

AI Response:

Kinematics is a branch of classical mechanics that describes the motion of objects.

Key Concepts in Kinematics:

- Displacement (s)**: The change in position of an object. It is a vector quantity.
- Distance**: The total length of the path traveled by an object, regardless of direction.
- Velocity (v)**: The rate of change of displacement with time. It is also a vector quantity.
$$v = \frac{\Delta s}{\Delta t}$$
where Δs is the change in displacement and Δt is the change in time.
- Speed**: The rate of change of distance with time. It is a scalar quantity and is calculated as:
$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$
- Acceleration (a)**: The rate of change of velocity with time, also a vector quantity.
$$a = \frac{\Delta v}{\Delta t}$$
where Δv is the change in velocity.

Equations of Motion:

In uniformly accelerated motion (constant acceleration), there are three key equations:

- $v = u + at$
 - v = final velocity
 - u = initial velocity
 - a = acceleration
 - t = time
- $s = ut + \frac{1}{2}at^2$
 - s = displacement
- $v^2 = u^2 + 2as$

Graphical Representation:

- Position-Time Graphs**: The slope of the graph represents velocity. A straight line indicates constant velocity.