NEET REVISION SERIES

KINEMATICS

Revise Most Important Questions to Crack NEET 2020

Q-1 - 10058420

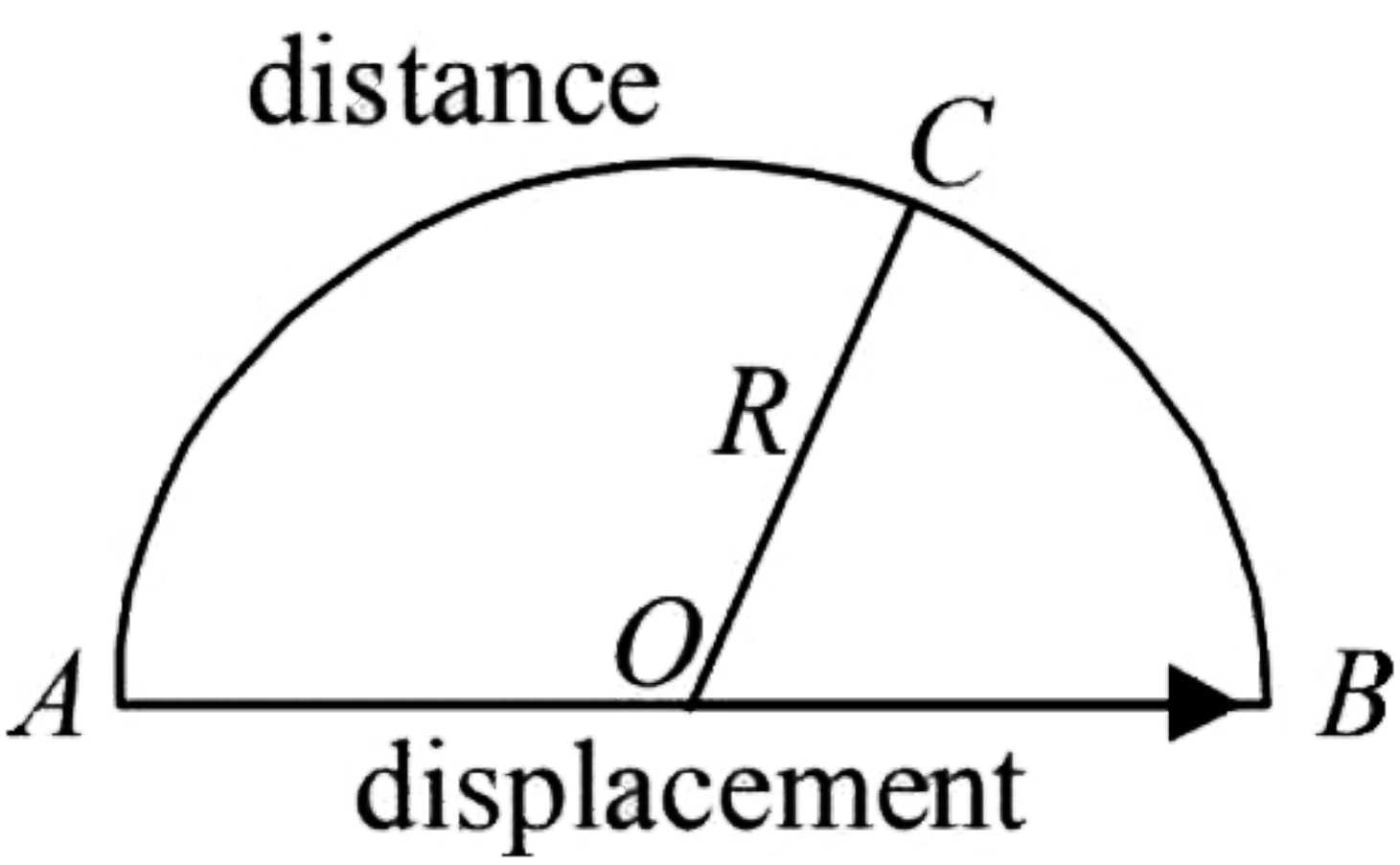
A particle moves in a circle of radius R. In half the period of revolution its displacement is and distance covered is ... .

CORRECT ANSWER: B

SOLUTION:

Displacement $= AOB = 2R$

Distance $= ACB = \pi R$



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Q-2 - 10058423

Two balls of different masses are thrown vertically upwards with the same speed . They pass through the point of projection in their downward motion with the same speed (Neglect air resistance).

SOLUTION:

When the two balls are thrown vertically upwards with the same speed u then their final speed v at the point of projection is $v^2 - u^2 = 2 \times g \times s$

Here , $s = 0$

$\therefore v = u$ for both the cases

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Q-3 - 10058424

A projectile fired from the ground follows a parabolic path. The speed of the projectile is minimum at the top of its path.

SOLUTION:

$T.E. = P.E. + K$
$.E.$

$T.E. = constant$

At P , $K.E.$ is minimum and $P.E.$ is maximum . Since $K.E.$ is minimum speed is also minimum .

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Q-4 - 10058425

Two identical trains are moving on rails along the equator on the earth in opposite directions with the same speed . They will exert the same pressure on the rails .

SOLUTION:

The pressure exerted will be different because one train is moving in the direction of earth's rotation and other in the opposite direction.

Q-5 - 20474395

A person travels along a straight road for the first half length with a constant speed v_1 and the second half length with a constant speed v_2. The average speed V is:

(A) $(v_1 + v_2)/2$

(B) $2v_1v_2/(v_1 + v_2)$

(C) $(v_1v_2)^{1/2}$

(D) $(v_2/v_1)^{1/2}$

CORRECT ANSWER: B

SOLUTION:

Let t_1 and t_2 be time taken to cover first and second half length

Then $t_1 = \dfrac{x/2}{v_1} = \dfrac{x}{2v_1}$

$t_2 = \dfrac{x/2}{v_2} = \dfrac{x}{2v_2}$

$v_{av} = \dfrac{(x/2 + x/2)}{\frac{x}{2v_1} + \frac{x}{2v_2}}$

$= \dfrac{1}{\frac{1}{2v_1} + \frac{1}{2v_2}}$

$$\frac{1}{2v_1} + \frac{1}{2v_2} = \frac{1}{v_{av}}$$

$$\frac{v_1 + v_2}{2v_1v_2} = \frac{1}{v_{av}}$$

$$v_{av} = \frac{2v_1v_2}{v_1 + v_2}$$

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Q-6 - 20474396

A motorist travels from A to B at a speed of $40km / hr$ and returns at a speed of 60 km/hr. His average speed will be:

(A) $40km / hr$

(B) $48km / hr$

(C) $50km / hr$

(D) $60km / hr$

CORRECT ANSWER: B

SOLUTION:

$$\left|\overrightarrow{v}_{\text{rel}}\right| = \left|\overrightarrow{v}_{\text{train}} - \overrightarrow{v}_{\text{parrot}}\right| = 10$$

$$-(-5) = 15m/s$$

$$\therefore t = \frac{x}{v_{\text{rel}}} = \frac{150}{15}$$

$$= 10s$$

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Q-7 - 11296660

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) $12s$

(B) $8s$

(C) $15s$

(D) $10s$

CORRECT ANSWER: D

SOLUTION:

(d) Relative velocity of bird with respect to train is

$V_{BT} = V_B + V_T = 5$

$+ 10 = 15ms^{-1}$

[Because they are going in opposite direction]

Time taken by the bird to cross the train is $\frac{150}{5} = 10s$.

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Q-8 - 20474398

The displacement s of a point moving in a straight line is given by:

$s = 8t^2 + 3t - 5$

s being in cm and t in s. The initial velocity of the particle is:

(A) 3 cm/s

(B) 16 cm/s

(C) 19 cm/s

(D) zero

CORRECT ANSWER: A

SOLUTION:

$$v = \frac{ds}{dt} = \frac{d}{dt}\left(8t^2 + 3t - 5\right) = 16t + 3$$

Initial velocity (time, $t = 0$) is given by $u = 3cm/s$

Q-9 - 10059296

A travelling wave in a stretched string is described by the equation

$y = A\sin(kx - \omega t)$ the maximum particle velocity is

(A) (a) $A\omega$

(B) (b) ω / k

(C) (c) $d\omega / dk$

(D) (d) x / t

CORRECT ANSWER: A

SOLUTION:

(a)

$$v = \frac{dy}{dt}$$

$$= A\omega\cos(kx - \omega t)$$

$$\therefore v_{\max} = A\omega$$

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Q-10 - 11763049

The velocity fo a body depends on time according to equation,

$v = 20 + 0.1t^2$. The body is undergoing.

CORRECT ANSWER: (C)

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Q-11 - 11296333

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)

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

(C)

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

(D)

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

CORRECT ANSWER: B

SOLUTION:

Suppose u be the initial velocity.

Velocity after time t_1: $v_{11} = u + at_1$

Velocity after time $t_1 + t_2$: $v_{22} = u + a(t_1 + t_2$

Velocity after time $t_1 + t_2 + t_3$:

$$v3 = u + a(t_1 + t_2 + t_3)$$

Now

$$v_1 = \frac{u + v_{11}}{2} = \frac{u + u + at_1}{2} = u + \frac{1}{2}at_1$$

$$v_2 = \frac{v_{11} + v_{22}}{2} = u + at_1 + \frac{1}{2_2}$$

$$v_3 = \frac{v_{33} + v_{33}}{2} = u + at_2 + \frac{1}{2}at_3$$

So

$$v_1 - v_2 = -\frac{1}{2}a(t_1 + t_2)$$

$$v_2 - v_3 =$$

$$-\frac{1}{2}a(t_2 - t_3)$$

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

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Q-12 - 20474404

A body starting from rest covers a distance of 9 m in the fifth second. The acceleration of the body is:

(A) $2m / s^2$

(B) $0.2m / s^2$

(C) $1.8m / s^2$

(D) $4m / s^2$

CORRECT ANSWER: A

SOLUTION:

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

$$9 = 0 + \frac{a}{2}(2 \times 5 - 1)$$

$$\therefore A = 2m / s^2$$

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Q-13 - 15599804

A car is moving along a straight road with a uniform acceleration. It passes through two points P and Q separated by a distance with velocity $30km / h$ and $40km / h$ respectively. The velocity of the car midway between P and Q is

(A) $33.3km / h$

(B) $20\sqrt{2}km / h$

(C) $25\sqrt{2}km / h$

(D) $0.35km/h$

CORRECT ANSWER: C

Q-14 - 20474406

A particle starts moving from the position of rest under a constant acc. It travels a distance x in the first 10 sec and distance y in the next 10 sec, then:

(A) $y = x$

(B) $y = 2x$

(C) $y = 3x$

(D) $y = 4x$

CORRECT ANSWER: C

SOLUTION:

$$x = \frac{1}{2} \times a(10)^2$$

$$x + y = \frac{1}{2} \times a \times (20)^2$$

$$\therefore y = \frac{1}{2} \times a \times (30) \times 10 = \frac{1}{2} \times a \times (10)^2 \times 3 = 3x$$

$$\therefore y = 3x$$

Q-15 - 15821760

Tripling the speed of the motor car multiplies the distance needed for stopping it by

(A) 3

(B) 6

(C) 9

(D) Some other number

CORRECT ANSWER: C

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Q-16 - 15821759

A car travelling at a speed of 30 km / hour is brought to a halt in 8 m by applying brakes. If the same car is travelling at 60 km / hour , it can be brought to a halt with the same braking force in

(A) 8 m

(B) 16 m

(C) 24 m

(D) 32 m

CORRECT ANSWER: D

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Q-17 - 10058454

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

(A) $12 m$

(B) $18 m$

(C) $24 m$

(D) $6 m$

CORRECT ANSWER: C

SOLUTION:

Case - 1 : $u = 50 \times \frac{5}{18} m/s, v = 0, s = 6m, a = a$

$v^2 - u^2 = 2as \Rightarrow 0^2$

$- \left(50 \times \frac{5}{18}\right)^2 = 2$

$\times a \times 6$

$\Rightarrow \ - \left(50 \times \frac{5}{18}\right)^2$ = 2 xx axx 6$(i) Case - 2$: u =

100xx5/18 m//sec, v = 0 , s = s, a =a :. v^(2) -u^(2) = 2as

rArr 0^(2)-(100xx5/18)^(2) = 2as rArr -(100xx5//18)^(2) =

2 as

$...(ii) Divid \in g(i)$ and

$(ii) we \geq t$

(100xx100)/(50xx50) = (2xxaxxs)/(2xxaxx6) rArr s = 24

m `

Q-18 - 11745953

A car 'A' moves due north at a speed of $40km/hr$, while another 'B' moves due east at a speed of $30km/hr$. Find the velocity of car B relative to car A (both in magnitude and direction).

(A) $40km/hr$, at an angle $\tan^{-1}\left(\frac{3}{5}\right)$ east of south

(B) $50km/hr$, at an angle $\tan^{-1}\left(\frac{3}{5}\right)$ east of south

(C) $40km/hr$, at an angle $\tan^{-1}\left(\frac{3}{4}\right)$ east of south

(D) $50km/hr$, at an angle $\tan^{-1}\left(\frac{3}{4}\right)$ east of south

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CORRECT ANSWER: D

SOLUTION:

$\overrightarrow{v}_A = 40\hat{j}, \overrightarrow{v}_B = 30\hat{i}$

$$\overrightarrow{v}_{B/A} = \overrightarrow{v}_B - \overrightarrow{v}_A$$

$$= 30\hat{i} - 40\hat{j}$$

$$\left|\overrightarrow{=}(B/A)\right|$$

$$= \sqrt{30^2 + 40^2}$$

$$= 50km/h$$

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Q-19 - 3953409

A speed of 14 metres per second is the same is 28 km/hr b.

50. 4 km/hr c. 46. 6 km/hr d. 70 km/hr

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Q-20 - 15716305

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) $5km/hr$

CORRECT ANSWER: B

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Q-21 - 3953134

Car A travels at the speed of 65 km/hr and reaches its destination in 8 hours. Car B travels at eh speed of 70 km/hr and reaches its destination in 4 hours. What is the ratio of the distance covered by car A and car B respectively? $7:11$ b. $13:7$ c. $7:13$ d. $11:7$ e. none

of these

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Q-22 - 10956330

A car is travelling along a circular curve that has a radius of $50m$.

If its is speed is $16m/s$ and is increasing uniformly at $8m/s^2$.

Determine the magnitude of its accleration at this instant.

CORRECT ANSWER: B

SOLUTION:

$$a_t = 8m/s^2$$

$$a_r = \frac{v^2}{R} = \frac{(16)^2}{50}$$

$$= 5.12m/s^2$$

$$a = \sqrt{a_t^2 + a_r^2} = 9.5m$$

$/ s^2$

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Q-23 - 11487564

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) $\frac{1}{2}$hr

(C) $\frac{1}{4}$ hr

(D) $\frac{1}{8}$ hr

CORRECT ANSWER: B

SOLUTION:

Let car B catches, car A after t sec, then

$$60t + 2.5 = 70t - \frac{1}{2}$$

$$\times 20 \times t^2$$

$$\Rightarrow 10t^2 - 10t + 2.5$$

$$= 0 \Rightarrow t^2 - t + 0.25$$

$$= 0$$

$$t$$

$$= \frac{1 \pm \sqrt{1 - 4 \times (0.25)}}{2}$$

$$= \frac{1}{2} hr$$

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Q-24 - 11487533

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) 40 $\frac{km}{hr}$

(B) 80 $\frac{km}{hr}$

(C) $46\frac{1}{2}\frac{km}{hr}$

(D) 36 $\frac{km}{hr}$

CORRECT ANSWER: D

SOLUTION:

average speed

$$= \frac{totaldistance}{\rightarrow taltime}$$

$$= \frac{x}{t_1 + t_2}$$

$$= \frac{x}{\frac{\frac{2x}{5}}{v_1} + \frac{\frac{2x}{3}}{v_2}}$$

$$= \frac{1}{\frac{1}{3 \times 20} + \frac{2}{3 \times 50}}$$

$$= 36 \frac{km}{hr}$$

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Q-25 - 20474374

Snow is falling vertically at a constant speed of $8m / s$. (a) At what angle from the vertical and (b) with what speed do the snow flakes appear to be falling as viewed by the driver in a car travelling on a straight road with a speed of $21.6km / hr$?

CORRECT ANSWER: (A) $TAN^{-1}(3/4) \cong 37^\circ$ (B)

10 M/S

SOLUTION:

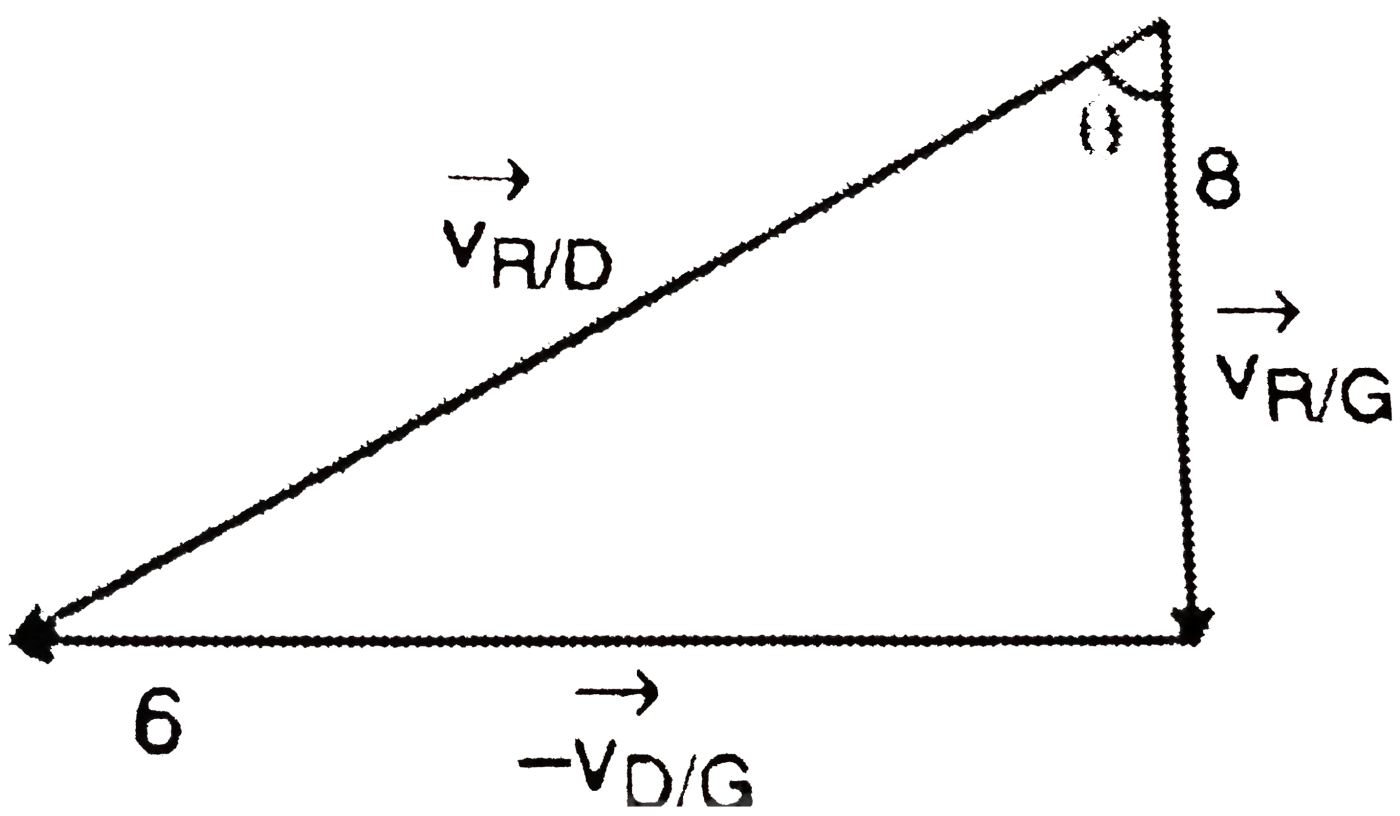
Speed of driver

$$= 21.6 \times \frac{5}{18} = 6.0m$$

$/s$

$$\tan\theta = \frac{6}{8}$$

$$\theta = \tan^{-1}\left(\frac{3}{4}\right)$$



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Q-26 - 66228

A car can finish a certain journey in 10 hours at the speed of 48 km/hr. By how much should its speed be increased so that it may

take only 8 hours to cover the same distance?

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Q-27 - 3953194

A man travels 600 km by train at 80 km/hr, 800 km by ship at 40 km/hr, 500 km by aeroplane at 400 km/hr and 100 km by car at 50 km/hr. What is the average speed for the entire distance? a. $60\ km/hr$ b. $62\ km/hr$ c. $60\frac{5}{123}\ km/hr$ d. $6\frac{5}{123} km/hr$

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Q-28 - 13309302

[27.If a matrix has 5 elements,then write all possible orders it can have.All indio 2011]

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Q-29 - 15599788

If a ball is thrown vertically upwards with a velocity of $40m/s$, then velocity of the ball after $2s$ will be $\left(g = 10m/s^2\right)$

(A) $15m/s$

(B) $20m/s$

(C) $25m/s$

(D) $28m/s$

CORRECT ANSWER: B

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Q-30 - 11757901

A ball thrown vertically upwards with a speed of $19.6ms^{-1}$ from the top of a tower returns to earth in $6s$. Calculate the height of the

tower.

CORRECT ANSWER: N/A

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Q-31 - 20474431

A wooden block is dropped from the top of a cliff 100m high and simultaneously a bullet of mass 10 g is fired from the foot of the cliff upwards with a velocity of $100 m / s$. The bullet and wooden block will meet each other after a time:

(A) 10 s

(B) 0.5 s

(C) 1 s

(D) 7 s

CORRECT ANSWER: C

SOLUTION:

For block $h = \frac{1}{2}gt^2$

For bullet $100 - h100t - \frac{1}{2}gt^2$

$t = 1\,\text{sec}$

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Q-32 - 15716303

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) $1:3$

CORRECT ANSWER: D

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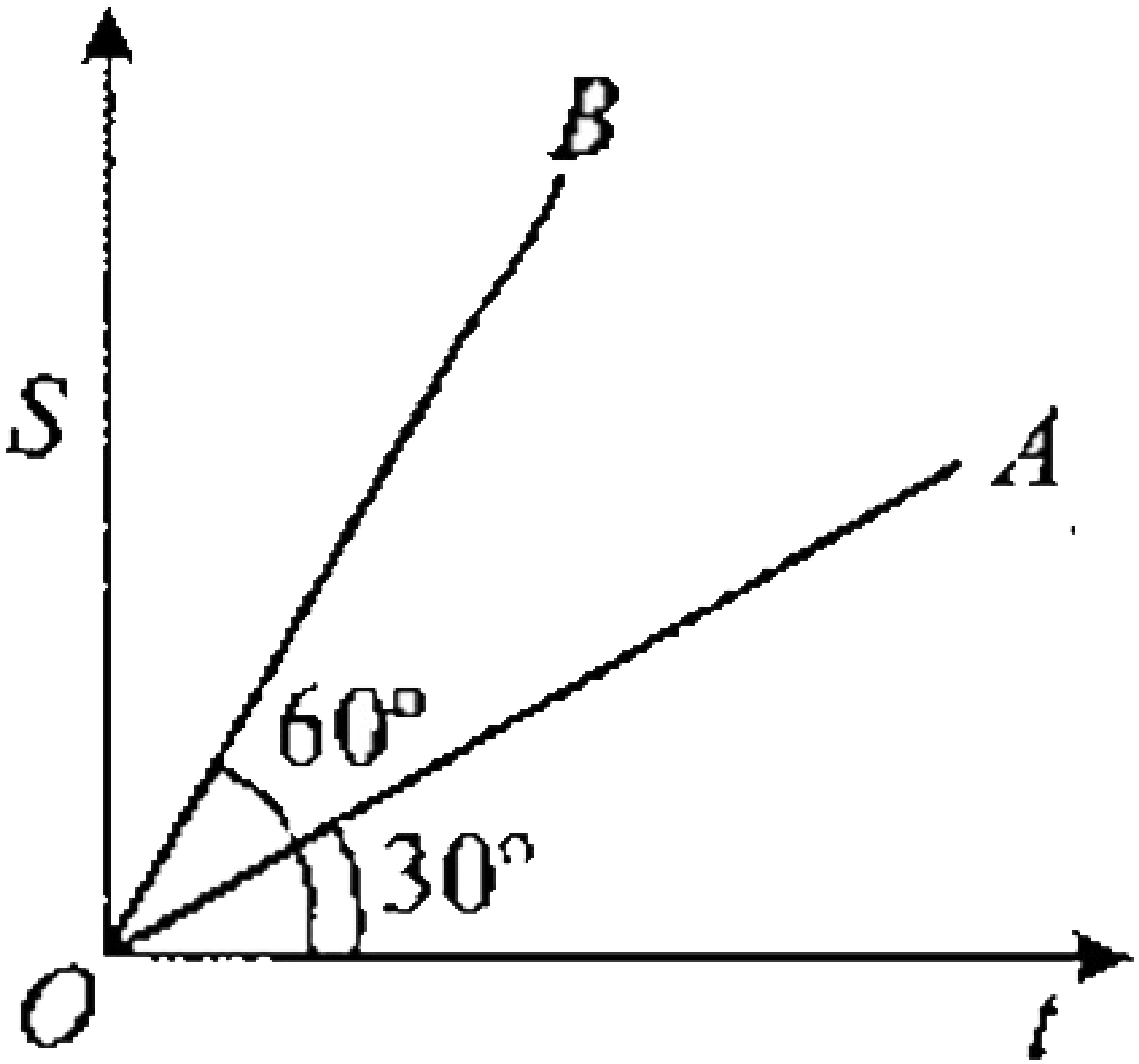
Q-33 - 17091191

The displacement-time graph for two particle A and B straight lines inclined at angle of 30 and 90 with the time axis. The ratio of the velocities V_A and V_B is :



(A) $1:2$

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

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

(D) $1:3$

CORRECT ANSWER: D

Q-34 - 13025351

Two particles A and B are moving in the $x-y$ plane such that their velocity components are $v_x = 1m/s, v_y = \frac{1}{\sqrt{3}}m/s$ (for A) and $v_x = 2m/s, v_y = 2m/s$ (for B). If both the particles start moving from the same point, what is the angle between their paths ?

CORRECT ANSWER: N/A

SOLUTION:

$$\tan\alpha = \frac{1}{1/\sqrt{3}} = \sqrt{3}$$

$$\Rightarrow \alpha = 60$$

$$\tan\beta = \frac{2}{2} = 1 \Rightarrow \beta$$

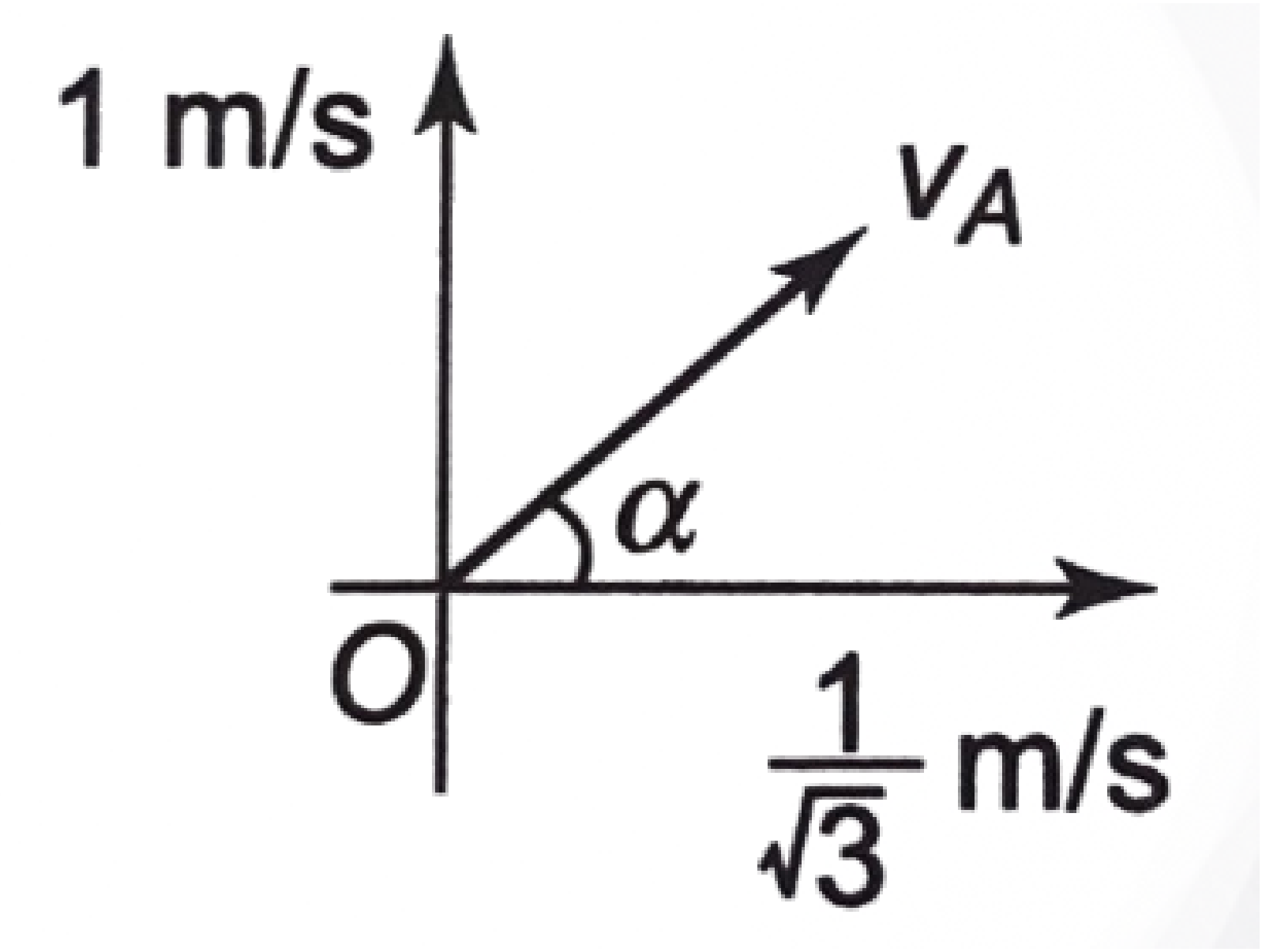
$$= 45$$

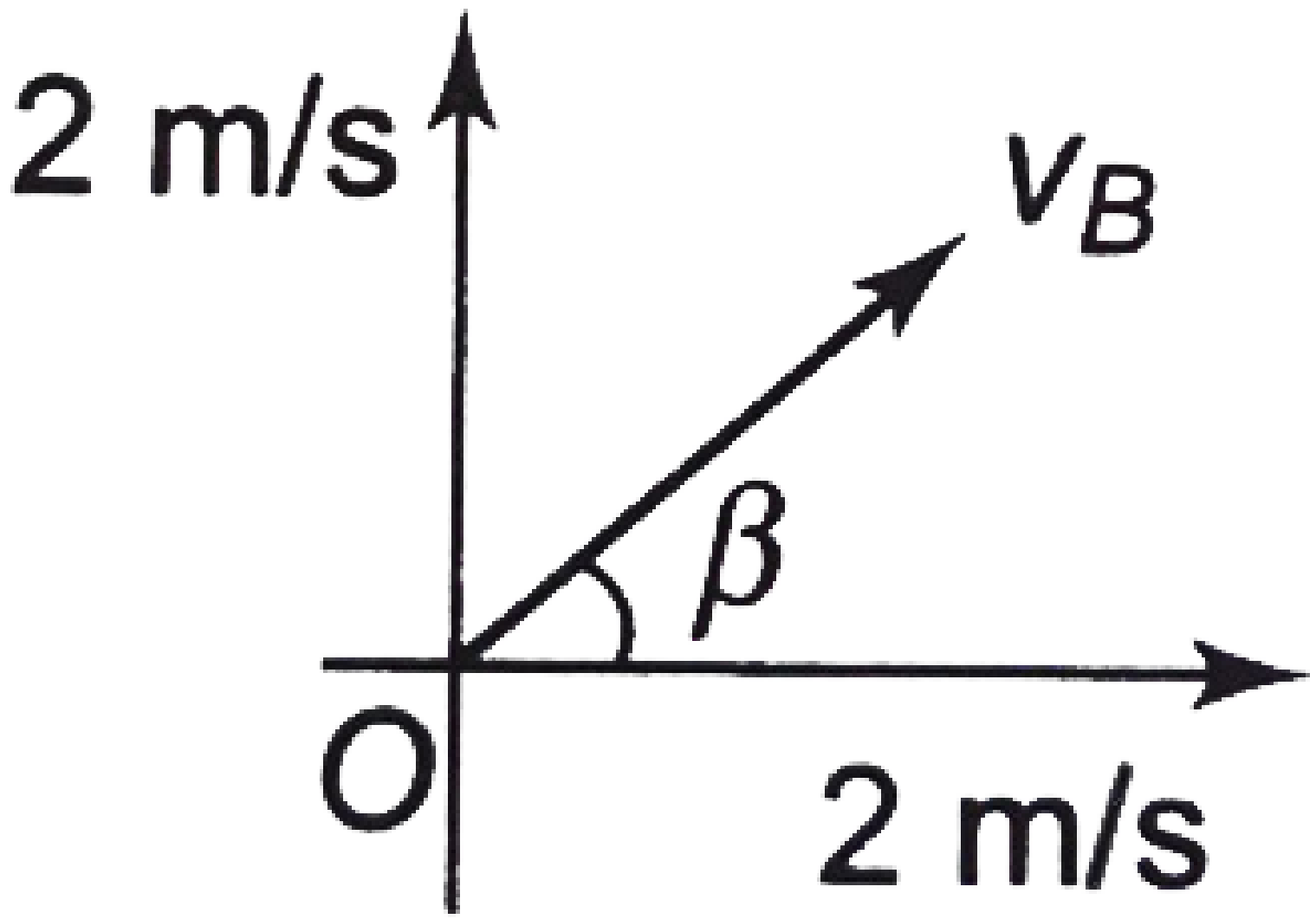
Particles are moving in straight lines, hence the angle between their paths

$= \alpha - \beta = 60 - 45$

$= 15$

.





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Q-35 - 11746014

Two point particles with masses m_1 and m_2 are thrown at angles θ_1 and θ_2 with horizontal with speeds v_1 and v_2 respectively. R, H and T are range, height and total time of flight respectively. Let $v_1 \sin\theta_1 = v_2 \sin\theta_2$. Then for both particles

(A) T,H and R are different

(B) H and R will be same but T will be different

(C) T and R are same but H will be different

(D) T and H are same but R is different.

CORRECT ANSWER: D

SOLUTION:

Relations for,

$$T = \frac{2u\sin\theta}{g}, R$$

$$= \frac{u^2\sin 2\theta}{g} \text{ and } H$$

$$= \frac{u^2\sin^2\theta}{2g}$$

Here, $u_1 \sin\theta_1 = u_2 \sin\theta_2$

T and H are same but will not be same.

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Q-36 - 20474424

A body is released from a great height and falls freely towards the earth. Exactly one sec later another body is released. What is the distance between the two bodies 2 sec after the release of the second body ?

(A) 4.9 m

(B) 9.8 m

(C) 24.5 m

(D) 50 m

CORRECT ANSWER: C

SOLUTION:

$$H_1 = \frac{1}{2} \times g(3)^2$$

$$\Delta H = H_1 - H_2$$

$$H_2 = \frac{1}{2} \times g(2)^2$$

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Q-37 - 14927477

Two bodies begin to fall freely from the same height but the second falls T second after the first. The time (after which the first body begins to fall) when the distance between the bodies equals L is

(A) $\frac{1}{2}T$

(B) $\frac{T}{2}+\frac{L}{gT}$

(C) $\frac{L}{>}$

(D) $t+\frac{2L}{gT}$

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Q-38 - 15716471

A body A is projected upwards with a velocity of $90m/s$. The second body B is projected upwards with the same initial velocity but after 4 sec. Both the bodies will meet after

(A) 6sec

(B) 8sec

(C) 10sec

(D) 12sec

CORRECT ANSWER: D

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Q-39 - 11745557

A body is moving with uniform velocity of $8ms^{-1}$. When the body just crossed another body, the second one starts and moves with uniform acceleration of $4ms^{-2}$. The time after which two bodies meet will be :

(A) 2 s

(B) 4 s

(C) 6 s

(D) 8 s

CORRECT ANSWER: B

SOLUTION:

Let they meet after time t. Then distance traveled by

both in time t should be same.

$$s = 8t = \frac{1}{2}4t^2 \Rightarrow t$$

$$= 4s$$

.

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Q-40 - 20474427

An object is projected upwards with a velocity of 4.9 m/s. It will strike the ground in approximately

(A) 2 s

(B) 1 s

(C) 1.5 s

(D) 0.5 s

CORRECT ANSWER: B

SOLUTION:

$$T = \frac{2v_0}{g}$$

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Q-41 - 11487615

A stone is projected from the ground with velocity $50\frac{m}{s}$ at an angle of 30 . It crosses a wall after 3 sec. How far beyond the wall the stone will strike the ground $\left(g = 10\frac{m}{\sec^2}\right.$?

(A) 90.2 m

(B) 89.6 m

(C) 86.6 m

(D) 70.2 m

CORRECT ANSWER: C

SOLUTION:

Total time of flight

$$= \frac{2u \sin \theta}{g}$$

$$= \frac{2 \times 50 \times 1}{2 \times 10} = 5$$

s

Time to cross the wall $= 3$ sec (given)

Time in air after crossing the wall $= (5 - 3) = 2$sec

Distance travelled beyond the wall

$$= (\cos \theta)t = 50$$

$$\times \frac{\sqrt{3}}{2} \times 2 = 86.6$$

m

Q-42 - 11757665

A ball is gently dropped from a height of $20m$. If its velocity increases uniformly at the rate of $10m / s^2$, with what velocity will it strike the ground ? After what time will it strike the ground ?

CORRECT ANSWER: N/A

SOLUTION:

Here,

$\text{Height} = \text{distance} = s$

$= 20m$

, acceleration, $a = 10m / s^2$

final velocity, $v = \ ?$, time taken, $t = \ ?$

As the ball is gently dropped, its initial velocity, $u = 0$

From $v^2 - u^2 = 2$ as, $v^2 = u^2 + 2$ as

$= 0 + 2(10) \times 20$

$= 400$

or $v = \sqrt{400} = 20m/s$

This is the velocity with which the ball will hit the ground.

From $v = u + at, 20 = 0 + 10t$ or $t = \frac{20}{10} = 2s$

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Q-43 - 17665864

A particle is projected from ground with velocity $40\sqrt{2}m/s$ at $45.$

At time $t = 2s$

(A) displacement of particle is $100m$

(B) vertical component of velocity is $20m/s$

(C) velocity makes an angle $\tan^{-1}(2)$ with vertical

(D) particle is at height of $60m$ from ground

CORRECT ANSWER: A::B::C::D

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Q-44 - 10955337

A particle is projected vertically upwards with velocity $40m/s$.

Find the displacement and distance travelled by the particle in

(a) $2s$ (b) $4s$ (c) $6s$ Take $g = 10m/s^2$

CORRECT ANSWER: A

SOLUTION:

Here, u is positive (upwards) and a is negative

(downwards). So, first we will find

t_0, the time when velocitybecomes zero.

$$t_0 = \left|\frac{u}{a}\right| = \frac{40}{10} = 4s$$

$(a)t < t_0$. Therefore, distance and displacement are

equal.

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

$$= 40 \times 2 - \frac{1}{2} \times 10$$

$$\times 4 = 60m$$

(b) $t = t_0$. So, again distance and displacement are equal.

$$d = s = 40 \times 4 - \frac{1}{2}$$

$$\times 10 \times 16 = 80m$$

(c) $t > t_0$. Hence, $d > s$,

$$s = 40 \times 6 - \frac{1}{2} \times 10$$

$$\times 36 = 60m$$

While

$$d = \left|\frac{u^2}{2a}\right|$$

$$+ \frac{1}{2}\left|a(t - t_0)^2\right|$$

$$= \frac{\left(40^2\right)}{2 \times 10} + \frac{1}{2} \times 10$$

$$\times (6 - 4)^2$$

$$= 100m$$

Q-45 - 17665790

A particle is projected from the ground with an initial velocity of $20m / s$ at an angle of 30 with horizontal. The magnitude of change in velocity in a time interval from $t = 0$ to $t = 0.5s$ ($g = 10m / s^2$)

(A) $5m / s$

(B) $2.5m / s$

(C) $2m / s$

(D) $4m / s$

CORRECT ANSWER: A

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Q-46 - 13399488

A body is projected horizontally from the top of a tower with a velocity of $10m/s$.If it hits the ground at an angle 45, th vertical component of velocity when it hits ground in m/s is

(A) 10

(B) $10\sqrt{2}$

(C) $5\sqrt{2}$

(D) 5

CORRECT ANSWER: A

SOLUTION:

$$\tan 45 = \frac{v_y}{u}$$

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Q-47 - 11762986

A body is projected downwards at an angle of 30 to the horizontal with a velocity of $9.8m/s$ from the top of a a tower $29.4m$ high.

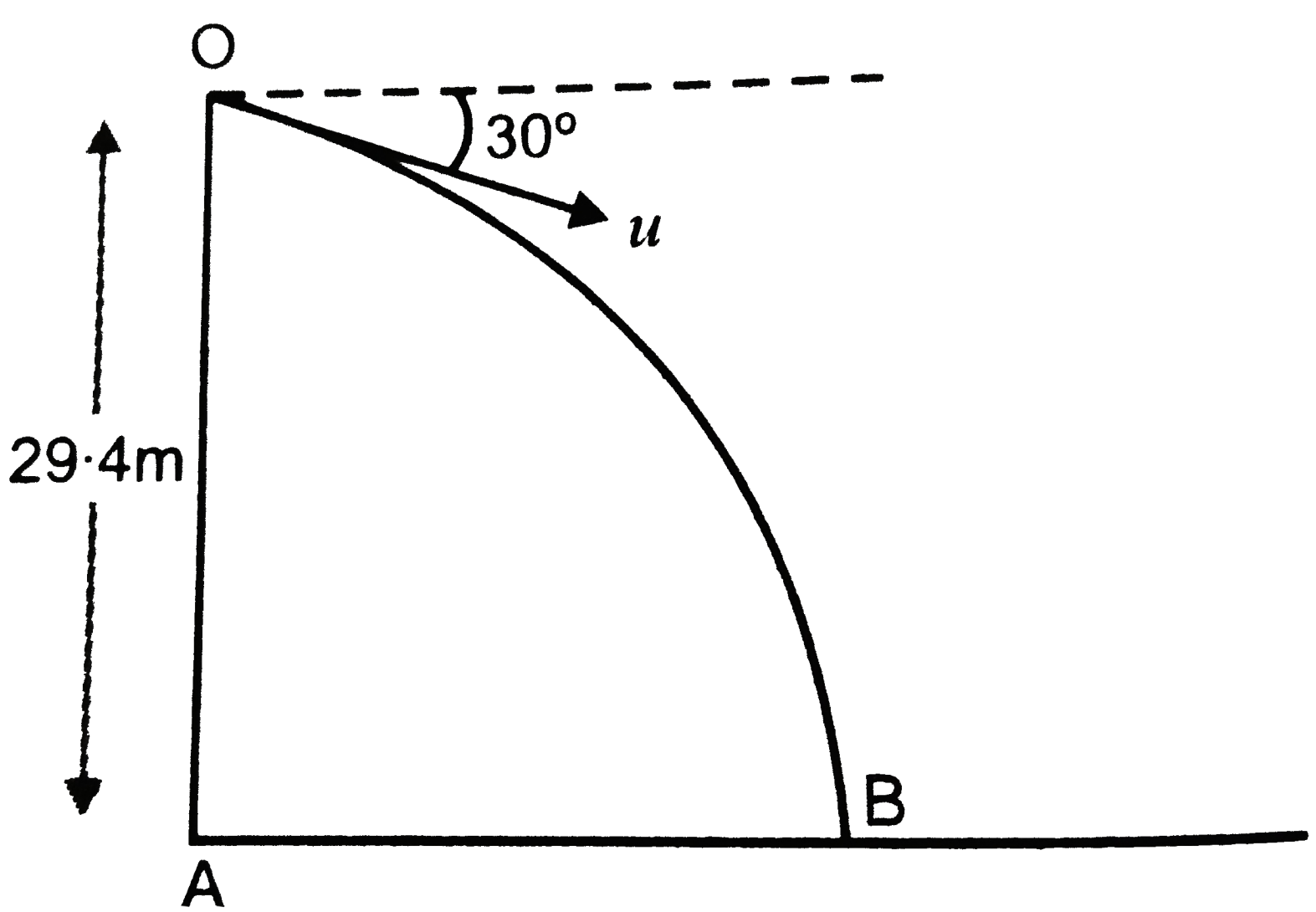
How long will it take before striking the ground ?

SOLUTION:

The situation id shown in Fig. 2 (d). 41.

Resolving $\overrightarrow{u}$ into two rectangular components we have the coponent velocity along vertically downwards,

$$u_y = u\sin 30^2 = 9.8$$
$$\times 1/2 = 4.9m/s$$



.

Taking vertical dpwmward moton of the body from (O) to

(B), we have

$y_0 = 0, y = 29.\,4m, u_y$

$= 4.9m/s,$

$a_y = 9.8m/s^2, t = \ ?$

$As,$ y=y_0 + u_y t + 1/2 a_y t^2 or 29.4 =0 + 4.9 + 4.9

xx t = 1/2 xx 9.8 xx t^2 or

$4.9t^2 + 4.9t - 29.4$

$= 0$

or $t^2 + t - 6 = 0$

$Onsolv \in gwe \geq t$, t= 2 s or -3 s $\therefore$ Time taken to reach the ground $= 2s$.

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Q-48 - 17817612

A particle P is projected upwards with $80m/s$. One second later another particle Q is projected with initial velocity $70m/s$. Before either of the particle srikes the ground $\left(g = 10m/s^2\right)$

(A) both particle are at rest with respect to each other

(B) after $2s$ distance between the particles is $75m$

(C) when particle P is at highest point, particle Q is moving downwards

(D) when particle P is at highest point, particle Q is moving upwards

CORRECT ANSWER: A::B

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Q-49 - 15716601

Velocity-time curve for a body projected vertically upwards is 0 times (s)

(A) Parabola

(B) Ellipse

(C) Hyperbola

(D) Straight line

CORRECT ANSWER: D

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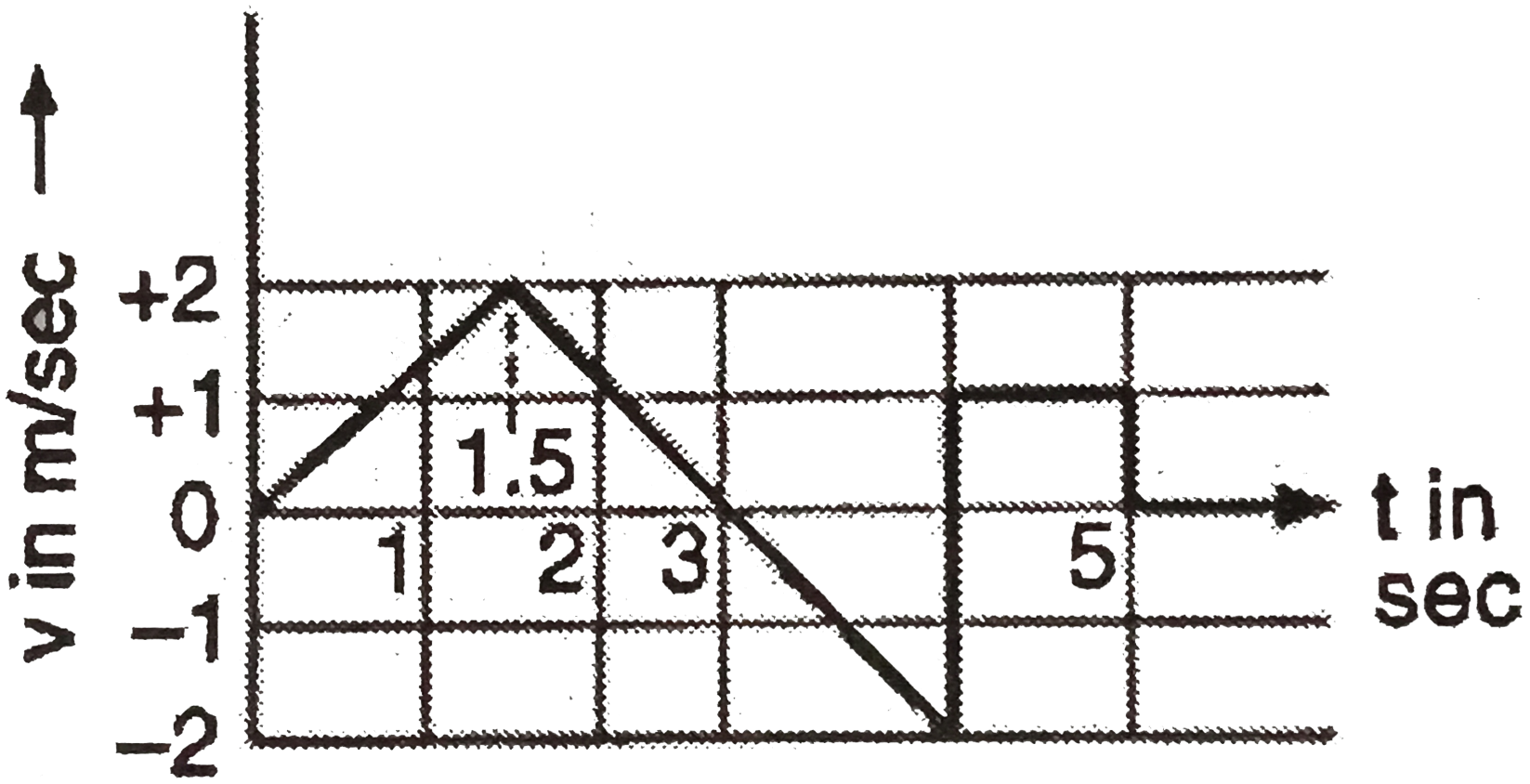
Q-50 - 20474457

The velocity versus time graph of a body moving in a straight line is as follows. The distance travelled by the body is 5 sec is



(A) 2 m

(B) 3 m

(C) 4 m

(D) 5 m

CORRECT ANSWER: D

SOLUTION:

Distance

$$= \left(\frac{1}{2} \times 3 \times 2\right)$$

$$+ \left(\frac{1}{2} \times 1 \times 2\right)$$

$$+ (1 \times 1) = 5m$$

(In this problem displacement $= 3m$)

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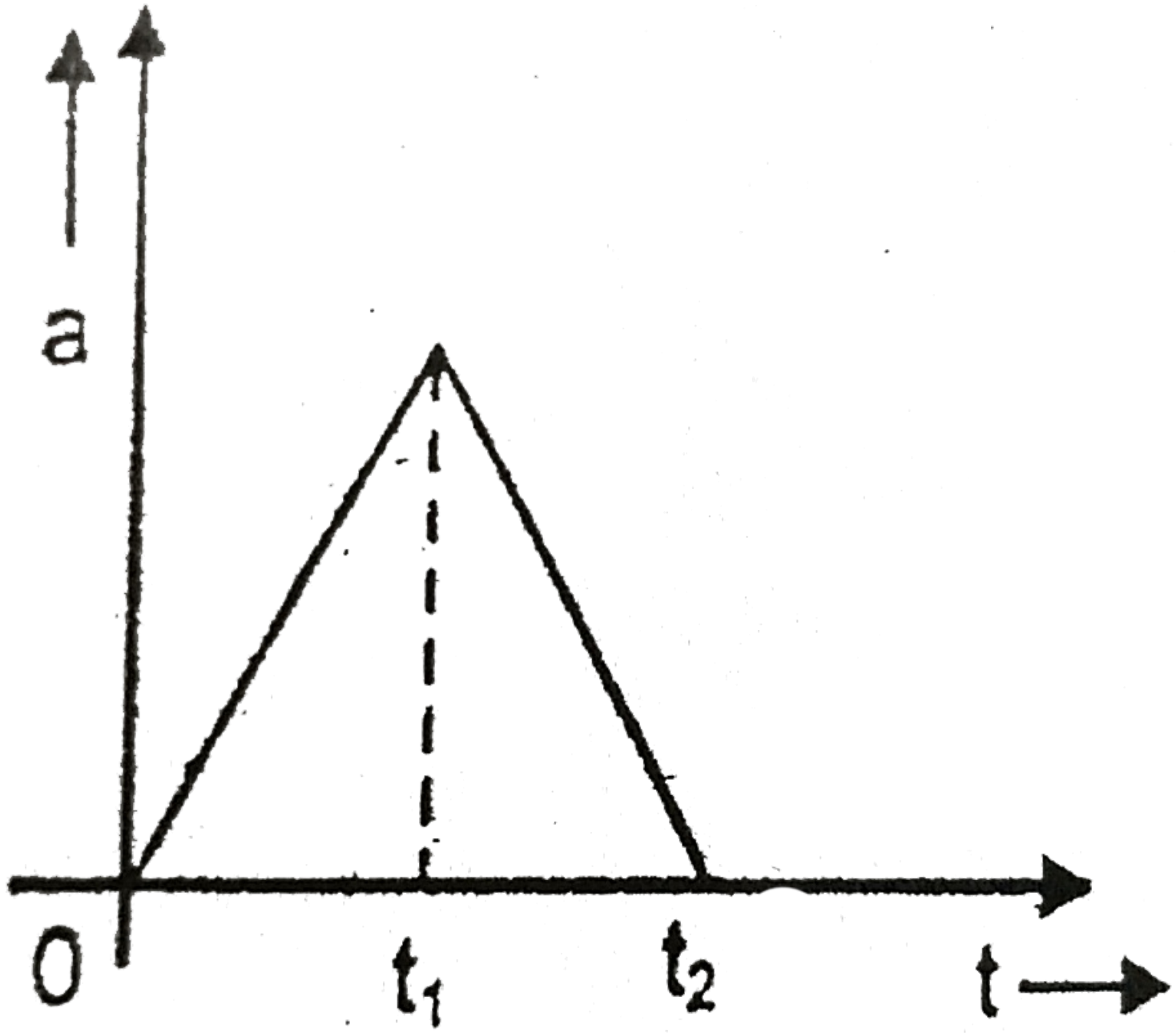
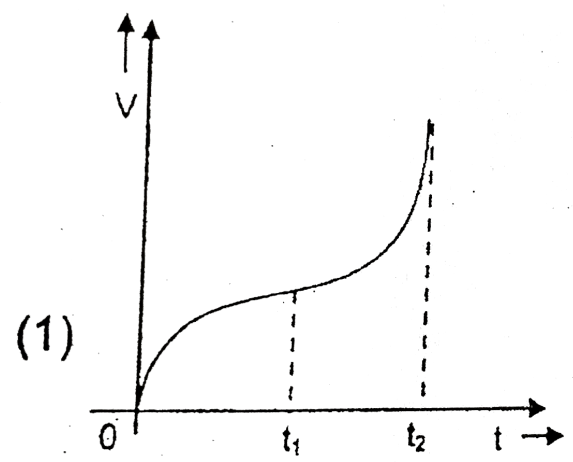
Q-51 - 14160986

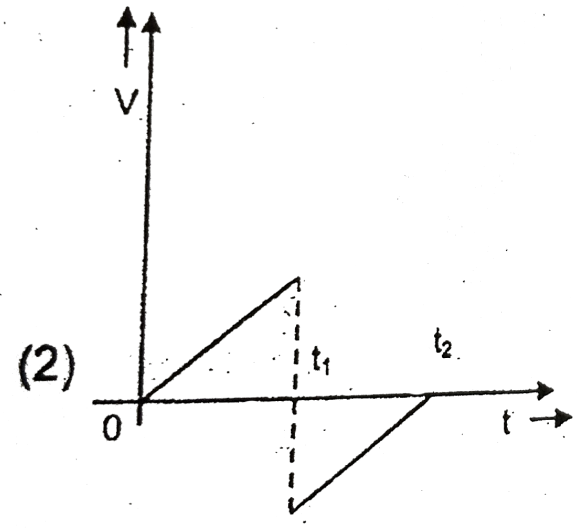
A particle starts to move along a straight line. The acceleration versus time graph of particle is as shown in figure. The correct velocity versus time graph is :



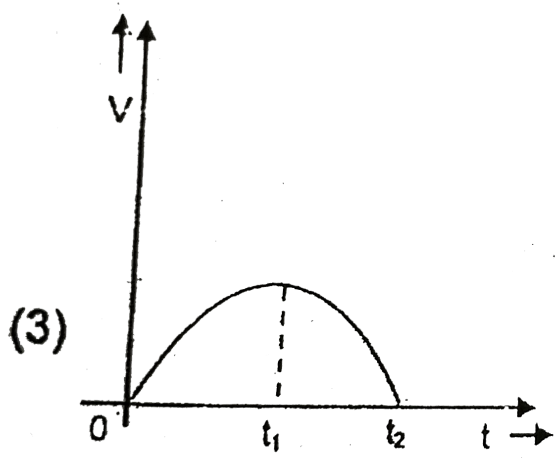
(A)



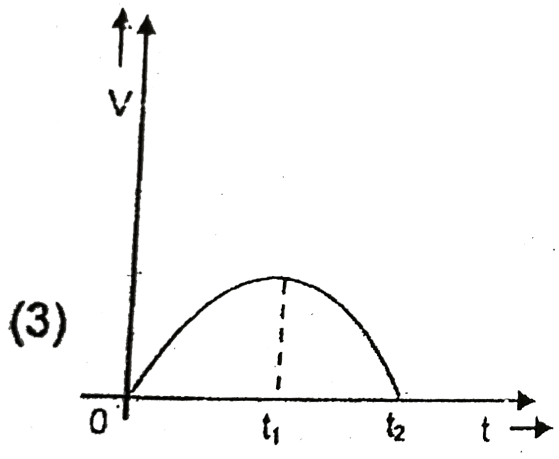
(B)



(C)



(D)



CORRECT ANSWER: D

SOLUTION:

A particle .

for t graph $\because slope > 0$ Itbgt For $0 < t < t_1$, $\frac{dv}{dt} \Rightarrow$ increasing

for $t_1 < t < t_2$, $\frac{dv}{dt} \Rightarrow$ "decreasing"

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Q-52 - 13399070

Displacement-time graph of a body projected vertically up is

(A) a straight line

(B) a parabola

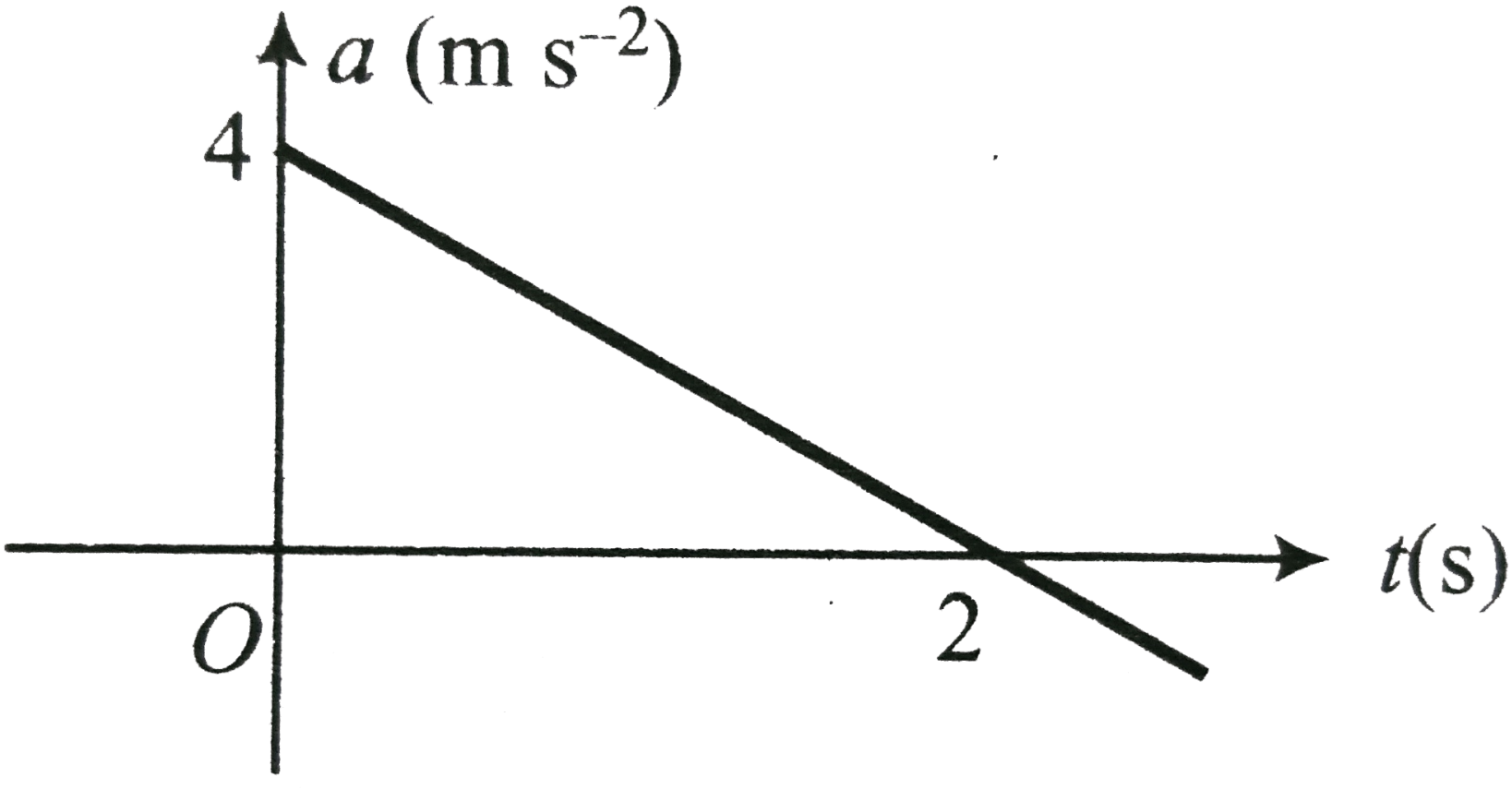
(C) a hyperbola

(D) a circle

CORRECT ANSWER: B

Q-53 - 11296353

The acceleration versus time graph of a particle moving in a straight line is show in. The velocity-time graph of the particle would be



(A) `A straight line

(B) A parabola

(C) A circle

(D) An ellipse

CORRECT ANSWER: B

SOLUTION:

$$a = -\frac{4}{2}t + 4 \Rightarrow a$$
$$= -2t + 4$$

$$v = \int a dt + C =$$

$$\int (- 2t + 4) dt + C$$

$$= - t^2 + 4t + C$$

Hence, graph will be parablic.

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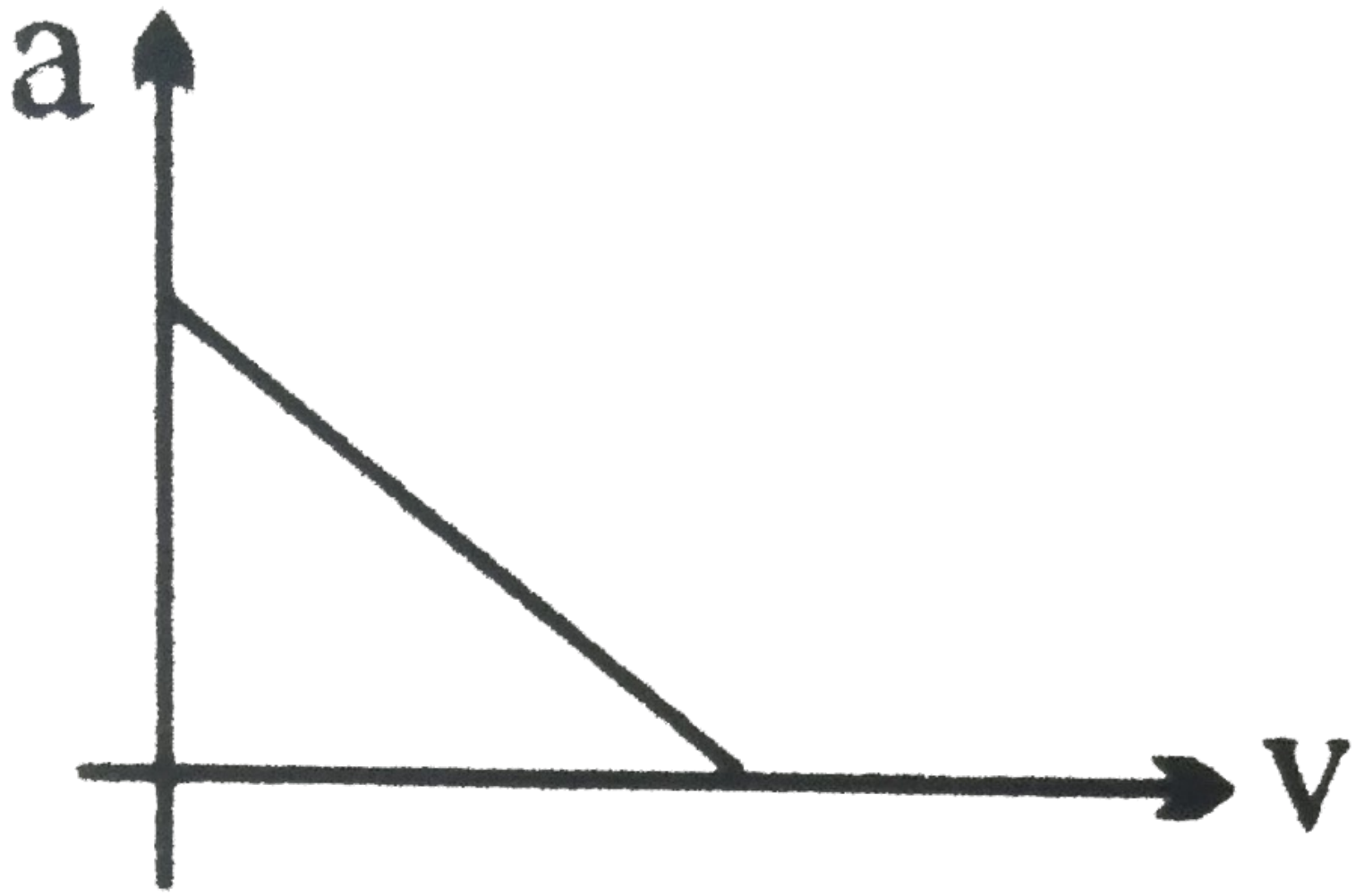
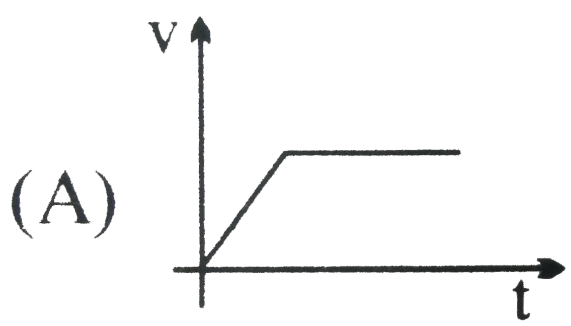
Q-54 - 12229503

Acceleration versus velocity graph of a aprticle moving in a straight line starting form rest is as shon in figure. The corresponding velocity-time graph would be

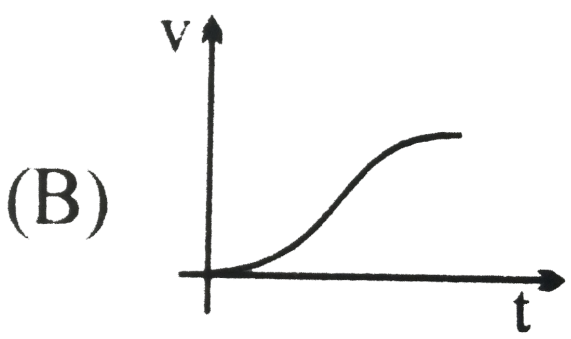


(A)



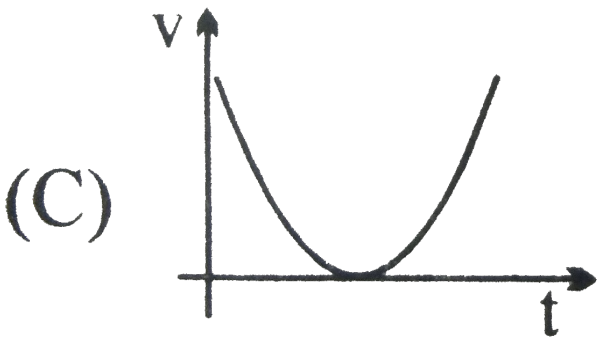
(A)

(B)

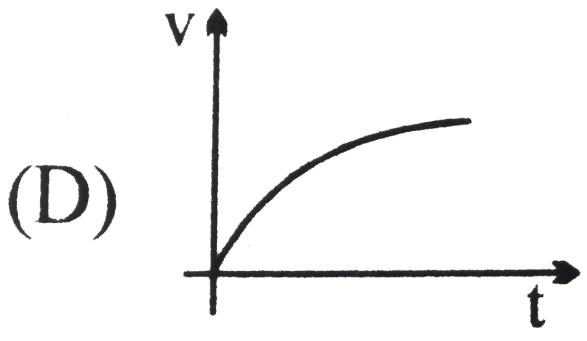


(B)

(C)



(C)

(D) 

(D)

CORRECT ANSWER: D

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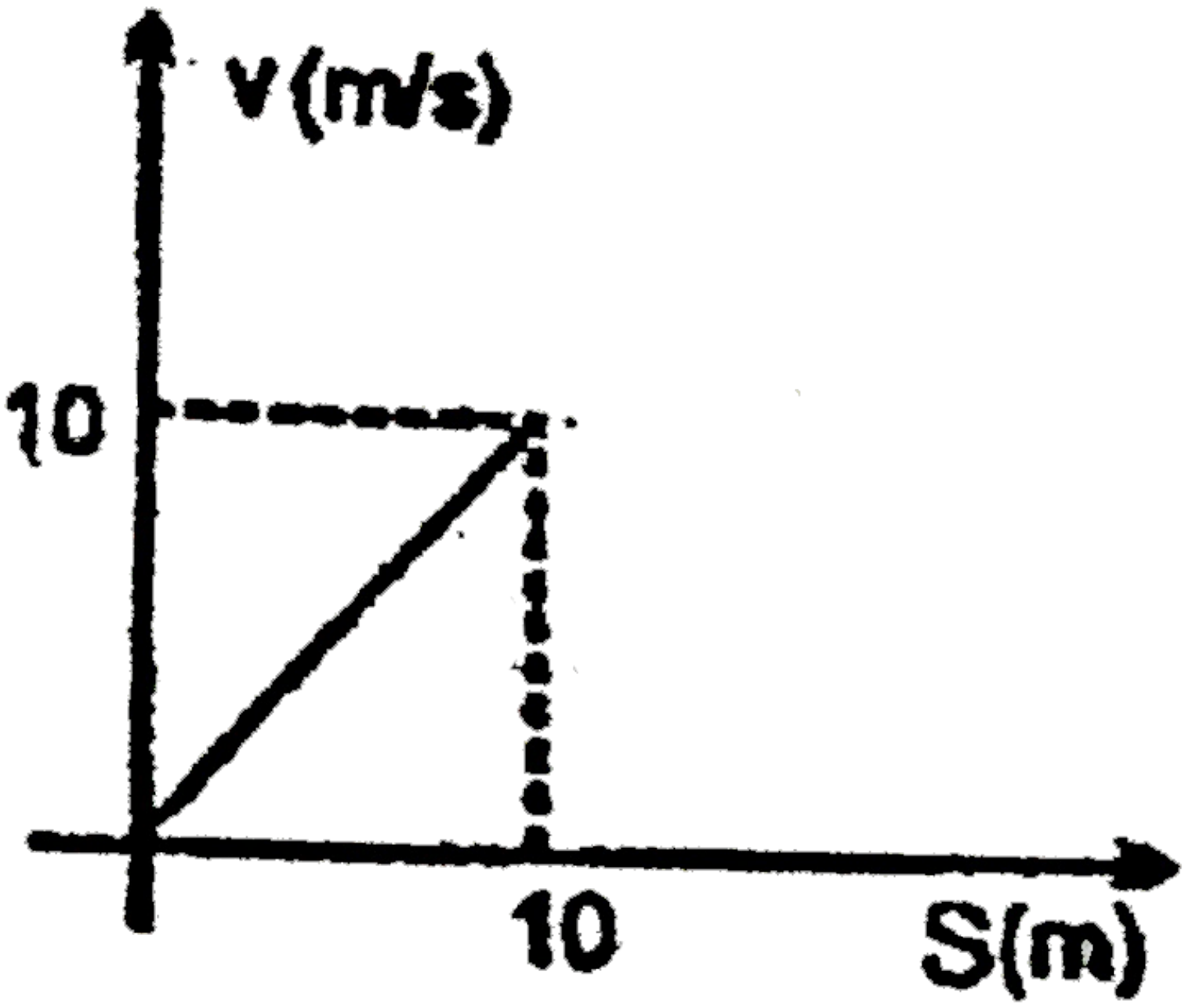
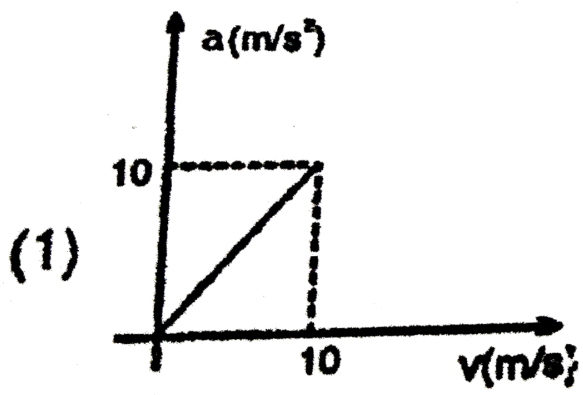
Q-55 - 14527193

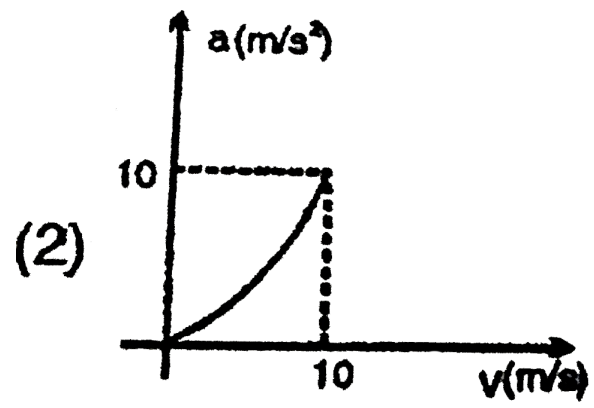
Velocity (v) versus displacement (s) graph of a particle moving in a straight line is shown in figure. Corresponding acceleration (a) versus velocity (v) graph will be



(A)

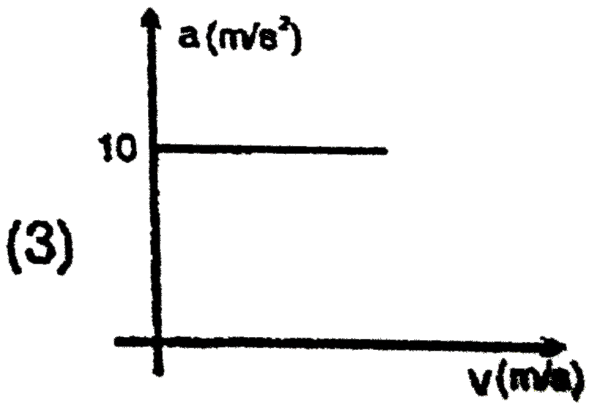


(B)



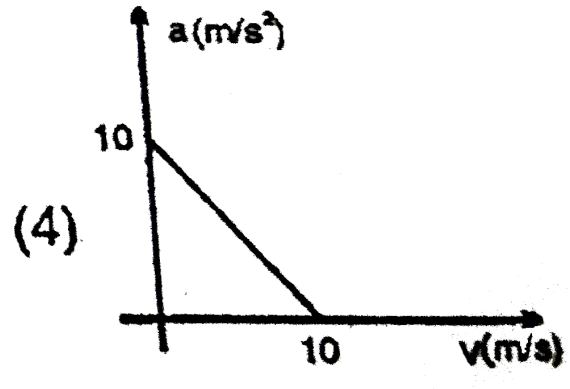
(C)

(3)



(D)

(4)



CORRECT ANSWER: A

SOLUTION:

From the given graph relation between velocity (V) and displacement (S) is given by

v=S

$$\frac{dv}{dS} = 1$$

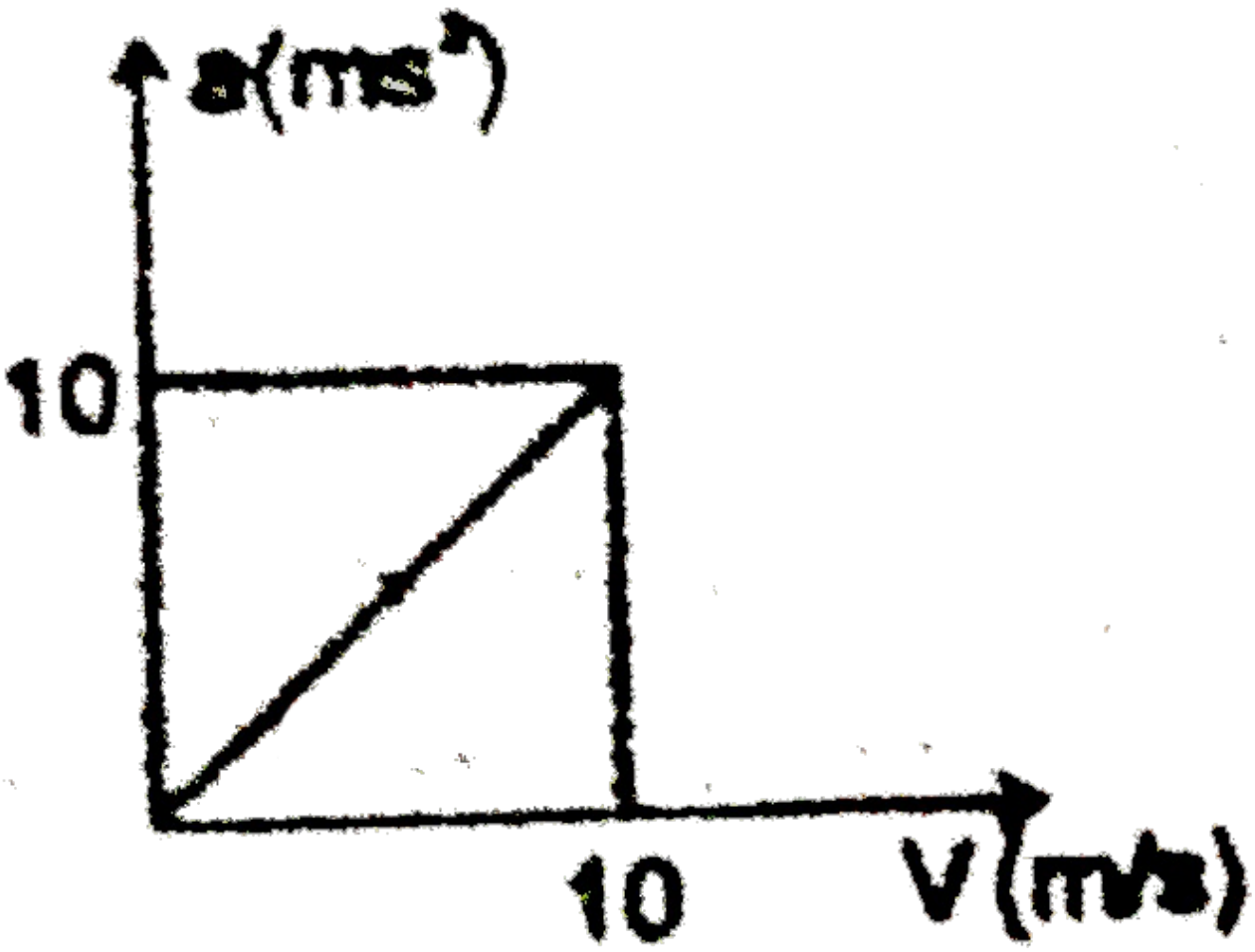
Hence, acceleration $a = v\frac{dv}{dS}$

a=v x1

a=v

Therefore, graph between acceleration

and velocity will be as shown.



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Q-56 - 11757715

What can you say about the motion of a body if

(a) its displacement-time graph is a straight line, with some slope.

(b) its velocity-time graph is a straight line, with some slope ?

CORRECT ANSWER: N/A

SOLUTION:

(a) The body is moving with a unifrom velocity.

(b) The body is moving with a uniform acceleration.

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Q-57 - 20474425

A body falls from rest freely under gravity with an acceleration of $9.8 m / s^2$. Neglecting air resistance, the distance travelled by the body during the third second of its motion will be:

(A) 14.7 m

(B) 24.5 m

(C) 19.6 m

(D) 29.4 m

CORRECT ANSWER: B

SOLUTION:

$$s = u + \frac{1}{2}g(2t - 1)$$

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Q-58 - 15716552

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

CORRECT ANSWER: B

Q-59 - 11296301

The distance moved by a freely falling body (startibg from rest) during st, $2nd$, $3nd$, nth second of its motion are propotional to .

(A) Even numbers

(B) Odd numbers

(C) All integral numbers

(D) Squares of integral numbere

CORRECT ANSWER: D

SOLUTION:

The required ratio is 1:3:5:. So on .

Q-60 - 15716657

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