EngineeringRise

Motion in a straight line

Formulas and units, JEE Main. Status: Reviewed on 2026-11-20.

Result	Formula	Units or note
Velocity-time relation	v = u + at Valid when: constant acceleration along a straight line	m/s
Displacement	s = ut + (1/2)at^2 Valid when: constant acceleration along a straight line	m
Velocity-displacement relation	v^2 = u^2 + 2as Valid when: constant acceleration along a straight line	m^2/s^2
Distance in the nth second	s_n = u + a(n - 1/2) Valid when: constant acceleration; equals distance only if direction does not reverse	m
Average velocity (constant a)	v_avg = (u + v)/2 = s/t Valid when: constant acceleration along a straight line	m/s
Calculus forms	v = dx/dt; a = dv/dt = v dv/dx Valid when: any straight-line motion; x, v signed along the line	m/s (m/s^2)
Vertical throw from ground	H = u^2/(2g); T = 2u/g Valid when: thrown up from ground and returning to it; constant g, no air resistance	m (s)
Equal-distance average speed	v_avg = 2 v1 v2/(v1 + v2) Valid when: equal distances at constant speeds v1 and v2	m/s

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/physics/kinematics/motion-in-a-straight-line

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