

## Chapter: 8 Motions Solved Test Paper -02

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

Ans: Straight line

2. Q. 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 travels at the speed of light, that is,  $3 \times 10^8 \text{ m/s}$

Ans: Time =  $5 \times 60 = 300 \text{ sec}$  ; Distance = speed  $\times$  Time =  $3 \times 10^8 \text{ m/s} \times 300 \text{ sec} = 9 \times 10^{10} \text{ m}$

3. Q. Usha swims in a 90 m long pool. She covers 180 m in one minute by swimming from one end to the other and back along the same straight path. Find the average speed and average velocity of Usha.

Ans: The average speed = Total distance covered/Total time taken =  $180/60 = 3 \text{ m/s}$

Average velocity = Displacement/ Total time taken =  $0/60 = 0 \text{ m/s}$

4. Q. What is accelerations?

Ans: The rate of the change in velocity of an object is called acceleration.

Acceleration = Change in velocity/time taken

Let the velocity of an object changes from an initial value  $u$  to the final value  $v$  in time  $t$

The acceleration =  $a = (v - u)/t \text{ m/s}^2$

+  $a$  indicates that acceleration is in the direction of velocity and  $-a$  indicates that acceleration is in opposite to the direction of velocity.

(a) Uniform Acceleration (Uniformly Accelerated Motion): If a body travels in a straight line and its velocity increases in equal amounts in equal intervals of time. Its motion is known as uniformly accelerated motion. e.g. Motion of a freely falling body is an example of uniformly accelerated motion (or motion of a body under the gravitational pull of the earth). Motion of a bicycle going down the slope of a road when the rider is not pedaling and wind resistance is negligible,

(b) None-Uniform Acceleration: If during motion of a body its velocity increases by unequal amounts in equal intervals of time, then its motion is known as non uniform accelerated motion. E.g. Car moving in a crowded street. Motion of a train leaving or entering the platform.

Positive acceleration: If the velocity of an object increases in the same direction, the object has a positive acceleration,

Negative acceleration (retardation): If the velocity of a body decreases in the same direction, the body has negative acceleration or it is said to be retarding. Eg. A train slows down.

5. Q. A bus decreases its speed from 80 km/h to 60 km/h in 5 s. Find the acceleration of the bus.

Ans: The change in velocity = 80 km/h - 60 km/h = - 20km/h =  $(-20 \times 1000) / 3600 = 5.55 \text{ m/s}$   
 The acceleration of the bus = the change in velocity/time =  $- 5.5/5 = - 1.1 \text{ m/s}^2$  [retardation]

6. A train starting from a railway station and moving with uniform acceleration attains a speed 40 km/h in 10 minutes. Find its acceleration.

Ans:  $u = 0 \text{ m/s}$  ;  $v = 40 \text{ km/h} = (40 \times 5/18) \text{ m/s} = (200/18) \text{ m/s}$  ;  
 Time = 10min =  $10 \times 60 \text{ sec} = 600 \text{ sec}$  Acceleration =  $(v-u)/t = [(200/18)-0]/600 = 0.018 \text{ m/s}^2$

7. Q. What is distance time graph? How can you plot graph of uniform and non uniform motion?

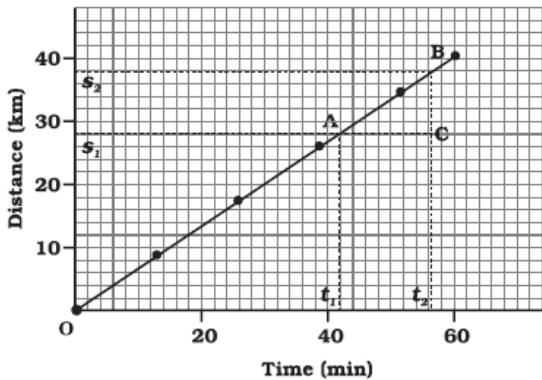
Ans: The graph represent the change in the position of an object with time using a convenient scale of own choice is called the distance-time graph. In this graph, time is taken along the x- axis and distance is taken along the y-axis.

In uniform speed the distance travelled by the object is directly proportional to time taken.  
 Thus, for uniform speed, a graph of distance travelled against time is a straight line.

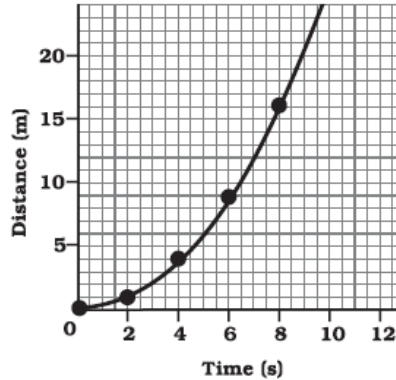
Distance travelled from A to B =  $(S_2 - S_1)$  ; Time taken to travel A to B =  $(t_2 - t_1)$

The speed,  $v$  of the object =  $\frac{(S_2 - S_1)}{(t_2 - t_1)}$

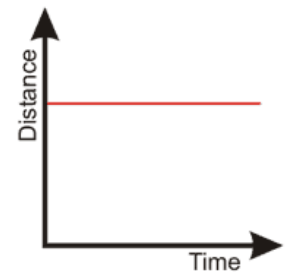
*Distance-time graph*



*an object moving with uniform speed*



*a car moving with non-uniform speed*



Object at rest

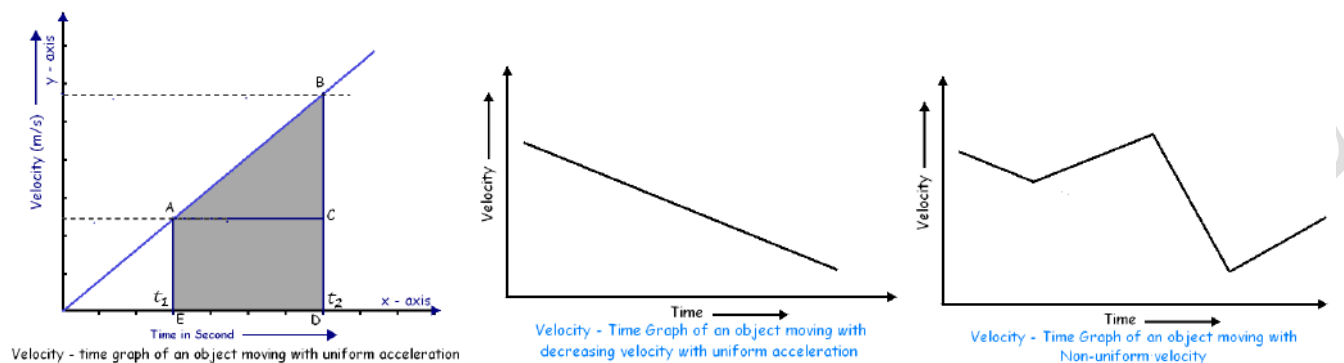
Nature of graph for object at rest: Parallel to time – axis

Nature of graph for object moving with uniform motion: Straight line

Nature of graph for object moving with Non - uniform motion: Curved line

8. Q. What is Velocity time graph? How can you plot graph of uniform and non-uniform motion?

Ans: The variation in velocity with time for an object moving in a straight line can be represented by a graph called a velocity-time graph. In this graph, time is represented along the x-axis and the velocity is represented along the y-axis. The area enclosed by velocity-time graph and the time axis will give us magnitude of the displacement.



For uniform velocity [constant acceleration]: The height of its velocity-time graph will not change with time therefore it will be a straight line parallel to the x-axis.

The nature of the graph shows that Velocity changes by equal amounts in equal intervals of equal interval of time, it is said to be in non-uniform motion.

9. Q. How can you measuring the rate of motion of an object?

Ans: The distance travelled by the object in unit time is called its speed. The SI unit of speed is m/s . Speed has only magnitude so it is called scalar quantity. Speed = Distance/Time

Uniform Speed (or Constant Speed): When an object covers equal distance in equal intervals of time, it is said to move with uniform speed. E.g. A car move 10 m is every one second so it motion is uniform.

Variable Speed (Non-Uniform Speed) : If a body covers unequal distance in equal intervals of time, its motion is said to be non-uniform. E.g. Falling of a apple from a tree, a cyclist moving on a rough road, an athlete running a race, vehicle starting from rest, the motion of freely falling body etc.

Instantaneous Speed: The speed of an object at any particular instant of time or at particular point of its path is called the instantaneous speed of the object. It is measure red by speedometer in an automobile.

Average Speed: For an object moving with variable speed or with non-uniform motion, we describe the rate of motion of such objects in terms of their average speed. Average speed is the total distance traveled by the object divided by the total time. Thus, for all uniformly accelerated motion, the velocity-time graph is a straight line making angle with time axis.

10. Q. What is the quantity which is measured by the area occupied below the velocity-time graph?

Answer: Distance