PRAYAS

JEE 2025

Lecture - 01

Physics

Laws Of Motion

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Topics to be covered

1. Newtons Law
2. N, mg, T force
3. FBD
4.

NLM

Inertia ⟶ It is the tendency to resist the change.

It is the property due which a body wants to be in state of rest or in Uniform motion in a straight line

- mass is the measurement of

Momentum → $\vec{P} = m\vec{v}$

(" Particle)

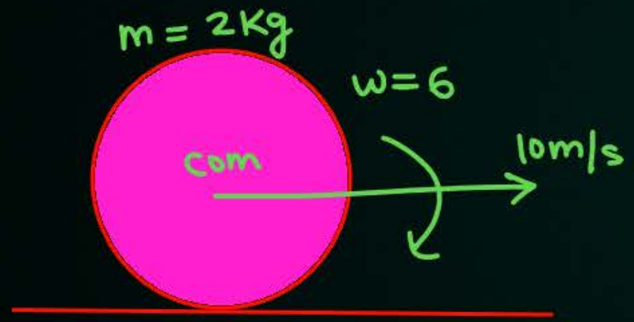
$$\begin{cases} \vec{P}_{body} = M_{body}\,\vec{v}_{com\ of\ body} \\ \vec{P}_{system} = M_{syst.}\,\vec{v}_{com\ of\ Syst} \end{cases} \equiv \text{Com से}$$

Q1

$\vec{p} = 2 \times 10 \hat{i} = 20 \hat{i}$

↳ momentum

Q2



$\vec{P}_{sphere} = m\vec{v}_{com}$

$= 2 \times 10 = 20$

Force → push or pull.

very imp **

Types of force

1. Gravitational force → mg, $\frac{Gm_1m_2}{r^2}$
2. Electromagnetic force → $T, N, f, \ldots$

} 11^{th}

3. Strong nuclear force
4. Weak nuclear force

} 12^{th} (modern)

Newton 1st Law ⟶ A body continue to be in state of rest or in state of uniform velocity (st. line) until or unless net external force acts on it.

– Law of inertia.

Newton Second Law.

$F = ma$

If $m \longrightarrow$ const

$$(\vec{F}_{net})_{ext} = m\vec{a}$$

$$(\vec{F}_{net})_{ext} = \frac{d\vec{P}}{dt} \qquad \vec{P} = m\vec{v}$$

$$(\vec{F}_{net})_{ext} = \frac{d(m\vec{v})}{dt} = m\frac{d\vec{v}}{dt} + \vec{v}\frac{dm}{dt}$$

rocket prop. $\equiv F = ma$

Variable mass system $\Rightarrow F = ma$ X

If $m \longrightarrow$ const $\equiv \frac{dm}{dt} = 0$

$$(\vec{F}_{net})_{ext} = m\frac{d\vec{v}}{dt} = m\vec{a}$$

Newton third Law

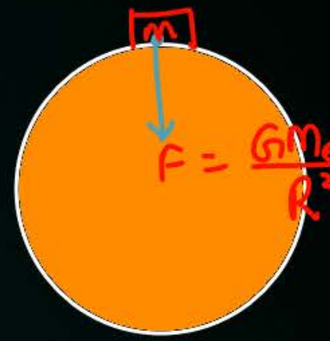
- For every action there is equal & opposite reaction.
- at the same time, simultaneously
- same nature, same magnitude.
- two diff body event
- Action reaction pair.

अगर A ने B पर force लगाया F तो B भी वापस A पर force लगाएगी F'

{ same nature
" magnitude
" line
dir^n opposite }

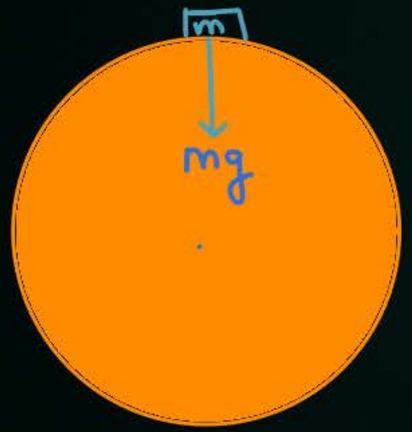
Gravitational force

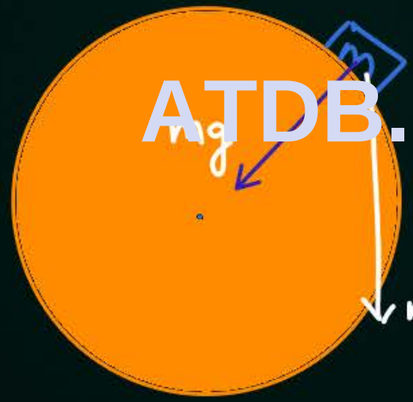
$$F = \frac{G m_1 m_2}{r^2}$$

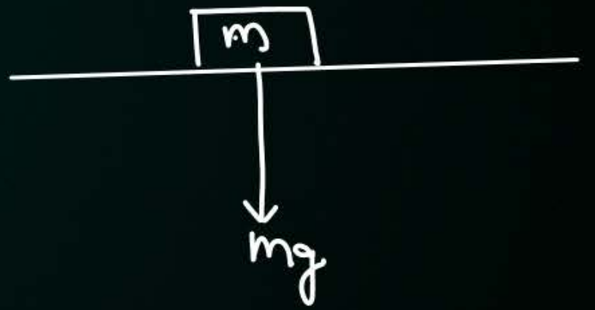


$$F = \frac{G M_e m}{R^2} = gm = mg$$

$$g = \frac{G M_e}{R^2} = 9.8 \ m/s^2$$





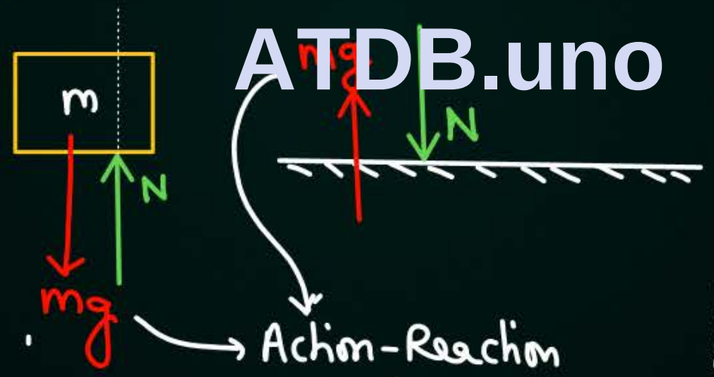


② Normal force

- Towards the body. (perpendicular to flat surface)
- pushing nature.

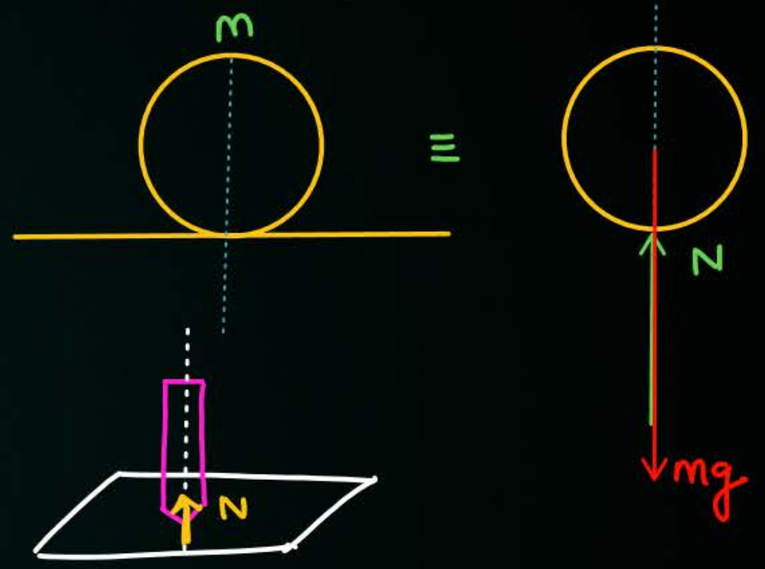
① If both surface are flat

Equilibrium
$N = mg$



FBD of mass

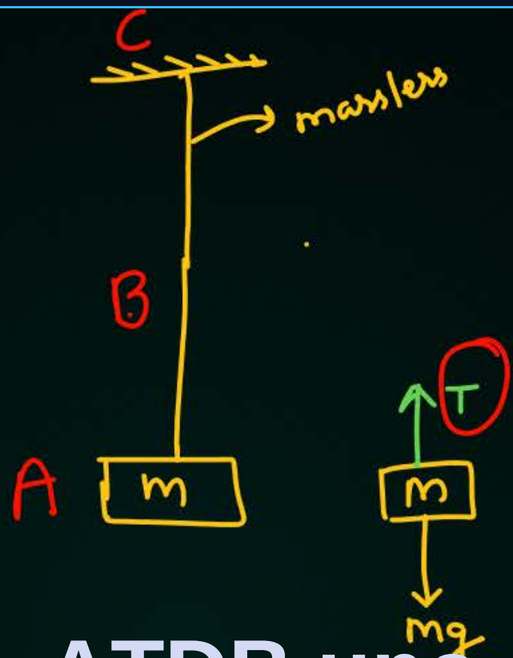
② If one surface is flat

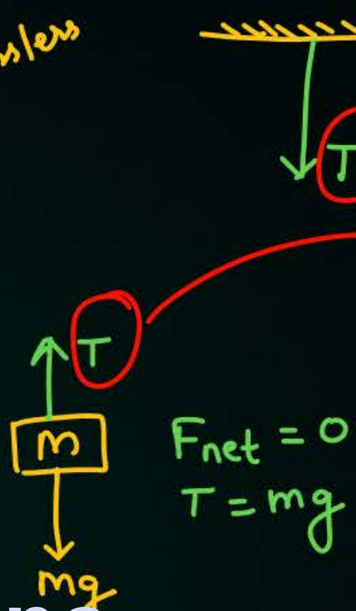


③ If both surface का ऊबड़ खाबड़, चोंच ≡ दिमाग मत लगाओ
N_x N_y मानलो

Tension force

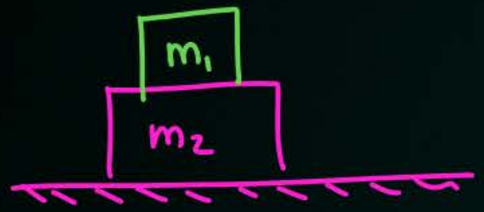
- Pulling nature
- Act away from the body along the string

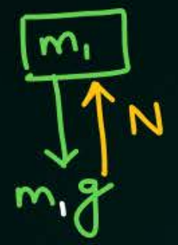


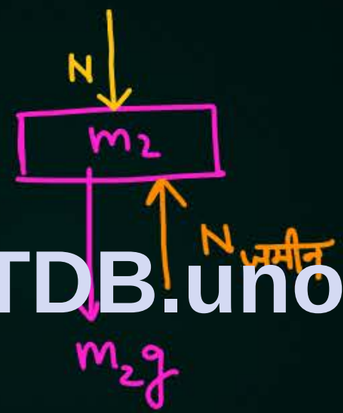


जिसकी FBD बना रहे हैं उस पर लगने वाले सभी forces दिखाने हैं

Q Draw FBD of given masses.





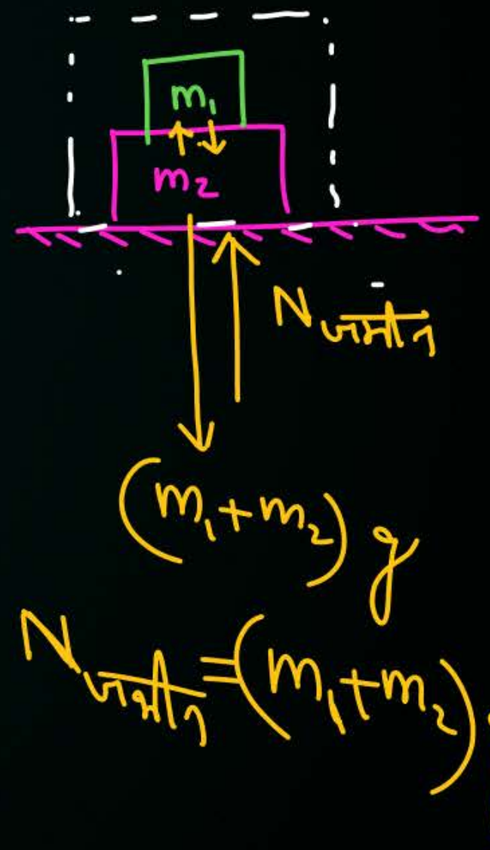


Equilibrium $N = m_1g$

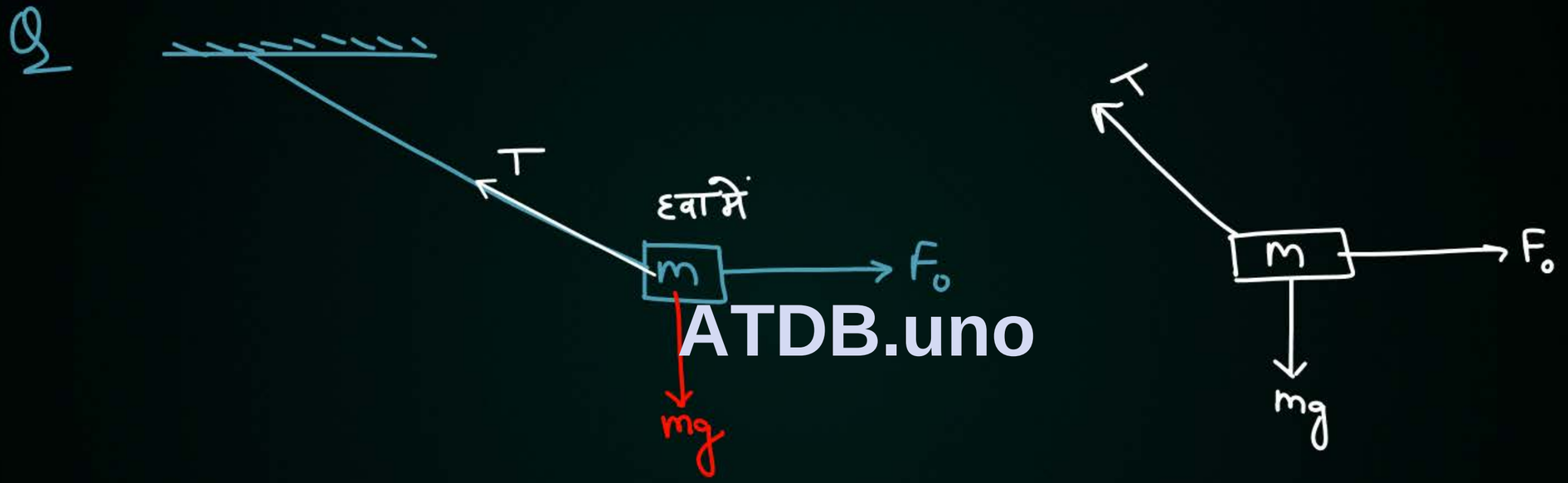
$N_{\text{जमीन}} = m_2g + N$

Solve $N_{\text{जमीन}} = m_2g + m_1g$

If Both masses are Considered as System



$N_{\text{जमीन}} = (m_1+m_2)g$



Home Work

- Complete Kinematics H.W & solve ques.
- module H.W motion in a plane

Tuesday (21 may) ⇒ Aarambh All solved example (page 130) (1 – 18)

Wednesday ⇒ Prarambh ⇒ (53 – 74)

Thursday Prarambh ⇒ (75 – 94)

Friday ⇒ Prabal ⇒ (1 – 30)

(Saturday - Sunday) Parikshit JA level ⇒ 1, 3, 6, 8, (15 – 18), (19 – 25)