# Physics Formula Sheet

Chapter by chapter, topic by topic. Written by the PadhoNa team for quick revision.

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CHAPTER 5

## Laws of Motion

### Newton's laws

$$\vec{F} = \frac{d\vec{p}}{dt} = m\vec{a}, \qquad \vec{J} = \int \vec{F}\,dt = \Delta\vec{p}$$

LIFT

$$\text{apparent weight} = m(g+a) \text{ going up with } a; \qquad m(g-a) \text{ going down}$$

### Friction

$$f_s \le \mu_s N, \qquad f_k = \mu_k N$$

ANGLE OF REPOSE

$$\tan\theta = \mu_s$$

BLOCK ON AN INCLINE

$$a = g(\sin\theta - \mu_k \cos\theta) \text{ sliding down}$$

### Pulleys, constraints and pseudo force

ATWOOD MACHINE

$$a = \frac{(m_1 - m_2)g}{m_1 + m_2}, \qquad T = \frac{2m_1 m_2 g}{m_1 + m_2}$$

PSEUDO FORCE

$$\vec{F}_{\text{pseudo}} = -m\vec{a}_{\text{frame}} \text{ (in an accelerating frame)}$$

STRING CONSTRAINT

$$\sum T \cdot \vec{v} = 0 \text{ (inextensible strings)}$$

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