



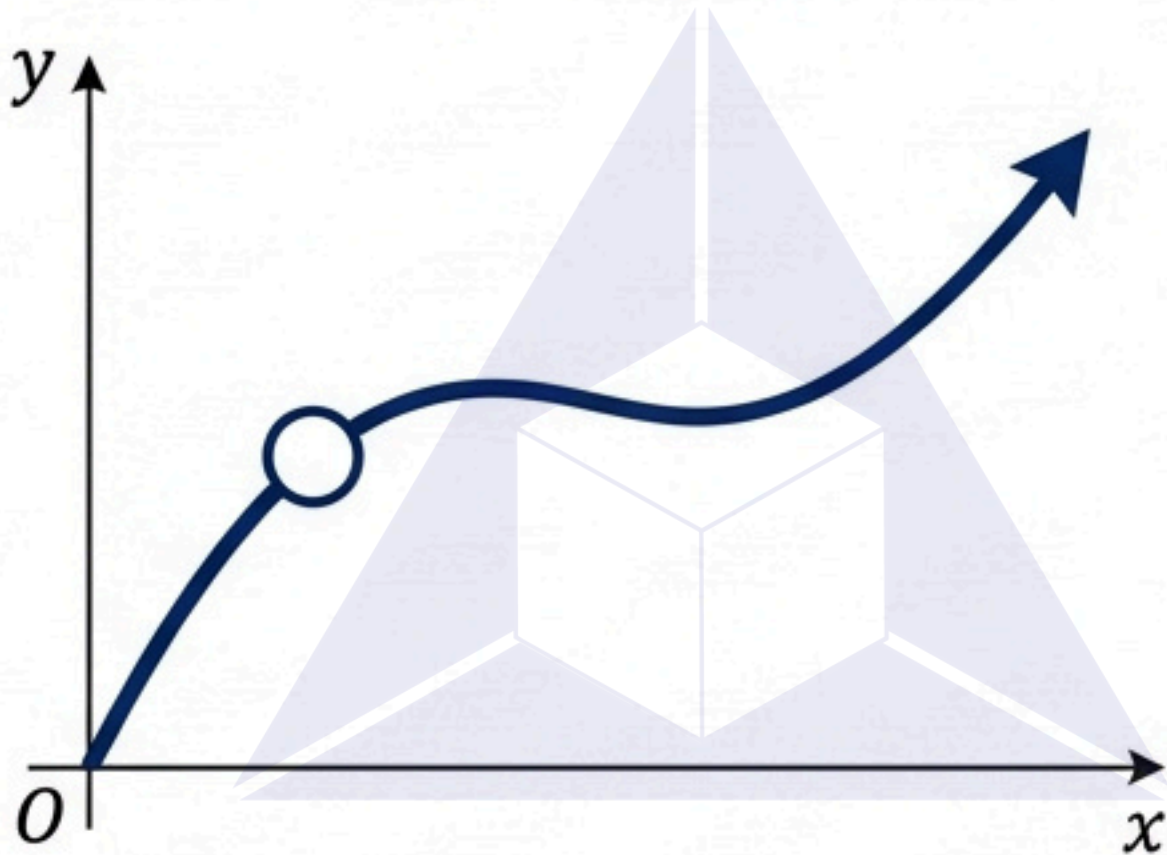
CHAPTER 3.5 • MOTION IN A PLANE

Resolution of Vectors

Master the mathematics of 2D motion.

Why Resolve a Vector?

The Problem

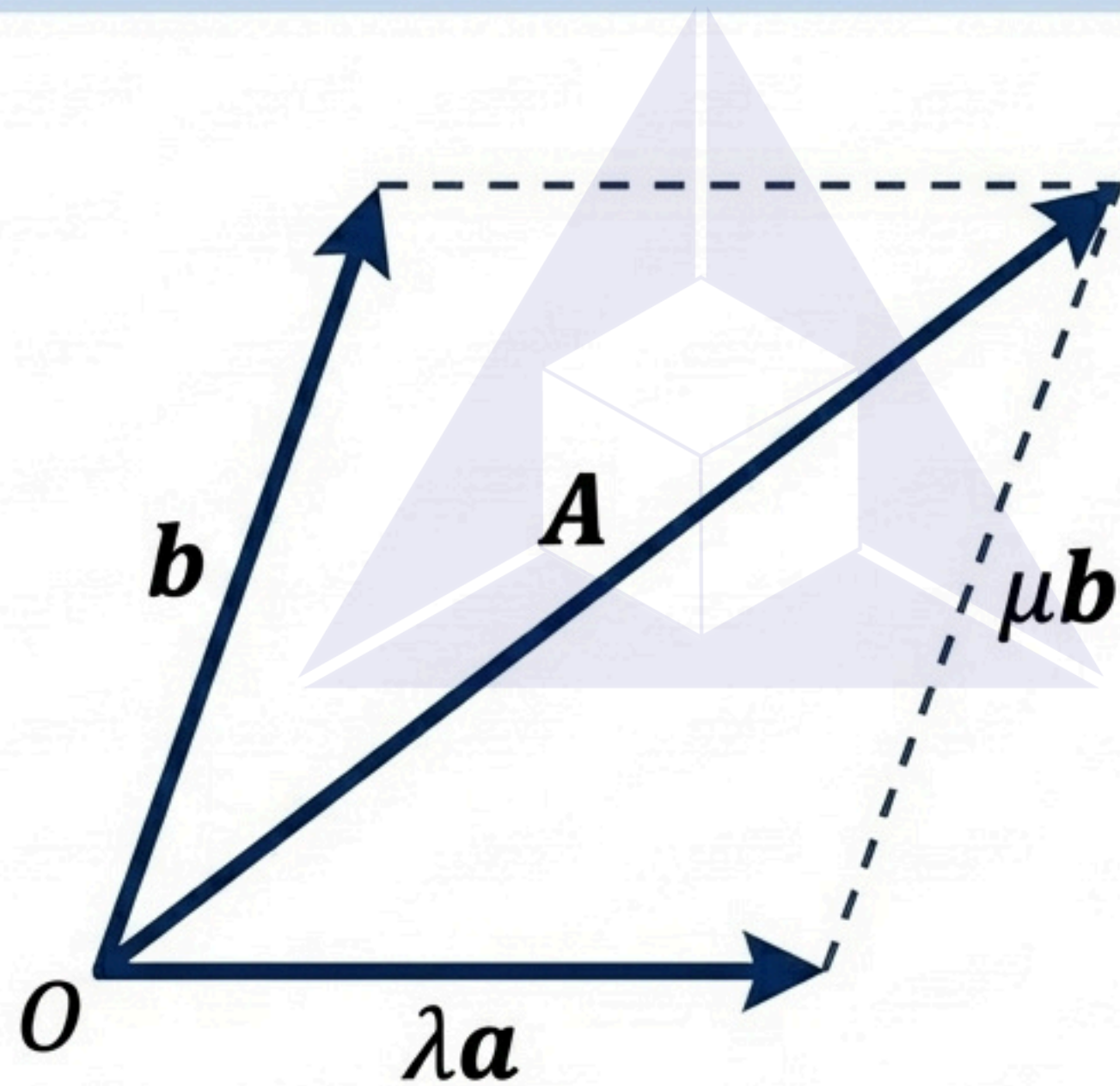


The Solution



Complex 2D motion is mathematically simpler when treated as two independent 1D motions. By resolving vectors, we can calculate horizontal and vertical effects independently without them interfering with each other.

Resolution Along Two Directions



$$\mathbf{A} = \lambda\mathbf{a} + \mu\mathbf{b}$$

The Components

A vector $\mathbf{A}$ can be expressed as the **sum of two component** vectors lying in the same plane.

The Scalars

We achieve this by scaling two non-zero vectors ($\mathbf{a}$ and $\mathbf{b}$) pointing in different directions by real numbers (λ and μ).



You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



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Practice Now



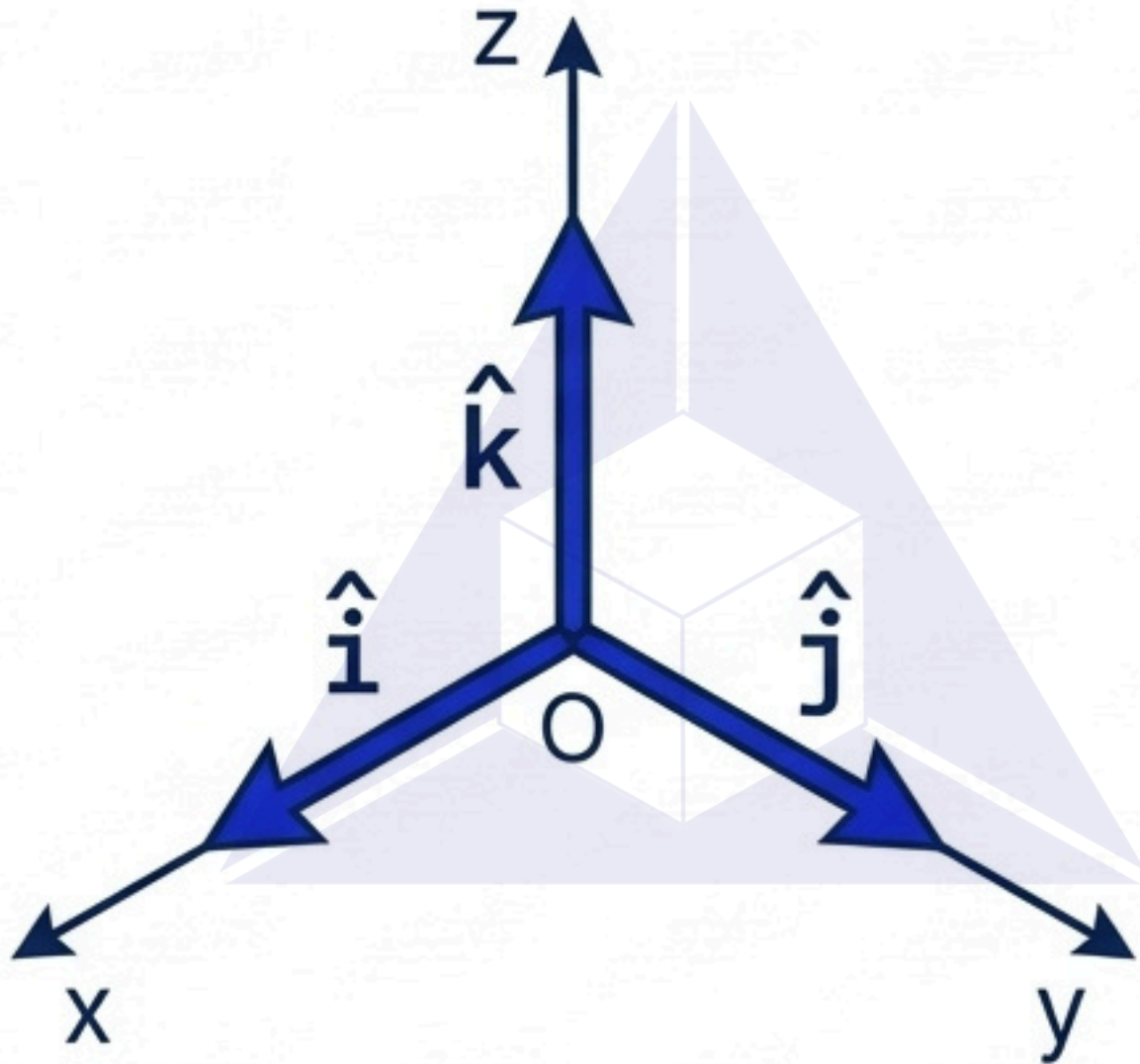
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Key Highlights

- » Free Study Material, Videos & Infographics
- » Push Your Limits with Level-Based Challenges
- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter



Unit Vectors



Magnitude = 1

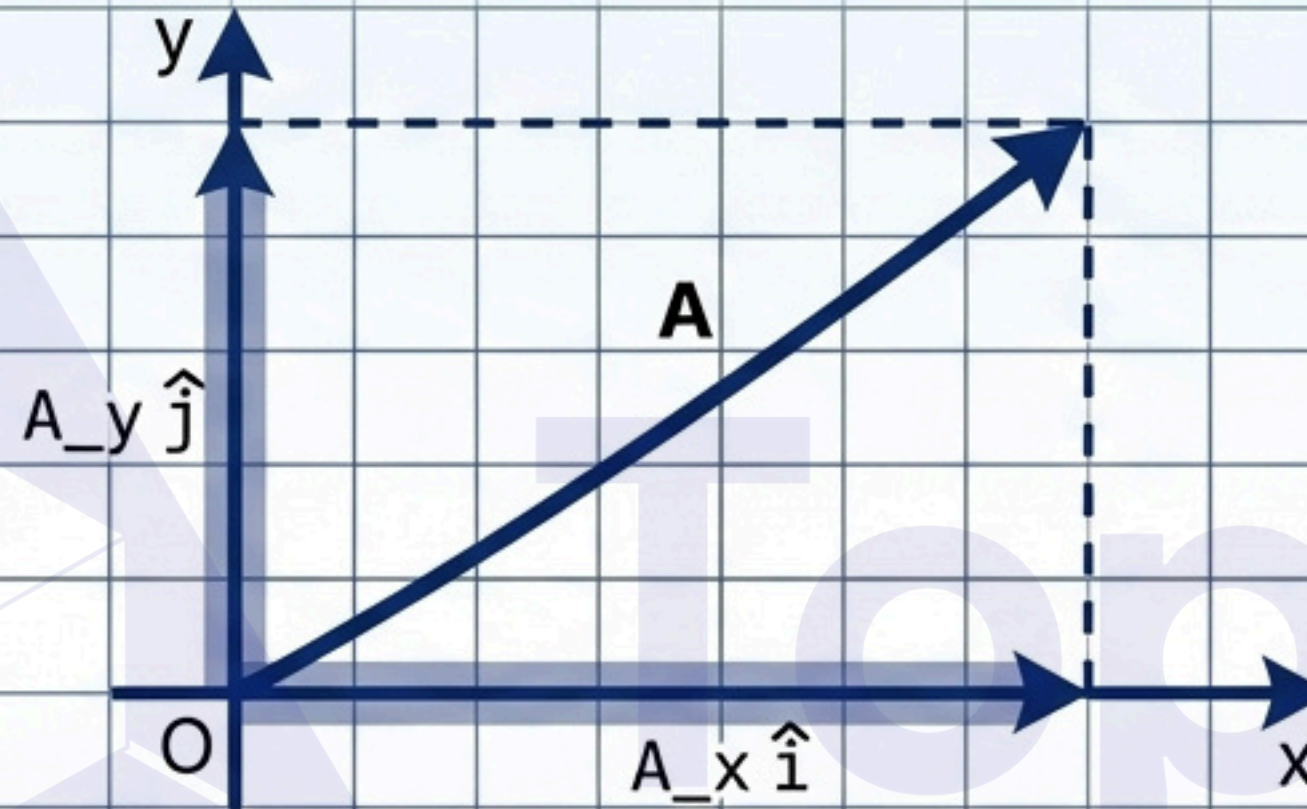
No Physical Dimension

Indicates Direction Only

$$|\hat{i}| = |\hat{j}| = |\hat{k}| = 1$$

Unit vectors are the standardized language for a rectangular coordinate system. Multiplying a scalar by a unit vector gives it a strict direction in 3D space.

Rectangular Resolution in 2D



$$\mathbf{A} = A_x \hat{i} + A_y \hat{j}$$

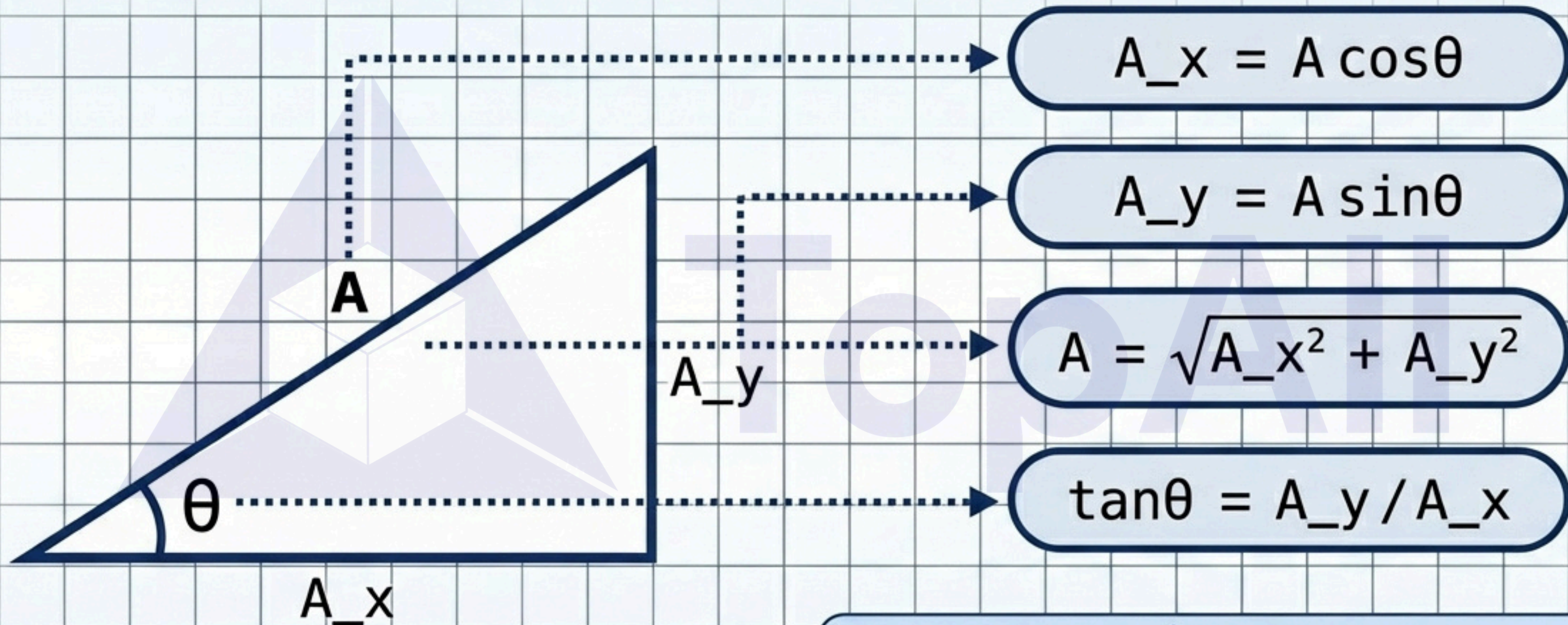
Scalar Components

A_x and A_y are real numbers representing the length along the axes.

Vector Components

$A_x \hat{i}$ and $A_y \hat{j}$ are the actual directed vectors that sum perfectly to equal **A**.

Component Formulas



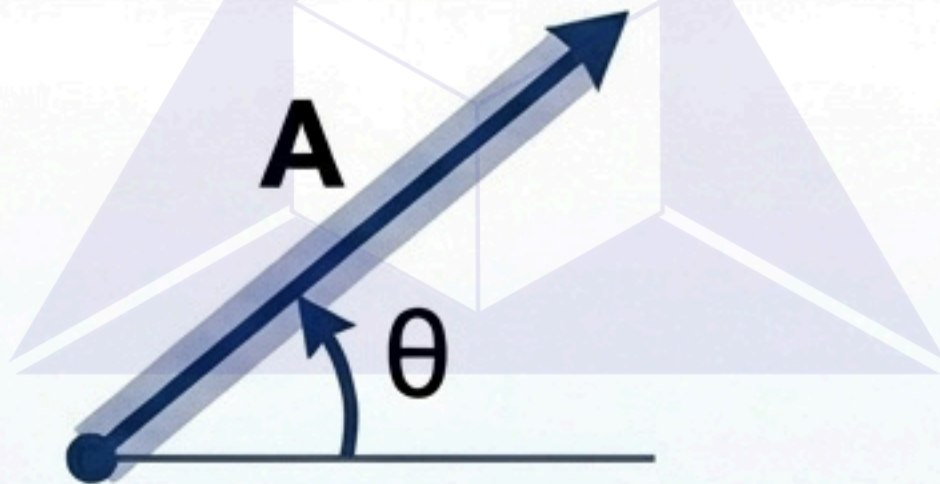
! Pro Tip

Sign Check: The +/- signs of A_x and A_y depend entirely on which quadrant the angle θ points into.

Two Ways to Describe a Vector

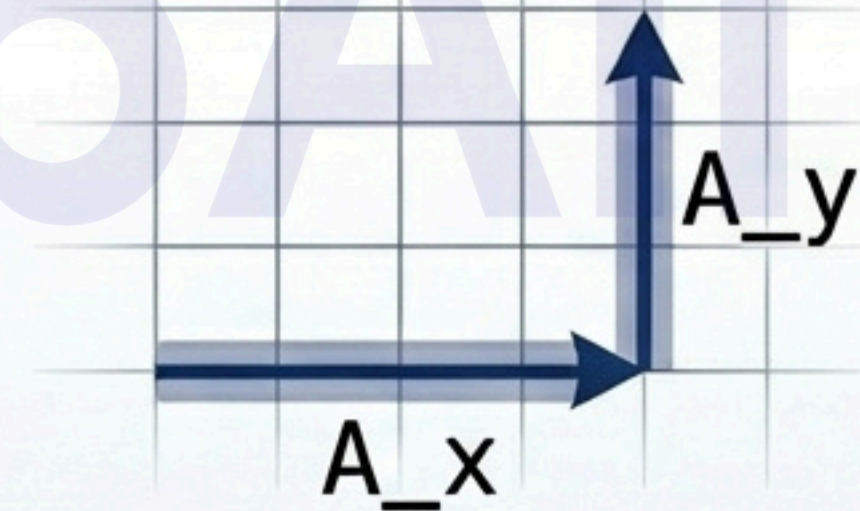
Polar Format Magnitude + Direction

A and θ



Cartesian Format Rectangular Components

A_x and A_y



Perfect Translation: Knowing one pair of variables allows you to calculate the other pair instantly using geometry and trigonometry.



You've Learned the Theory.

Now Let's Test It.

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