8

Motion

In the Chapter

- Motion is a change of position; it can be described as the distance moved or the displacement.
- The motion of an object could be uniform or non-uniform depending on whether its velocity is constant or changing.
- The speed of an object is the distance covered per unit time, and velocity is the displacement per unit time.
- The acceleration of an object is the change in velocity per unit time.
- Uniform and non-uniform motions of objects can be shown through graphs.
- The motion of an object moving at uniform acceleration can be calculated with the help of three equations, namely
  $v = u + at$
  $s = ut + \frac{1}{2}at2$
  $2as = v2 - u2$
  where u is initial velocity of the object, which moves with uniform acceleration a for time t, v is its final velocity and s is the distance it travelled in time t.
- If an object moves in a circular path with uniform speed, its motion is called uniform circular motion.

Intext Exercises

Page No. 100

1. An object has moved through a distance. Can it have zero displacement? If yes, support your answer with an example.

Ans. Yes. The displacement of the object can be zero. Let a body completes one round of a circular track in 5 minutes. The distance travelled by the boy = circumference of the circular track. However, displacement of the boy is zero because his initial and final positions are same.

2. A farmer moves along the boundary of a square field of side 10 min. 40 s. What will be the magnitude of displacement of the farmer at the end of 2 minutes 20 seconds?

Ans. Side of square = 10 m
Perimeter of square = 4 × 10 m = 40 m
In 40 s the farmer cover 40 m

In 1 s the farmer will cover = 40/40 = 1 m
In 80 s (2 min 20 s) the farmer will cover = 1 × 80 = 80 m
Thus the farmer will come back to the starting point in 80 s after taking two rounds. Hence, displacement is zero.

3. Which of the following is true for displacement?
(a) It cannot be zero.
(b) Its magnitude is greater than the distance travelled by the object.

Ans. None of the statement (a) or (b) is true for displacement.

Page No. 102

1. Distinguish between speed and velocity.

Ans. Speed and velocity differ from each other as follows :

Speed
1. The distance travelled by a moving body per unit time is called the speed.
2. Speed in a scalar quantity.

Velocity
1. The distance travelled by a moving body in a particular direction per unit time is called the velocity.
2. Velocity is a vector quantity.

2. Under what conditions is the magnitude of average velocity of an object equal to average speed?

Ans. The magnitude of average velocity is equal to the average speed when the object moves in the same direction along a straight line.

3. What does the odometer of an automobile measure?

Ans. The odometer of an automobile measure the distance covered by the automobile.

4. What does the path of an object look like when it is in uniform motion?

Ans. When an object is in uniform motion it moves along a straight line.

5. During an experiment, a signal from a spaceship reached the ground station in five minutes. What was the distance of the spaceship from the ground station ? The signal travel at speed of light that is $3 \times 108\ ms^{-1}$.

Ans. Time = 5 min = 300s
Speed = $3 \times 108\ ms^{-1}$
Distance = Speed × Time
= 3 × 108 × 300
= 9 × 1010 m

Page No. 103

1. When will you say a body is in (i) uniform acceleration (ii) non-uniform acceleration?

Ans. (i) When a body travels in a straight line, and its velocity increases by equal amount in equal intervals of time, it is said to have a uniform acceleration.
Examples : (a) A body falling freely under gravity has uniform acceleration.
(b) A ball moving down an inclined plane has uniform acceleration.
(ii) When the velocity of a body increases by unequal amounts in equal intervals of time, it is said to have a non-uniform acceleration.
Example : An auto/car driven on a crowded city road with frequent application of brakes has a non-uniform acceleration.

2. A bus decreases its speed from 80 km/h^{-1} to 60 km/h^{-1} in 5s. Find the acceleration

of the bus.

Ans. Initial velocity

$u = 800\ \text{km/h}$

$= \frac{80000}{3600} = 22.22\ \text{ms}^{-1}$

Final velocity,

$v = 60\ \text{km/h}$

$v = \frac{60000}{3600} = 16.66\ \text{ms-1}$

Time, $t = 5\ \text{s}$

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

$= \frac{(16.66 - 22.22)\ \text{ms}^{-1}}{5\ \text{s}}$

$= -1.11\ \text{ms}^{-2}$

3. A train starting from a railway station and moving with uniform acceleration attains a speed 40 km/h^{-1} in 10 minutes. Find its acceleration.

Ans.

Initial Velocity, $u = 0$

Final velocity, $v = 40\ \text{km/h}$

$v = \frac{40000}{3600}$

$= 11.11\ \text{ms}^{-1}$

Time, $t = 10\ \text{min} = 600\ \text{s}$

Acceleration, $\alpha = \frac{v-u}{t}$

$= \alpha = \frac{(11.11 - 0)\ \text{ms}^{-1}}{600\text{s}}$

$= 0.018\ \text{ms}^{-2}$

Page No. 107

1. What is the nature of the distance time graph for uniform and non-uniform motion of an object?

Ans. For uniform motion, distance time graph is a straight line and for non-uniform motion, distance time graph is a parabola.

2. What do you say about the motion of an object whose distance time graph is a straight line parallel to the time axis?

Ans. This indicates that the body is at rest.

3. What can you say about the motion of an object if its speed time graph is a straight line parallel to the time axis?

Ans. This indicates that the body is moving at a constant speed with zero acceleration.

4. What is the quantity which is measured by the area occupied below the velocity time graph?

Ans. Distance is measured by the area occupied below velocity time graph.

Page No. 109

1. A bus starting from rest moves with a uniform acceleration of 0.1 ms $^{-2}$ for 2 minutes. Find :

(a) the speed acquired
(b) the distance travelled

Ans. (i) $u = 0$
$\alpha = 0.1\ ms^{-2}$
$t = 2\ min = 120s$
By first equation of motion,
$v = u + at$
$v = 0 + 0.1 \times 120$
$v = 12\ ms^{-1}$
(ii) By second equation of motion,
$s = ut + \frac{1}{2}at^2$
$s = 0 \times 120 + \frac{1}{2} \times 0.1 \times (120)^2$
$s = 0 + 0.1 \times 60 \times 120$
$s = 720\ m$

2. A train is travelling at a speed of 90km/h^{-1}. Brakes are applied so as to produce a uniform acceleration of –0.5 ms^{-2}. Find how far the train will go before it is brought to rest.

Ans. $u = 90\ km/h$

$$u = \frac{90000}{3600} = 25\ m/s$$

$\alpha = -0.5\ ms{-}2$
$v = 0$
By third equation of motion,
$2as = v^2 - u^2$
$= 2 \times (-0.5) \times s = (0)^2 - (25)^2$
$= -1\ s = -625$
$= s = 625\ m$

3. A trolley, while going down an inclined plane has an acceleration of 2 cm s^{-2}. What will be its velocity 3 s after the start?

Ans. $u = 0$
$\alpha = 2\ cm/s^{-2}$
$t = 3\ s$
By first equation of motion,
$v = u + at$
$= v = 0 + 2 \times 3$
$= v = 6\ cm/s$

4. A racing car has a uniform acceleration of 4ms^{-2}. What distance will it cover in 10 s after start?

Ans $u = 0$
$\alpha = 4\ cm/s^{-2}$
$t = 10\ s$
By second equation of motion,
$s = ut + \frac{1}{2}at^2$
$s = 0 \times 10 + \frac{1}{2} \times 4 \times (10)^2$
$s = 200\ m$

5. A stone is thrown in a vertically upward direction with a velocity of 5 ms^{-1}. If the acceleration of the stone during its motion is 10 ms^{-2} in the downward direction,

what will be the height attained by the stone and how much time will it take to reach there.

Ans. $u = 5\ ms^{-1}$

$\alpha = -10\ ms^{-2}$

$v = 0$

By third equation of motion,

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

$2 \times (-10) \times s = (0)^2 - (5)^2$

$= -20\ s = -25$

$= s = \frac{25}{20} = 1.25\ m$

By first equation of motion,

$v = u + at$

$t = \frac{v-u}{\alpha} = \frac{(0-5)ms^{-1}}{-10\ ms^{-2}} = \frac{1}{2}\ s$

$t = 0.5\ s$

Exercise

1. An athlete completes one round of a circular track of diameter 200 min 40 s. What will be the distance and displacement at the end of 2 minutes 20 s?

Ans (i) Distance covered in 40 s

$= 2 \times \pi \times 100$

$(r - \frac{d}{2} = \frac{200m}{2} = 100m)$

Distance covered in 1 s

$= \frac{200\pi}{40}$

Distance covered in 2 min 20 is or 140 s

$= \frac{200\pi}{40} \times 140$

$= 5\pi \times 140$

$= 700\pi$

$= 700 \times 3.14$

$= 2198\ m$

(ii) Displacement in 2 min 20 s = 0 m ($\therefore$ initial and final position is the same)

2. Joseph jogs from one end A to the other end B of a straight 300 m road in 2 minutes 50 seconds and then turns around and jogs 100 m back to point C in another 1 minute. What are Joseph's average speeds and velocities in jogging (a) from A to B and (b) from A to C?

Ans. (a) From A to B

Distance = 300 m

Time = 2 min 50 s = 170 s

$$\text{Average speed} = \frac{\text{Total distance}}{\text{Total time}}$$

$$= \frac{300\,\text{m}}{170\,\text{s}} = 1.76\,\text{m s}^{-1}$$

$$\text{Average velocity} = \frac{\text{Displacement}}{\text{Total Time}}$$

$$= \frac{300\,\text{m}}{170\,\text{s}} = 1.76\,\text{m s}^{-1}$$

(b) From A to C

Distance = (300 + 100) m = 400 m

Time = (170+60) s = 230 s

$$\text{Average speed} = \frac{\text{Total distance}}{\text{Total time}}$$

$$= \frac{400\text{m}}{230\text{s}} = 1.73\text{ms}^{-1}$$

$$\text{Average velocity} = \frac{\text{Displacement}}{\text{Total Time}}$$

$$= \frac{200\text{m}}{230\text{s}}$$

$= 0.86\ \text{ms}^{-1}$

3. Abdul while driving to school computes the average speed for his trip to be 20 km h^{-1}. On his return trip along the same route there is less traffic and the average speed is 40 km h^{-1}. What is the average speed for Abdul's trip?

Ans. Let the distance between starting point and school be x km

Average speed from the starting point to school

$= 200\ \text{km h}^{-1}$

$$\text{Time for onward journey} = \frac{x}{20}\,\text{h}$$

Average speed from the school to the starting point

$= 400\ \text{km h}^{-1}$

$$\text{Time for return journey} = \frac{x}{40}\,\text{h}$$

Average speed for total trip

$$= \frac{\text{Total distance}}{\text{Total Time}}$$

$$= \frac{2x}{\frac{x}{20} + \frac{x}{40}}$$

$$= \frac{2x}{\frac{21x}{40}}$$

$$= 2x \times \frac{40}{21x} = \frac{80}{21} = 3.8\text{km/h}$$

4. A motorboat starting from rest on a lake accelerates in a straight line at a constant rate of 3.0 ms^{-2} for 8.0s. How far does the boat travel during this time?

Ans. $u = 0$

$\alpha = 3 ms^{-2}$

$t = 8 s$

According to second equation of motion,

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

$$s = 0 \times 8 + \frac{1}{2} \times 3 \times (8)^2$$

$$s = 96 m$$

5. A driver of a car travelling at 52 km h^{-1} applies the brakes and accelerates uniformly in the opposite direction. The car stops in 5s. Another driver going at 3 km h^{-1} in another car applies his brakes slowly and stops in 10s. On the same graph paper, plot the speed versus time graph for two cars. Which of the two cars travelled farther after the brakes were applied?

Ans.

$$52 km h^{-1} = \frac{52 \times 1000}{3600} = 14.4 m s^{-1}$$

$$3 km h^{-1} = \frac{3 \times 1000}{3600} = 0.83 m s^{-1}$$

At 52 km h^{-1} the car stops in 5s.

At 3 km h^{-1} the car stops in 10s.

Distance travelled by first car

= Area of triangle OAB

$$= \frac{1}{2} \times OB \times OA$$

$$= \frac{1}{2} \times 5 \times 14.4$$

$$= 36 m$$

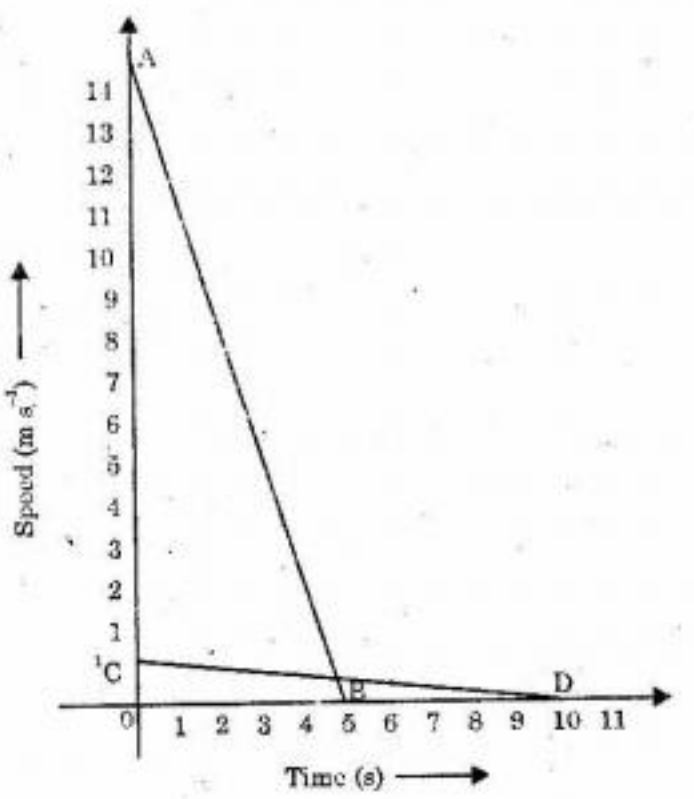
Distance travelled by second car

= Area of triangle OCD

$$= \frac{1}{2} \times Od \times OC$$

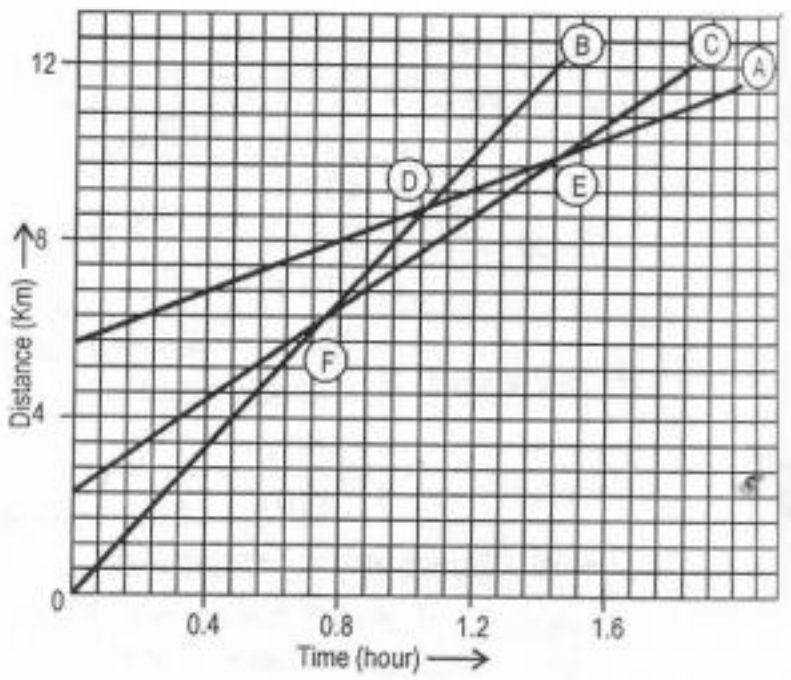
$$= \frac{1}{2} \times 10 \times 0.8$$

$$= 4 m$$



Thus, the first car travelled farther after the brakes were applied.

6. The following figure shown the distance-time graph of three object A,B and C. Study the graph and answer the following questions.



(a) Which of three is travelling the fastest?
(b) Are all three ever at the same point on the road?
(c) How far has C travelled when B passes A?
(d) How far has B travelled by the time it passes C?

Ans. (a) The slope of a distance time graph gives its speed. The object having the maximum slope will travel the fastest. If we find the slope of A, B and C we will find that B has the greatest slope. Hence, B is travelling fastest.
(b) If the three persons are at the same place at a particular time, the three straight lines should intersect, at the same point. As there is no such point where the three straight lines intersect, the three persons are never at the same place at the same time.
(c) The graph of A and B intersect at D. (at 1.12 hours.) At this time C is at a distance of 8 km.
(d) The graph of B and C intersect at F. This is at a distance of 5 km.

7. A ball is gently dropped from a height of 20m. If its velocity increases uniformly at the rate of 10m s–2, with what velocity will it strike the ground? After what time will it strike the ground?

Ans. $s = 20\,\text{m}$
$u = 0$
$\alpha = 10\,\text{m s}^{-2}$ (since velocity increases at a uniform rate)
By second equation of motion,

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

$$20 = 0 + \frac{1}{2} \times 10 \times t^2$$

$\Rightarrow \quad 20 = 5t2$

$$\Rightarrow \quad \frac{20}{5} = t^2$$

or $\quad t = \sqrt{4} = 2\text{s}$

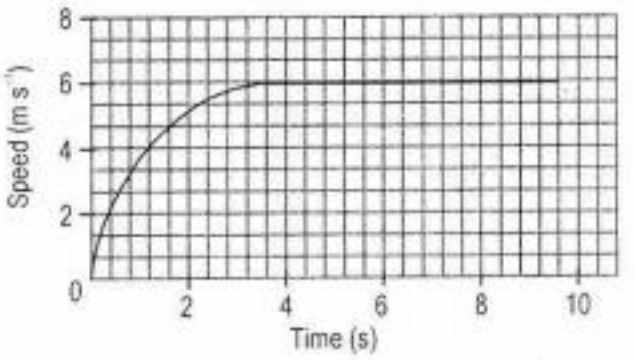
By first equation of motion,

$$v = u + at$$

$\Rightarrow \quad v = 0 + 10 \times 2$

$\Rightarrow \quad v = 20\,\text{ms}^{-1}$

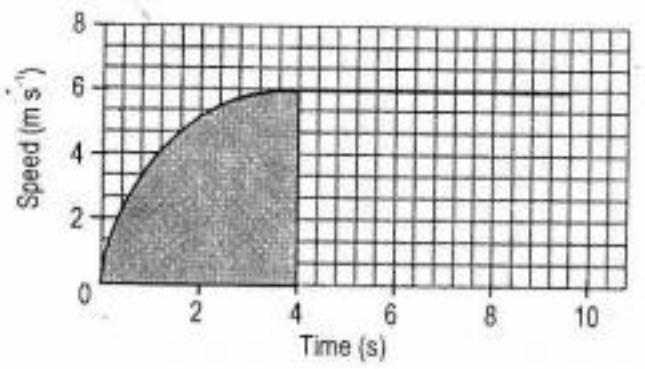
8. The speed time graph for a car is shown in the following figure :



(a) Find how far does the car travel in the first 4 seconds. Shade the area on the graph the represents the distance travelled by the car during the period.

(b) Which part of the graph represents uniform motion of the car?

Ans.



(a) In the first 4 seconds,

Speed $= 6\ ms^{-1}$

Distance = Speed × time

$= 6\ m\ s^{-1} \times 4s$

$= 24\ m$

The shaded portion of the graph represents the distance travelled by the car during the first 4 seconds.

(b) The straight part (OA) of the graph represents uniform motion of the car.

9. State which of the following situations are possible and give an example of each of these :

(a) a body with a constant acceleration but with zero velocity.

(b) a body moving in a certain direction with an acceleration in vertical direction.

Ans. (a) This situation is possible when the body is at rest. (The constant acceleration is zero)

(b) This situation is possible. Example – Motion of a ball thrown horizontally from a height.

10. An artifical satellite is moving in a circular orbit of radius 42250 km. Calculate its speed if it takes 24 hours to revolve around the earth.

Ans. Radius (r) = 42250 km

Time (t) = 24 hours.

$$v = \frac{2\pi r}{t}$$

$$v = 2 \times \frac{22}{7} \times \frac{42250}{24}$$

$$v = 11065.47\ km/h$$

Additional Questions

1. The displacement of a moving object in a given interval of time is zero. Would the distance travelled by the object also be zero? Justify your answer.

Ans. No, displacement becomes zero as the body returns to the initial point, but by covering non-zero distance.

2. What is the relation between distance and time when body is moving with uniform velocity?

Ans. The distance covered by the body is directly proportional to time.

3. Why does a body moving in a circular path have an accelerated motion?

Ans. There is a continuous change in velocity w.r.t. time because of change in direction, hence a body moving in a circular path have an accelerated motion.

4. A car is moving towards east with a velocity of 10 ms-1. It turns towards north east at the same speed. Will the velocity of the car change?

Ans. Yes, velocity is the speed in a specified direction. As the direction changes, so, velocity changes.

5. Define displacement. Give its S.I. unit.

Ans. The shortest distance from the initial to the final position of a body is known as its displacement. The S.I. unit of displacement is meter (m).

6. A cyclist is riding a circular path of radius 5 m with a speed of 10m/sec. What is the change in the velocity in a semicircle?

Ans. Change in the velocity in a semicircle = $2v = 2 \times 10 = 20$ m/s.

7. What can you say about the motion of an object whose distance-time graph is a straight line parallel to the time axis?

Ans. The object is stationary.

8. What can you say about the motion of an object if its speed-time graph is a straight line parallel to the time axis?

Ans. The object has uniform motion.

9. Does the second hand of a watch represent uniform motion or accelerated motion?

Ans. The second hand of a watch represents accelerated motion.

10. Can the speed of a body be negative?

Ans. No, because the speed of a body is the ratio of distance and time and distance trave]]ed is never negative.

11. If the displacement-time graph for a particle is parallel to time axis, what is the velocity of the particle?

Ans. Zero.

12. Give an example of a body which covers a certain distance, but its displacement is zero.

Ans. Earth has a zero displacement about its own axis after 24 hours, whereas it covers a vary large distance.

13. The velocity of a body increases by 10 m/s in every one second. What physical quantity does the body represent and what is its magnitude?

Ans. The physical quantity is acceleration. Its magnitude is 10 ms^{-2}.

14. A train running at 20 ms^{-1} slows down at a rate of 1 ms^{-1} in every one second, till the train stops. Is the train acted upon by negative or positive acceleration and state its magnitude?

Ans. The train is acted upon by negative acceleration and its magnitude is $^{-1}$ ms^{-2}.

15. Give an example of a motion in which distance is covered and there is no displacement.

Ans. Complete circular motion or when a body returns to the same point of origin.

16. When x-t graph is parallel to time axis, what can you say about the motion?

Ans. The body remains at rest.

17. What is the significance of x-t graph?

Ans. Slope of x-t graph gives velocity of motion.

18. A cricket ball is projected vertically upwards. What kind of acceleration is acting on the ball?

Ans. The negative acceleration acts on the cricket ball.

19. How can you calculate acceleration from the velocity-time graph ?

Ans. The acceleration is calculated by finding the slope of velocity-time graph.

20. What does the slope of a displacement time graph represent? Can displacement time sketch be parallel to the displacement axis? Give reason to your answer.

Ans. The slope of a displacement time graph gives the velocity. The displacement time graph can never be a straight line, parallel to the displacement axis because it would mean that the distance covered by the body in a certain direction is increasing without any increase in time i.e., the velocity of the body is infinite which is impossible.

21. What is the relation between distance and time?

(i) When body is moving with variable velocity.

(ii) When body is moving with uniform velocity.

Ans. (i) When the body is moving with variable velocity, the distance travelled by the body is not proportional to time.

(ii) When body is moving with uniform velocity, the distance travelled by body is proportional to time.

22. Why is speed considered an incomplete physical quantity? Name a quantity akin to speed which describes the motion of a particle more accurately.

Ans. Speed is a scalar quantity. It has magnitude, but no direction hence it is considered an incomplete physical quantity.

The physical quantity akin to speed which describes the motion of a particle more accurately is velocity.

23. What is meant by uniform circular motion? Out of speed and direction which quantity changes in uniform circular motion? Is uniform circular motion an accelerated motion? Justify.

Ans. When a body moves along a circular path with a constant (uniform) speed, its motion is called uniform circular motion.

Direction changes in uniform circular motion.

When a body moves in a circular path its direction of motion changes continuously. So, even when the body moves at a constant speed, its velocity is not constant. Thus, the velocity of a body moving in a circular path at a constant speed changes continuously. The change in velocity gives rise to an acceleration in the moving body. Therefore circular motion is an accelerated motion even when the speed remains constant.

24. What is meant by the term 'distance'?

Ans. The actual length of the path covered by the body irrespective of the direction is called the distance. Distance is a scalar quantity.

25. When do we say that the position of a body has changed?

Ans. If the distance, or direction, or both, of a body relative to a reference point changes, then we say that the position of the body has changed.

26. Define the following:
(i) Translatory motion
(ii) Complex motion

Ans. (i) When a body moves along a straight line, its motion is called rectilinear or translatory motion. For example, a car moving on a straight road.
(ii) When a body has two or more types of motions, it is said to possess complex motion. For example, a ball rolling down an inclined plane has both rectilinear as well as circular motion.

27. What is motion? Give some examples of directly perceivable motion in daily life.

Ans. (i) A body is said to be in motion if it changes its position in relation to a refence point (origin).
(ii) Some examples of directly perceivable motion in daily life are:
(a) Cars moving on the roads.
(b) Bird and animals moving from one place to another.
(c) Blades of a moving fan.
(d) Aeroplanes flying in the sky.
(e) Fish swimming in water.

28. Name the two types of physical quantities.

Ans. Scalar quantity and vector quantity.

29. Define a scalar quantity.

Ans. A physical quantity which has only magnitude is called a scalar quantity.

30. Give two examples of a vector quantity.

Ans. Displacement and velocity.

31. When do we say that the position of a body has changed?

Ans. If the distance, or direction, or both, of a body relative to a reference point changes then we say that the position of the body has changed.

32. What do graphs provide?

Ans. The graphs provide a convenient method to present pictorially the basic information about a variety of events such as motion.

33. Name the different types of graphs

Ans. Bar graphs, straight line graphs, histograms, etc.

34. Which type of graph is used to describe motion?

Ans. Line graphs are used to describe the motion of an object.

35. A satellite revolves round the earth with uniform speed. Is this motion accelerated? If so, in which direction does the acceleration act?

Ans. The velocity of the satellite revolving round the earth changes due to change in its direction of motion.
So, the motion of the satellite is an accelerated one.
The acceleration is directed towards the centre of the earth.

36. Why do cars need petrol if uniform motion requires no resultant force?

Ans. A moving object always experiences a drag, an unbalanced force that slows it down. Thus it needs a force provided by the engine to counteract this force. The engine doesn't work without petrol (or any other fuel). Hence a car needs petrol even if it is in a uniform motion.

37. How do speed and velocity affect cooking in a rotating restaurant?

Ans. In a rotating restaurant, the kitchen is generally located at the non rotating centre. If you had a kitchen on a rotating platform, the centrigugal forces would cause a certain amount of spillage and make it harder to control the ingredients.

Multiple Choice Questions

1. A particle is moving in a circular path of radius r. The displacement after half a circle would be :

(a) Zero (b) πr

(c) 2r (d) $2\pi r$

Ans. (c)

2. The numerical ratio of displacement to distance for a moving object is:

(a) always less than 1

(b) always equal to 1

(c) always more than 1

(d) equal or less than 1

Ans. (d)

3. 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

Ans. (b)

4. Suppose a boy is enjoying a ride on a merry-go-round which is moving with a constant speed of $10ms^{-1}$. It implies that the boy is :

(a) at rest

(b) moving with no acceleration

(c) in accelerated motion

(d) moving with uniform velocity

Ans. (c)

5. In which of the following cases of motions, the distance moved and the magnitude of displacement are equal?

(a) If the car is moving on straight road.

(b) If the car is moving in circular path.

(c) The pendulum is moving to and fro.

(d) The earth is revolving around the sun.

Ans. (a)

6. Slope of a velocity-time graph gives :

(a) the distance

(b) the displacement

(c) the acceleration

(d) the speed

Ans. (c)

7. A student plots a graph between the distance parallel by a car and the time taken by it. He measures the slope of distance-time graph. The slope is equal to the

(a) velocity of the car

(b) speed of the car

(c) average velocity of the car

(d) acceleration of the car

Ans. (b) speed of the car

8. A student watches a speedometer of bus in which he is travelling. He says that the speed of the bus is 40 km/hr. This is the
(a) average speed of the bus
(b) instantaneous speed of the bus
(c) velocity of the bus
(d) average velocity of the bus
Ans. (b) instantaneous speed of the bus

9. A device used to measure the distance travelled by a vehicle is
(a) speedometer (b) sonometer
(c) galvanometer (d) odometer
Ans.(d) odometer

10. An object has uniform motion if it covers
(a) equal distance in unequal intervals of time.
(b) equal displacements in equal intervals of time.
(c) equal distances in unequal intervals of time.
(d) unequal distances in equal intervals of time.
Ans. (c) equal distances in equal intervals of time.

11. "Acceleration" of an object is equal to
(a) speed/time
(b) velocity/time
(c) change in velocity/time
(d) change in speed/time
Ans. (c) change in velocity/time

12. If displacement of an object is zero, then the distance travelled by the object is
(a) zero (b) infinite
(c) negative (d) may not be zero
Ans. (d) may not be zero

13. An object is stationary if distance-time graph is
(a) parallel to distance-axis
(b) parallel to time-axis
(c) a straight line having constant slope
(d) a straight line having variable slope
Ans. (b) parallel to time-axis

14. The speed of one object increases if slope of distance-time graph
(a) a constant (b) increases
(c) decreases (d) zero
Ans. (b) increases

15. An athlete completes a circular pack of diameter 70 meter in 20 s. Distance travelled by the athlete is
(a) 70 m (b) 140 m
(c) 200 m (d) 220 m
Ans. (d) 220 m

16. Uniform circular motion of one object is
(a) non-accelerated motion
(b) accelerated motion
(c) uniform motion
(d) none of these
Ans. (b) accelerated motion.