

Class IX: Physics
Chapter 1: Motion
Key Learning

1. If the position of an object does not change with time, it is said to be at rest.
2. If the position of an object changes as time passes, it is said to be in motion.
3. Reference point is a fixed point with respect of which a body is at rest or in motion.
4. Rest and Motion are relative terms.
5. Distance is the length of actual path traveled by a body in a given time.
6. Displacement is the shortest distance between the initial and final positions of the body in a known direction.
7. A physical quantity which has both magnitude and direction is called as vector quantity.
8. A physical quantity which has only magnitude is called as scalar quantity.
9. The S.I unit of distance and displacement is metre.
10. A body is said to be in uniform motion, if travels equal distances in equal intervals of time.
11. A body is said to have non-uniform motion if it travels unequal distances in equal intervals of time.
12. Speed is the ratio of distance traveled to the time taken to cover that distance.
13. In non-uniform motion, speed of an object is not constant. The S.I. unit of speed is m/s or ms^{-1} .
14. Average speed of a body is the total distance traveled divided by the total time taken.
15. Velocity is displacement per unit time. The S.I. unit of velocity is meter per second.
16. Average velocity is displacement divided by the time taken.
17. Speed is a scalar quantity and velocity is a vector quantity.

18. Time is independent variable, plotted along X-axis. Distance is dependent variable, plotted along Y-axis.
19. Graphs are designed to make it easier for the reader to interpret and understand numerical data.
20. The distance-time graph is a straight line parallel to time axis when the object is at rest.

$$\text{Slope of a straight line} = \frac{y_2 - y_1}{x_2 - x_1}$$

Slope of position-time graph is zero if the object is at rest.

21. The nature of distance-time graph is a straight line when the object is in the state of uniform motion. Slope of the distance-time graph gives the speed of the object.
23. A more steeply inclined distance-time graph indicates greater speed. The nature of distance-time graph is a curve having varying slope when the object has non-uniform motion.
24. If the velocity of a body remains constant, the velocity-time graph is a horizontal line parallel to the time axis.
25. If the velocity of the body changes uniformly at a constant rate, the velocity-time graph is a straight line.
26. If the velocity of the object changes non-uniformly, the velocity-time graph is a curve having increasing slope.
27. The area enclosed by the velocity-time graph and the time axis represents the displacement.
28. The slope of the velocity-time graph gives the acceleration.
29. When a body travels along a circular path of constant radius with a constant speed v then its motion is uniform circular motion.
30. In a uniform circular motion, velocity of a particle is not constant but its speed is constant, hence it is an accelerated motion.