RADIANT 2026

Physics

Motion In One Dimension

Lecture - 03

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Topics *to be covered*

1. Numerical

2) Numericals of speed || Velocity || Acceleration

Recap *of previous lecture*

1. Speed
2. Velocity
3. Acceleration

1-D motion [x|y|z]

Distance :- रास्ते की लंबाई

Unit - m

+ve

Scalar

Displacement

$S = m$

+ve | -ve | 0

Vector

$D \geq S$ Jump

Speed = $\frac{\text{distance}}{\text{time}}$

Unit : m/s

+ve

Scalar

(i) Uniform → equal Distance/equal time

(iii) Non Uniform → Unequal dis /equal time

(iv) Average Speed = $\frac{\text{total distance}}{\text{total time}}$

$$\text{Velocity} = \frac{\text{displacement}}{\text{time}}$$

Vector

m/s

+ve/-ve/0

$$\text{Average velocity} = \frac{\text{Initial velocity} + \text{final velocity}}{2}$$

$$\text{acc} = \frac{\text{Change in Velocity}}{\text{time}}$$

$$a = \frac{v - u}{t}$$

Unit: m/s^2

O → A
A → B
B → O

= 2 + 3 + 5 = 10 Unit

Distance = OA + AB + BO

Displacement = 0

Distance = 2 + 3 + 6 = 11 Unit

Displacement = -1 Unit

2.5

Distance $= 2\pi r + 2\pi r + \frac{2\pi r}{2}$

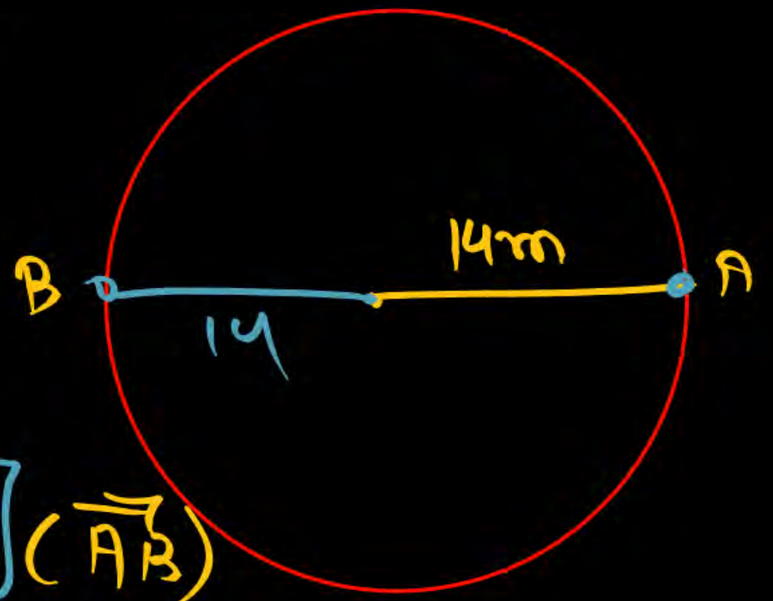
$= 5\pi r$

$= 5 \times \frac{22}{7} \times 14^2$

$\boxed{D = 220 m}$

$S = 14 + 14$

$\boxed{S = 28 m}$ $(\overrightarrow{AB})$

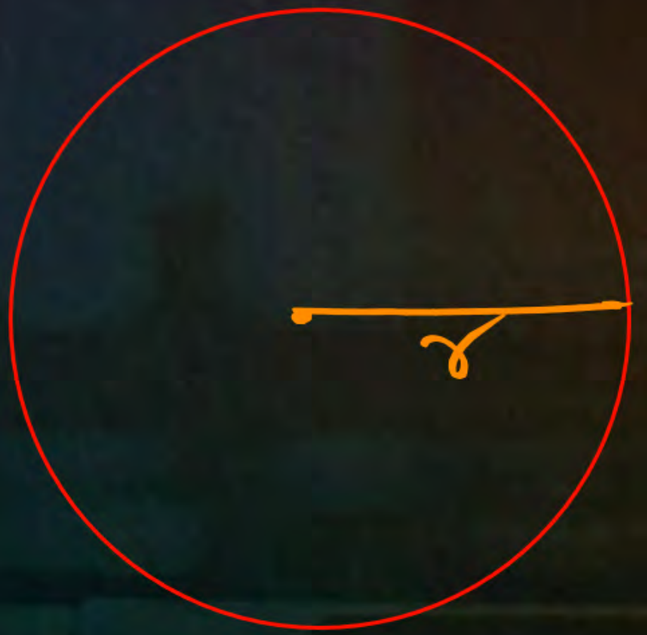


Question

Can displacement be zero even if distance is not zero? Give one example to explain your answer.

Distance = $2\pi r$

Displacement = 0



Distance = 10 m

Displacement = 0

Question

Which of the following is true about motion along a straight line?

A. It can only be uniform motion

B. It can only be nonuniform motion

C. It can be either uniform or nonuniform motion

D. It can have multiple directions

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ANSWER

(C) It can be either uniform or nonuniform motion

Question

What does the rate of motion refer to?

A Change in position

B Change in speed

C Change in direction

D Change in time

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What does the rate of motion refer to?

(A) Change in position

(B) Change in speed

(C) Change in direction

(D) Change in time

ANSWER

(A) Change in position

Question

When an object moves at a constant speed and in a straight line, what kind of motion is it?

A. Uniform motion

B. Nonuniform motion

C. Circular motion

D. Accelerated motion

Question

When an object moves at a constant speed and in a straight line, what kind of motion is it?

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(B) Nonuniform motion

(C) Circular motion

(D) Accelerated motion

ANSWER

(A) Uniform motion

Question

A toy car initially moving with a uniform velocity of 18 km h^{-1} comes to a stop in 2 s. Find the retardation of the car in S.I. units.

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

$v = 0$

$t = 2\ sec$

$a = ?$

$a = \frac{\text{change in Velocity}}{\text{time}}$

$a = \frac{v - u}{t} = \frac{0 - 5}{2}$

$a = -2.5\ m/s^2$

Question

A car is moving with a velocity 20 m s^{-1}. The brakes are applied to retard it at a rate of 2 m s^{-2}. What will be the velocity after 5 s of applying the brakes?

$u = 20\ m/s$

$a = -2\ m/s^2$

$V = ?$

$t = 5\ sec$

$$a = \frac{V-u}{t}$$

$$-2 = \frac{V-20}{5}$$

$$-10 = V-20$$

$$-10+20 = V$$

$$V = 10\ m/s$$

Question

A bicycle initially moving with a velocity 5.0 m s^{-1} accelerates for 5 s at a rate of 2 m s^{-2}. What will be its final velocity?

given

$u = 5$ m/s

$t = 5$ sec

$a = 2$ m/s^2

$V = ?$

$a = \frac{V-u}{t}$

$2 = \frac{V-5}{5}$

$10 = V - 5$

$10 + 5 = V$

$V = 15$ m/s

Question

A car is moving in a straight line with speed 18 km h^{-1}. It is stopped in 5s by applying the brakes. Find–

$u = 18 \frac{km}{h} = 18 \times \frac{5}{18} = 5 m/s$ $\quad V = 0 \quad t = 5s$

(i) The speed of car in m s^{-1},

(ii) The retardation and $a = \frac{V-u}{t} \quad a = \frac{0-5}{5} = \frac{-5}{5} = -1 m/s^2$

(iii) The speed of car after 2s of applying the brakes.

$$a = \frac{V-u}{t}$$

Question

Which is greater?

(i) 60 km/hr

(ii) 15 m/s

$60 \times \frac{5}{18} = \frac{50}{3} = 16.6$

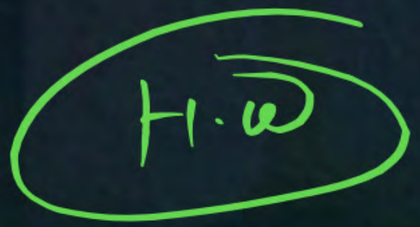
Question

A boy covers half of his journey with a uniform speed of u and the other half with a uniform speed of v. What is the average speed for the whole journey?

HW

Question

A car traveling at 60km/h, stops on applying brakes in 10 seconds. What is its acceleration?



Question

Find the initial velocity of a car which is stopped in 10 seconds by applying brakes. Retardation due to brakes is 2.5 ms^{-2}.

H.W


Thank You