NDA-CDS 1 2025

GS

LIVE

PHYSICS

MOTION

MCQS

NAVJYOTI SIR

SSBCrack EXAMS

28 Jan 2025 Live Classes Schedule

9:00AM	28 JANUARY 2025 DAILY DEFENCE UPDATES	DIVYANSHU SIR
10:00AM	28 JANUARY 2025 DAILY CURRENT AFFAIRS	RUBY MA'AM

AFCAT 1 2025 LIVE CLASSES

12:30PM	REASONING - FIGURE CLASSIFICATION	RUBY MA'AM
3:00PM	STATIC GK - INDIAN FESTIVALS & FOLK DANCES	DIVYANSHU SIR
4:30PM	ENGLISH - SYNONYMS - CLASS 3	ANURADHA MA'AM
5:30PM	MATHS - RATIO & PROPORTION	NAVJYOTI SIR

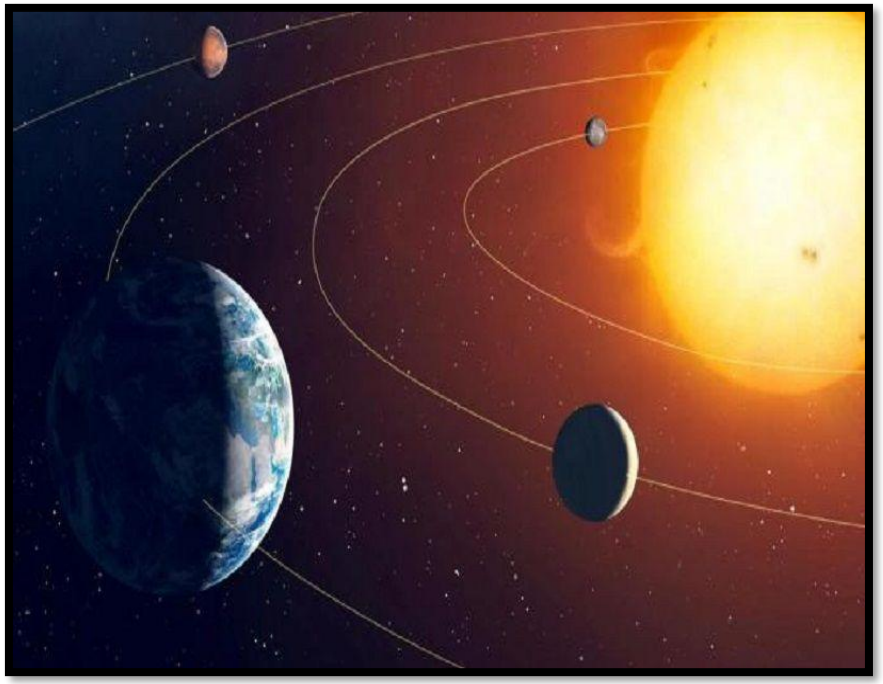
NDA 1 2025 LIVE CLASSES

10:00AM	MATHS - ANALYTICAL GEOMETRY 2D - CLASS 1	NAVJYOTI SIR
11:30AM	ANCIENT & MEDIEVAL HISTORY	RUBY MA'AM
1:00PM	PHYSICS - MOTION	NAVJYOTI SIR
4:30PM	ENGLISH - SYNONYMS - CLASS 3	ANURADHA MA'AM

CDS 1 2025 LIVE CLASSES

11:30AM	ANCIENT & MEDIEVAL HISTORY	RUBY MA'AM
1:00PM	PHYSICS - MOTION	NAVJYOTI SIR
4:30PM	ENGLISH - SYNONYMS - CLASS 3	ANURADHA MA'AM
5:30PM	MATHS - RATIO & PROPORTION	NAVJYOTI SIR

MOTION - MCQs



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

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

$2 \times 5 \times \cos\frac{60^\circ}{2} = 10\cos 30^\circ$

$= 10 \times \frac{\sqrt{3}}{2} = 5\sqrt{3} = 5 \times 1.732 \sim 8.660$

$\sim 8.6\,N$

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

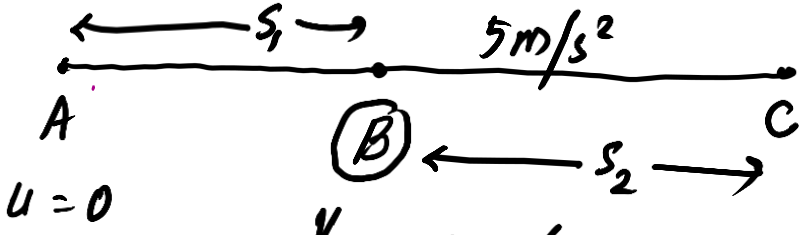
A vehicle starts moving along a straight line path from rest. In first t seconds it moves with an acceleration of 2 m/s^2 and then in next 10 seconds it moves with an acceleration of 5 m/s^2. The total distance travelled by the vehicle is 550 m. The value of time t is

(a) 10 s

(b) 13 s

(c) 20 s

(d) 25 s



$V_{B_i} = 0 + (2)t$

$V_{B_i} = 2t$

AB

$v^2 - u^2 = 2as_1$

$(2t)^2 - 0^2 = 2(2)(s_1)$

$s_1 = t^2$

$V_{B_f} = 2t + (5)(10)$

$= 2t + 50$

BC

$V_{B_f}^2 - V_{B_i}^2 = 2as_2$

$(2t+50)^2 - (2t)^2 = 2(5)s_2$

$2(2t)50 + (50)^2 = 10s_2$

$s_2 = \frac{200t + 2500}{10}$

$s_2 = 20t + 250$

$$S_1 + S_2 = 550$$

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

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

Options

10 ✓ — answer

13

20

25

satisfy

300

50 x 6

25 x 12

15 x 20

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

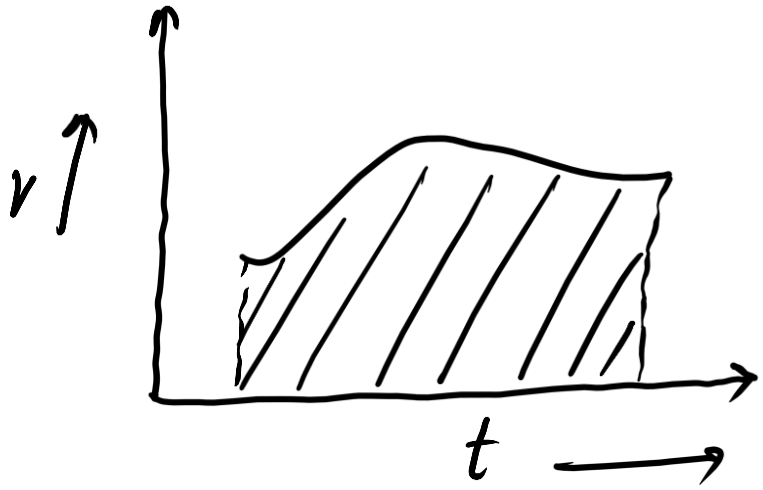
The Area Under Speed-time Graph Gives :

A. Acceleration

B. Velocity

C. Distance

D. None of the Above



Area = y-axis parameter x x-axis parameter [y x x]

= time x velocity

= total distance

The Area Under Speed-time Graph Gives :

A. Acceleration

B. Velocity

C. Distance

D. None of the Above

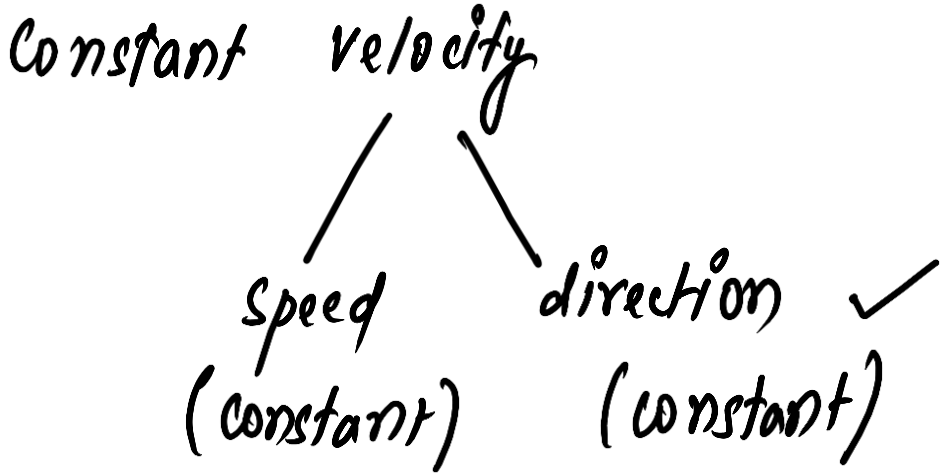
If an object moves with constant velocity then which one of the following statements is NOT correct ?

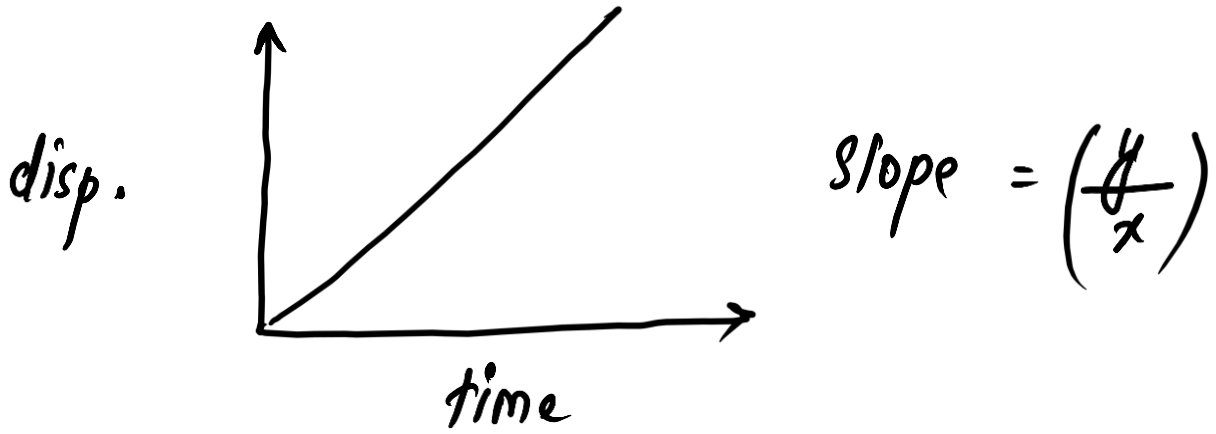
(a) Its motion is along a straight line ✓

(b) Its speed changes with time. ✓

(c) Its acceleration is zero

(d) Its displacement increases linearly with time





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

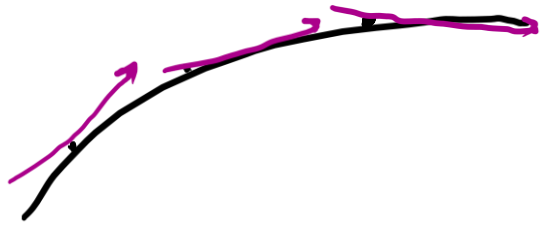
An object moves along a curved path. The following quantities may remain constant during its motion.

A. Speed ✓

B. Velocity ✗

C. Magnitude of Acceleration ✓

D. Both A and C



direction at every point is along the tangent

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

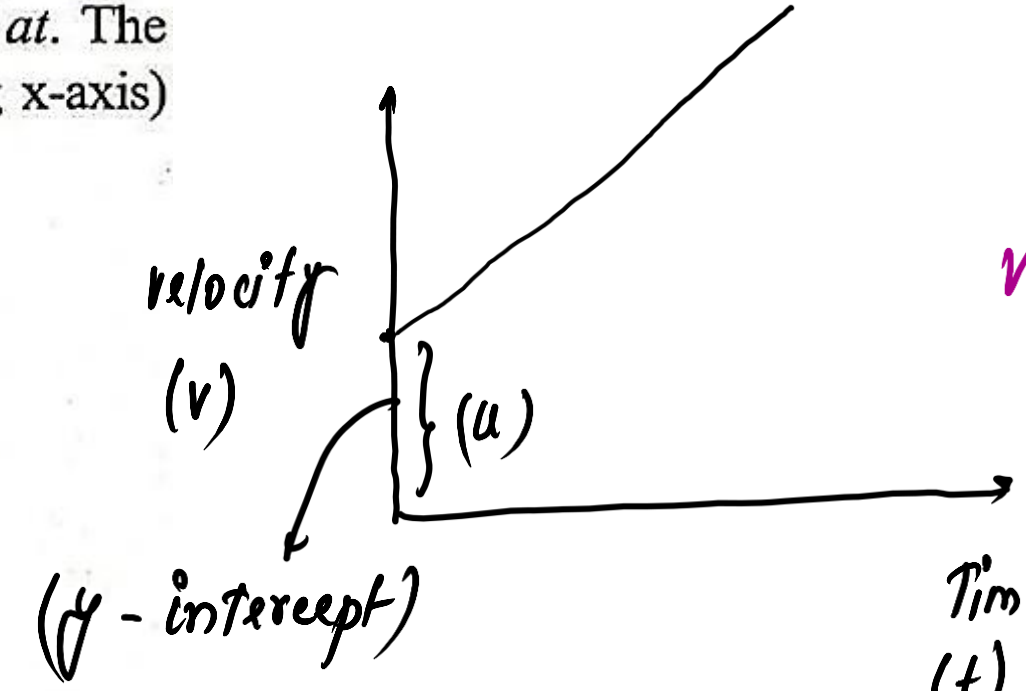
An object is moving with uniform acceleration a. Its initial velocity is u and after time t its velocity is v. The equation of its motion is $v = u + at$. The velocity (along y-axis) time (along x-axis) graph shall be a straight line

(a) passing through origin

(b) with x-intercept u

(c) with y-intercept u

(d) with slope u



$v = u + at$

acceleration (a) = slope of v-t graph = uniform ⇒ straight line

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

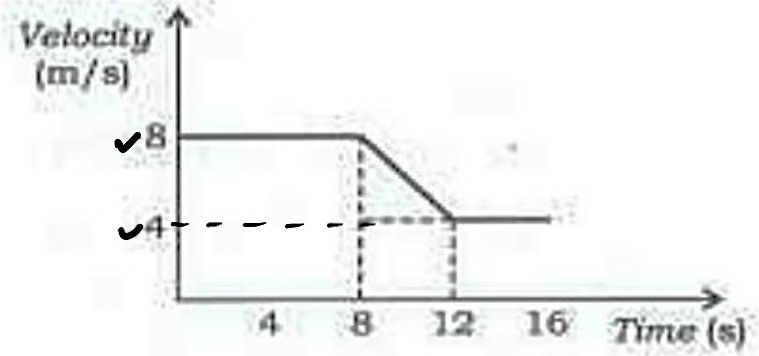
(b) with x-intercept u

(c) with y-intercept u

(d) with slope u

Answer: C

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) $2\ m/s^2$

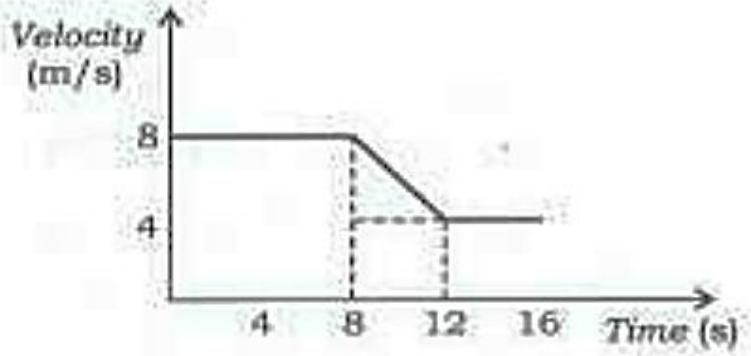
(d) $-1\ m/s^2$

$$\text{avg. accln.} = \frac{\text{change in velocity}}{\text{change in time}}$$

$$= \frac{(\text{final} - \text{initial})}{\text{time}}$$

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

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

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

displacement = 0

avg. velocity = 0

(a) is 0.

(b) is 50 km/hr.

(c) is 25 km/hr.

(d) cannot be calculated without knowing acceleration.

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

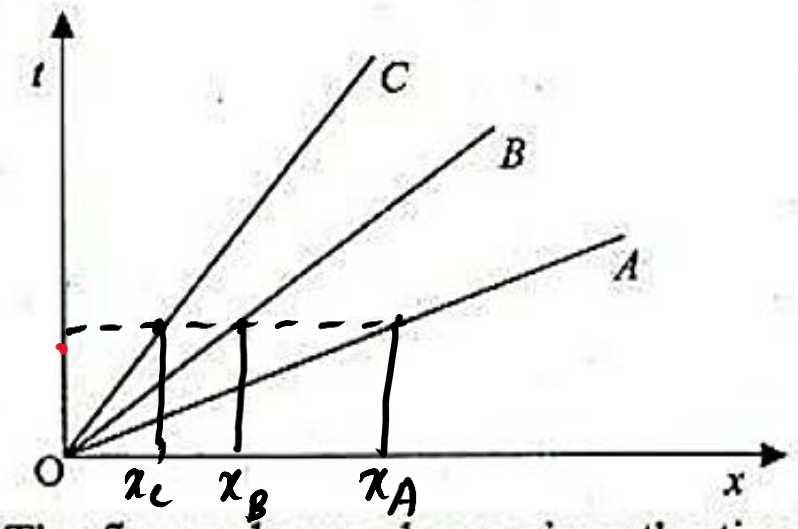
(a) is 0.

(b) is 50 km/hr.

(c) is 25 km/hr.

(d) cannot be calculated without knowing acceleration.

Answer: A



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) $V_A = V_B = V_C = 0$

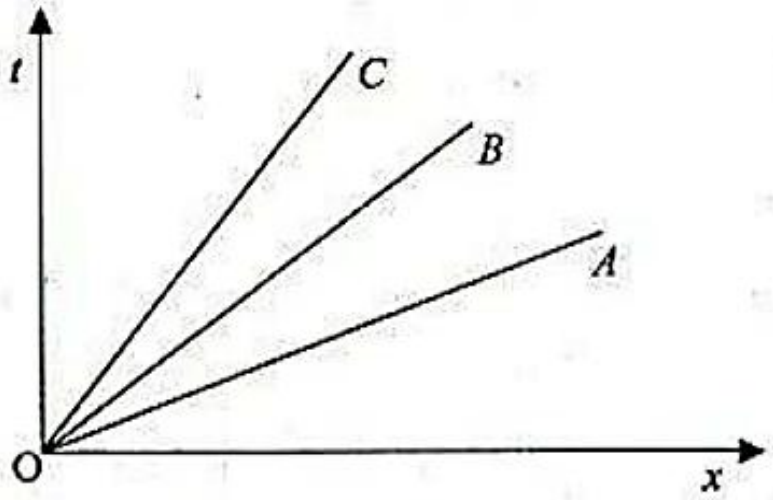
$$\text{Speed } (v) = \frac{\text{distance } (x)}{\text{time } (t)}$$

For same values of t,

greater x $\Rightarrow$ greater v,

$$x_A > x_B > x_C$$

$$v_A > v_B > v_C$$



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 ($t > 0$)?

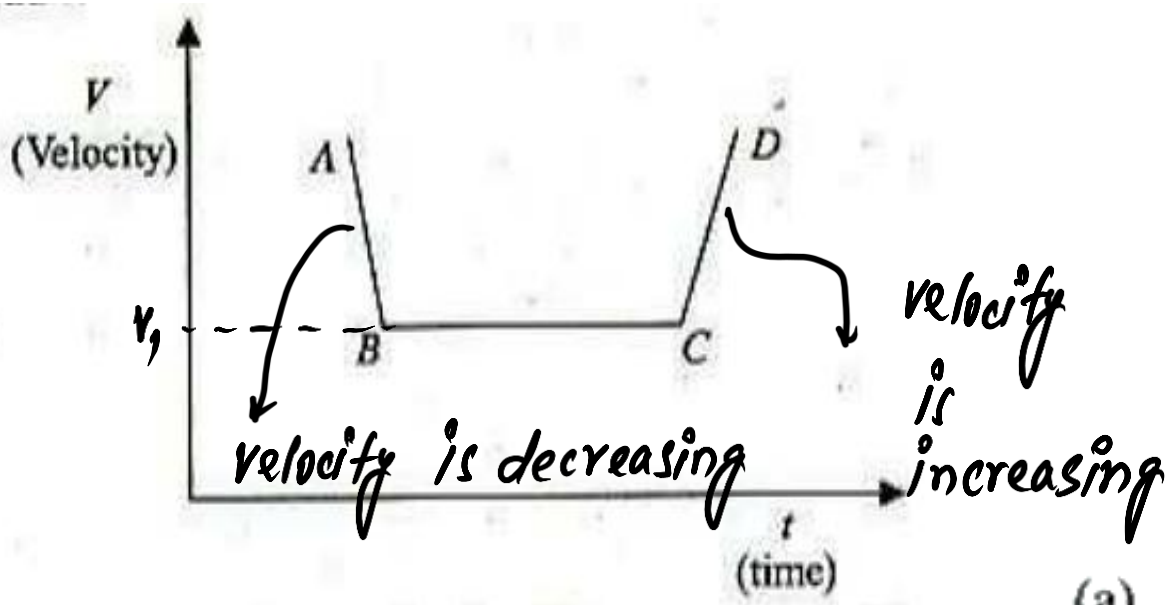
(a) $V_A < V_B < V_C$

(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



BC = no change in velocity = no acceleration

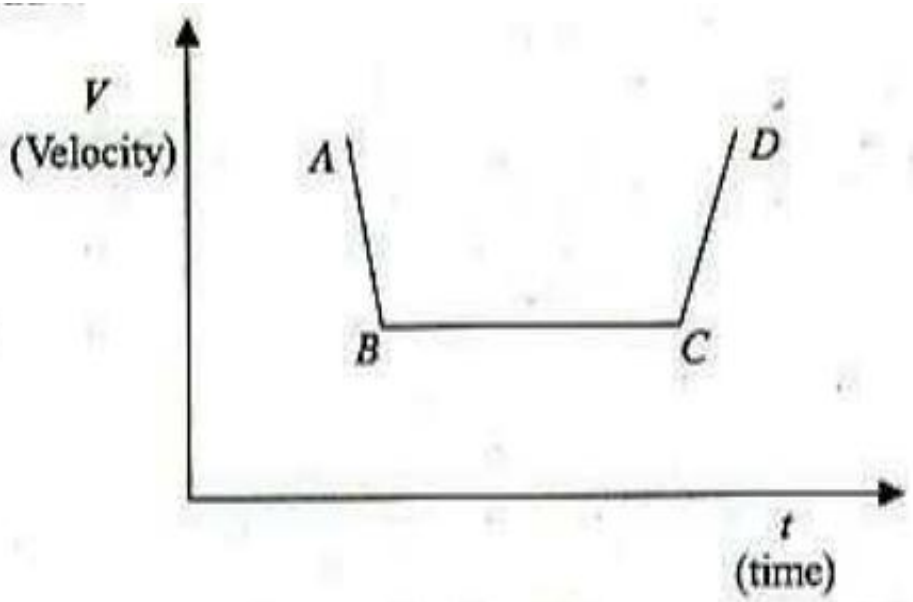
In the given velocity (V) versus time (t) graph, accelerated and decelerated motions are respectively represented by line segments

(a) CD and BC

(b) BC and AB

(c) CD and AB ✓

(d) AB and CD



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

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

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

As vertically upward, $\theta = 90^\circ$

$$20 = \frac{u^2 \sin^2 90^\circ}{2 \times 10} \Rightarrow u^2 = 20 \times 20$$

$$u = 20 \text{ m/s}$$

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

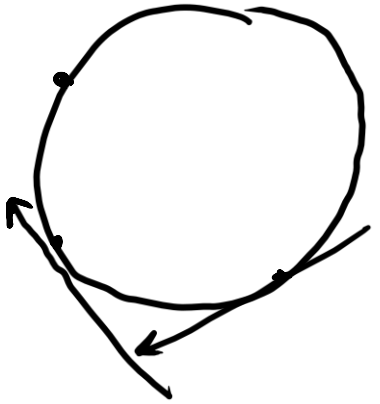
A uniform motion of a car along a circular path experiences

(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. ✗



uniform speed

momentum = mass x velocity

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

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. ✓

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

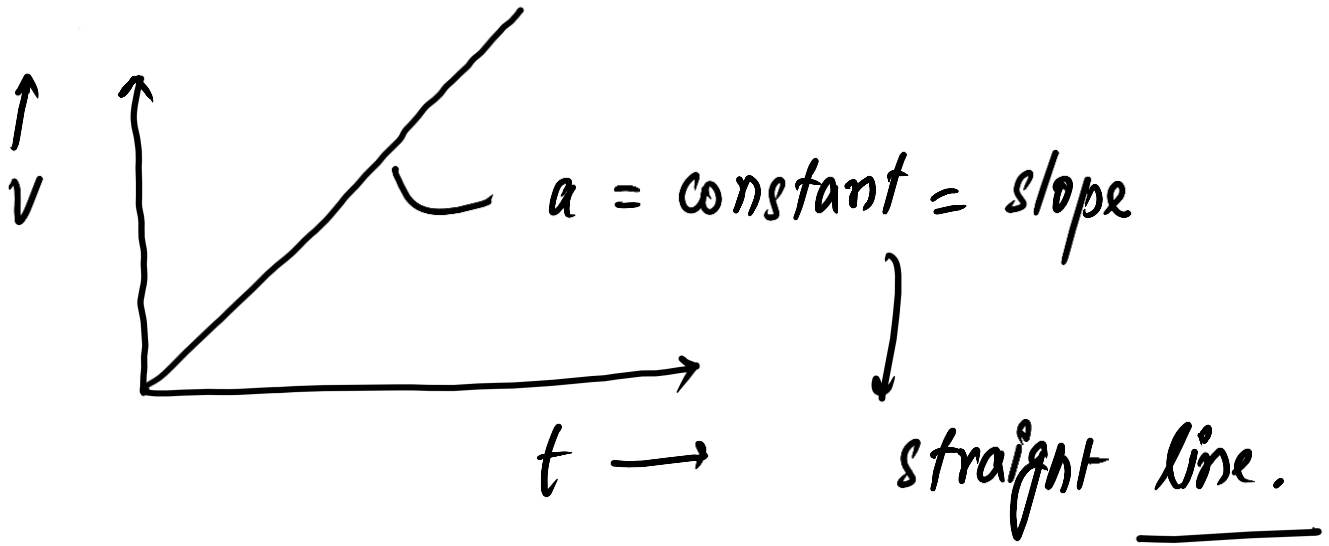
What is the nature of velocity-time graph for a car moving with uniform acceleration?

(a) Parabola

(b) Logarithmic

(c) Straight line

(d) Exponential



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: C

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

Distance travelled = 2400 − 2000

= 400

avg. speed = $\frac{400}{8}$ = 50 km/h

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

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

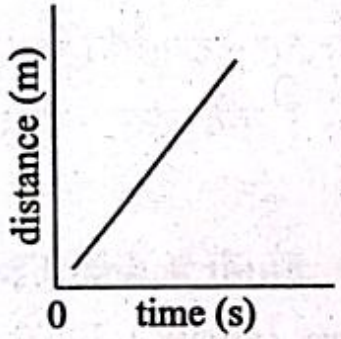
(c) 70 km/h

(d) 80 km/h

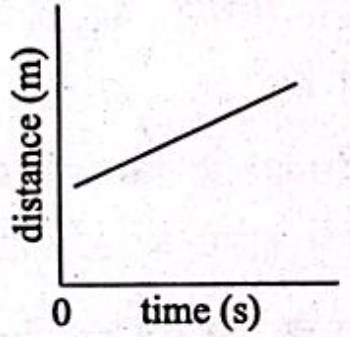
Answer: A

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 ?

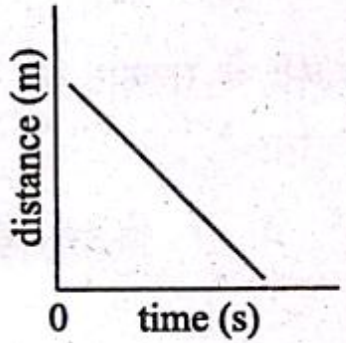
(a)



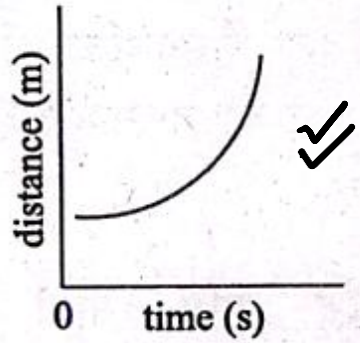
(b)



(c)



(d)



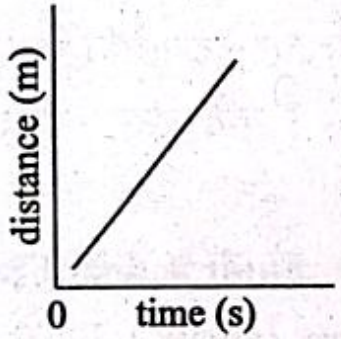
As $v > 0$, $a > 0$

$u > 0$

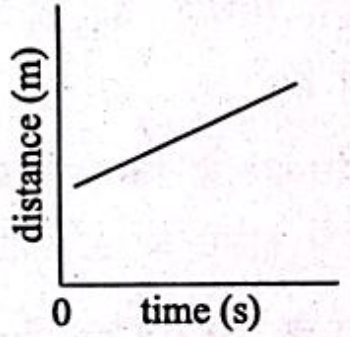
Which one of the following graphs represents the equation of motion $v = u + at$; where all quantities are non-zero and symbols carry their usual meanings ?

Answer: D

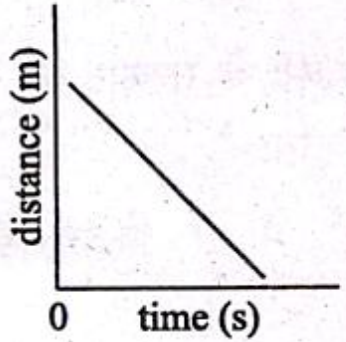
(a)



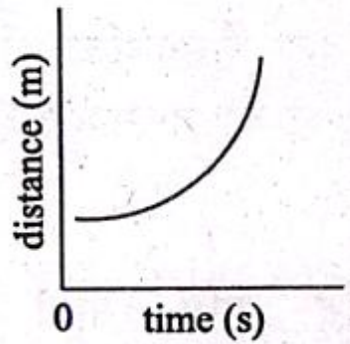
(b)



(c)



(d)



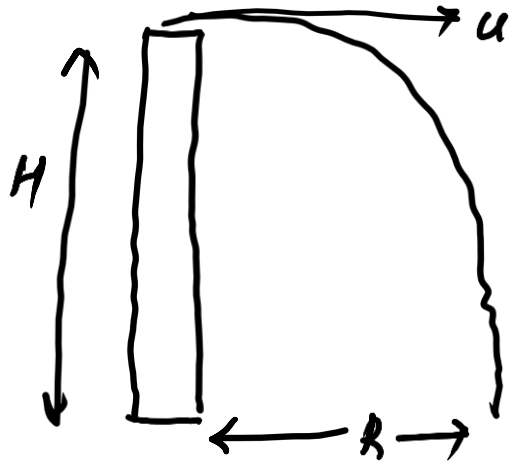
A stone is thrown horizontally from the top of a 20 m high building with a speed of 12 m/s. It hits the ground at a distance R from the building. Taking g = 10 m/s^2 and neglecting air resistance will give :

(a) R = 12 m

(b) R = 18 m

(c) R = 24 m

(d) R = 30 m



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

$$R = uT = 12 \times \sqrt{\frac{2 \times 20}{10}} = 12 \times 2 = 24 \text{ m}$$

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

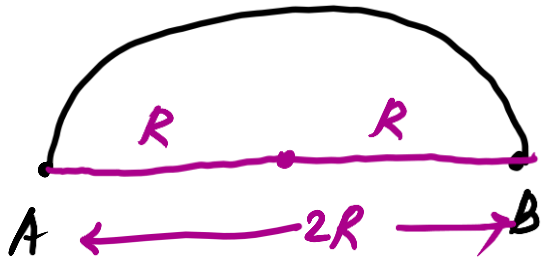
A. R

B. 2R

C. 2πR

D. 0

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



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

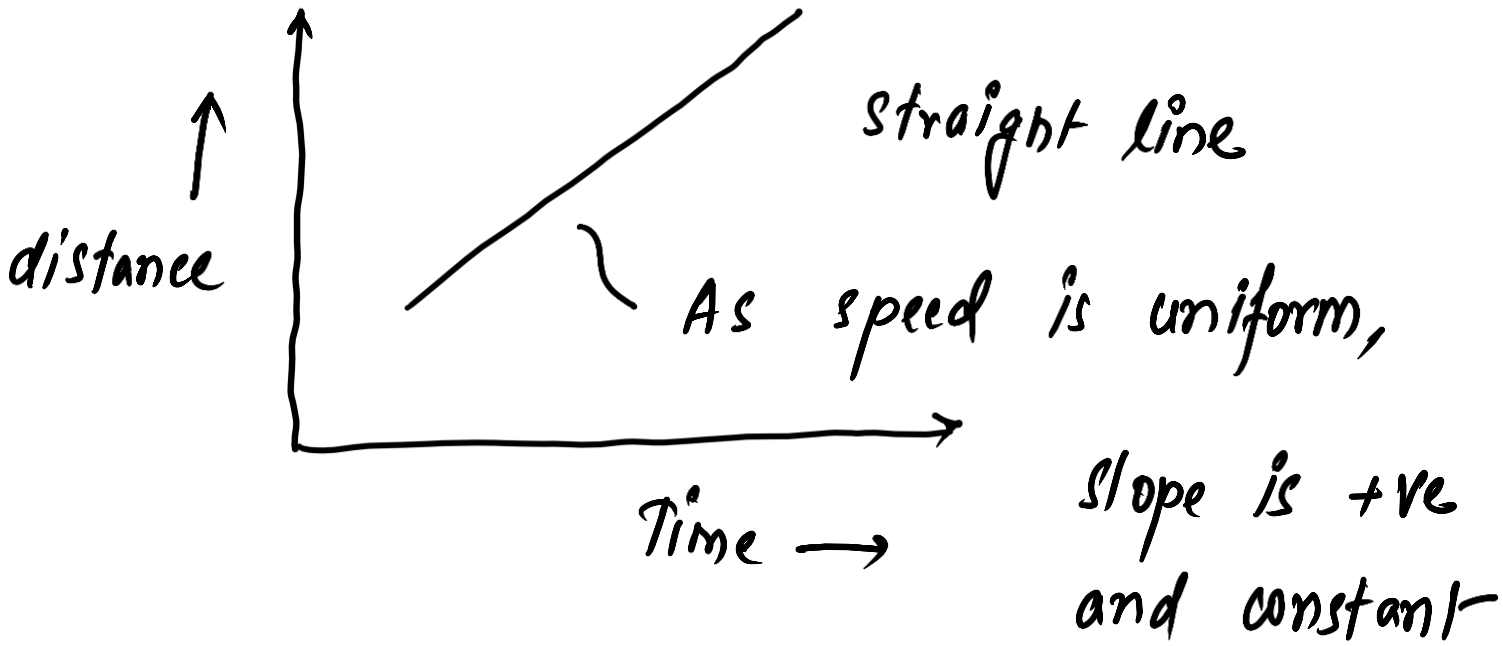
17. The distance – time graph of a body moving along a straight path in a single direction with uniform speed will be

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

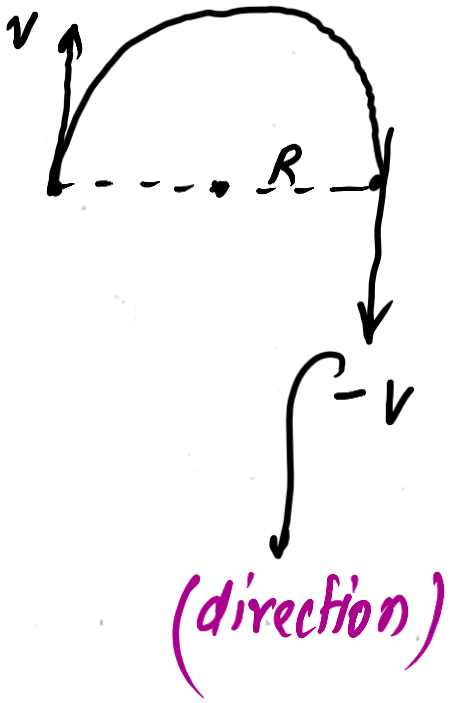
A particle is moving in a circle of radius R with a constant speed v. Its average acceleration over the time when it moves over half the circle is :

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

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

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

(d) 0



avg. acceleration = $\frac{\text{change in velocity}}{\text{Time taken}}$

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

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

magnitude $\frac{2v^2}{\pi R}$

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}

av. speed $= \frac{2v_1v_2}{v_1+v_2}$ (when distance travelled are same)

$= \frac{2\times30\times20}{30+20} = \frac{1200}{50}$

$= 24$ km/h

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}

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

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

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

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

Answer: B

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

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

The area under acceleration-time graph represents

(a) velocity

(b) displacement travelled

(c) distance travelled

(d) change in velocity

The area under acceleration-time graph represents

(a) velocity
(b) displacement travelled
(c) distance travelled
(d) change in velocity

Answer: D

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

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

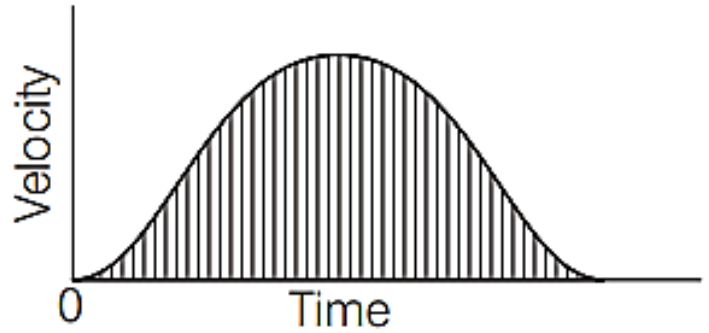
(b) $\frac{2uv}{u + v}$

(c) $\sqrt{uv}$

(d) zero

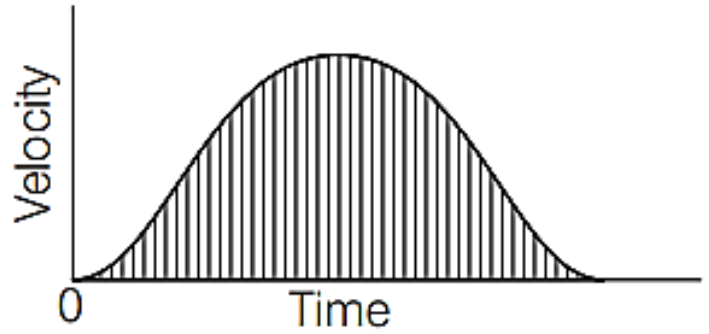
Answer: B

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



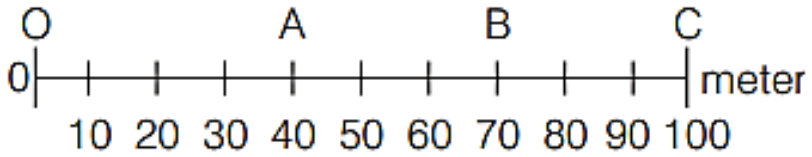
(a) Momentum (b) Acceleration
(c) Distance covered (d) Speed

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



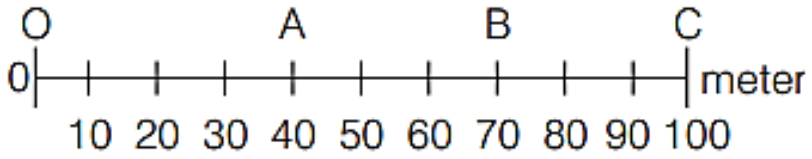
(a) Momentum (b) Acceleration
(c) Distance covered (d) Speed

Answer: C



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

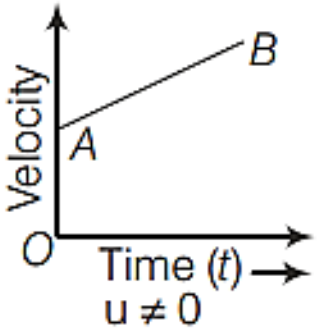


The motion of car along a straight path is shown in above figure. The car starts from O and reaches at point C, back to point A. The distance and the magnitude of the displacement are respectively.

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

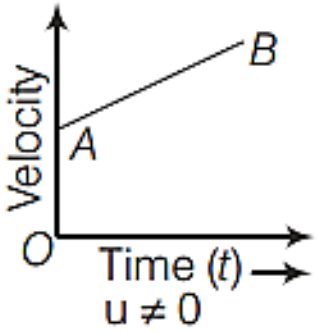
Answer: A

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

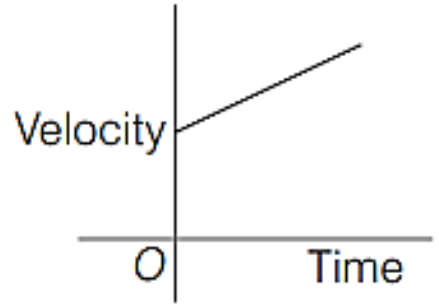
Which one among the following situation is best represented by the velocity-time graph shown alongside?



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

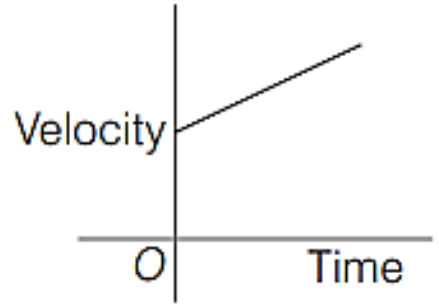
Answer: A

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

MCQS

NAVJYOTI SIR

SSBCrack EXAMS