EngineeringRise

Newton's laws and free-body diagrams

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

Result	Formula	Units or note
Second law	F_net = m a (per axis) Valid when: inertial frame, constant mass; applied along each axis separately	N (with m in kg and a in m/s^2)
Weight	W = m g, g = 10 m/s^2 in this course Valid when: near the Earth's surface, g = 10 m/s^2 here	N
Lift, apparent weight	N = m (g + a) with a upward positive Valid when: lift or similar accelerating frame; a is lift acceleration, upward positive	N
Contact force, two blocks pushed	N = F m_ahead/(m1 + m2) Valid when: two blocks pushed on a smooth surface, F on the rear block, m_ahead is the front block	N
Lami theorem	F1/sin(a1) = F2/sin(a2) = F3/sin(a3) Valid when: three concurrent forces in equilibrium; each angle is opposite its force	N
Equilibrium of concurrent forces	sum F_x = 0 and sum F_y = 0 Valid when: concurrent forces on a body in equilibrium	N
Third law	F_AB = - F_BA (on different bodies) Valid when: always, for the two bodies of an interaction	N
First law (no net force)	F_net = 0 means a = 0, velocity constant Valid when: inertial frame; net force on the body is zero	m/s^2

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/physics/laws-of-motion/newton-s-laws-and-free-body-diagrams

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