

• EXERCISES •

A. Objective Questions

1. Pick the correct option.

- A particle is travelling with a constant speed. This means
  - its position remains constant as time passes
  - it covers equal distances in equal time intervals
  - its acceleration is zero
  - it does not change its direction of motion
- A particle moves with a uniform velocity.
  - The particle must be at rest.
  - The particle moves along a curved path.
  - The particle moves along a circle.
  - The particle moves along a straight line.
- If a particle covers equal distances in equal time intervals, it is said to
  - be at rest
  - move with a uniform speed
  - move with a uniform velocity
  - move with a uniform acceleration
- A quantity has a value of  $-6.0 \text{ m/s}$ . It may be the
  - speed of a particle
  - velocity of a particle
  - acceleration of a particle
  - position of a particle
- The area under a graph between two quantities is given in the unit  $\text{m/s}$ . The quantities are
  - speed and time
  - distance and time
  - acceleration and time
  - velocity and time
- The area under a speed–time graph is represented by the unit
  - $\text{m}$
  - $\text{m}^2$
  - $\text{m}^3$
  - $\text{m}^{-1}$
- The velocity–time graph of a particle is not a straight line. Its acceleration is
  - zero
  - constant
  - negative
  - variable
- If a particle moves with a constant speed, the distance–time graph is a
  - straight line
  - circle
  - stairlike line
  - polygon
- The distance–time graph of an object moving in a fixed direction is shown in Figure 2.E1.

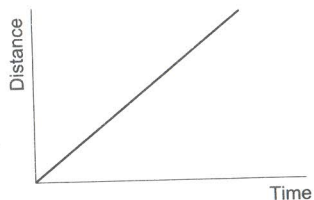


Fig. 2.E1

The object

- is at rest
  - moves with a constant velocity
  - moves with a variable velocity
  - moves with a constant acceleration
10. The distance–time graph of an object is shown in Figure 2.E2.

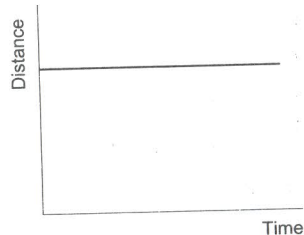


Fig. 2.E2

The object

- is at rest
  - moves with a constant speed
  - moves with a constant velocity
  - moves with a constant acceleration
11. The speed–time graph of an object moving in a fixed direction is shown in Figure 2.E3.

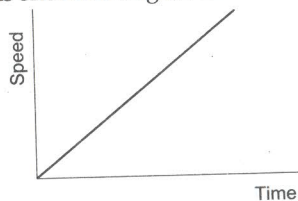


Fig. 2.E3

The object

- is at rest
- moves with a constant speed
- moves with a constant velocity
- moves with a constant acceleration

12. The speed–time graph of an object moving in a fixed direction is shown in Figure 2.E4.

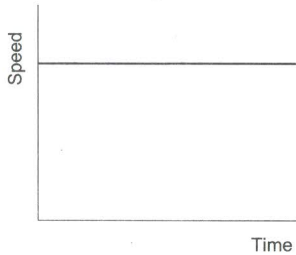


Fig. 2.E4

The object

- (a) is at rest
  - (b) moves with fluctuating speed
  - (c) moves with a constant speed
  - (d) moves with a nonzero acceleration
13. In circular motion the
- (a) direction of motion is fixed
  - (b) direction of motion changes continuously
  - (c) acceleration is zero
  - (d) velocity is constant

**II. Mark the statements true (T) or false (F).**

1. If A moves with respect to B then B moves with respect to A.
2. Scalar quantities can be added according to the rules of arithmetic.
3. The magnitude of the displacement of a particle can be greater than the distance traversed.
4. The magnitude of the displacement of a particle can be equal to the distance traversed.
5. Vector quantities can be added according to the rules of arithmetic.
6. The displacement of a particle in a 10-minute interval is zero. Its velocity at every instant in this interval must be zero.
7. A particle is known to be at rest at time  $t = 0$ . Its acceleration at  $t = 0$  must be zero.
8. For a particle moving with a constant velocity, the distance–time graph is a straight line.
9. For a particle moving with a constant acceleration along a straight line, the velocity–time graph is a straight line.

**III. Fill in the blanks.**

1. A vector quantity has magnitude as well as .....
2. Distance is a ..... quantity as it has no direction.
3. Displacement is a ..... quantity.
4.  $\text{km/h}^2$  is a unit of .....
5. The slope of a distance–time graph gives .....
6. The speed–time graph for a particle moving at a constant speed is a straight line ..... to the time-axis.

7. When an object moves in a fixed direction with a uniform acceleration, the speed–time graph is a .....
8. The area under the speed–time graph gives the .....
9. The area under the velocity–time graph gives the .....

**B. Very-Short-Answer Questions**

Answer the following in one word or maximum one sentence.

1. You are walking towards India Gate. Is India Gate at rest with respect to you or is it moving with respect to you?
2. Which of the following are scalar quantities?
  - (a) Mass
  - (b) Displacement
  - (c) Speed
  - (d) Velocity
3. Here are certain positions of a particle which can move in a horizontal plane. Two of them denote identical positions. Identify these positions.
  - (a) 5 m,  $30^\circ$  north of east
  - (b) 5 m,  $30^\circ$  east of north
  - (c) 5 m,  $60^\circ$  south of west
  - (d) 5 m,  $60^\circ$  east of north
4. What is the displacement of a satellite when it makes a complete round along its circular path?
5. A scooter moves 45 km on one litre of petrol. In a journey, the scooter used up one litre of petrol. Is it necessary that the displacement of the scooter in the journey is 45 km? Is it possible that the displacement is 45 km?
6. Can the distance travelled by an object be smaller than the magnitude of its displacement?
7. In what condition is the distance covered equal to the magnitude of the displacement of a particle?
8. A particle is moving with a uniform speed. Is it necessary that it is moving along a straight line?
9. A particle is moving with a uniform velocity. Is it necessary that it is moving along a straight line?
10. Which of the quantities—speed, velocity and acceleration—have the same SI unit?
11. Consider three quantities—time, velocity and acceleration. The product of the units of two of these quantities gives the unit of the third. Which is the third quantity?
12. Can the equation  $v = u + at$  be used for a particle moving with nonuniform acceleration?
13. A particle is moving with a uniform velocity. What is its acceleration?
14. Figure 2.E5 shows speed–time graphs for four cases. In which case is the speed constant? In which case is the speed decreasing? In which case is the speed increasing? What happens in the fourth case?

