AP PHYSICS 1 CHEAT SHEET
Unit 1 : Kinematics

Quick Overview

- **Focus:** Motion in one dimension and two dimensions without considering forces.
- **Exam Lens:** The AP exam tests your ability to interpret motion using equations, graphs, and verbal reasoning, not just plug numbers.

Quick Overview

- Describes how objects move, not why they move
- Motion along a line and motion in a plane
- Heavy focus on graphs and representations
- Constant acceleration is the core assumption

Key Concepts and Definitions

- **Position (x):** Location relative to an origin
- **Displacement (Δx):** Change in position, includes direction
- **Velocity (v):** Rate of change of position, vector quantity
- **Speed:** Magnitude of velocity only
- **Acceleration (a):** Rate of change of velocity
- **Average velocity:** $\Delta x \div \Delta t$
- **Instantaneous velocity:** Slope of position vs time graph
- **Free fall:** Motion under gravity only, a = g

Essential Formulas and Constants

- $v = v_0 + at$
- $\Delta x = v_0 t + \frac{1}{2}at^2$
- $v^2 = v_0^2 + 2a\Delta x$
- $\Delta x = \frac{1}{2}(v + v_0)t$
- $a = \Delta v \div \Delta t$
- $g = 9.8 \text{ m/s}^2$ downward
- **Horizontal motion:** $a_x = 0$
- **Vertical motion:** $a_y = -g$

Mini Formula Boxes

Mini formula box
$v = v_0 + at$

- Use when time is known or asked.

Mini formula box
$\Delta x = v_0 t + \frac{1}{2}at^2$

- Best for displacement with constant acceleration.

Mini formula box
$v^2 = v_0^2 + 2a\Delta x$

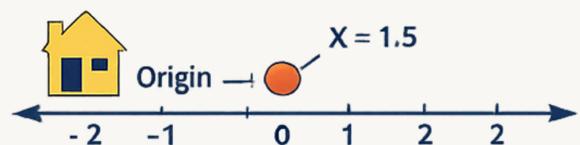- Use when time is not given.

Mnemonics

- "Slope of x–t is v"
- "Area under v–t is Δx"
- "Free fall means a = -g"
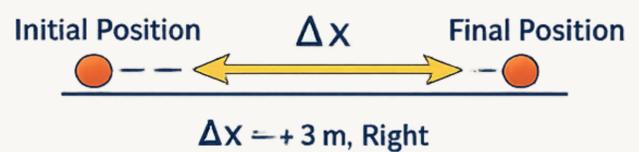- "Horizontal and vertical motions are independent"

Visual Mnemonics

Position (x)
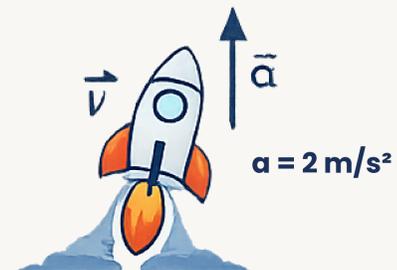Location relative to an origin.
X = 1.5

Displacement (Δx)
Change in position
Initial Position — Δx — Final Position
$\Delta x = +3$ m, Right

Velocity (v)
Rate of change of position.
v = 10 m/s

Acceleration (a)
Rate of change of velocity.
$\vec{v}$ $\vec{a}$
a = 2 m/s²

Common Pitfalls

- Confusing velocity with speed
- Forgetting direction signs
- Using g as positive when downward is negative
- Mixing up graph slopes and areas
- Assuming velocity is zero at the top of projectile motion in both directions
- Forgetting units