

# Motion in Straight Line



## Terms and Definitions in Motion in a Straight Line

### 1. Motion

- The change in position of an object with respect to time.

### 2. Rest

- The state of an object when it does not change its position with respect to its surroundings over time.

### 3. Distance

- The total path length covered by an object in motion, irrespective of direction. It is a scalar quantity.

### 4. Displacement

- The shortest straight-line distance from the initial to the final position of an object, considering direction. It is a vector quantity.

### 5. Speed

- The rate at which an object covers distance. It is a scalar quantity.
- Formula:  $\text{Speed} = \frac{\text{Distance}}{\text{Time}}$

### 6. Velocity

- The rate at which an object changes its displacement. It is a vector quantity.
- Formula:  $\text{Velocity} = \frac{\text{Displacement}}{\text{Time}}$

### 7. Average Speed

- The total distance traveled divided by the total time taken.
- Formula:  $\text{Average Speed} = \frac{\text{Total Distance}}{\text{Total Time}}$

### 8. Instantaneous Speed

- The speed of an object at a particular moment in time.

### 9. Average Velocity

- The total displacement divided by the total time taken.
- Formula:  $\text{Average Velocity} = \frac{\text{Total Displacement}}{\text{Total Time}}$

## 10. Instantaneous Velocity

- The velocity of an object at a specific instant.

## 11. Acceleration

- The rate at which an object changes its velocity. It is a vector quantity.
- Formula:  $\text{Acceleration} = \frac{\text{Change in Velocity}}{\text{Time}}$

## 12. Uniform Acceleration

- Acceleration that remains constant over time.

## 13. Non-uniform Acceleration

- Acceleration that changes over time.

## 14. Deceleration (Negative Acceleration)

- The rate at which an object slows down; acceleration in the direction opposite to the velocity.

## 15. Free Fall

- The motion of an object under the influence of gravitational force only.

## 16. Equations of Motion

- Equations that relate displacement, velocity, acceleration, and time for uniformly accelerated motion:
  1.  $v = u + at$
  2.  $s = ut + \frac{1}{2}at^2$
  3.  $v^2 = u^2 + 2as$
  - where  $u$  is the initial velocity,  $v$  is the final velocity,  $a$  is the acceleration,  $t$  is the time, and  $s$  is the displacement.

## 17. Relative Velocity

- The velocity of an object as observed from a particular reference frame.

## 18. Position-Time Graph

- A graph that represents the position of an object as a function of time.

## 19. Velocity-Time Graph

- A graph that represents the velocity of an object as a function of time.

## 20. Acceleration-Time Graph

- A graph that represents the acceleration of an object as a function of time.

