

PRAYAS

JEE 2025

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Lecture - 03

Physics

Laws Of Motion

By- Saleem Ahmed Sir

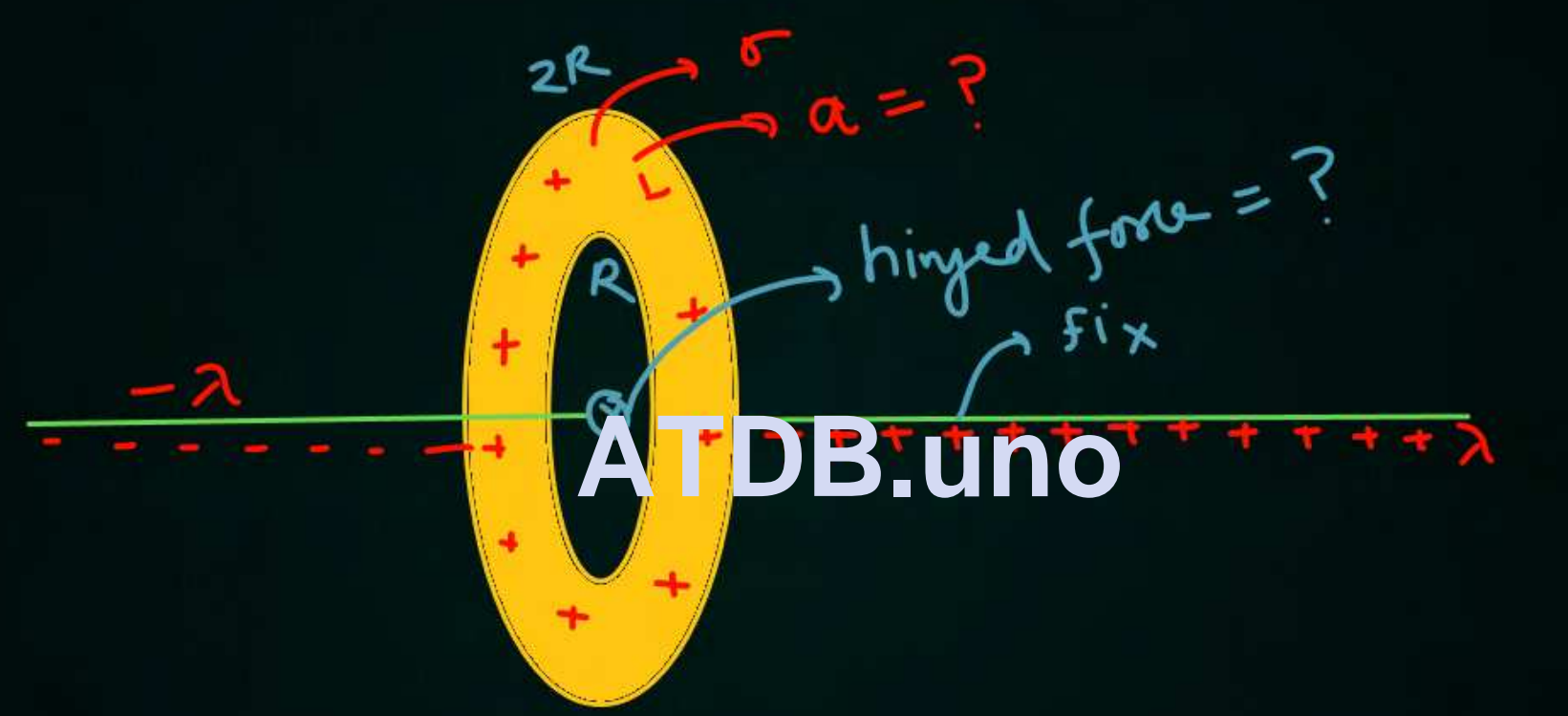




Topics to be covered

- 1 Equilibrium
- 2 Pulley System
- 3

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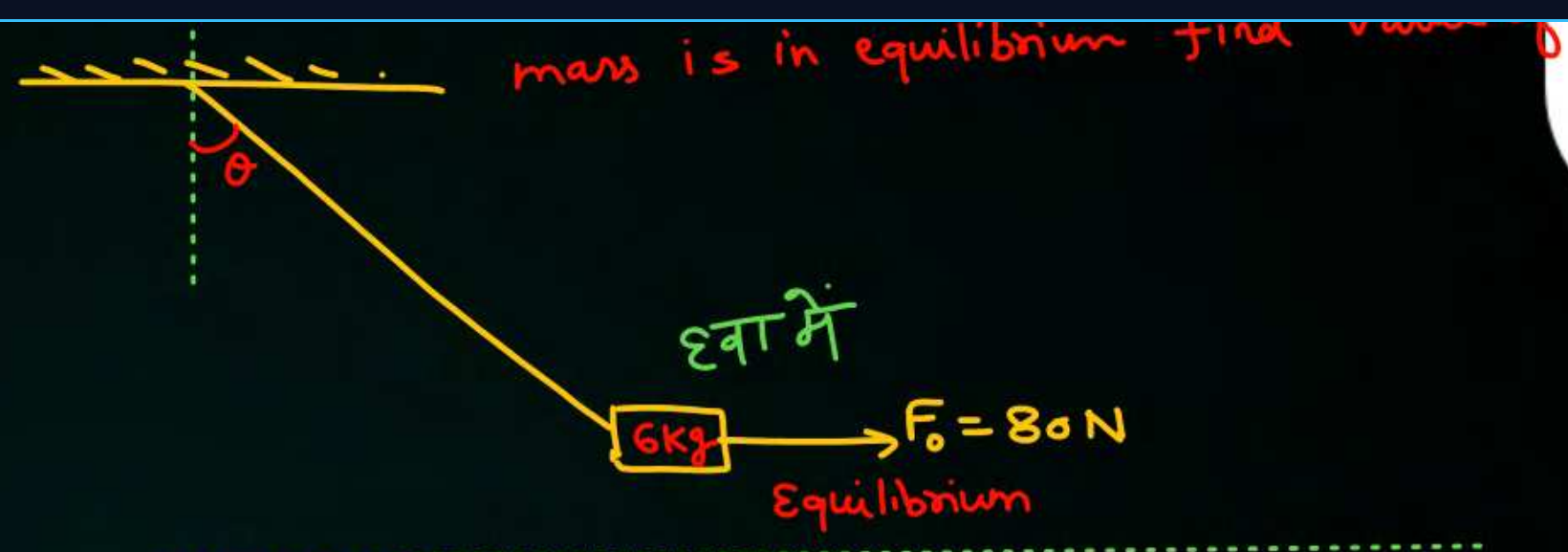
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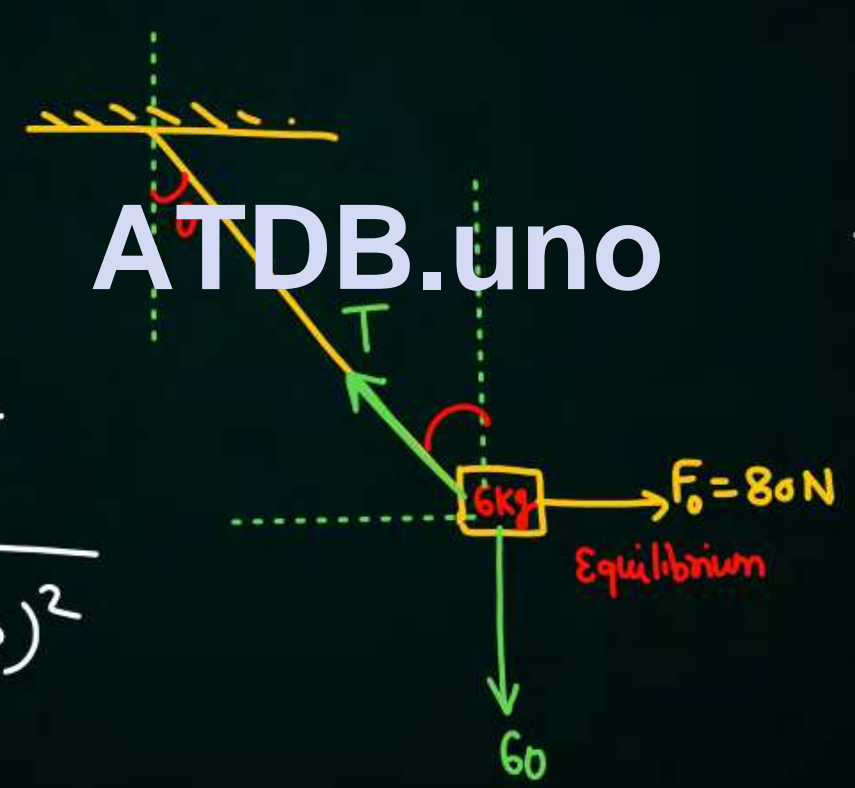
(Transst.)
Equilibrium के गुण

$F_{net} = 0$

- * FBD
- * Component
- * Balance

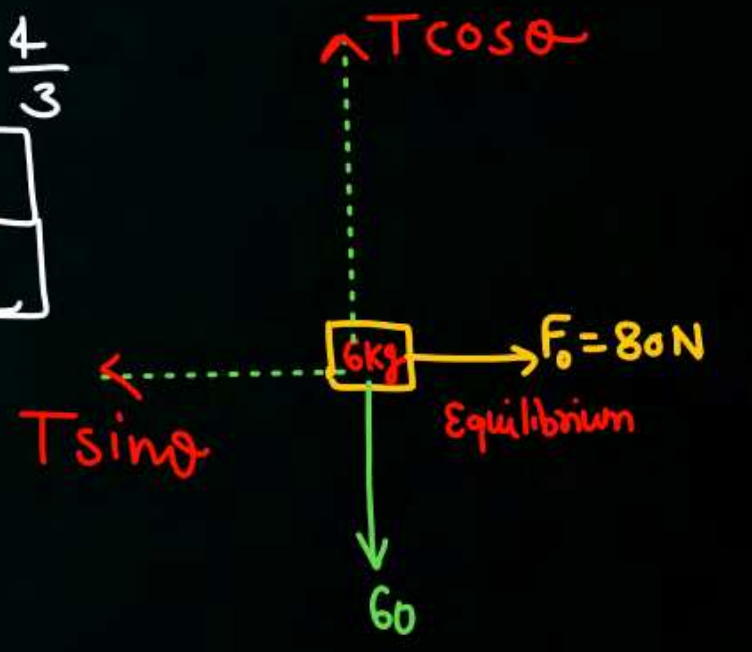


Solⁿ



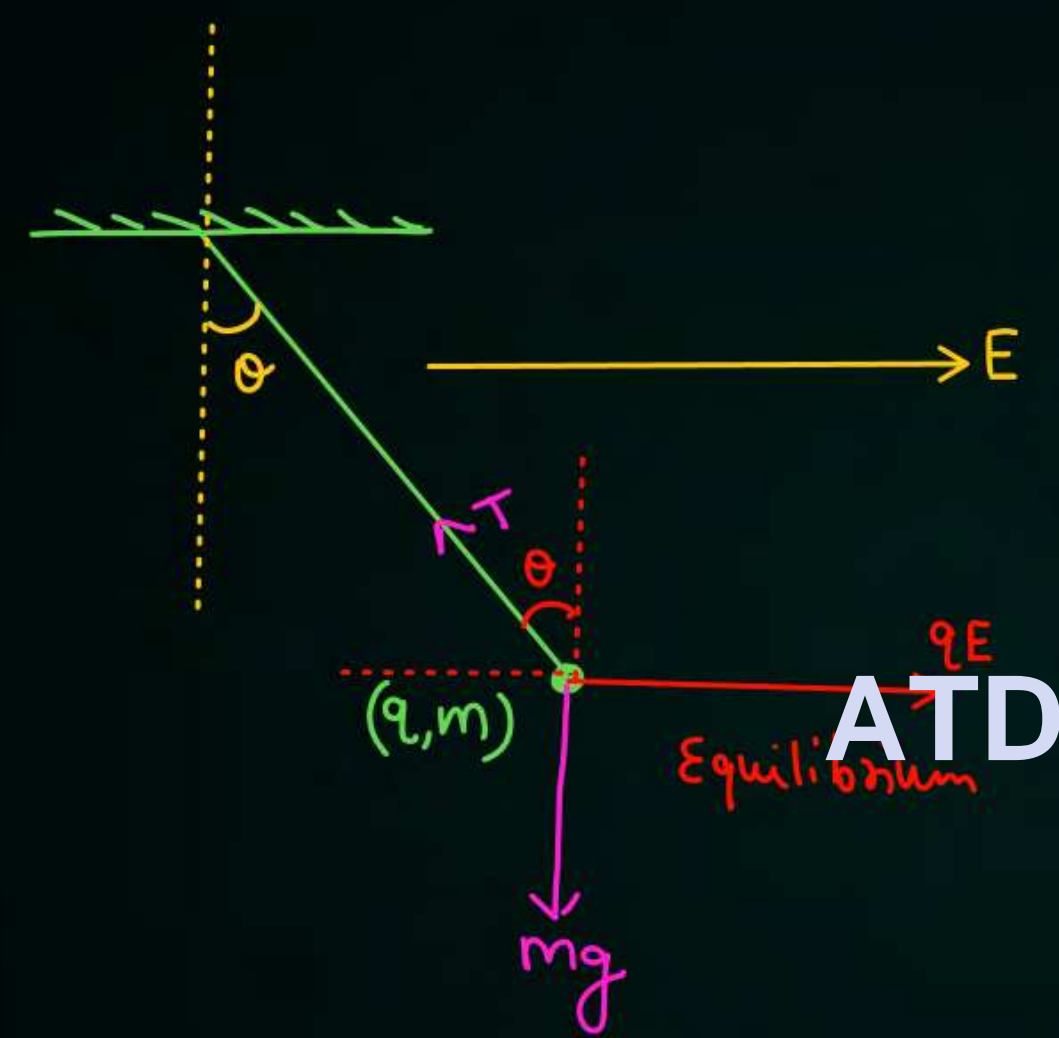
$$\begin{aligned} T \sin \theta &= 80 \\ T \cos \theta &= 60 \\ \hline \tan \theta &= \frac{4}{3} \\ \theta &= 53^\circ \\ T &= 100 \end{aligned}$$

$$\begin{aligned} T &= \sqrt{F_o^2 + (mg)^2} \\ &= \sqrt{(80)^2 + (60)^2} \\ T &= 100 \end{aligned}$$





12th class



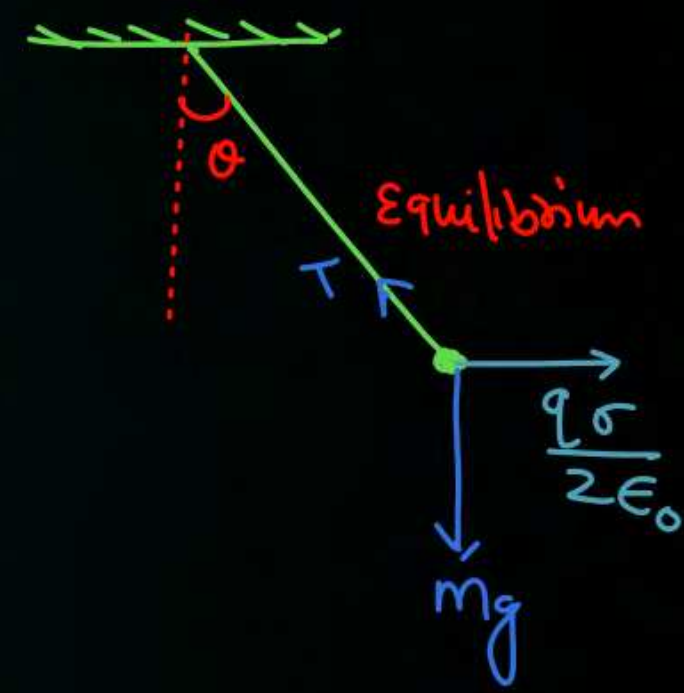
$$T \sin \theta = qE$$

$$T \cos \theta = mg$$

$$T = \sqrt{(qE)^2 + (mg)^2}$$

$$\tan \theta = \frac{qE}{mg}$$

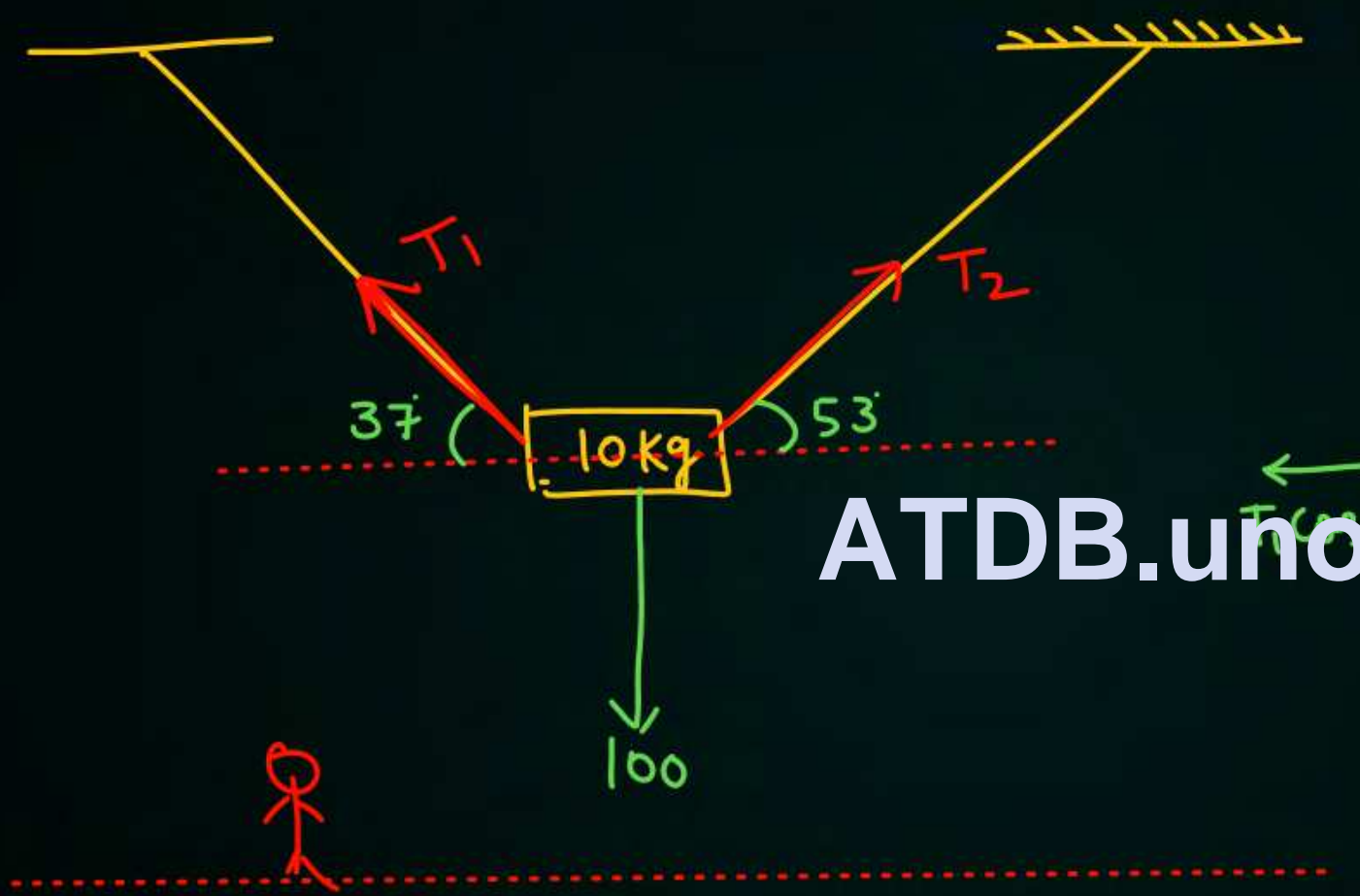
Equilibrium



Equilibrium

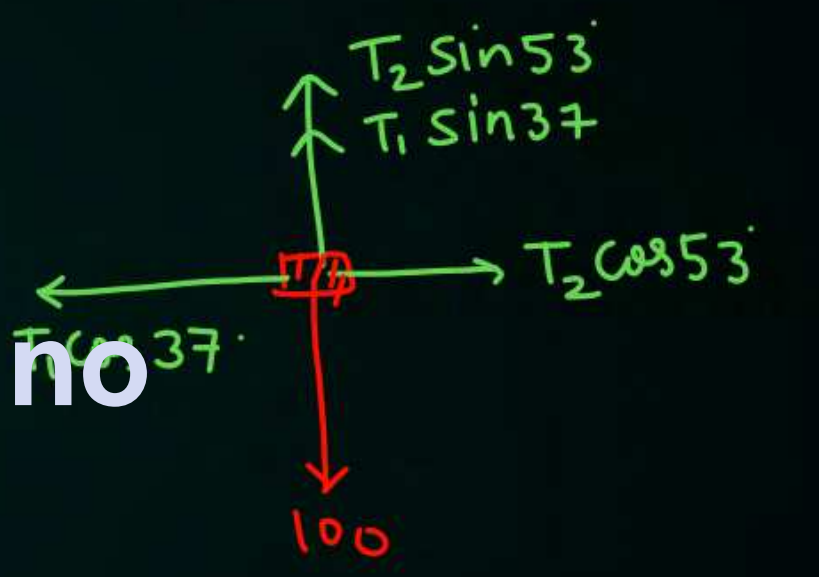


Q



find tension in string.

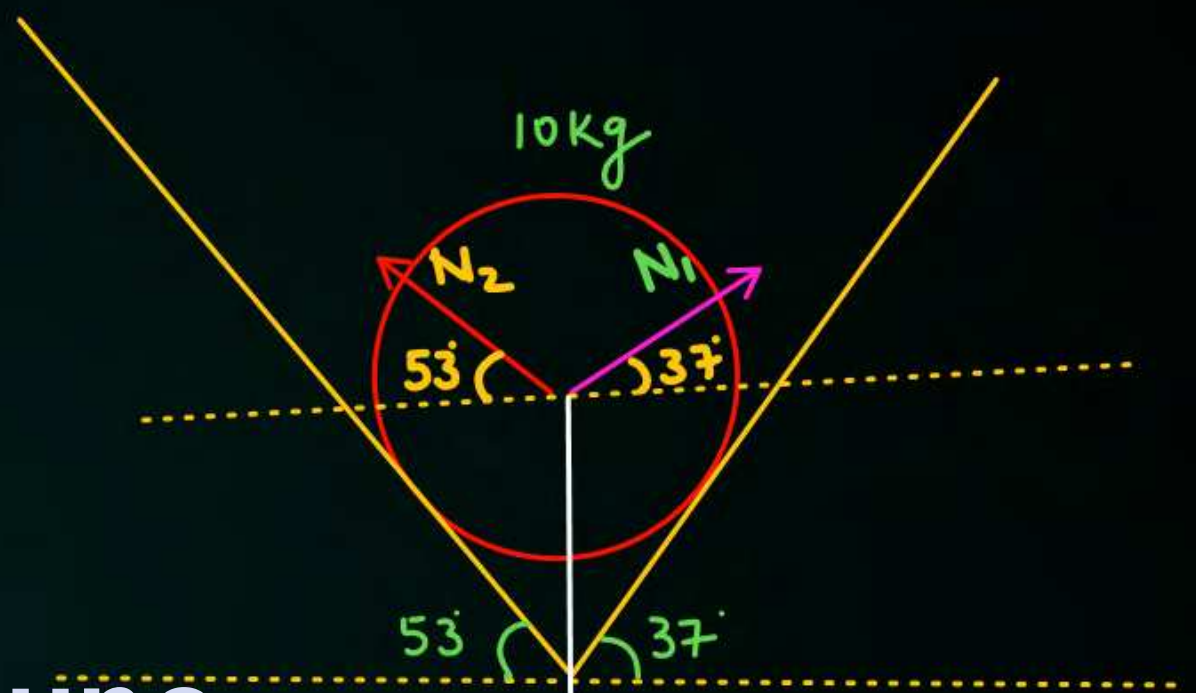
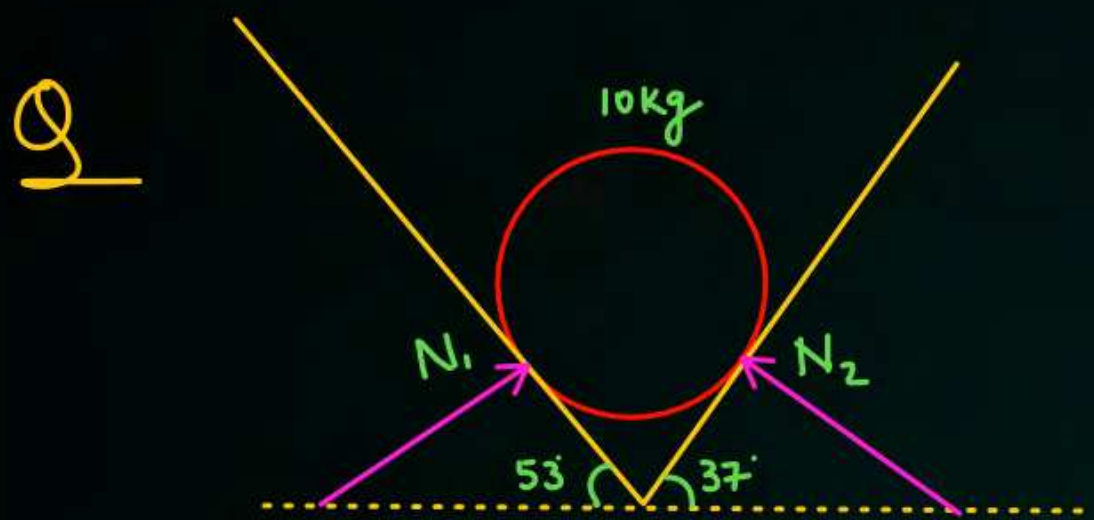
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$$T_2 \cos 53 = T_1 \cos 37$$

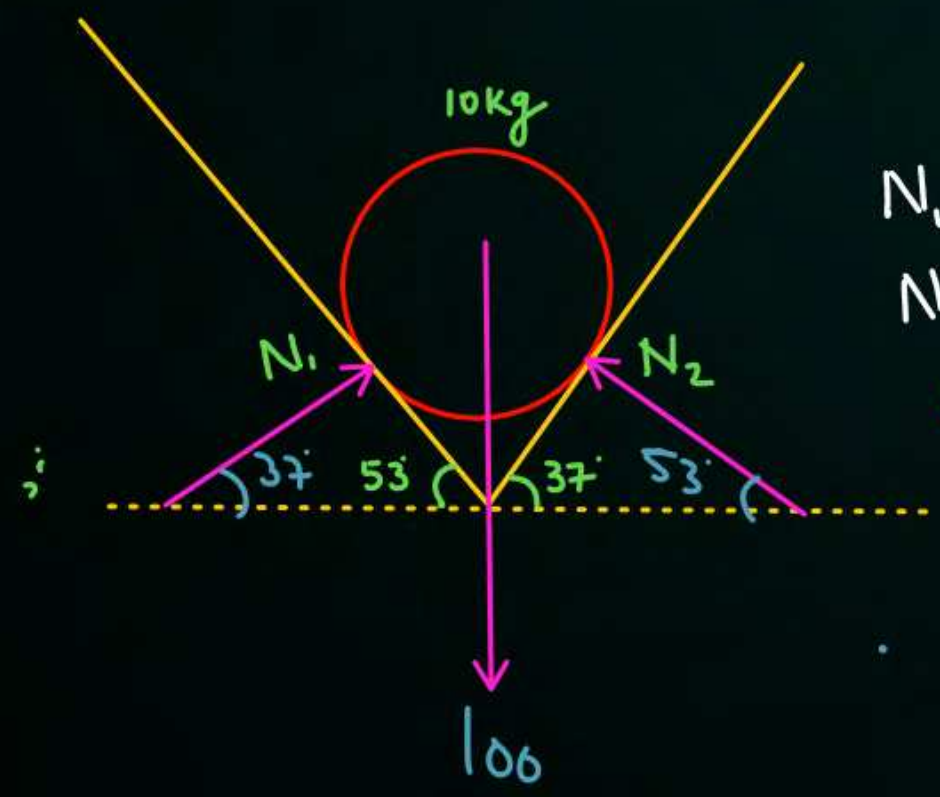
$$T_2 \sin 53 + T_1 \sin 37 = 100$$

Solve & get



force applied by wall on sphere.

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$$N_1 \cos 37^\circ = N_2 \cos 53^\circ$$

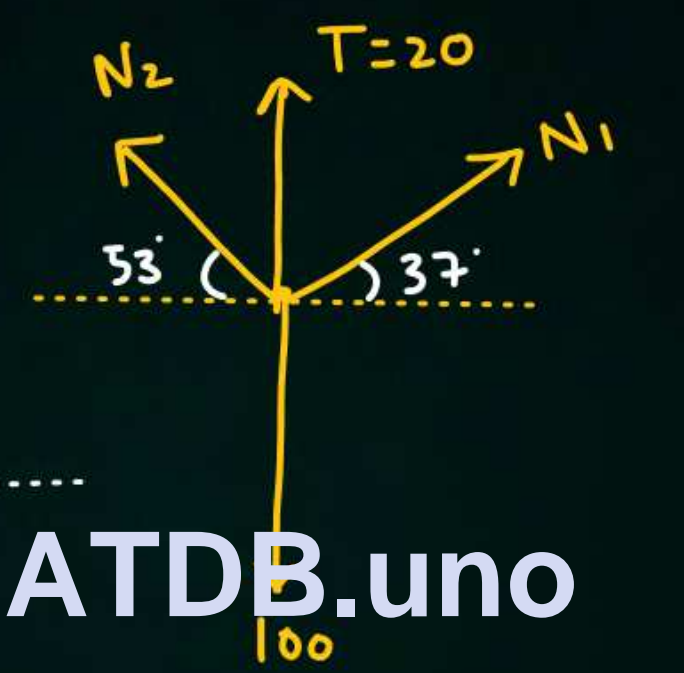
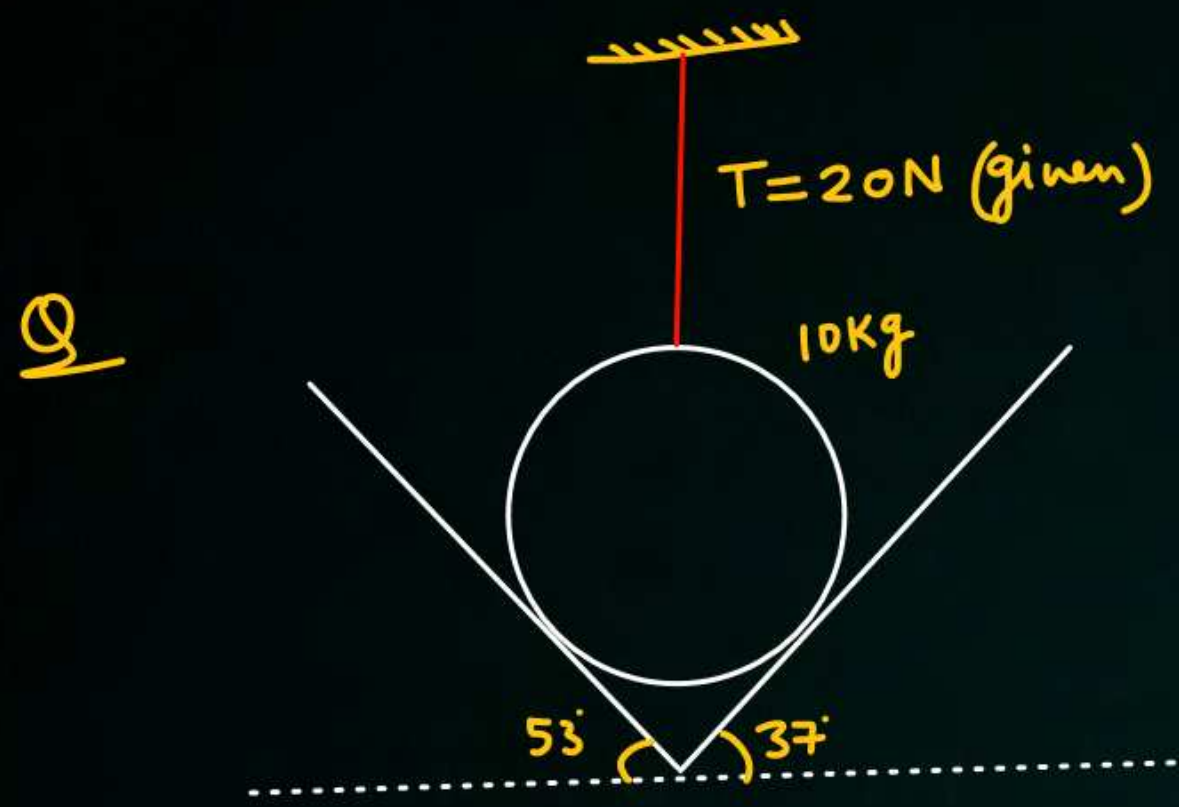
$$N_1 \sin 37^\circ + N_2 \sin 53^\circ = 100$$

Solve

$$N_2 = 80$$

$$N_1 = 60$$

$$mg = 100$$



≡

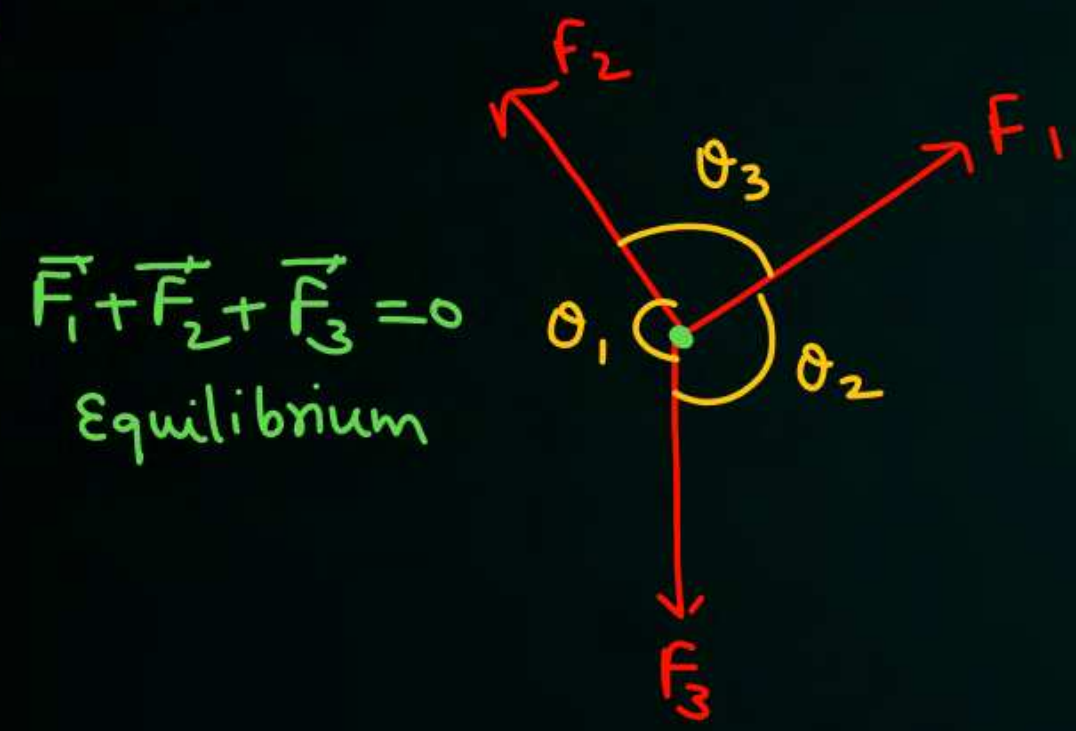


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Lami's theorem

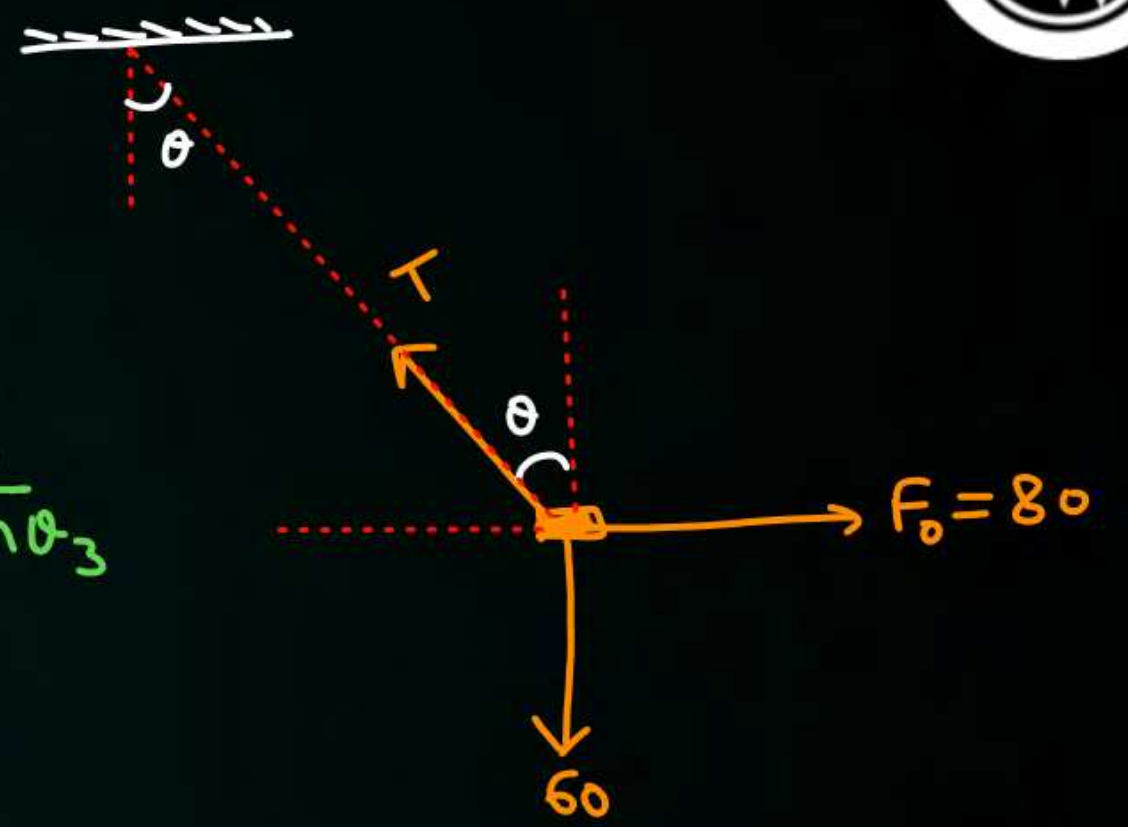
सुरत



$\vec{F}_1 + \vec{F}_2 + \vec{F}_3 = 0$
Equilibrium

$\frac{F_1}{\sin \theta_1} = \frac{F_2}{\sin \theta_2} = \frac{F_3}{\sin \theta_3}$

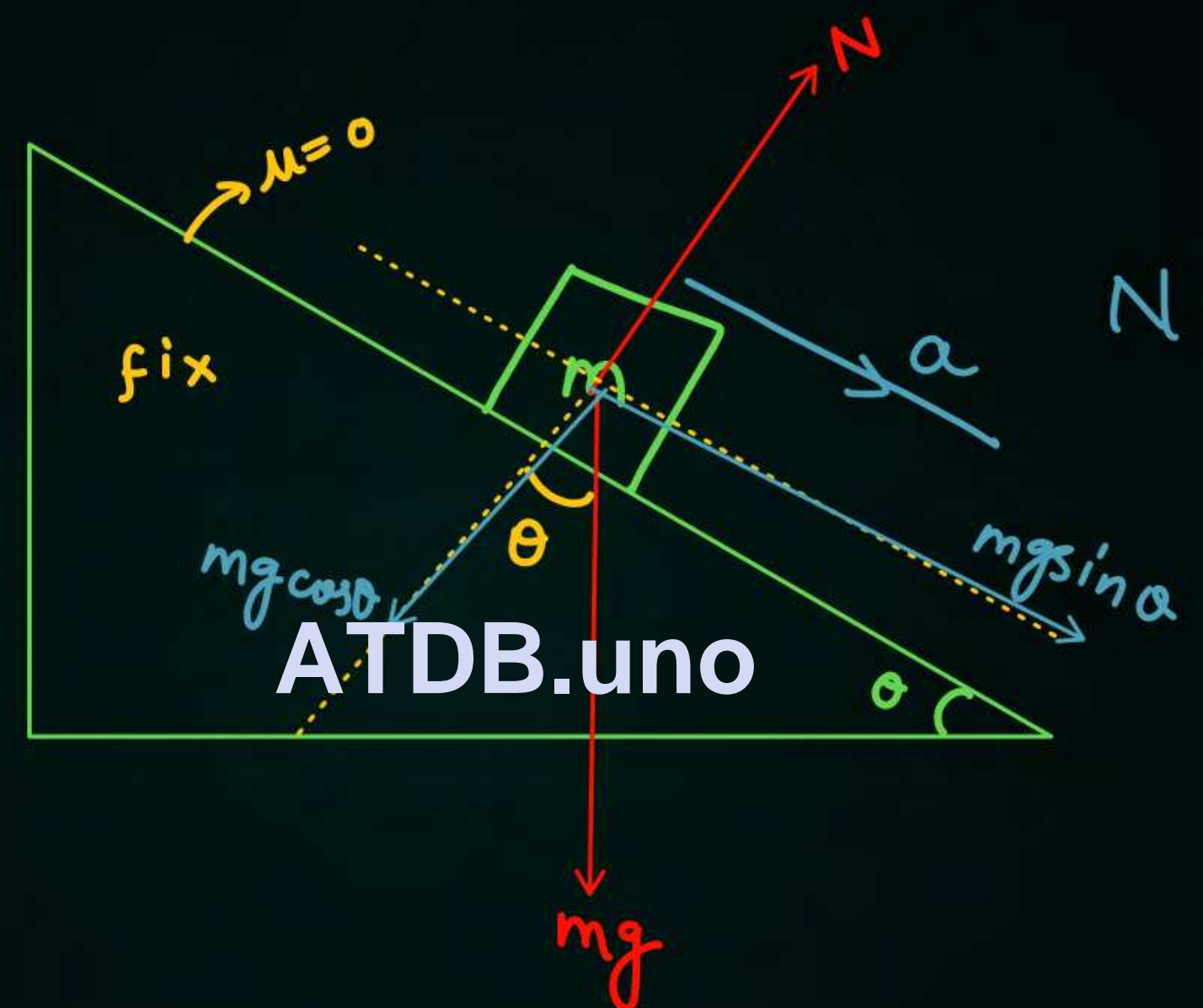
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$\frac{T}{\sin 90} = \frac{60}{\sin(90 + \theta)} = \frac{80}{\sin(180 - \theta)}$

$T = \frac{60}{\cos \theta} = \frac{80}{\sin \theta}$

$\frac{\sin \theta}{\cos \theta} = \frac{80}{60}$ $\theta = 53^\circ$



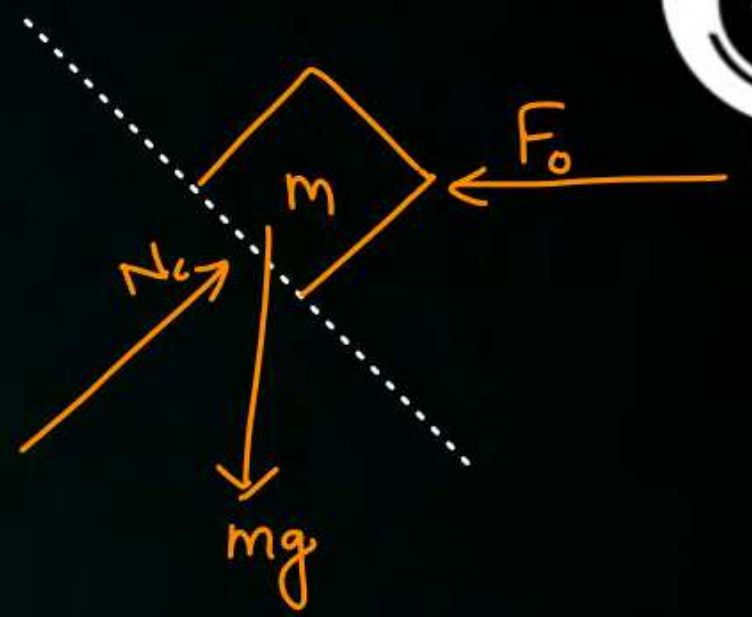
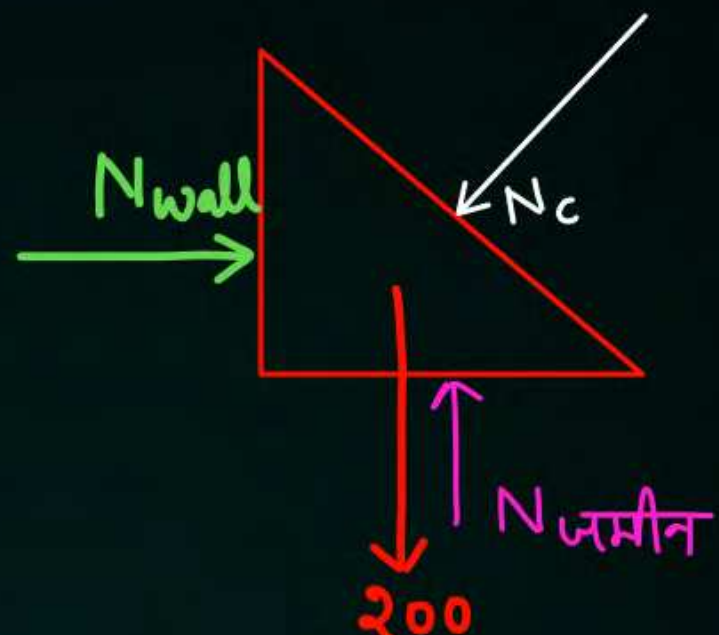
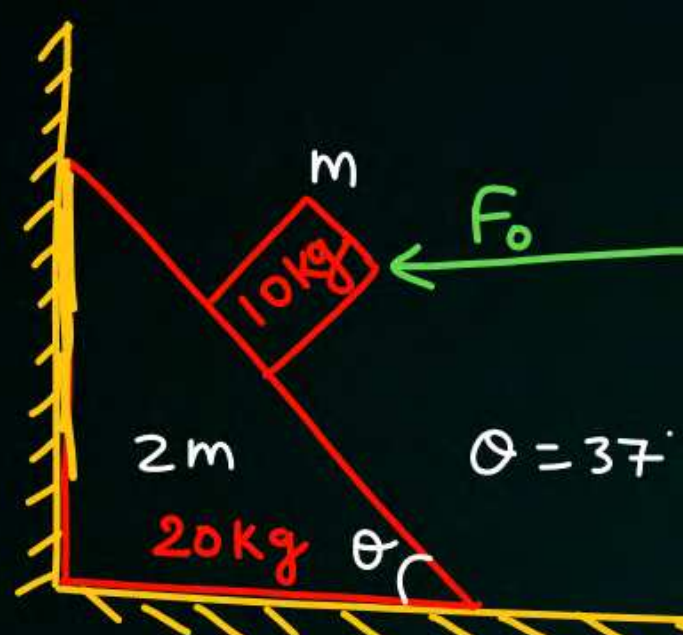
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$$N = mg \cos \theta$$

$$a = \frac{mg \sin \theta}{m} = g \sin \theta$$



Q



masses are in equilibrium
find everything.

- ① F_0
- ② N_{wall}
- ③ $N_{बल्लन}$
- ④ $N_{b/w block}$

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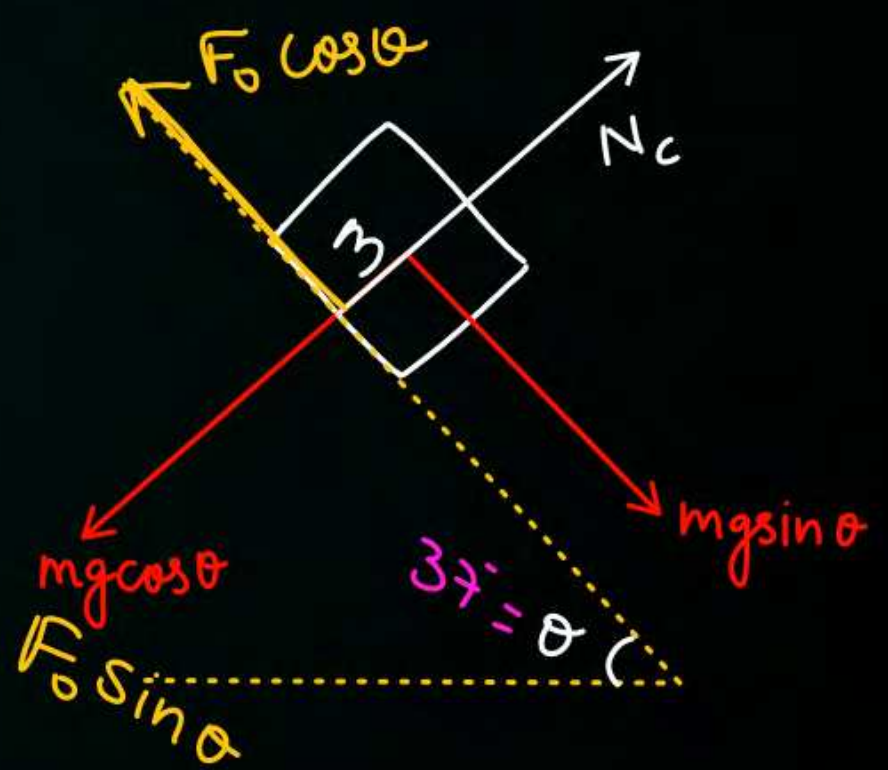
$$F_0 \cos \theta = mg \sin \theta$$

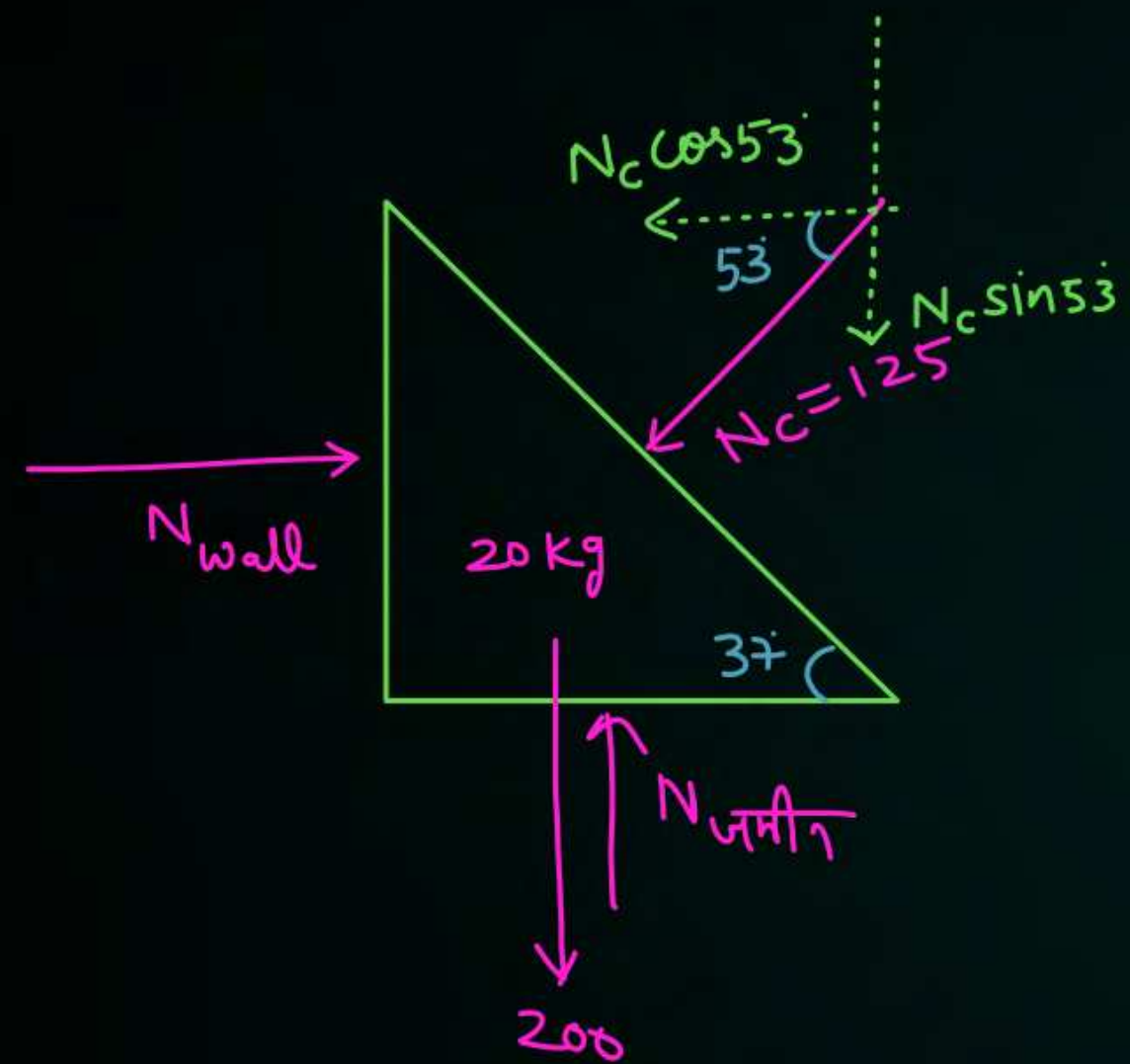
put value $F_0 \frac{4}{5} = 100 \times \frac{3}{5}$

$$F_0 = \frac{300}{4} = 75 \text{ N}$$

$$N_c = mg \cos \theta + F_0 \sin \theta$$

$$= 100 \times \frac{4}{5} + 75 \times \frac{3}{5} = 125$$



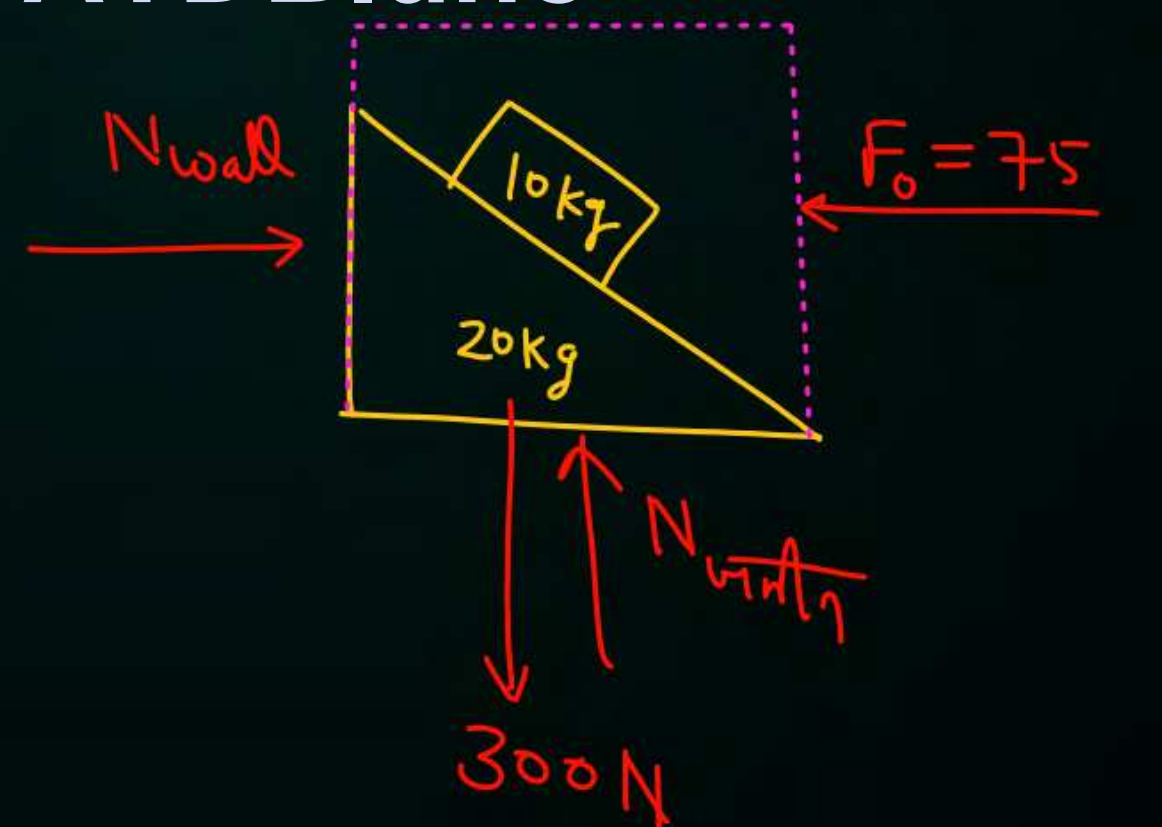


$$N_{wall} = N_c \cos 53 = 125 \times \frac{3}{5} = 75$$

$$N_{floor} = 200 + N_c \sin 53$$

$$= 200 + 125 \times \frac{4}{5} = 300$$

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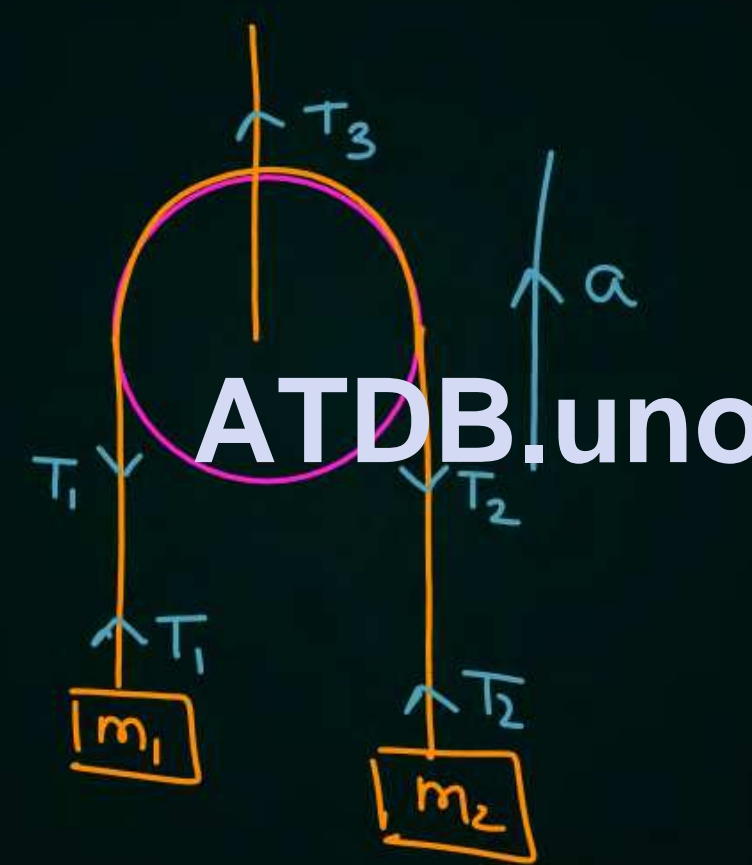


Pulley system (Atwood machine) → NLM, circular, WPE, COM
 → Rotation

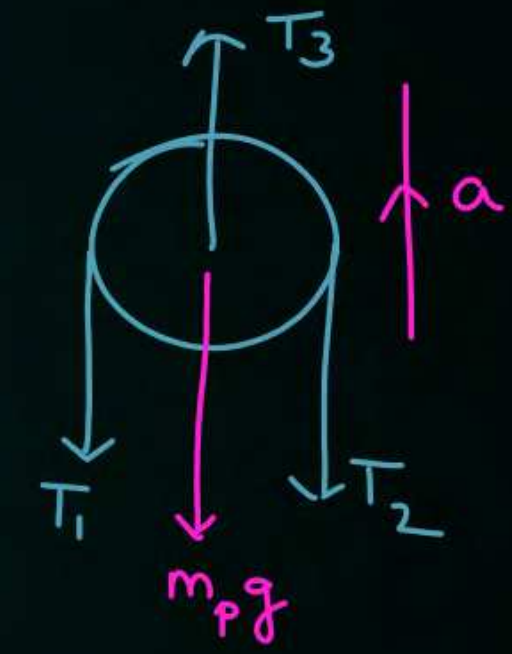
NLM

ideal pulley

- massless
- there is no friction b/w string & pulley.



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$$T_3 - (T_1 + T_2 + m_p g) = m_p a$$

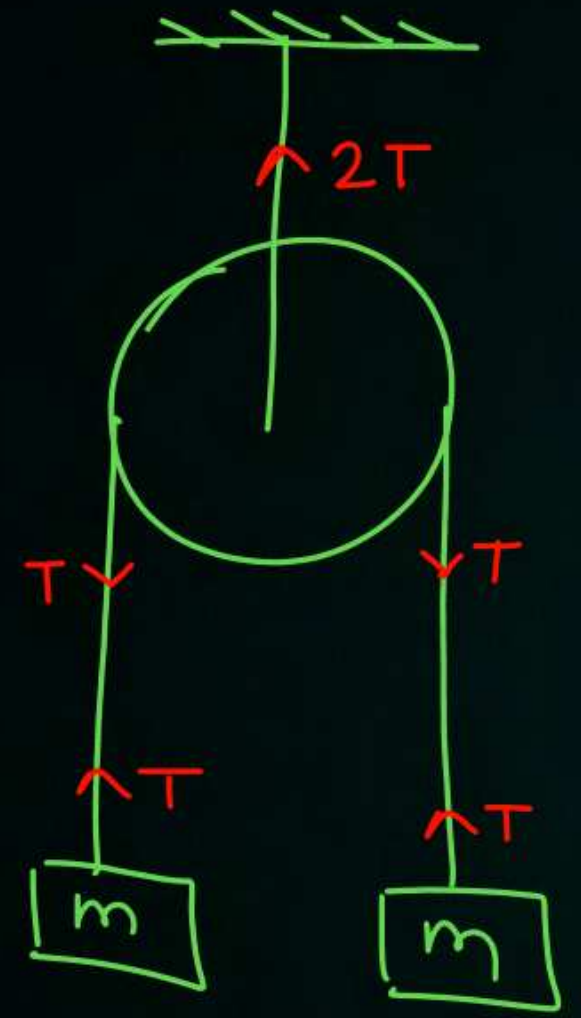
ideal NLM

$$m_p \rightarrow 0$$

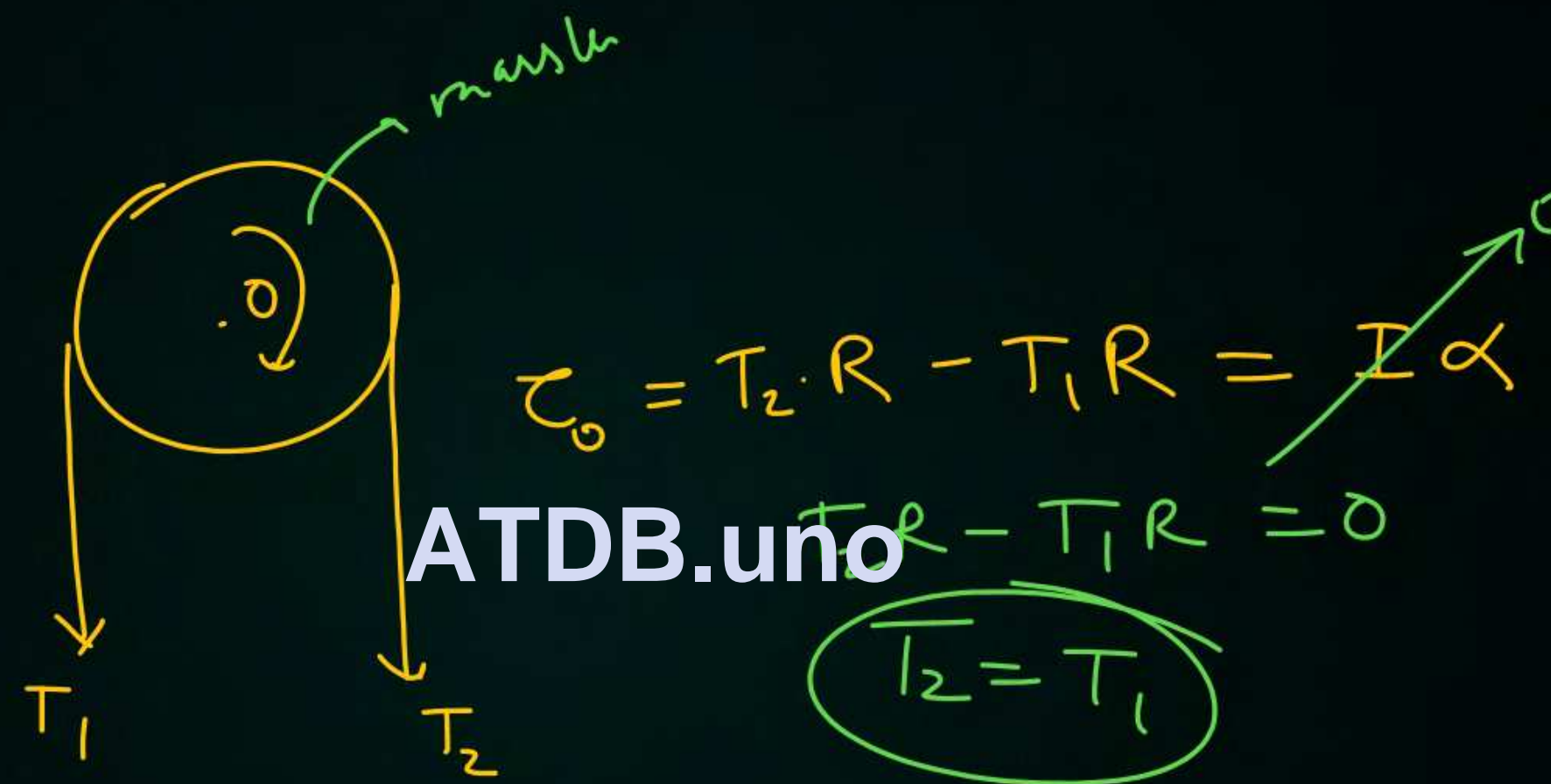
$$T_3 - (T_1 + T_2 + 0) = 0$$

$$T_3 = T_1 + T_2$$

$$T_1 = T_2 = T, \quad f = 0$$



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Always ^(SKC) जब भी कभी N, T पूछे सबसे पहले FBD बनाओ

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Home work

- Take rest & revise kinematics
NLM h.w will start tomorrow
- DPP 1 \Rightarrow (theoretical & take reading)

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THANK YOU

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