

TURBO

MOTION IN A PLANE

Class 11 Physics • Complete Formula Sheet

Sr.	Concept	Formulas	Other Information
1	Relative Velocity	$\vec{v}_{AB} = \vec{v}_A - \vec{v}_B$ $\vec{v}_{BA} = \vec{v}_B - \vec{v}_A$	Same dir: $v_A - v_B$. Opp dir: $v_A + v_B$.
2	Swimmer Problem	Shortest Path: $\sin \theta = \frac{v_r}{v_s}$ Shortest Time: $\theta = 0^\circ$	v_r : river, v_s : swimmer speed in still water.
3	Projectile (Ground)	$T = \frac{2u \sin \theta}{g}$, $H = \frac{u^2 \sin^2 \theta}{2g}$, $R = \frac{u^2 \sin 2\theta}{g}$	R_{max} at $\theta = 45^\circ$.
4	Path Equation	$y = x \tan \theta - \frac{gx^2}{2u^2 \cos^2 \theta}$	Parabolic trajectory.
5	Inclined Projectile	$T = \frac{2u \sin \theta}{g \cos \alpha}$ $R = \frac{u^2}{g \cos^2 \alpha} [\sin(2\theta + \alpha) - \sin \alpha]$	α : incline angle, θ : angle with incline.
6	Max Range (Incline)	$R_{max} = \frac{u^2}{g(1 + \sin \alpha)}$	For upward projection.

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