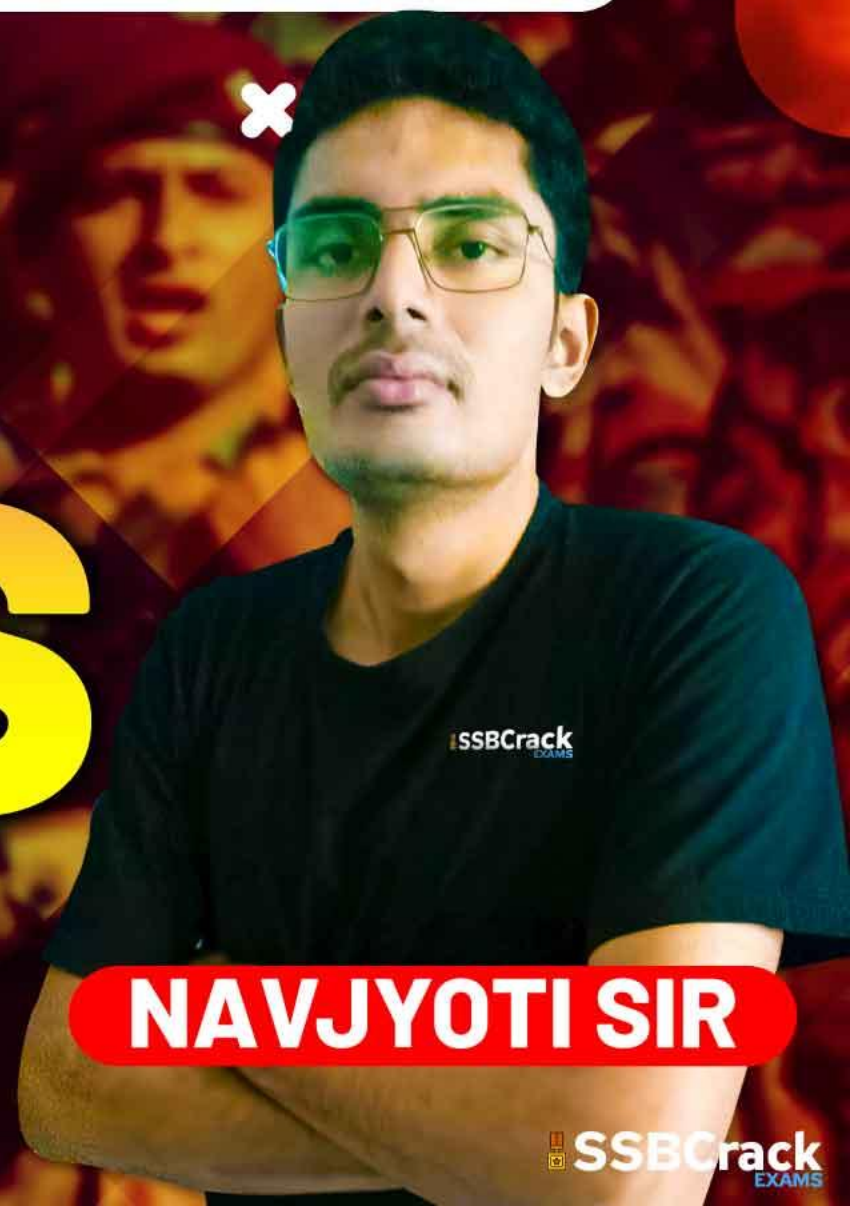
NDA-CDS 1 2025

GS PHYSICS

LIVE

MOTION

CLASS 2



NAVJYOTI SIR

SSBCrack EXAMS

12 Dec 2024 Live Classes Schedule

8:00AM	12 DEC 2024 DAILY CURRENT AFFAIRS	RUBY MA'AM
9:00AM	12 DEC 2024 DAILY DEFENCE UPDATES	DIVYANSHU SIR

SSB INTERVIEW LIVE CLASSES

9:30AM	OVERVIEW OF PIQ & PERSONAL INTERVIEW	ANURADHA MA'AM

NDA 1 2025 LIVE CLASSES

1:00PM	PHYSICS - MOTION - CLASS 2	NAVJYOTI SIR
4:30PM	ENGLISH - ACTIVE PASSIVE VOICE - CLASS 1	ANURADHA MA'AM
5:30PM	MATHS - APPLICATIONS OF DERIVATIVES - CLASS 3	NAVJYOTI SIR

CDS 1 2025 LIVE CLASSES

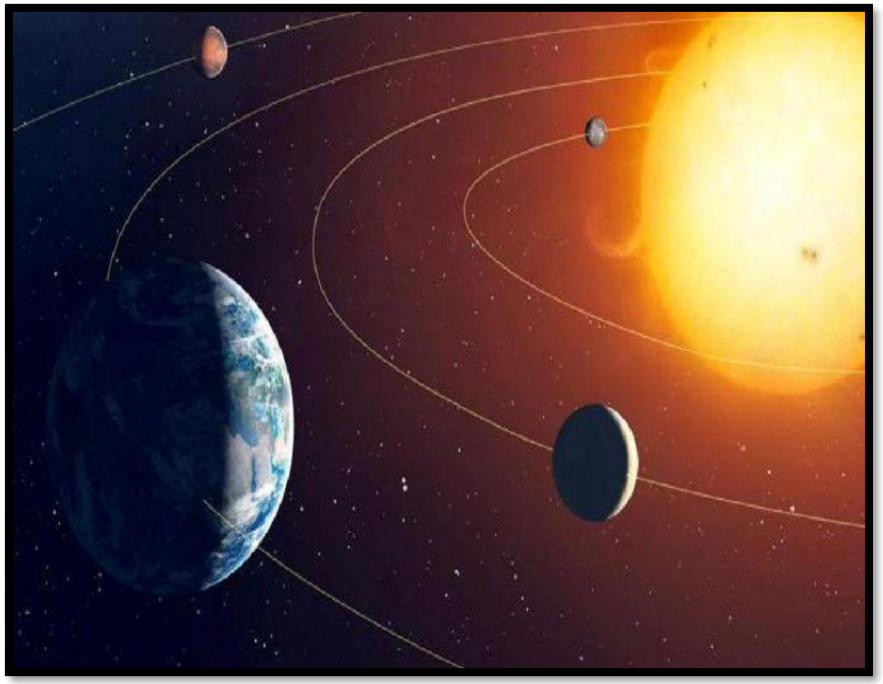
1:00PM	PHYSICS - MOTION - CLASS 2	NAVJYOTI SIR
4:30PM	ENGLISH - ACTIVE PASSIVE VOICE - CLASS 1	ANURADHA MA'AM
7:00PM	MATHS - STATISTICS - CLASS 1	NAVJYOTI SIR

SSBCrack EXAMS

CALL US: 080-69185400

GET IT ON Google Play | DOWNLOAD THE APP NOW

MOTION - MCQs



SSBCrack EXAMS

Two forces of 5·0 N each are acting on a point mass. If the angle between the forces is 60°, then the net force acting on the point mass has magnitude close to :

(a) 8·6 N ✓

(b) 4·3 N ✗

(c) 5·0 N ✗

(d) 6·7 N ✗

$$R = 2A\cos\frac{\theta}{2}$$

$$= 2 \times 5 \cos\frac{60^\circ}{2} = 10 \times \frac{\sqrt{3}}{2}$$

$$= \underline{5\sqrt{3}} = 5 \times \underline{1.732}$$

$$= 8.660\ N \sim \underline{8.67\ N}$$

SSBCrack EXAMS

Two forces of 5·0 N each are acting on a point mass. If the angle between the forces is 60°, then the net force acting on the point mass has magnitude close to :

(a) 8·6 N

(b) 4·3 N

(c) 5·0 N

(d) 6·7 N

Answer: A

SSBCrack EXAMS

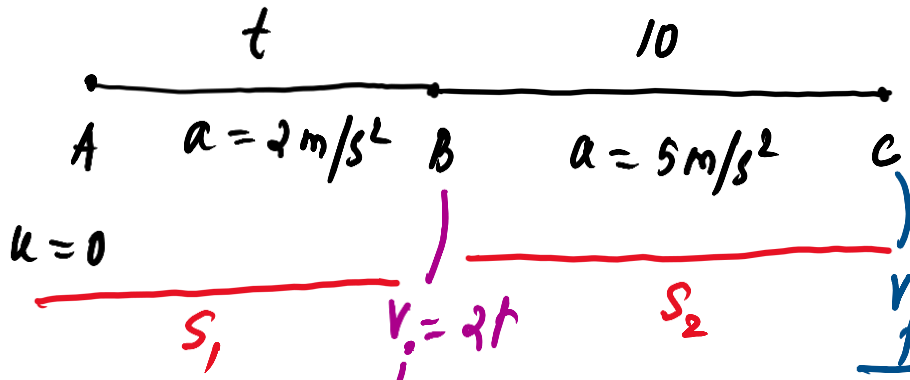
A vehicle starts moving along a straight line path from rest. In first t seconds it moves with an acceleration of 2 m/s^2 and then in next 10 seconds it moves with an acceleration of 5 m/s^2. The total distance travelled by the vehicle is 550 m. The value of time t is

(a) 10 s

(b) 13 s

(c) 20 s

(d) 25 s



$S_1 + S_2 = 550$

$v = u + at$

$v = 0 + 2(t)$

$v = 2t$

$v_f = v_i + at$

$= 2t + 5(10)$

$v_f = 2t + 50$

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

$(2t)^2 - 0^2 = 2(2)S_1$

$S_1 = \frac{4t^2}{4} = t^2 \Rightarrow S_1 = t^2$ — (1)

$(2t+50)^2 - (2t)^2 = 2(5)(S_2)$

$(2t+50-2t)(2t+50+2t) = 10S_2$

$5(4t+50) = S_2$ — (2)

SSBCrack EXAMS

$$S_1 + S_2 = 550$$

$$t^2 + 20t + 250 = 550$$

$$t^2 + 20t - 300 = 0$$

$$(t + 30)(t - 10) = 0$$

$t = -30$ $\quad t = 10\,s$ (Answer)

(time cannot be negative) — rejected

SSBCrack EXAMS

A vehicle starts moving along a straight line path from rest. In first t seconds it moves with an acceleration of 2 m/s^2 and then in next 10 seconds it moves with an acceleration of 5 m/s^2. The total distance travelled by the vehicle is 550 m. The value of time t is

(a) 10 s

(b) 13 s

(c) 20 s

(d) 25 s

Answer: A

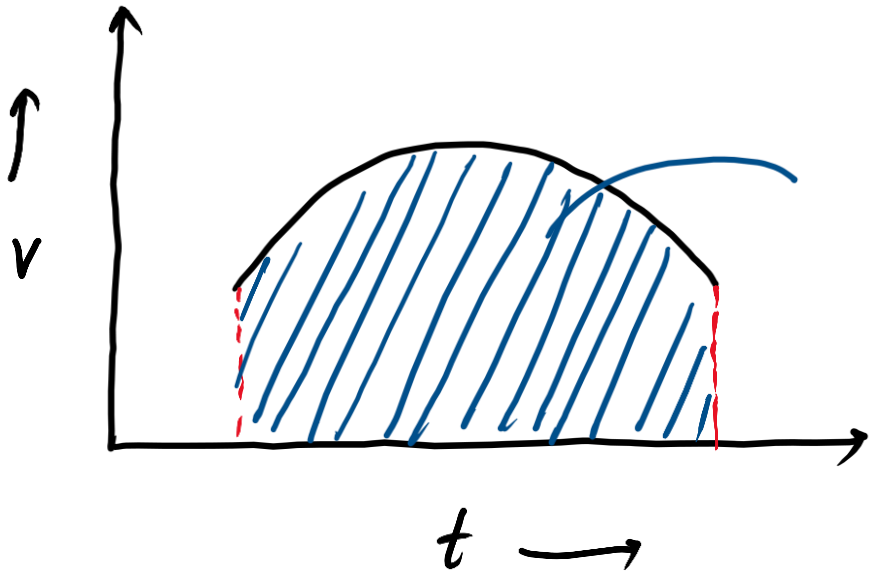
The Area Under Speed-time Graph Gives :

A. Acceleration

B. Velocity

C. Distance

D. None of the Above



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

$v \times t = d$

Area under curve → product of (y × x) coordinate

slope — ratio of $\frac{y}{x}$ coordinate,

The Area Under Speed-time Graph Gives :

A. Acceleration

B. Velocity

C. Distance

D. None of the Above

SSBCrack EXAMS

If an object moves with constant velocity then which one of the following statements is NOT correct ?

(a) Its motion is along a straight line ✓

(b) Its speed changes with time. ✗

(c) Its acceleration is zero

(d) Its displacement increases linearly with time

velocity = constant

magnitude (constant) — direction (constant)

speed

As speed is constant, $\frac{\text{disp.}}{\text{time}}$ = constant

increases linearly with time

$a = 0$;

SSBCrack EXAMS

If an object moves with constant velocity then which one of the following statements is NOT correct ?

(a) Its motion is along a straight line

(b) Its speed changes with time.

(c) Its acceleration is zero

(d) Its displacement increases linearly with time

Answer: B

SSBCrack EXAMS

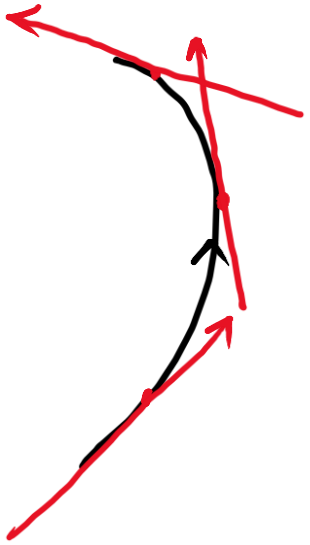
An object moves along a curved path. The following quantities may remain constant during its motion.

A. Speed ✓

B. Velocity ✗

C. Magnitude of Acceleration ✓

D. Both A and C



UCM

(Uniform circular motion)

speed = constant

$a = \frac{v^2}{r} = r\omega^2$ (magnitude is constant)

An object moves along a curved path. The following quantities may remain constant during its motion.

A. Speed

B. Velocity

C. Magnitude of Acceleration

D. Both A and C

SSBCrack EXAMS

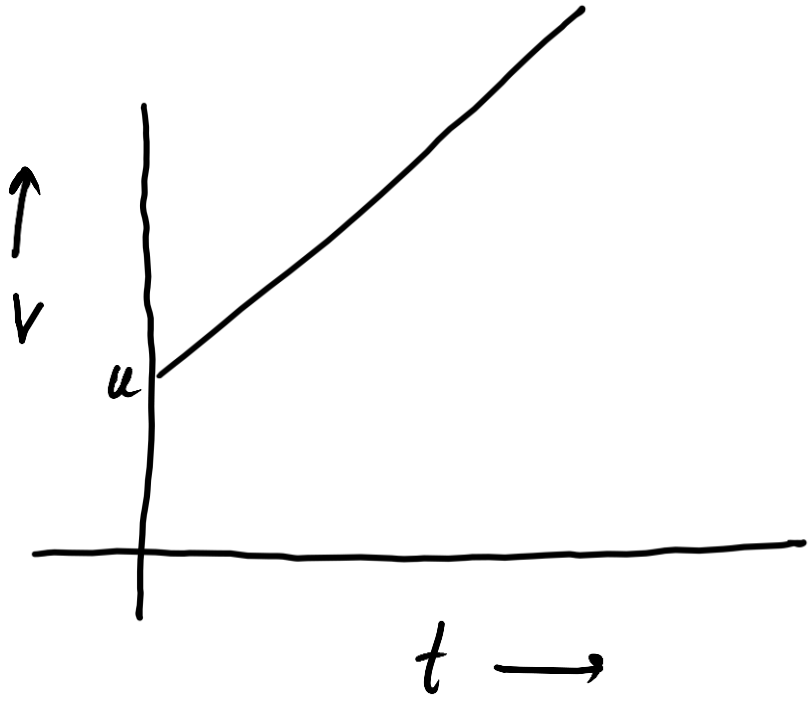
An object is moving with uniform acceleration a. Its initial velocity is u and after time t its velocity is v. The equation of its motion is $v = u + at$. The velocity (along y-axis) time (along x-axis) graph shall be a straight line

(a) passing through origin ✗

(b) with x-intercept u ✗

(c) with y-intercept u ✓

(d) with slope u ✗



acceleration = $a\left(\frac{v}{t}\right)$

SSBCrack EXAMS

An object is moving with uniform acceleration a. Its initial velocity is u and after time t its velocity is v. The equation of its motion is $v = u + at$. The velocity (along y-axis) time (along x-axis) graph shall be a straight line

(a) passing through origin

(b) with x-intercept u

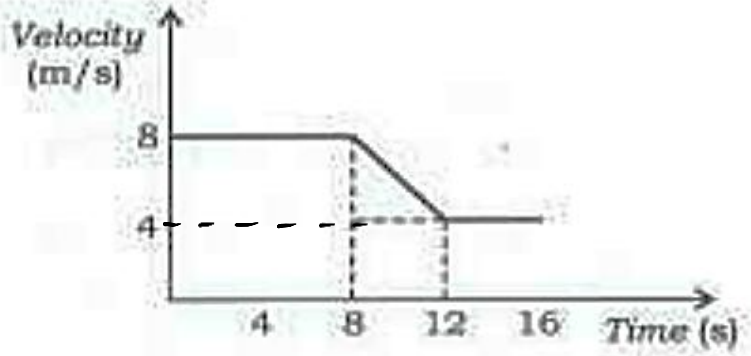
(c) with y-intercept u

(d) with slope u

Answer: C

SSBCrack EXAMS

Consider the following velocity and time graph :



Which one of the following is the value of average acceleration from 8 s to 12 s?

(a) $8\ m/s^2$

(b) $12\ m/s^2$

(c) $2\ m/s^2$

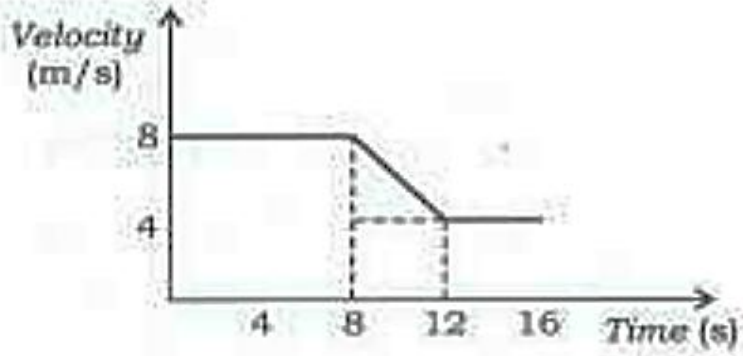
(d) $-1\ m/s^2$

$$a = \frac{\text{change in velocity}}{\text{Time taken}}$$

$$\frac{4-8}{12-8} = \frac{-4}{4} = -1\ m/s^2$$

SSBCrack EXAMS

Consider the following velocity and time graph :



Which one of the following is the value of average acceleration from 8 s to 12 s?

(a) $8\ m/s^2$

(b) $12\ m/s^2$

(c) $2\ m/s^2$

(d) $-1\ m/s^2$

Answer: D

SSBCrack EXAMS

A car starts from Bengaluru, goes 50 km in a straight line towards south, immediately turns around and returns to Bengaluru. The time taken for this round trip is 2 hours. The magnitude of the average velocity of the car for this round trip

(a) is 0. ✓

(b) is 50 km/hr.

(c) is 25 km/hr.

(d) cannot be calculated without knowing acceleration.

$$\text{Avg. velocity} = \frac{\text{Total displacement}}{\text{Total time}}$$

$$= \frac{0}{2} = 0 \text{ km/h}$$

SSBCrack EXAMS

A car starts from Bengaluru, goes 50 km in a straight line towards south, immediately turns around and returns to Bengaluru. The time taken for this round trip is 2 hours. The magnitude of the average velocity of the car for this round trip

(a) is 0.

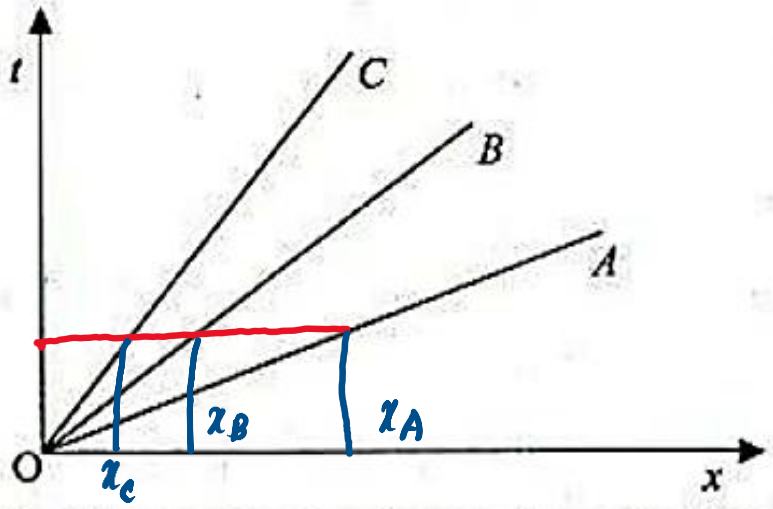
(b) is 50 km/hr.

(c) is 25 km/hr.

(d) cannot be calculated without knowing acceleration.

Answer: A

SSBCrack EXAMS



The figure shown above gives the time (t) versus position (x) graphs of three objects A, B and C. Which one of the following is the correct relation between their speeds V_A, V_B and V_C, respectively at any instant ($t > 0$)?

(a) $V_A < V_B < V_C$

(b) $V_A > V_B > V_C$

(c) $V_A = V_B = V_C \neq 0$

(d) $V_A = V_B = V_C = 0$

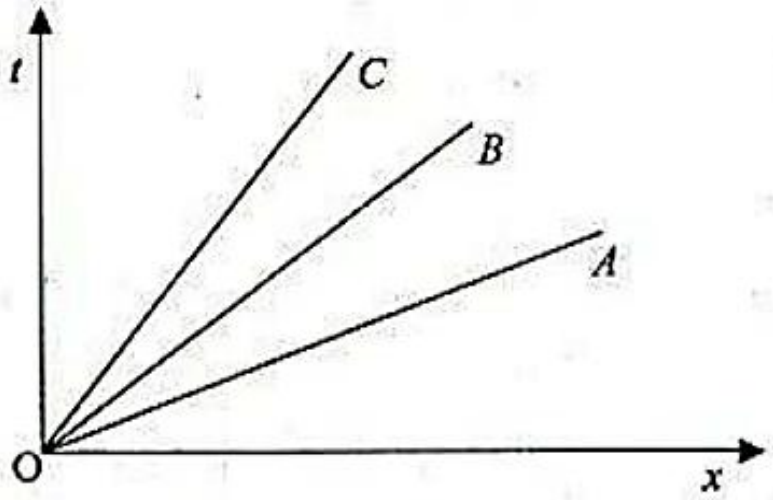
$$v = \frac{x}{t}$$

for same time t,

larger value of x $\Rightarrow$ larger value of v,

$$x_A > x_B > x_C$$

$$\Rightarrow V_A > V_B > V_C$$



The figure shown above gives the time (t) versus position (x) graphs of three objects A, B and C. Which one of the following is the correct relation between their speeds V_A, V_B and V_C, respectively at any instant ($t > 0$)?

(a) $V_A < V_B < V_C$

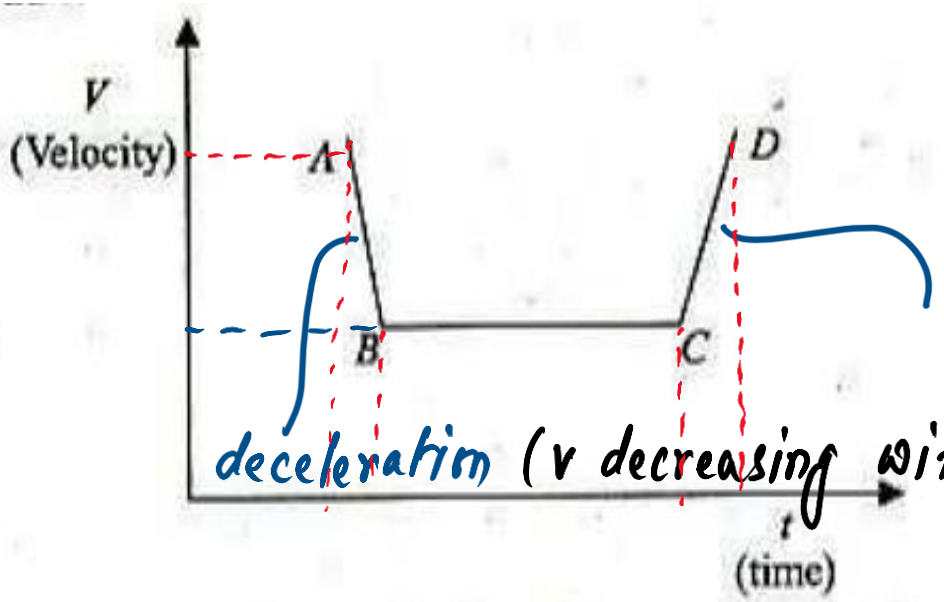
(b) $V_A > V_B > V_C$

(c) $V_A = V_B = V_C \neq 0$

(d) $V_A = V_B = V_C = 0$

Answer: B

SSBCrack EXAMS



acceleration (v increasing with time)

deceleration (v decreasing with time)

In the given velocity (V) versus time (t) graph, accelerated and decelerated motions are respectively represented by line segments

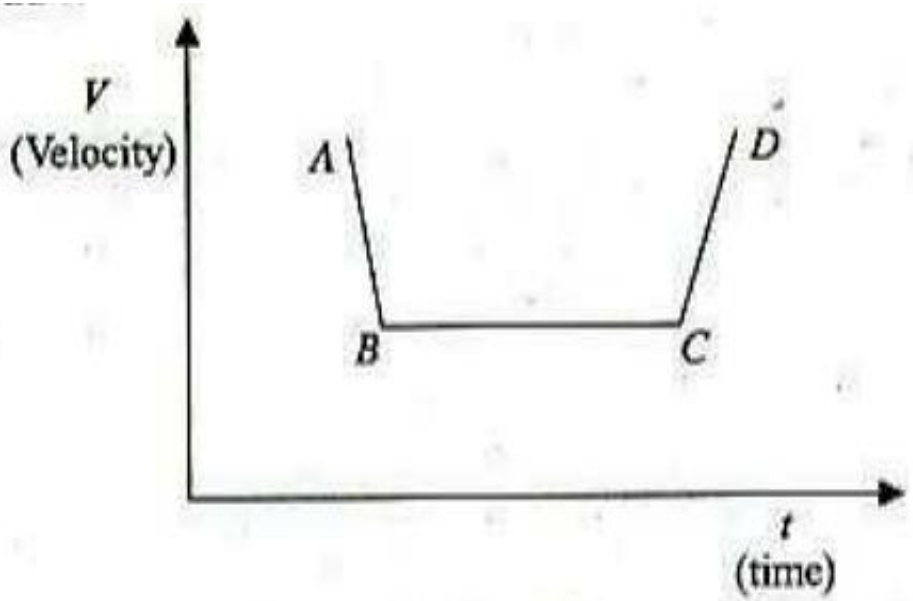
(a) CD and BC

(b) BC and AB

(c) CD and AB

(d) AB and CD

SSBCrack EXAMS



In the given velocity (V) versus time (t) graph, accelerated and decelerated motions are respectively represented by line segments

Answer: C

(a) CD and BC

(b) BC and AB

(c) CD and AB

(d) AB and CD

SSBCrack EXAMS

A tennis ball is thrown in the vertically upward direction and the ball attains a maximum height of 20 m. The ball was thrown approximately with an upward velocity of

(a) 8 m/s

(b) 12 m/s

(c) 16 m/s

(d) 20 m/s

projectile motion

$$H = \frac{u^2 \sin^2\theta}{2g} \quad ; \quad \theta = 90^\circ$$

$$20 = \frac{u^2}{2g} \Rightarrow u^2 = 20 \times 2 \times 10$$

$u = 20$ m/s

$(g \approx 10\ m/s^2)$

SSBCrack EXAMS

A tennis ball is thrown in the vertically upward direction and the ball attains a maximum height of 20 m. The ball was thrown approximately with an upward velocity of

(a) 8 m/s

(b) 12 m/s

(c) 16 m/s

(d) 20 m/s

Answer: D

SSBCrack EXAMS

A uniform motion of a car along a circular path experiences

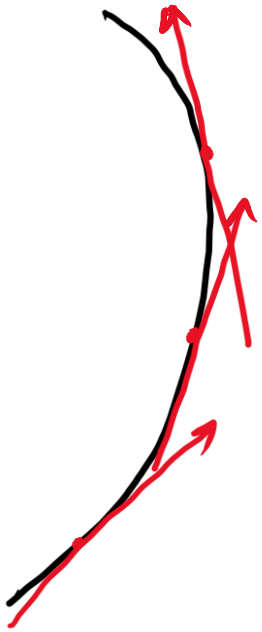
(a) a change in speed due to a change in its direction of motion. ✗

(b) a change in velocity due to a change in its direction of motion. ✓

(c) a change in momentum due to no change in its direction of motion. ✗

(d) a constant momentum due to a change in its direction of motion. ✗

mass x velocity



(Every point along curved path, direction of motion is changing)

SSBCrack EXAMS

A uniform motion of a car along a circular path experiences

(a) a change in speed due to a change in its direction of motion.

(b) a change in velocity due to a change in its direction of motion.

(c) a change in momentum due to no change in its direction of motion.

(d) a constant momentum due to a change in its direction of motion.

Answer: B

SSBCrack EXAMS

Which one of the following statements about speed and velocity is correct?

(a) Speed and velocity both are vector quantities. ✗

(b) Speed and velocity both are scalar quantities. ✗

(c) Speed is vector quantity and velocity is scalar quantity. ✗

(d) Speed is scalar quantity and velocity is vector quantity. ✓

Speed — only magnitude
↳ scalar

velocity — magnitude + direction
↳ vector

SSBCrack EXAMS

Which one of the following statements about speed and velocity is correct?

(a) Speed and velocity both are vector quantities.

(b) Speed and velocity both are scalar quantities.

(c) Speed is vector quantity and velocity is scalar quantity.

(d) Speed is scalar quantity and velocity is vector quantity.

Answer: D

SSBCrack EXAMS

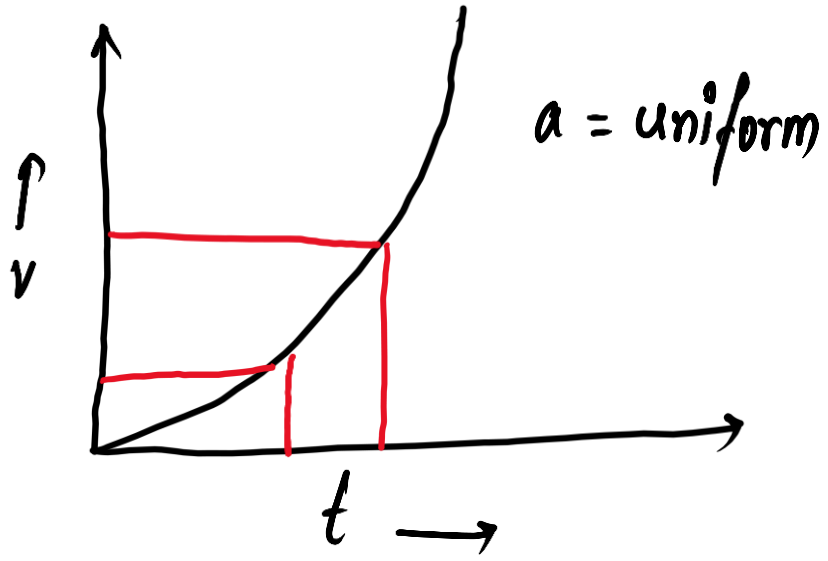
What is the nature of velocity-time graph for a car moving with uniform acceleration?

(a) Parabola

(b) Logarithmic

(c) Straight line

(d) Exponential



change in v is abrupt compared to change in t.

SSBCrack EXAMS

What is the nature of velocity-time graph for a car moving with uniform acceleration?

(a) Parabola

(b) Logarithmic

(c) Straight line

(d) Exponential

Answer: D

SSBCrack EXAMS

Ram records the odometer readings of his car for the distance covered from 2000 km at the start of his journey and 2400 km at the end of the journey after 8 hours. What is the average speed of the car ?

(a) 50 km/h

(b) 60 km/h

(c) 70 km/h

(d) 80 km/h

$$\frac{2400 - 2000}{8} = \frac{400\ km}{8\ h} = 50\ km/h$$

SSBCrack EXAMS

Ram records the odometer readings of his car for the distance covered from 2000 km at the start of his journey and 2400 km at the end of the journey after 8 hours. What is the average speed of the car ?

(a) 50 km/h

(b) 60 km/h

(c) 70 km/h

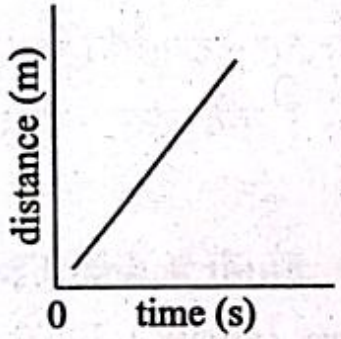
(d) 80 km/h

Answer: A

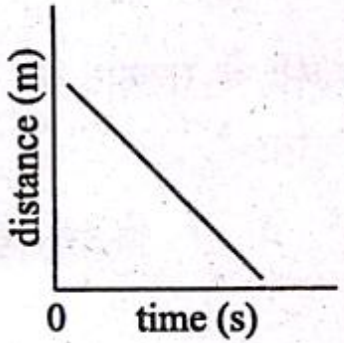
SSBCrack EXAMS

Which one of the following graphs represents the equation of motion $v = u + at$; where all quantities are non-zero and symbols carry their usual meanings ?

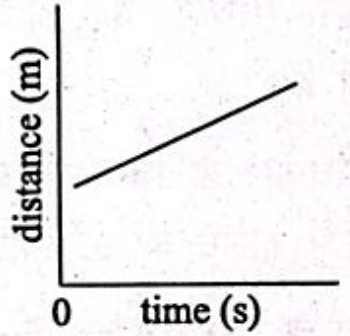
(a)



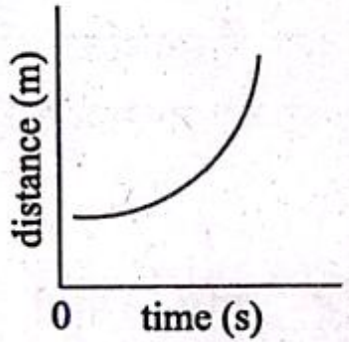
(c)



(b)



(d)



$\frac{d}{t}$ = slope ≠ constant

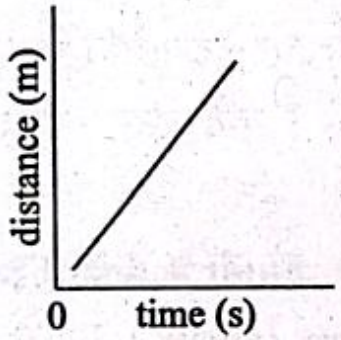
as 'a' is there,

v is changing ~

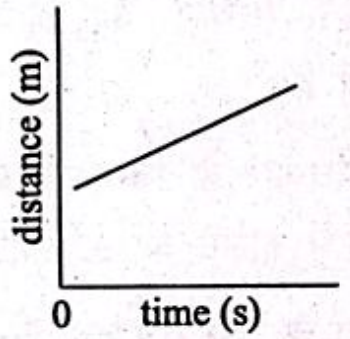
SSBCrack EXAMS

Which one of the following graphs represents the equation of motion $v = u + at$; where all quantities are non-zero and symbols carry their usual meanings ?

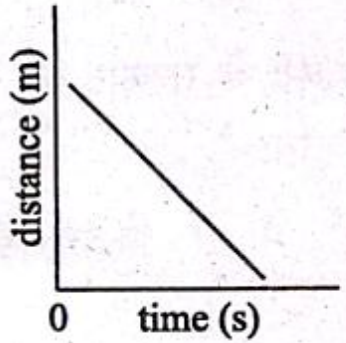
(a)



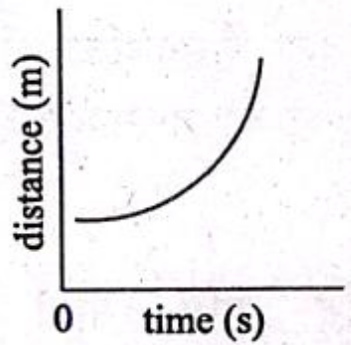
(b)



(c)



(d)



Answer: D

SSBCrack EXAMS

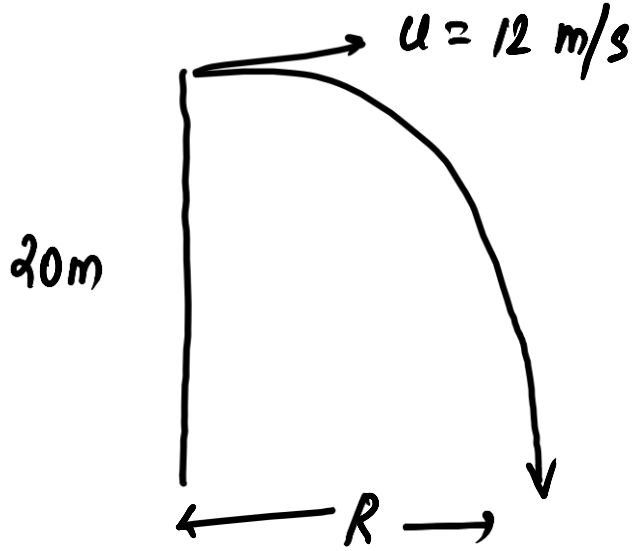
A stone is thrown horizontally from the top of a 20 m high building with a speed of 12 m/s. It hits the ground at a distance R from the building. Taking g = 10 m/s^2 and neglecting air resistance will give :

(a) R = 12 m

(b) R = 18 m

(c) R = 24 m

(d) R = 30 m



Time of flight,

$R = ut$

$= u\sqrt{\frac{2H}{g}}$

$= 12\sqrt{\frac{2\times 20}{10}}$

$= 12 \times 2 = \boxed{24\ m}$

SSBCrack EXAMS

A stone is thrown horizontally from the top of a 20 m high building with a speed of 12 m/s. It hits the ground at a distance R from the building. Taking g = 10 m/s^2 and neglecting air resistance will give :

(a) R = 12 m

(b) R = 18 m

(c) R = 24 m

(d) R = 30 m

Answer: C

A person travels distance πR along the circumference of a circle of radius R. Displacement of the person is

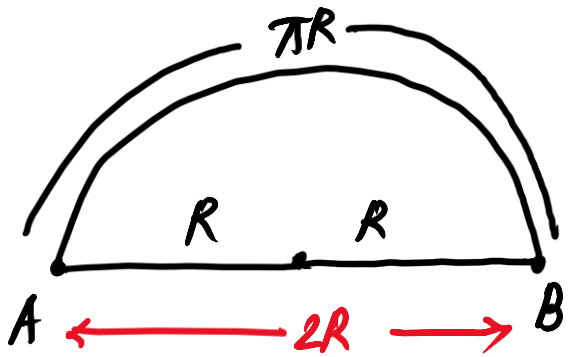
A. R

B. 2R

C. 2πR

D. 0

$$\pi R = \frac{2\pi R}{2}$$



SSBCrack EXAMS

A person travels distance πR along the circumference of a circle of radius R.

Displacement of the person is

A. R

B. 2R

C. 2πR

D. 0

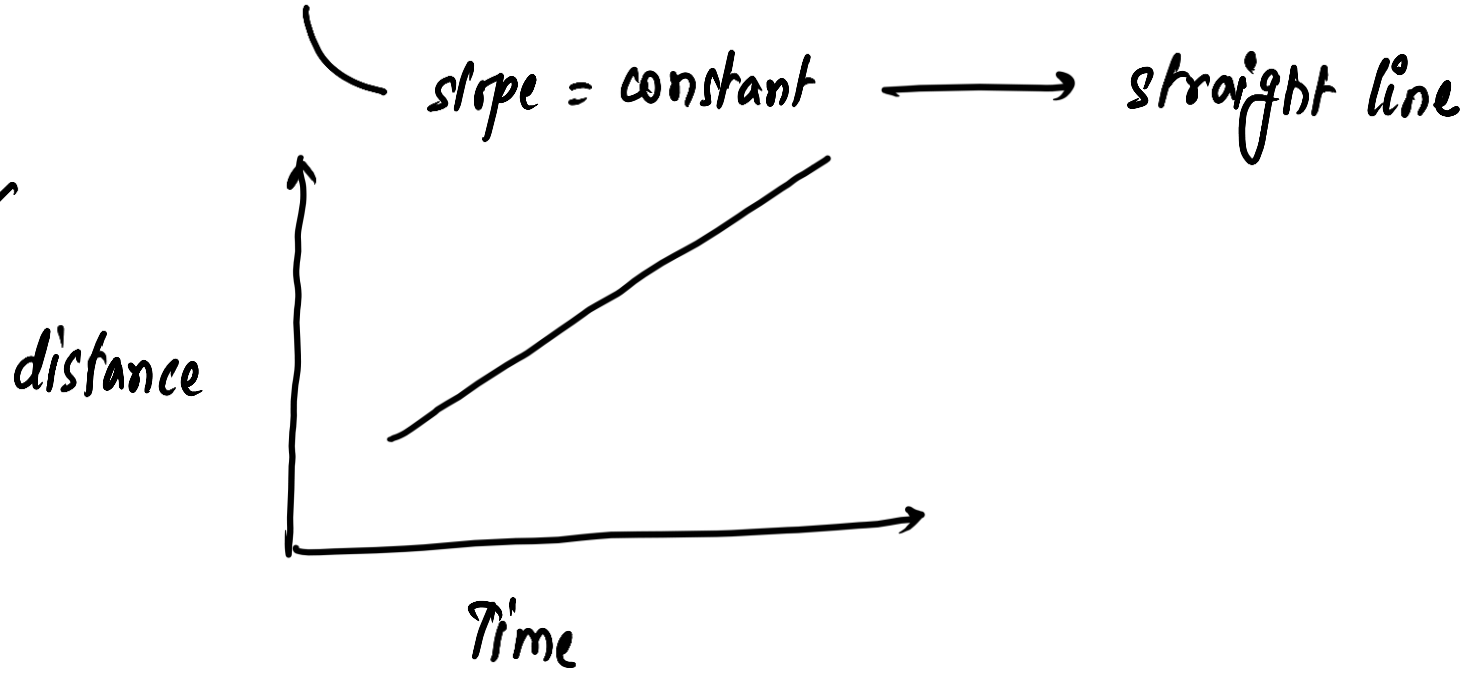
17. The distance – time graph of a body moving along a straight path in a single direction with uniform speed will be

A. Along X – Axis

B. A line with +ve slope ✓

C. Parallel to X – Axis

D. None of these



17. The distance – time graph of a body moving along a straight path in a single direction with uniform speed will be

A. Along X – Axis

B. A line with +ve slope

C. Parallel to X – Axis

D. None of these

SSBCrack EXAMS

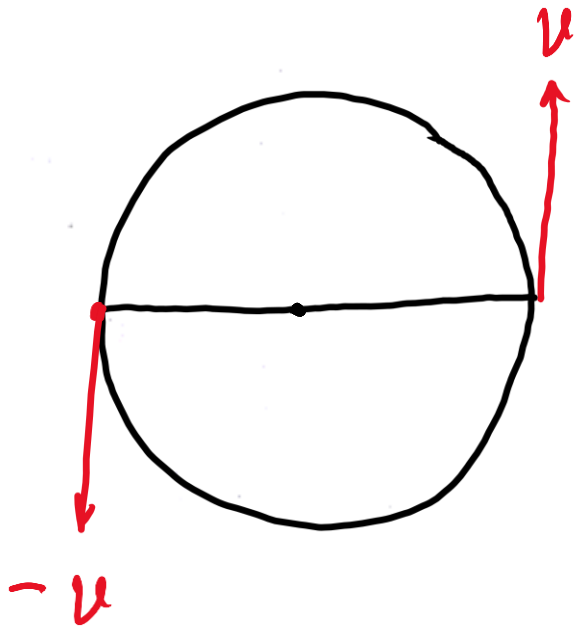
A particle is moving in a circle of radius R with a constant speed v. Its average acceleration over the time when it moves over half the circle is :

(a) $\frac{v^2}{R}$

(b) $\frac{\pi v^2}{2R}$

(c) $\frac{2v^2}{\pi R}$

(d) 0



$$\frac{\text{Total change in velocity}}{\text{Total change in time}}$$

$$= \frac{v-(-v)}{\left(\frac{\pi R}{v}\right)} = \frac{2v}{\frac{\pi R}{v}} = \frac{2v^2}{\pi R}$$

SSBCrack EXAMS

A particle is moving in a circle of radius R with a constant speed v. Its average acceleration over the time when it moves over half the circle is :

(a) $\frac{v^2}{R}$

(b) $\frac{\pi v^2}{2R}$

(c) $\frac{2v^2}{\pi R}$

(d) 0

Answer: C

A motorcyclist drives from place A to B with a uniform speed of 30 km h^{-1} and returns from place B to A with a uniform speed of 20 kmh^{-1}. Find his average speed.

A. 12 kmh^{-1}

B. 6kmh^{-1}

C. 24 kmh^{-1}

D. 10 kmh^{-1}

$$\text{avg. speed} = \frac{\text{Total distance}}{\text{Total time}}$$

$$\frac{d+d}{\frac{d}{30}+\frac{d}{20}} = \frac{2d}{d\left(\frac{1}{30}+\frac{1}{20}\right)} = \frac{2\times30\times20}{30+20}$$

$$= \frac{1200}{50} = \frac{120}{5} = 24 \text{ km/h}$$

for equal distances with velocity v_1 and v_2,

$$\left(\text{avg. speed} = \frac{2v_1v_2}{v_1+v_2}\right)$$

A motorcyclist drives from place A to B with a uniform speed of 30 km h^{-1} and returns from place B to A with a uniform speed of 20 kmh^{-1}. Find his average speed.

A. 12 kmh^{-1}

B. 6kmh^{-1}

C. 24 kmh^{-1}

D. 10 kmh^{-1}

SSBCrack EXAMS

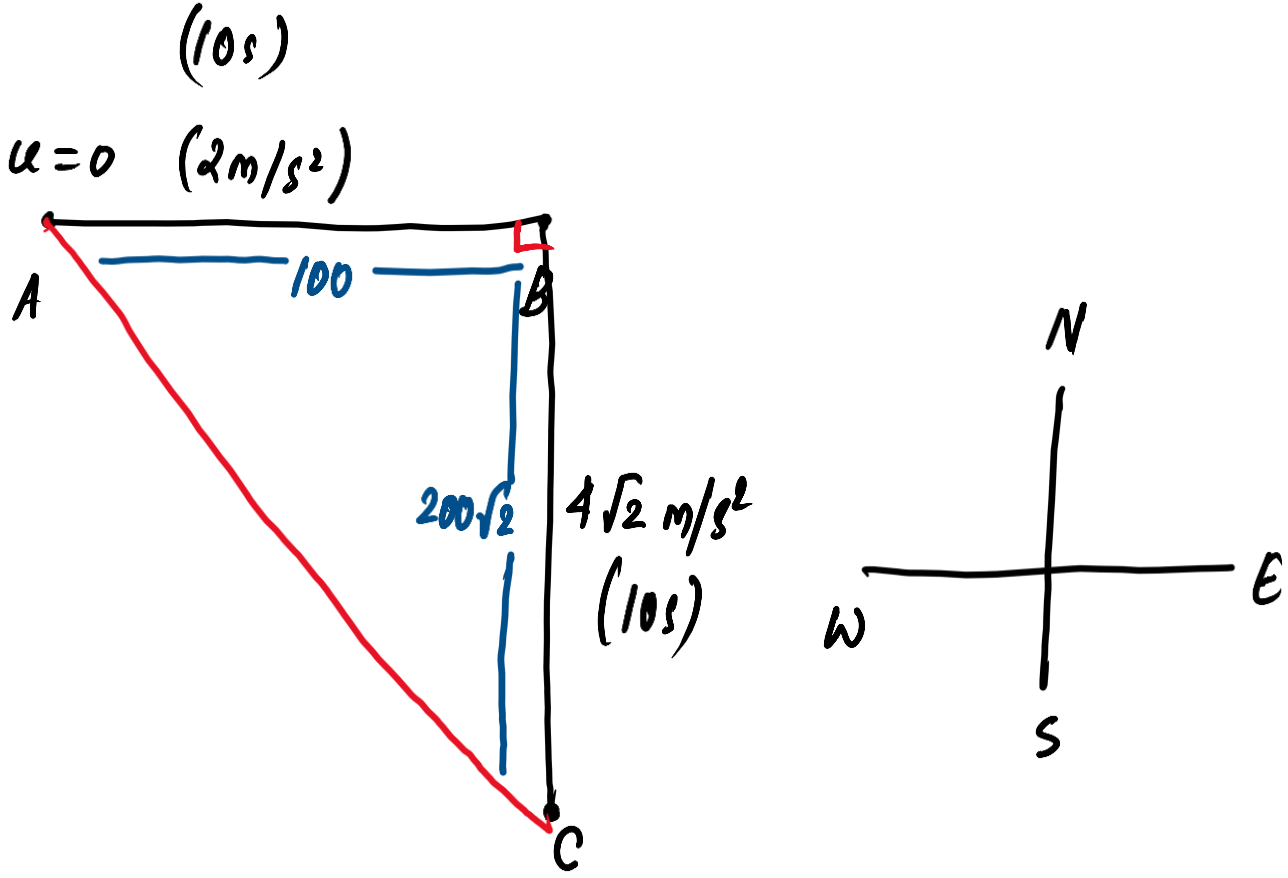
Starting from rest a vehicle accelerates at the rate of 2 m/s^2 towards east for 10 s. It then stops suddenly. It then accelerates again at a rate of $4\sqrt{2}\ m/s^2$ for next 10 s towards south and then again comes to rest. The net displacement of the vehicle from the starting point is

(a) 100 m

(b) 200 m

(c) 300 m

(d) 400 m



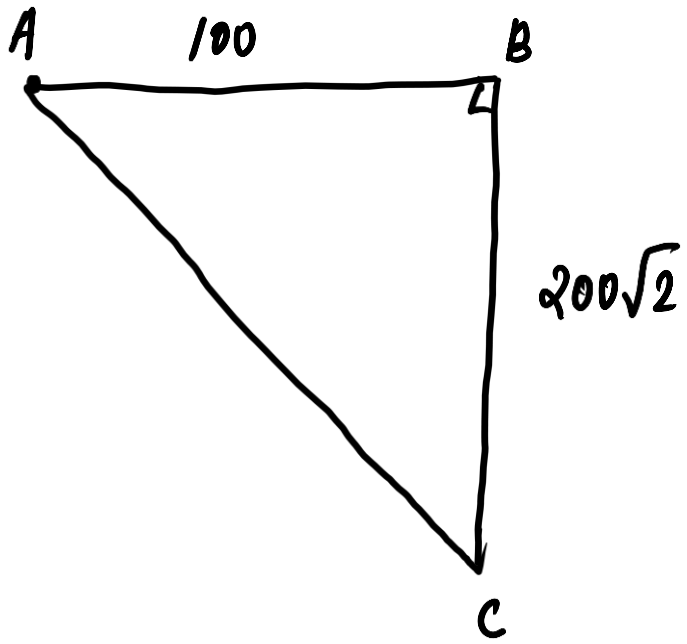
$$s = ut + \frac{1}{2}at^2$$

$$s = 0(10) + \frac{1}{2}(2)(10)^2$$

$$s = 100$$

$$s = 0 + \frac{1}{2}(4\sqrt{2})(10)^2$$

$$s = 200\sqrt{2}$$



$$AC^2 = (100)^2 + (200\sqrt{2})^2$$

$$= 10000 + 40000 \times 2$$

$$AC^2 = 10000 + 80000$$

$$AC^2 = 90000 = 9 \times 10,000$$

$$AC = 300 \text{ m}$$

SSBCrack EXAMS

Starting from rest a vehicle accelerates at the rate of 2 m/s^2 towards east for 10 s. It then stops suddenly. It then accelerates again at a rate of $4\sqrt{2}\ m/s^2$ for next 10 s towards south and then again comes to rest. The net displacement of the vehicle from the starting point is

(a) 100 m

(b) 200 m

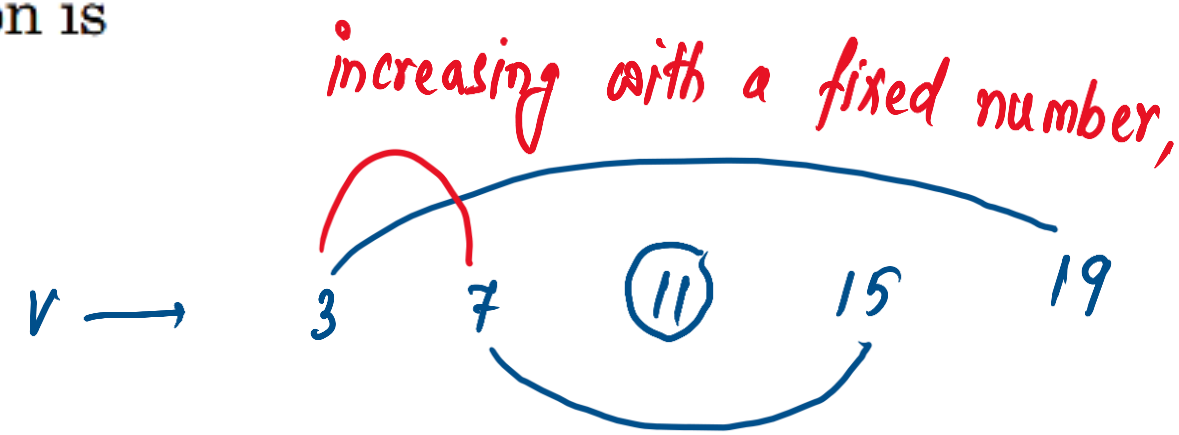
(c) 300 m

(d) 400 m

Answer: C

Average velocity of an object is equal to the mean of its initial and final velocities, if the acceleration is

(a) uniform
(b) variable
(c) Both (a) and (b)
(d) None of these



$$V_{av} = \frac{3+19}{2} = \frac{22}{2} = 11$$

SSBCrack EXAMS

Average velocity of an object is equal to the mean of its initial and final velocities, if the acceleration is

(a) uniform
(b) variable
(c) Both (a) and (b)
(d) None of these

Answer: A

SSBCrack EXAMS

If the displacement of an object is proportional to square of time, then the object moves with

(a) uniform velocity
(b) uniform acceleration
(c) increasing acceleration
(d) decreasing acceleration

If the displacement of an object is proportional to square of time, then the object moves with

(a) uniform velocity
(b) uniform acceleration
(c) increasing acceleration
(d) decreasing acceleration

$s \propto t^2$

uniform acceleration

Answer: B

SSBCrack EXAMS

A body goes from P to Q with a velocity of 40 ms^{-1} and comes back from Q to P with a velocity of 60 ms^{-1}. Then, the average velocity of the body during the whole journey is

(a) 50 ms^{-1} (b) 48 ms^{-1}

(c) 45 ms^{-1} (d) zero

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

A body goes from P to Q with a velocity of 40 ms^{-1} and comes back from Q to P with a velocity of 60 ms^{-1}. Then, the average velocity of the body during the whole journey is

(a) 50 ms^{-1} (b) 48 ms^{-1}

(c) 45 ms^{-1} (d) zero

Answer: D

SSBCrack EXAMS

The area under acceleration-time graph represents

(a) velocity

(b) displacement travelled

(c) distance travelled

(d) change in velocity ✓

acceleration x time

$$a = \frac{\text{change in velocity}}{\text{Time (t)}}$$

$$a \times t = \text{change in velocity}$$

The area under acceleration-time graph represents

(a) velocity

(b) displacement travelled

(c) distance travelled

(d) change in velocity

Answer: D

SSBCrack EXAMS

A man travels along a straight road for the first half length with a velocity u and the second half length with a velocity v. Then, the mean velocity is given by

(a) $\frac{u+v}{2}$ (b) $\frac{2uv}{u+v}$

(c) $\sqrt{uv}$ (d) zero

mean, or average velocity,

A man travels along a straight road for the first half length with a velocity u and the second half length with a velocity v. Then, the mean velocity is given by

(a) $\frac{u+v}{2}$

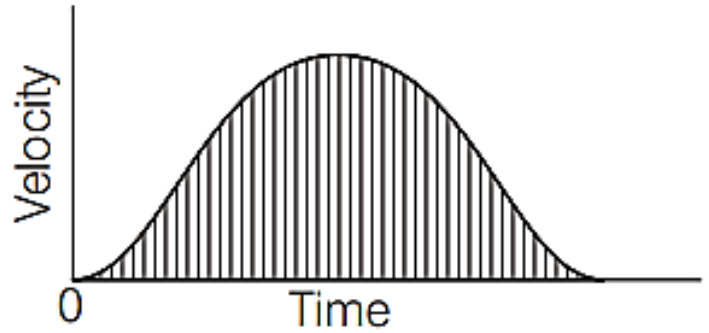
(b) $\frac{2uv}{u+v}$

(c) $\sqrt{uv}$

(d) zero

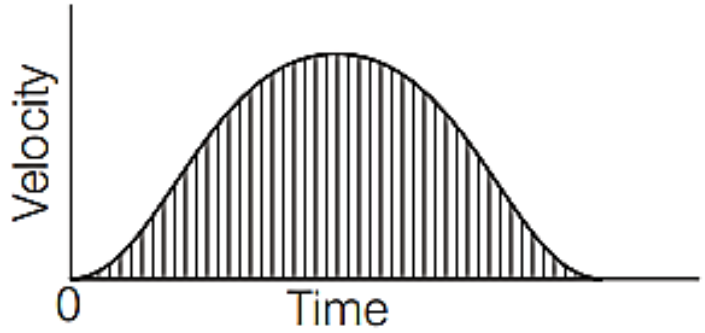
Answer: B

Which one of the following characteristics of the particle does the shaded area of the velocity-time graph shown below represent?



(a) Momentum (b) Acceleration
(c) Distance covered (d) Speed

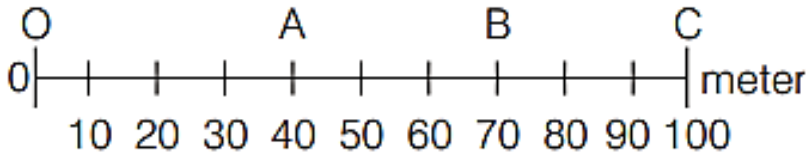
Which one of the following characteristics of the particle does the shaded area of the velocity-time graph shown below represent?



(a) Momentum (b) Acceleration
(c) Distance covered (d) Speed

Answer: C

SSBCrack EXAMS



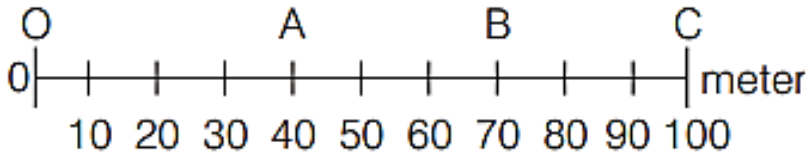
The motion of car along a straight path is shown in above figure. The car starts from O and reaches at point C, back to point A. The distance and the magnitude of the displacement are respectively.

(a) 160 m, 40 m ✓
(b) 190 m, 50 m
(c) 120 m, 40 m
(d) 140 m, 100 m

Distance = OC + AC

= 100 + 60 = 160 m

Displacement = OA = 40 m



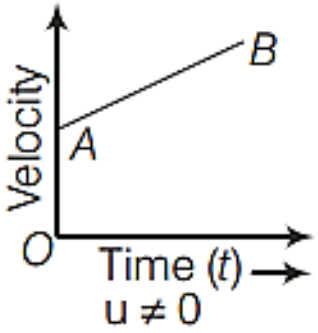
The motion of car along a straight path is shown in above figure. The car starts from O and reaches at point C, back to point A. The distance and the magnitude of the displacement are respectively.

(a) 160 m, 40 m
(b) 190 m, 50 m
(c) 120 m, 40 m
(d) 140 m, 100 m

Answer: A

SSBCrack EXAMS

Which one among the following situation is best represented by the velocity-time graph shown alongside?



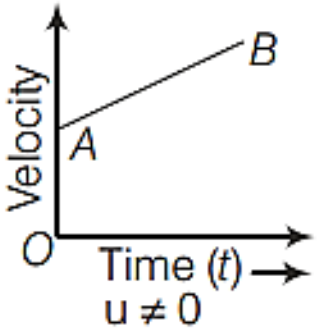
(a) velocity changes by equal amount → a = constant

(b) slope of graph is zero. ✗

(c) slope of graph is negative ✗

(d) None of the above

Which one among the following situation is best represented by the velocity-time graph shown alongside?

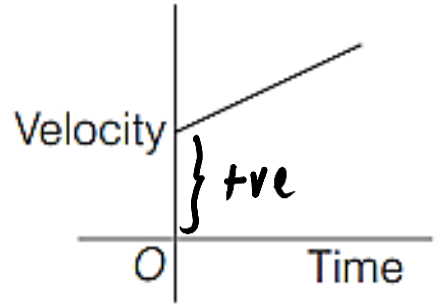


(a) velocity changes by equal amount
(b) slope of graph is zero.
(c) slope of graph is negative
(d) None of the above

Answer: A

SSBCrack EXAMS

Which statement is true for shown graph?



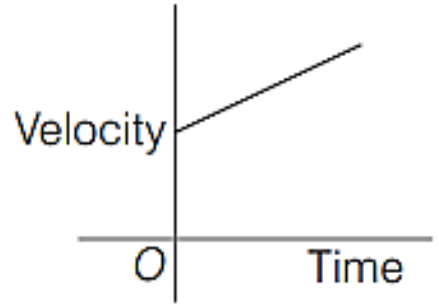
(a) Acceleration have positive and constant value ✓

(b) Initial velocity of particle is negative ✗

(c) velocity of particle is constant ✗

(d) None of the above

Which statement is true for shown graph?



(a) Acceleration have positive and constant value
(b) Initial velocity of particle is negative
(c) velocity of particle is constant
(d) None of the above

Answer: A

NDA-CDS 1 2025

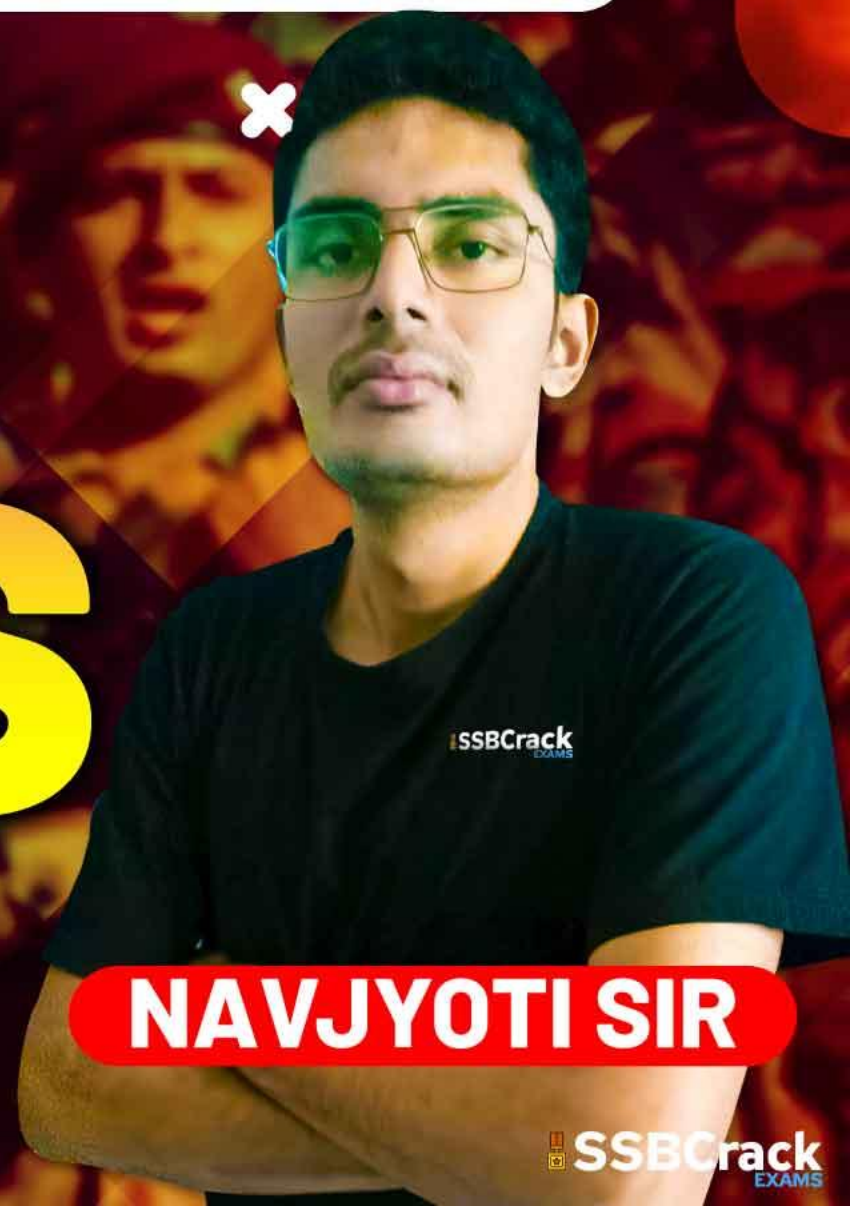
GS

LIVE

PHYSICS

FORCE & LAWS OF MOTION

CLASS 1



NAVJYOTI SIR

SSBCrack EXAMS