text{At } t = 2 \text{ s, } v = 2 + (2)^3 + (2)^2 + 2 \times 2$$

$$= 18 \text{ m s}^{-1}$$

Video Solution:



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