8. Describing motion

Exercises

1 A. Question

Uniform circular motion is called continuously accelerated motion because,

A. direction of motion changes continuously

B. speed changes

D. velocity remains the same

D. direction of motion does not change

Answer

In uniform circular motion, the speed is constant. The direction of motion of a body in uniform circular motion is given by a tangent drawn at the point where the body is. As the direction of motion changes at every instant, the velocity changes continuously. The continuous change in velocity makes it a continuously accelerated motion.

1 B. Question

A cricketer hits a sixer. The cricket ball moves up with a velocity of 2 ms^{-1} and falls down. Its initial velocity while falling down will be

A. 1 ms^{-1}

B. 1 ms^{-2}

C. 0 ms^{-1}

D. 2 ms^{-1}

Answer

The ball will stop at its maximum height where final velocity will be 0 ms^{-1} . Then the ball will start falling towards the ground. The initial velocity of fall will be the final velocity of ball when reached maximum height. Thus, initial velocity is 0 ms^{-1} .

2 A. Question

Fill in the blanks with suitable words

S I Unit of acceleration is _____ .

Answer

S I Unit of acceleration is ms^{-2} .

2 B. Question

Fill in the blanks with suitable words

Velocity has both speed and _____ .

Answer

Velocity has both speed and direction.**Explanation:** Velocity is a vector quantity. It has both magnitude and the direction of motion.

2 C. Question

Fill in the blanks with suitable words

If an object starts from 'A' and comes back to 'A', its displacement will be _____ .

Answer

If an object starts from 'A' and comes back to 'A', its displacement will be zero.**Explanation:** The displacement of an object is the shortest distance between its initial and final position. If the initial position is same as final position, the displacement is zero.

3 A. Question

Solve

An object is moving in a circular path of radius 3.5m. If it completes one full cycle, what will be the displacement and what is the distance travelled?

Answer

Given, radius(r) = 3.5 mOn completing one full cycle, the initial and final position of the object will be same.

$$\text{Distance} = \text{Circumference} = 2\pi r = 2 \times \frac{22}{7} \times 3.5 = 22\ \text{m}$$

Displacement = 0 as initial and final position are same.

3 B. Question

Solve

An object changes its velocity from 30 ms^{-1} to 40 ms^{-1} in a time interval of 2s. What is its acceleration?

Answer

Given,initial velocity(u) = 30 ms^{-1}final velocity(v) = 40 ms^{-1}time(t) = 2 sThus,

$$\text{acceleration(a)} = \frac{v-u}{t} = \frac{40-30}{2} = 5\ ms^{-2}$$

3 C. Question

Solve

An object at rest starts moving. It covers a distance of 2m in one second. It covers a further distance of 5 m in two seconds in the same direction. What is its average velocity and acceleration?

Answer

Given,The object is at rest, so initial velocity is zero.⇒u = 0In one second, distance travelled = 2 mIn next two seconds, distance travelled = 5 mTotal time taken(t) = 1 + 2 = 3 sTotal distance travelled(s) = 2 + 5 = 7 mAs the direction of motion is not changed, so distance = displacement.Total Displacement = 7 m

$$\text{Average velocity} = \frac{\text{Net displacement}}{\text{Total time}} = \frac{7}{3} = 2.33\ ms^{-1}$$

$$\text{Average acceleration} = \frac{\text{Average velocity}}{\text{Total time}} = \frac{2.33}{3} = 0.78\ ms^{-2}$$

4 A. Question

Answer the following

If a body is moving with uniform velocity in a given direction its acceleration will be zero. Why?

Answer

The acceleration of a body is the rate of change of velocity. If the velocity is not changed with time, then the acceleration is constant and is equal to zero. So, for a body moving with uniform velocity, the acceleration is zero.

4 B. Question

Answer the following

Distinguish between speed and velocity.

Answer

speed	velocity
It is the distance travelled by a body per unit time.	It is the displacement of a body per unit time.
Its SI unit is ms^{-1} .	Its SI unit is ms^{-1}
It has only magnitude but no direction.	It has both magnitude and direction.

4 C. Question

Answer the following

Distinguish between distance travelled and displacement.

Answer

Distance travelled is the length of the actual path travelled by a body.Displacement is the shortest distance between the initial and final position of the body.

4 D. Question

Answer the following

What are uniform and non-uniform speed?

Answer

If a body does not changes its speed with respect to time, it is said to be moving with uniform speed.If a body changes its speed with respect to time, it is said to be moving with non-uniform speed.

4 E. Question

Answer the following

While mentioning acceleration the time is mentioned two times. Why?

Answer

The acceleration is the rate of change of velocity with time and the velocity is the rate of change of displacement with time. As both the terms are time dependent, thus with acceleration, time is mentioned twice.

5. Question

Extended activity

Represent the following motion by a graph.

Velocity ms^{-1})	40	30	20	10
Time (s)	1	2	3	4

1. Find the acceleration

2. Find the time taken when the velocity is 35 ms^{-1}.

Answer

1. $a = \frac{v-u}{t} = \frac{30-40}{1} = -10\ ms^{-2}$

2. At v = 35 ms^{-1} a = -1 ms^{-2} $t = \frac{v-u}{a} = \frac{35-40}{-10} = 0.5\ s$