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Class 9 Name of topic MOTION

An object is said to be in motion when its position changes with time.

- We describe the location of an object by specifying a reference point. Motion is relative. The total path covered by an object is said to be the distance travelled by it.
- The shortest path/distance measured from the initial to the final position of an object is known as the displacement.
- **Uniform motion:** When an object covers equal distances in equal intervals of time, it is said to be in uniform motion.
- **Non-uniform motion:** Motions where objects cover unequal distances in equal intervals of time.
- **Speed:** The distance travelled by an object in unit time is referred to as speed. Its unit is m/s.
- **Average speed:** For non-uniform motion, the average speed of an object is obtained by dividing the total distance travelled by an object by the total time taken.

$$\text{Average speed (v)} = \frac{\text{Total distance travelled(s)}}{\text{Total time taken (t)}}$$

- **Velocity:** Velocity is the speed of an object moving in definite direction. S.I. unit is m/s.

$$\text{Average velocity} = \frac{\text{initial velocity} + \text{final velocity}}{2}$$

$$\therefore V_{av} = \frac{u+v}{2} \quad \begin{array}{l} u = \text{initial velocity} \\ v = \text{final velocity} \end{array}$$

- **Acceleration:** Change in the velocity of an object per unit time.

$$\text{Acceleration } a = \frac{v-u}{t} \quad \text{S.I. unit is m/s}^2$$

- **Graphical representation of motions**

(i) Distance-time graph

For a distance-time graph time is taken on x-axis and distance is taken on y-axis.