

# TURBO

## NEWTON'S LAWS OF MOTION & FRICTION

Class 11 Physics • Complete Formula Sheet

Sr.	Concept	Formulas	Other Information
1	Newton's 1st Law	$\sum \vec{F} = 0 \Rightarrow \vec{v} = \text{constant}$	Law of Inertia. Defines Force.
2	Frame of Reference	Inertial: At rest/Uniform motion. Non-Inertial: Accelerated.	NLM valid only in Inertial frames.
3	Newton's 2nd Law	$\vec{F} = \frac{d\vec{p}}{dt} = m\vec{a}$ (if $m$ is constant)	$\vec{p} = m\vec{v}$ (Linear Momentum).
4	Impulse ( $\vec{J}$ )	$\vec{J} = \vec{F}_{avg}\Delta t = \int \vec{F}dt = \Delta\vec{p}$	Area under F-t graph.
5	Newton's 3rd Law	$\vec{F}_{AB} = -\vec{F}_{BA}$	Action and Reaction forces.
6	Equilibrium	$\sum F_x = 0, \sum F_y = 0, \sum F_z = 0$	Lami's Theorem: $\frac{F_1}{\sin \alpha} = \frac{F_2}{\sin \beta} = \frac{F_3}{\sin \gamma}$ .
7	Static Friction	$f_s \leq \mu_s N$	Self-adjusting force.
8	Kinetic Friction	$f_k = \mu_k N$	Opposes relative motion.
9	Angle of Friction	$\tan \theta = \mu_s$	Angle between Net Contact Force and Normal.
10	Angle of Repose	$\alpha = \tan^{-1}(\mu_s)$	Max angle of incline for rest.