

Motion in Straight Line



List of Formulas, SI Units, Dimensional Formulas, and Constants

1. Position, Path Length, and Displacement

Position (x):

- **Formula:** $x(t)$
- **SI Unit:** Meter (m)
- **Dimensional Formula:** [L]

Path Length:

- **Formula:** Sum of all distances traveled
- **SI Unit:** Meter (m)
- **Dimensional Formula:** [L]

Displacement (s):

- **Formula:** $s = x_f - x_i$
 - **SI Unit:** Meter (m)
 - **Dimensional Formula:** [L]
-

2. Average Velocity and Average Speed

Average Velocity (\bar{v}):

- **Formula:** $\bar{v} = \frac{\Delta s}{\Delta t}$
- **SI Unit:** Meter per second (m/s)
- **Dimensional Formula:** [L T⁻¹]

Average Speed (\bar{v}_{speed}):

- **Formula:** $\bar{v}_{\text{speed}} = \frac{\text{Total Distance}}{\text{Total Time}}$
 - **SI Unit:** Meter per second (m/s)
 - **Dimensional Formula:** [L T⁻¹]
-

3. Instantaneous Velocity and Speed

Instantaneous Velocity (v):

- **Formula:** $v = \frac{dx}{dt}$
- **SI Unit:** Meter per second (m/s)

- **Dimensional Formula:** $[L T^{-1}]$

Instantaneous Speed:

- **Formula:** Magnitude of instantaneous velocity
 - **SI Unit:** Meter per second (m/s)
 - **Dimensional Formula:** $[L T^{-1}]$
-

4. Acceleration

Acceleration (a):

- **Formula:** $a = \frac{dv}{dt}$ or $a = \frac{\Delta v}{\Delta t}$
 - **SI Unit:** Meter per second squared (m/s²)
 - **Dimensional Formula:** $[L T^{-2}]$
-

5. Kinematic Equations for Uniformly Accelerated Motion

First Equation:

- **Formula:** $v = u + at$
- **SI Unit:** Meter per second (m/s)
- **Dimensional Formula:** $[L T^{-1}]$

Second Equation:

- **Formula:** $s = ut + \frac{1}{2}at^2$
- **SI Unit:** Meter (m)
- **Dimensional Formula:** $[L]$

Third Equation:

- **Formula:** $v^2 = u^2 + 2as$
 - **SI Unit:** Meter squared per second squared (m²/s²)
 - **Dimensional Formula:** $[L^2 T^{-2}]$
-

6. Relative Velocity

- **Dimensional Formula:** $[L T^{-2}]$

This comprehensive list covers the essential formulas, SI units, dimensional formulas, and relevant constants associated with the topics mentioned in the image.

Relative Velocity (v_{AB})

- **Formula:** $v_{AB} = v_A - v_B$
 - **SI Unit:** Meter per second (m/s)
 - **Dimensional Formula:** $[L T^{-1}]$
-

Constants

- **Acceleration due to Gravity (g):**
 - **Value:** 9.8 m/s²
 - **SI Unit:** Meter per second squared (m/s²)

