PRAYAS

JEE 2025

Lecture - 03

Physics

Laws Of Motion

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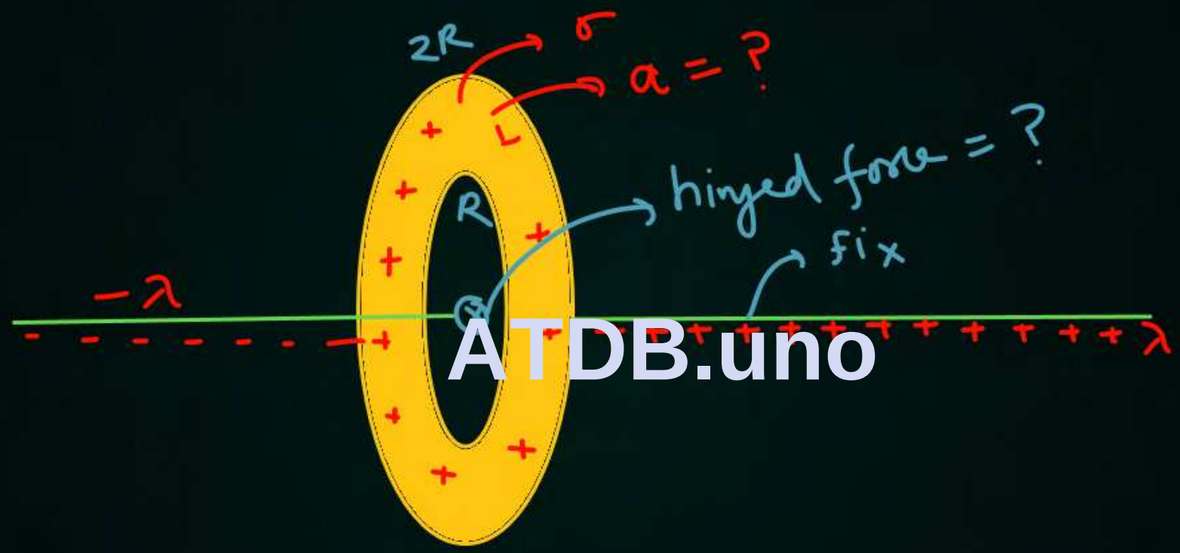
Topics to be covered

1. Equilibrium
2. Pulley System
3.

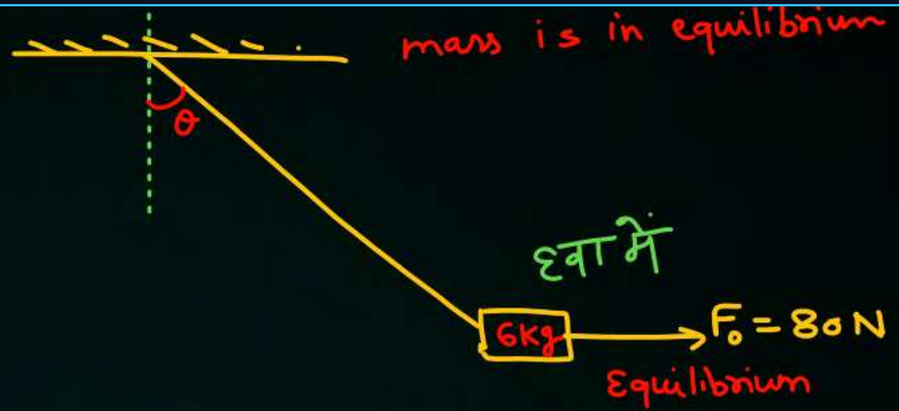


(Transt.)

① mass is in equilibrium find

Equilibrium में q ues

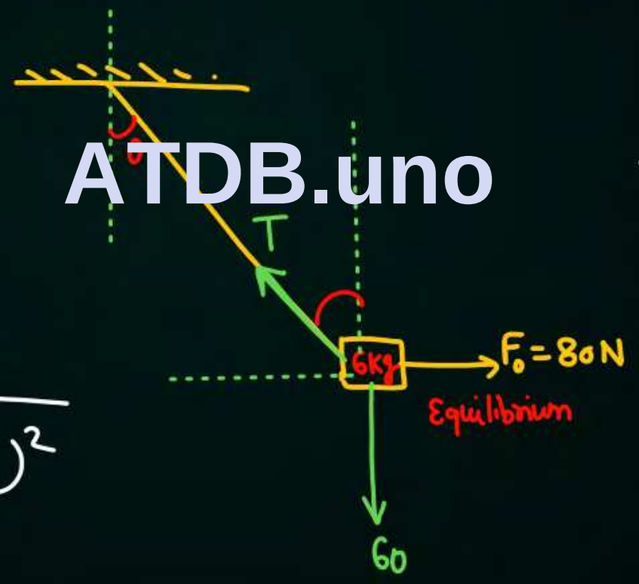
$F_{net} = 0$



हवा में

* FBD
* Component
* Balance

Sol^n



$T\sin\theta = 80$

$T\cos\theta = 60$

$\tan\theta = \frac{4}{3}$

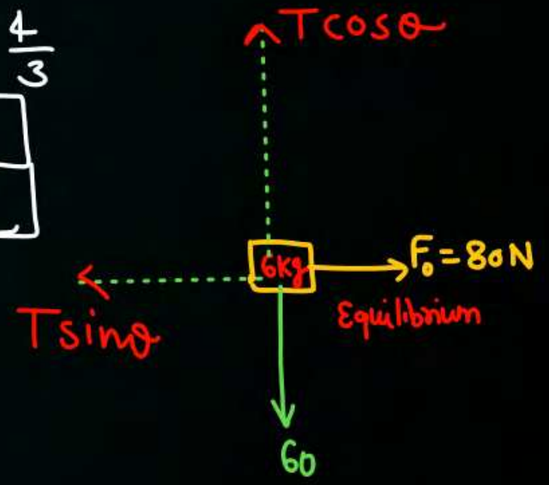
$\theta = 53^\circ$

$T = 100$

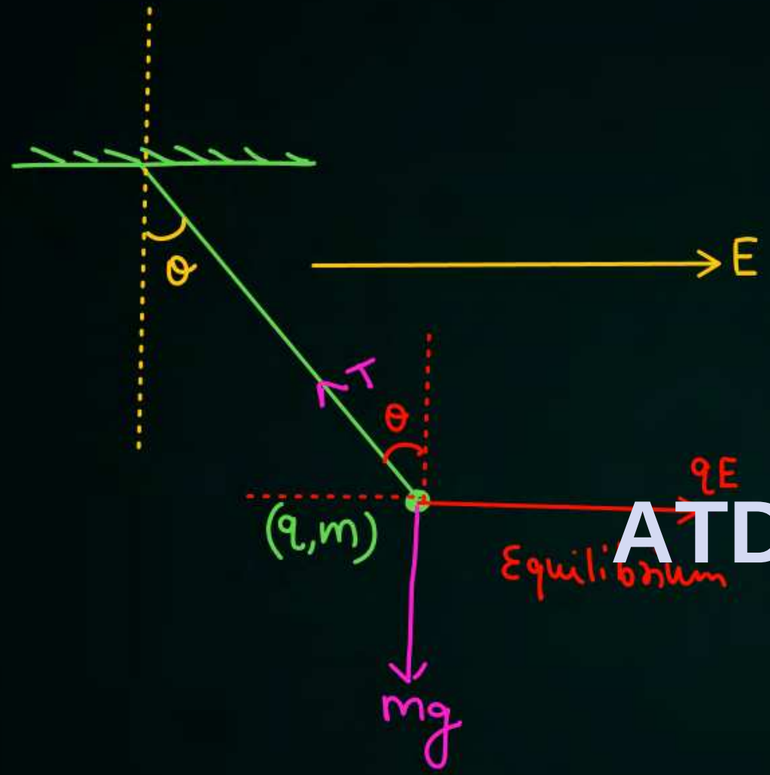
$$T = \sqrt{F_0^2 + (mg)^2}$$

$$= \sqrt{(80)^2 + (60)^2}$$

$$T = 100$$



12th class



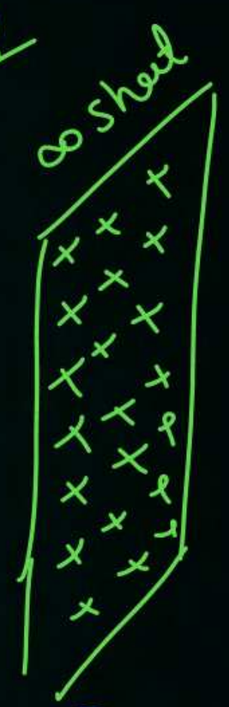
Equilibrium

$T\sin\theta = qE$

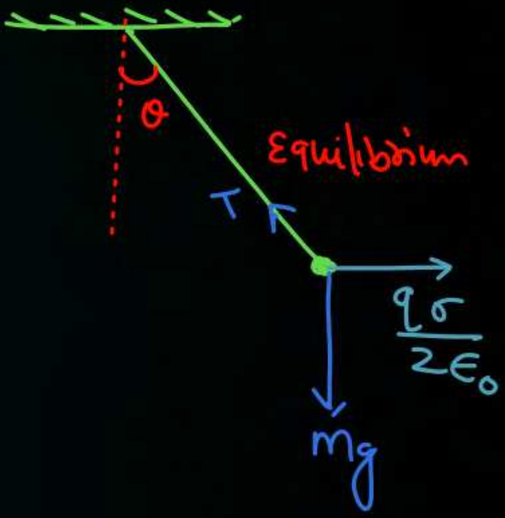
$T\cos\theta = mg$

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

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

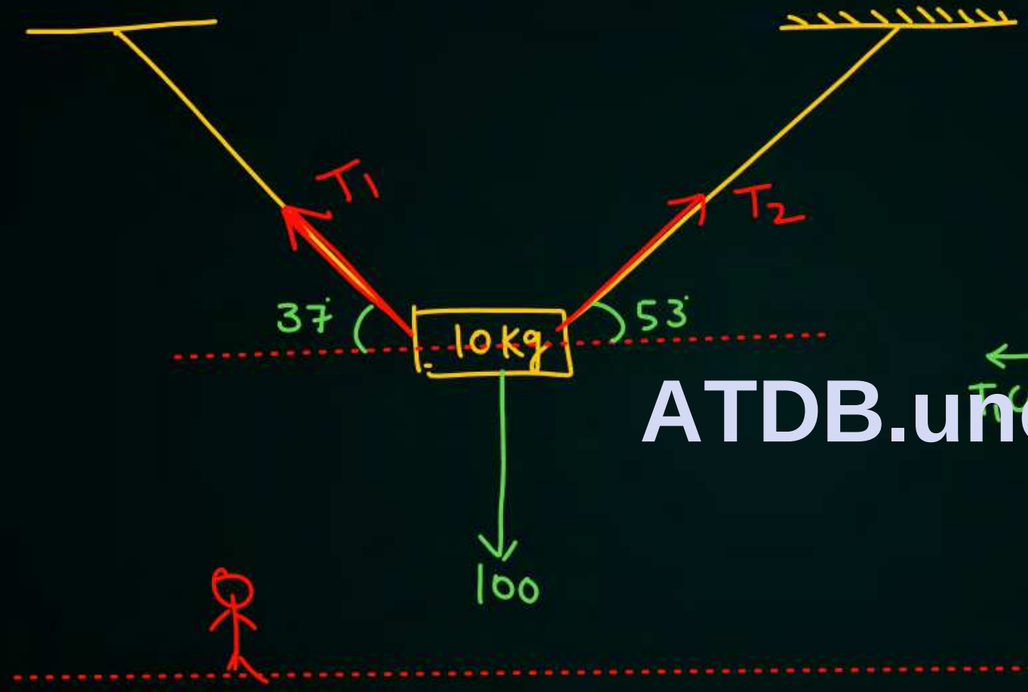


$E = \frac{\sigma}{2\epsilon_0}$

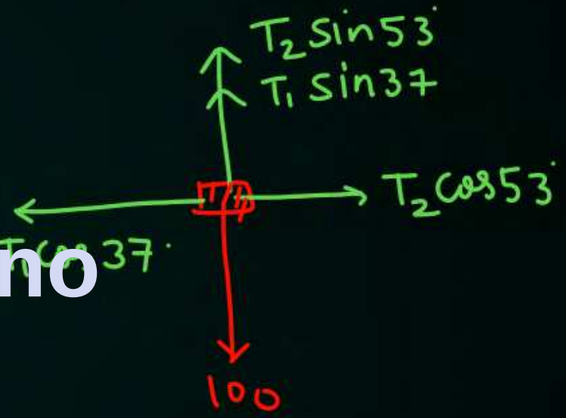


Equilibrium

Q



find tension in string.

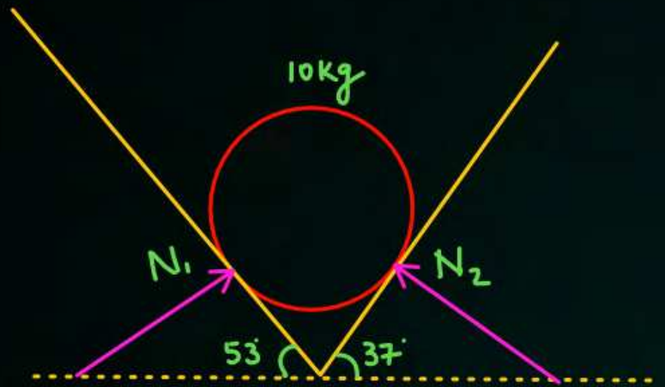


$T_2\cos 53 = T_1\cos 37$

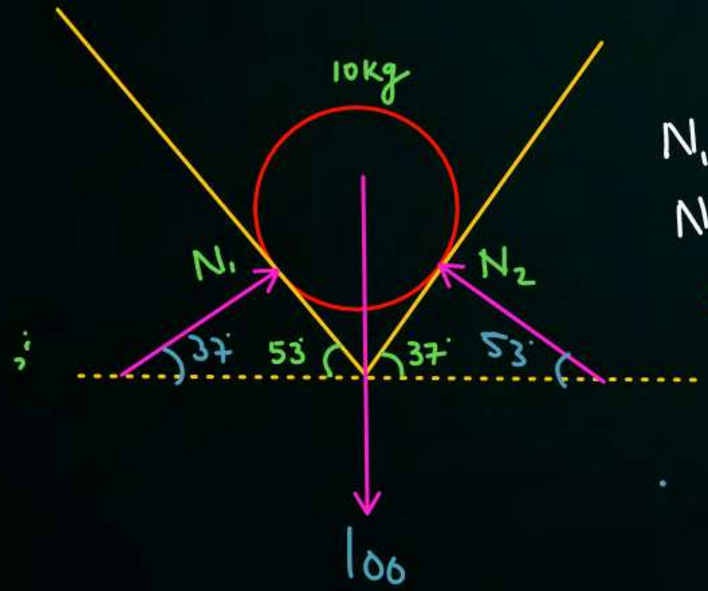
$T_2\sin 53 + T_1\sin 37 = 100$

Solve & get

Q



force applied by wall on sphere.



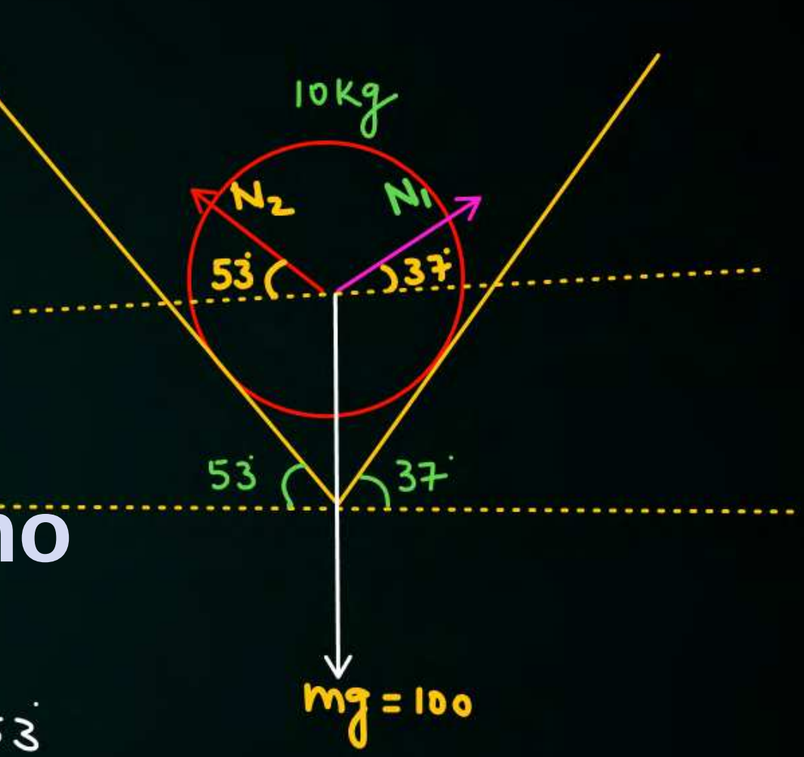
$N_1 \cos 37^\circ = N_2 \cos 53^\circ$

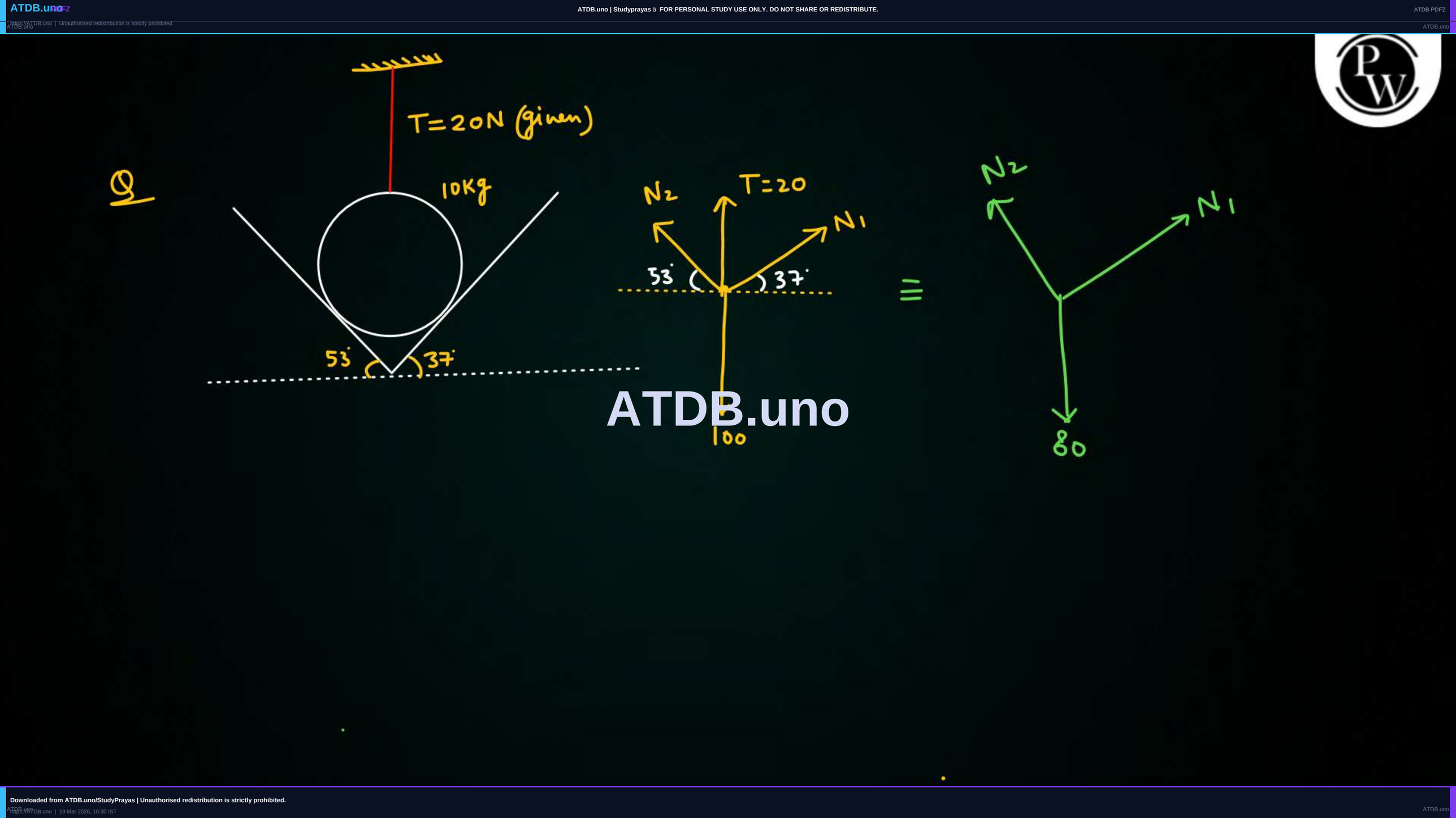
$N_1 \sin 37^\circ + N_2 \sin 53 = 100$

Solve

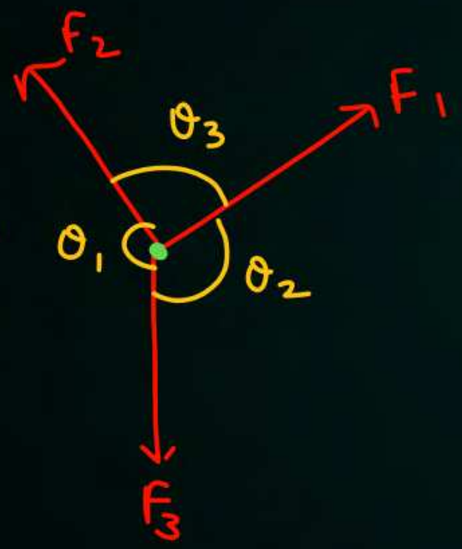
$N_2 = 80$

$N_1 = 60$





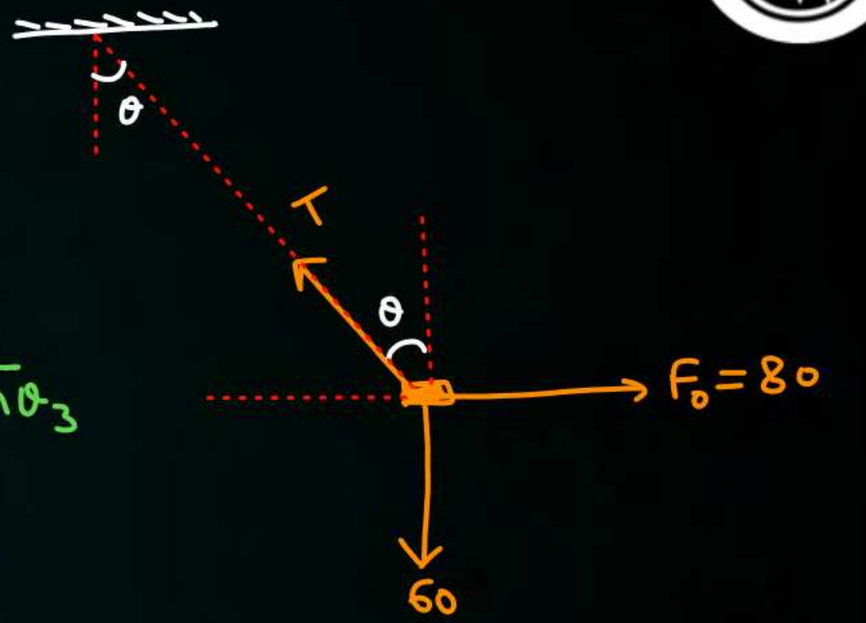
Lami's theorem



$$\vec{F_1}+\vec{F_2}+\vec{F_3}=0$$

Equilibrium

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

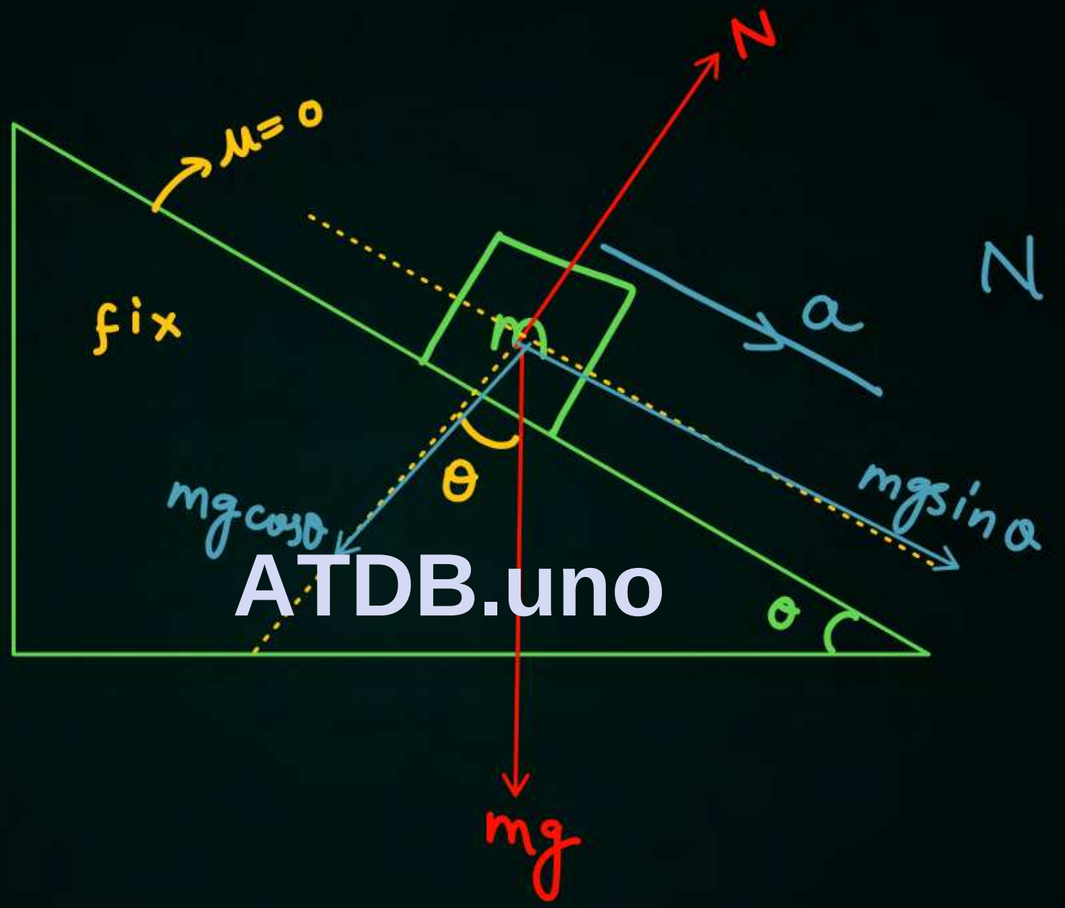


$$\frac{T}{\sin 90}=\frac{60}{\sin(90+\theta)}=\frac{80}{\sin(180-\theta)}$$

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

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

$$\theta=53^\circ$$

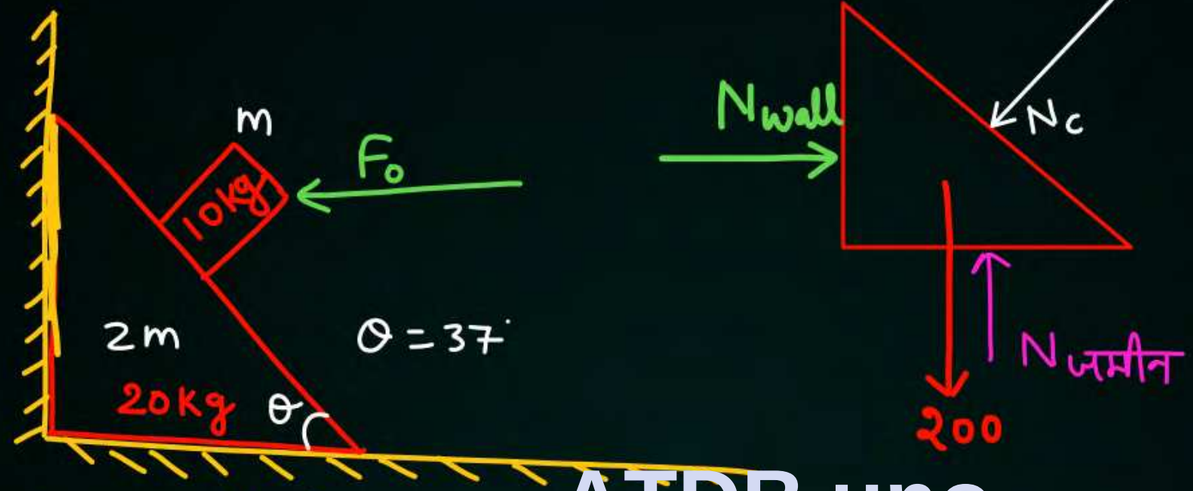


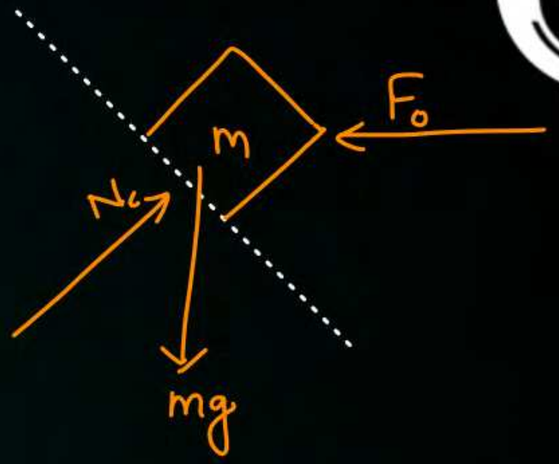
$$N = mg\cos\theta$$

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

$$= g\sin\theta$$

Q





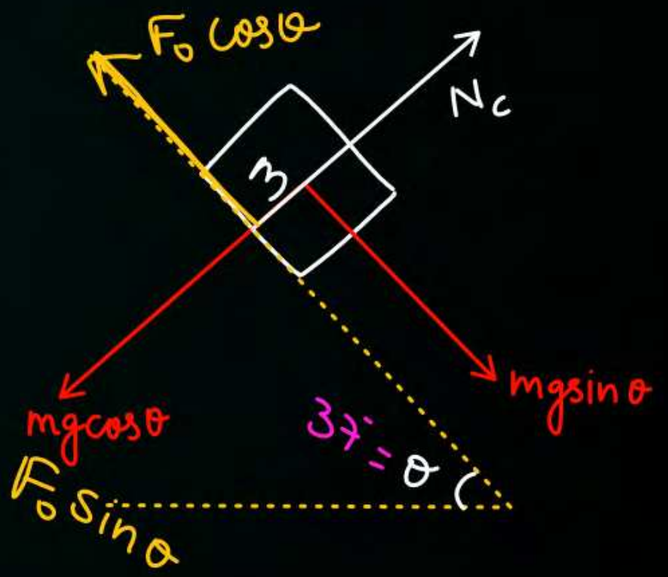
masses are in equilibrium
find everything.

1. F_0
2. N_{wall}
3. N_{ground}
4. $N_{b/w\ block}$

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

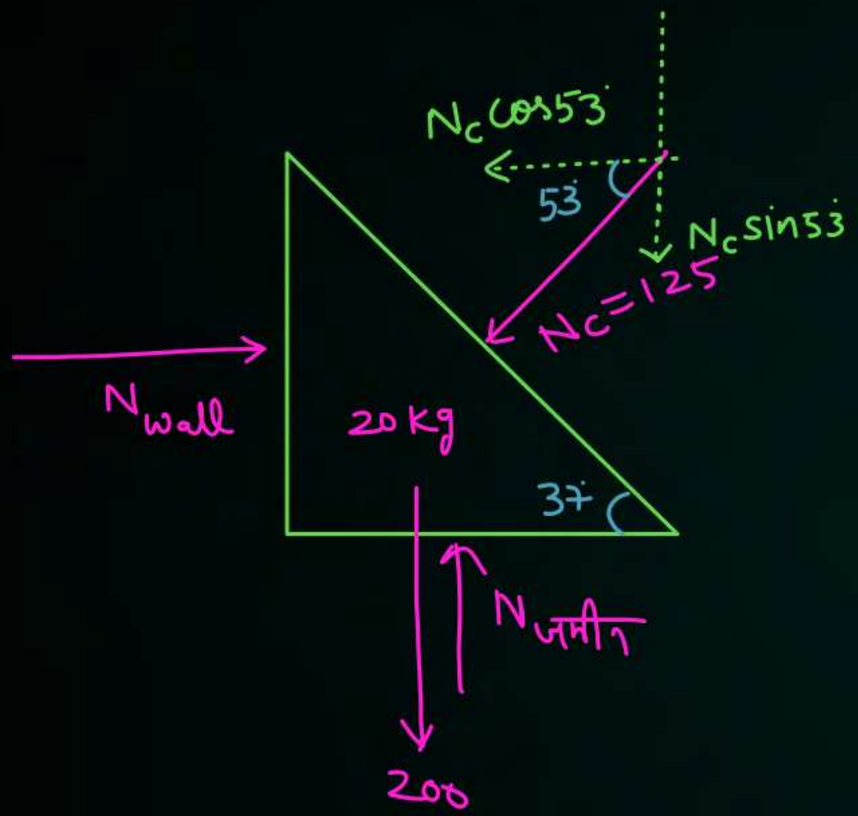
put value $F_0 \frac{4}{5} = 100 \times \frac{3}{5}$

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



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

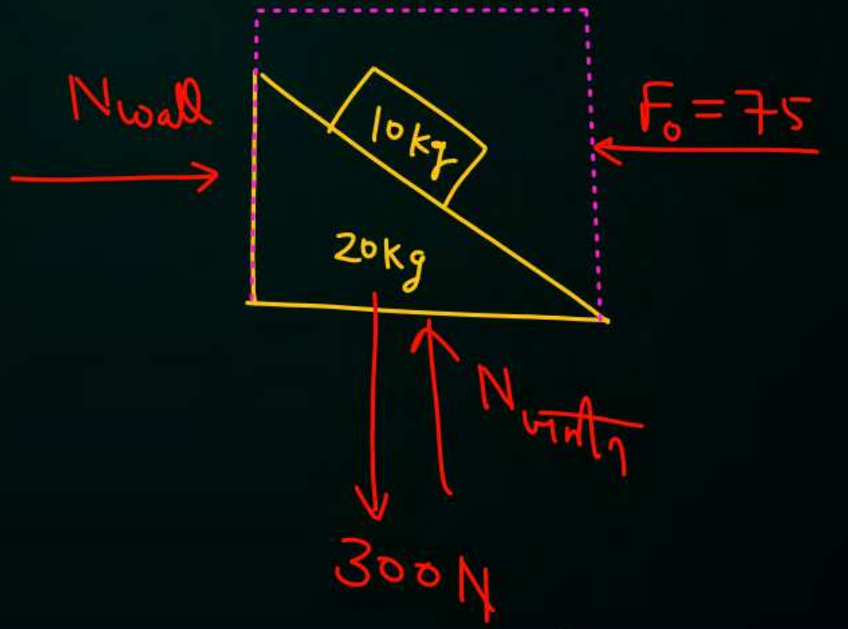
$$= 100 \times \frac{4}{5} + 75 \times \frac{3}{5} = 125$$



$$N_{wall} = N_c\cos53 = 125\times\frac{3}{5} = 75$$

$$N_{ज़मीन} = 200 + N_c\sin53^\circ$$

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



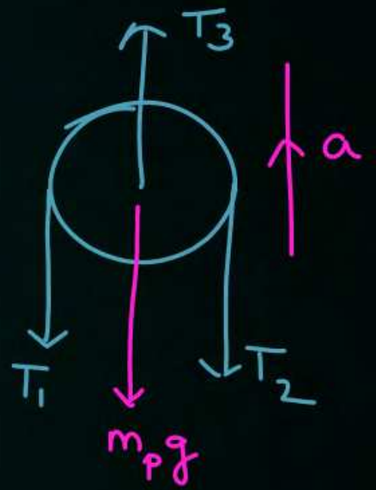
Pulley system (Atwood machine)

→ NLM, Circular, WPE, COM

→ Rotation

NLM **ideal pulley**

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



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

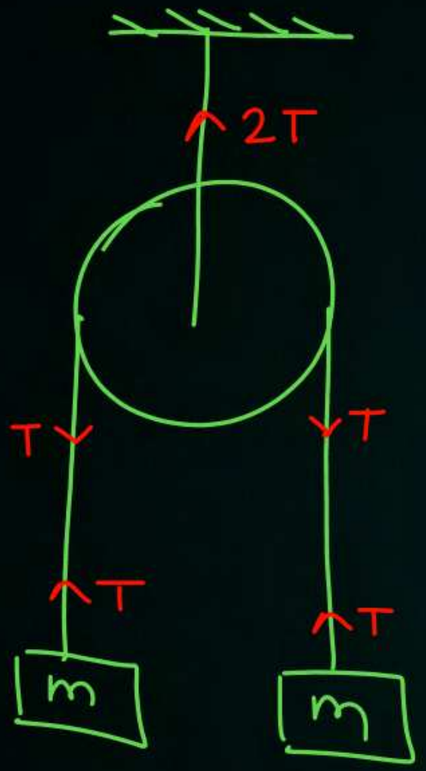
ideal NLM

$m_p \to 0$

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

$$T_3 = T_1 + T_2$$

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



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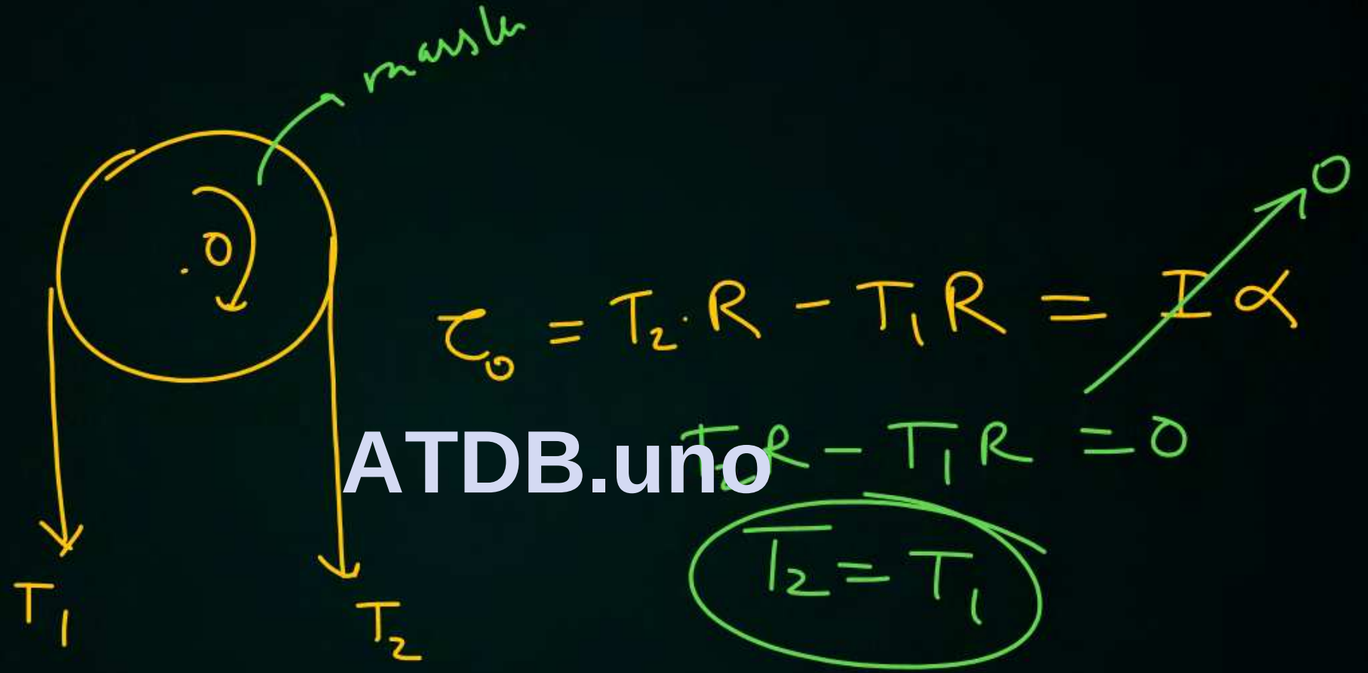

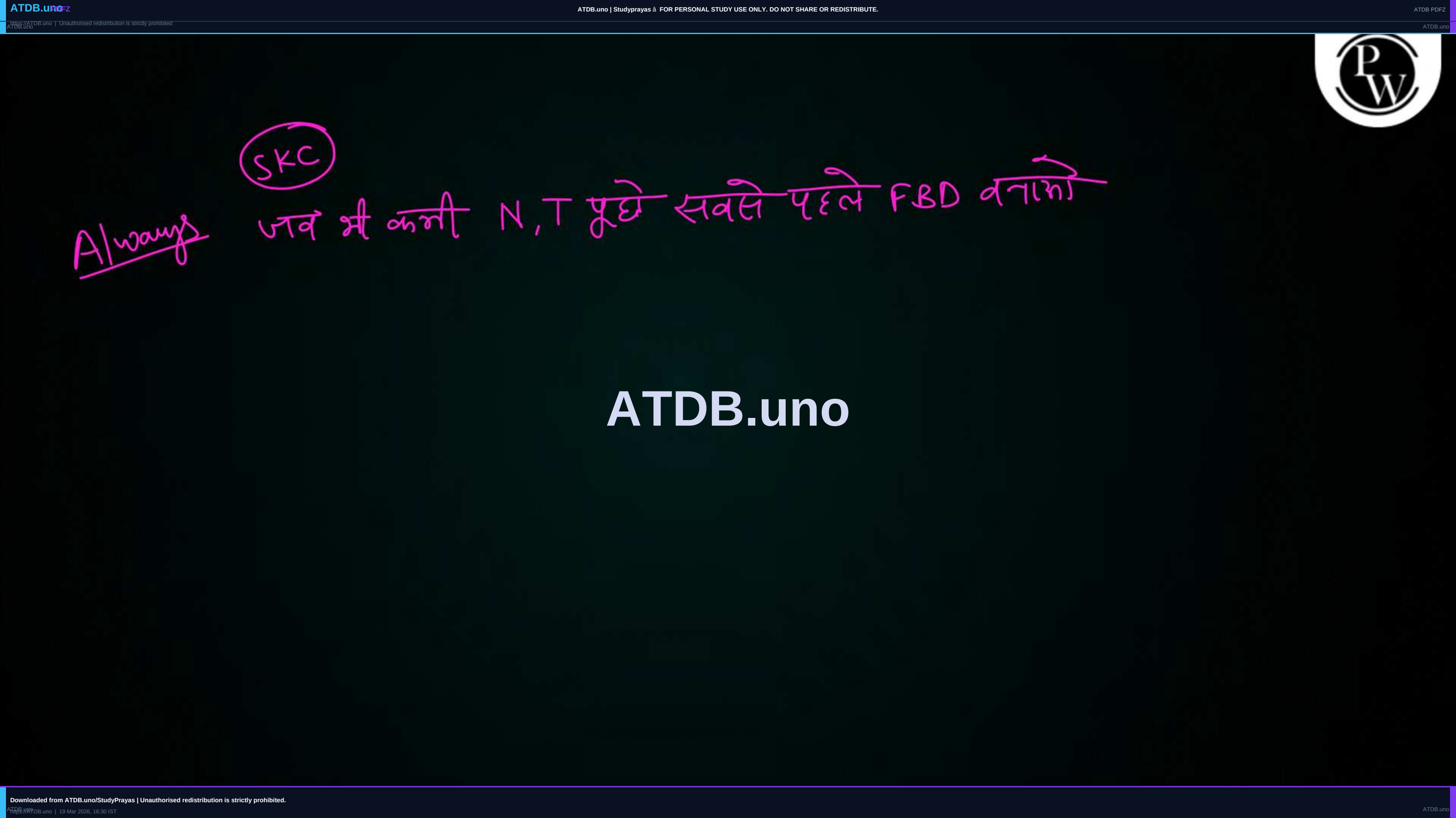

Home Work

- Take rest revise kinematics
  NLM H.W will start tommorw
- DPP 1 ⇒ (theoritical & take reading)