

LAW'S OF MOTION



First Law

Every body remains in a state of rest or uniform motion unless acted upon by a **net external force**.



Second Law

The amount of acceleration of a body is proportional to the acting force and inversely proportional to the mass of the body.

$$F = ma$$



Third Law

For every action there is an equal but opposite reaction. If an object A exerts a force on object B, then object B will exert an equal but opposite force on object A.

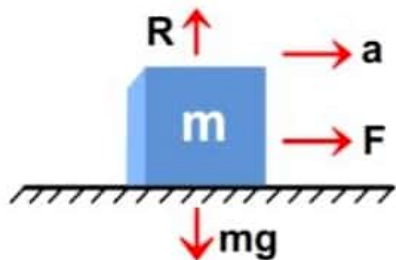


APPLICATION OF N.L.M

1 Motion of a Block on a Horizontal Smooth Surface

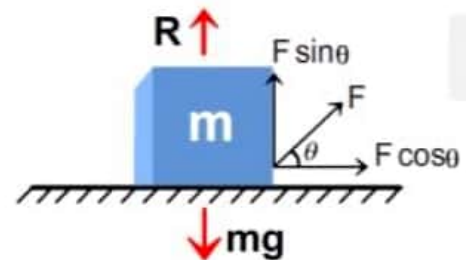
Case (i) Horizontal pull

$$F = ma \text{ or } a = \frac{F}{m}$$



Case (ii) Pull acting at an angle (θ)

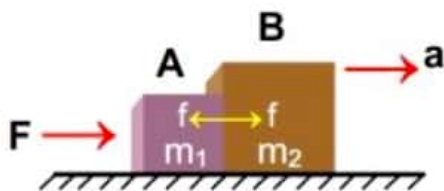
$$R + F \sin \theta = mg \quad a = \frac{F \cos \theta}{m}$$



2 Motion of Bodies in Contact

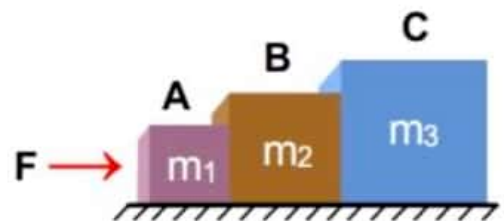
Case (i) Two Body System

$$\Rightarrow a = \frac{F}{m_1 + m_2} \quad \& \quad f = \frac{m_2 F}{m_1 + m_2}$$



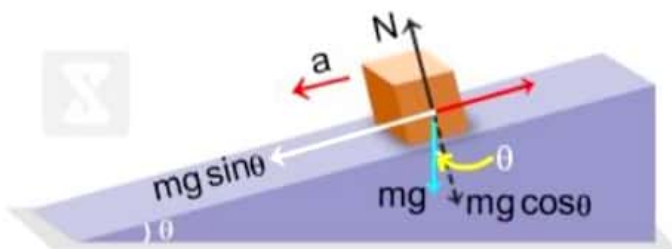
Case (ii) Three Body System

$$\Rightarrow a = \frac{F}{m_1 + m_2 + m_3}$$



3 Motion of a Body on a Smooth Inclined Plane

$$a = g \sin \theta \quad N = mg \cos \theta$$



4 Climbing on the Rope

- $T > mg$, man accelerates in upward direction
- $T < mg$, man accelerates in downward direction

