# YAKEEN NEET 2.0

2026

## Laws of Motion


PHYSICS | Lecture 04

By - Saleem Ahmed Sir

## Todays Goal

- Equilibrium.

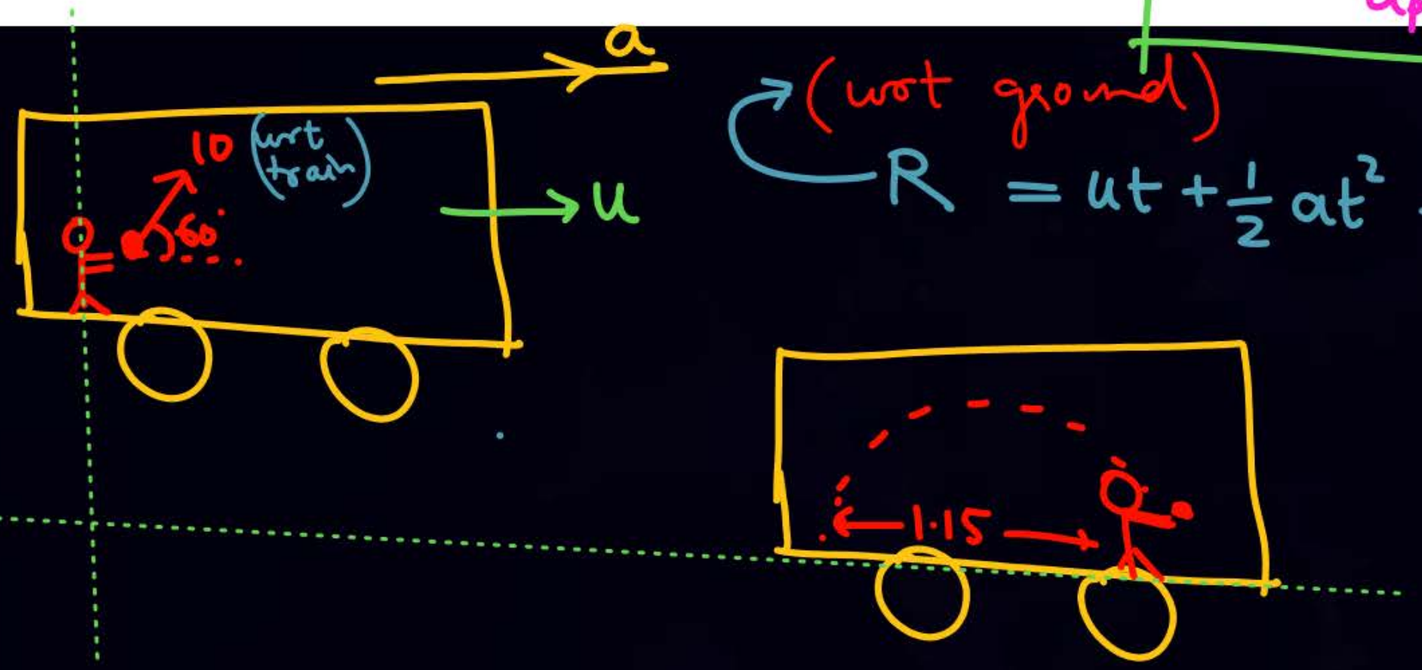
**1.** A train is moving along a straight line with a constant acceleration 'a'. A boy standing in the train throws a ball forward with a speed of 10 m/s, at an angle of 60° to the horizontal. The boy has to move forward by 1.15 m inside the train to catch the ball back at the initial height. The acceleration of the train, in $m/s^2$, is **[IIT-JEE 2011]**

एक ट्रेन समान त्वरण 'a' से एक सीधी रेखा पर चल रही है। ट्रेन में खड़ा एक लड़का 10 m/s के वेग से क्षैतिज से 60° के कोण पर एक गेंद आगे की ओर फेंकता है। लड़का ट्रेन में 1.15 m आगे चलकर गेंद को उसकी आरंभिक ऊंचाई पर पकड़ता है। ट्रेन के त्वरण का मान $m/s^2$ में है।

**Ans. 5**

$\vec{a}_{p/box} = \vec{a}_p - \vec{a}_{box}$

$a_{p/box} = 0 - a$



wrt ground

$T = \frac{2 \times 10 \times \frac{\sqrt{3}}{2}}{10} = \sqrt{3}$


wrt ground

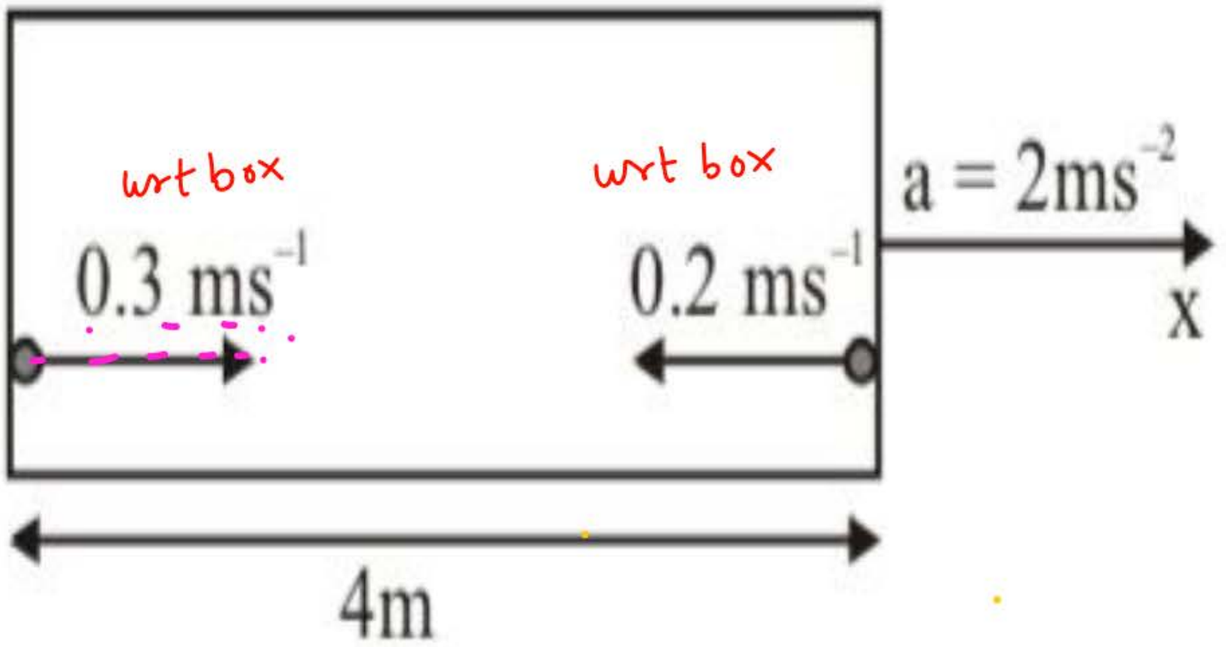
$(5+u)t = 1.15 + ut + \frac{1}{2}at^2$

$5t + ut = 1.15 + ut + \frac{1}{2}at^2$

$5\sqrt{3} = 1.15 + \frac{1}{2} \times a \times (\sqrt{3})^2$

$\Rightarrow$ solve $a = 5$

**2.** A rocket is moving in a gravity free space with a constant acceleration of 2 $ms^{-2}$ along + x directio (see figure). The length of a chamber inside the rocket is 4m. A ball is thrown from the left end of t chamber in + x direction with a speed of 0.3 $ms^{-1}$ relative to the rocket. At the same time, another ba is thrown in –x direction with a speed of 0.2 $ms^{-1}$ from its right end relative to the rocket. The time seconds when the two balls hit each other is . **[JEE Advanced 2014**

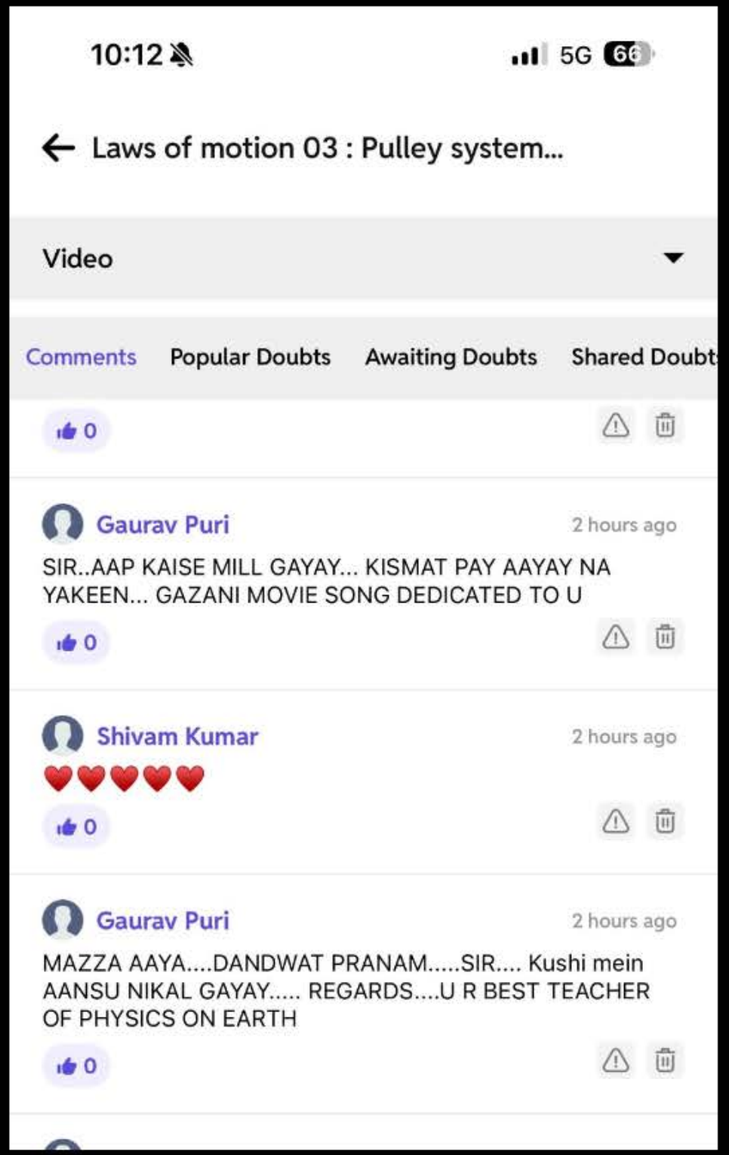


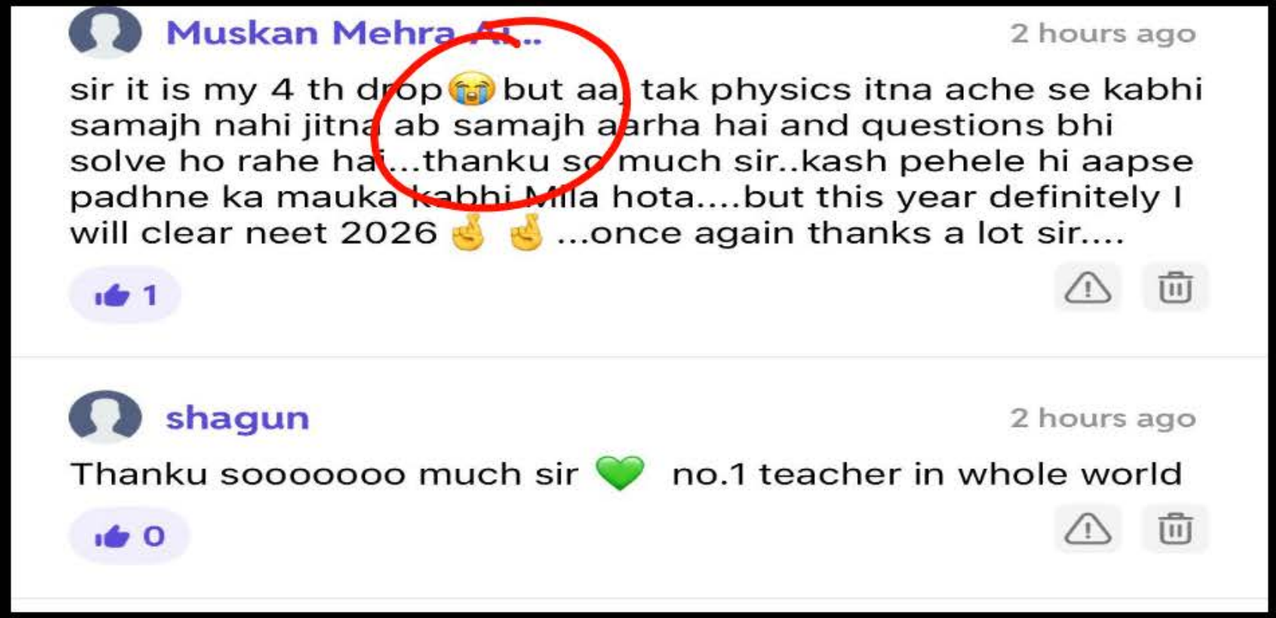

$u_{rel} = .5$

$s_{rel} = 4$

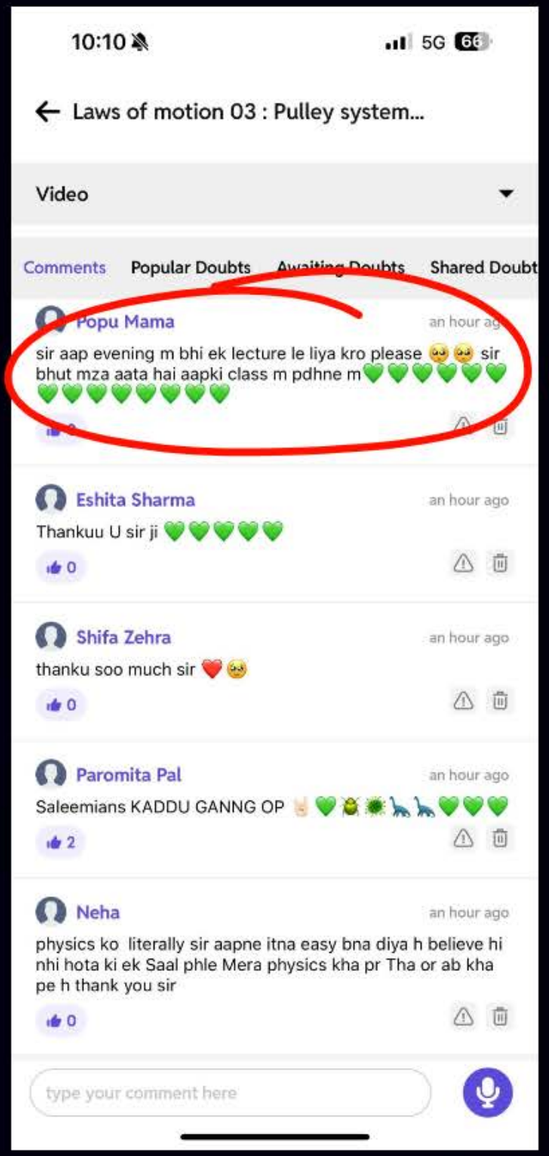
$t = \frac{4}{.5}$

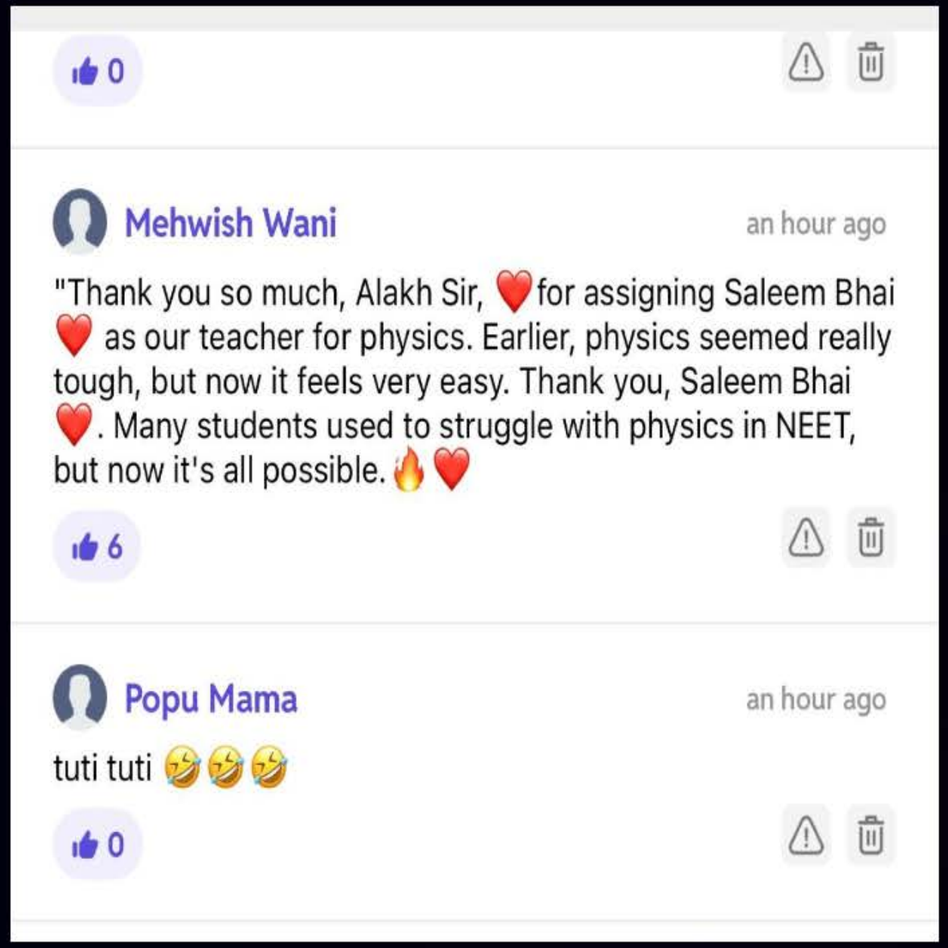
$t = 8$


10:12
5G
Laws of motion 03 : Pulley system...
Video
Comments
Popular Doubts
Awaiting Doubts
Shared Doubt
0
Gaurav Puri
2 hours ago
SIR..AAP KAISE MILL GAYAY... KISMAT PAY AAYAY NA YAKEEN... GAZANI MOVIE SONG DEDICATED TO U
0
Shivam Kumar
2 hours ago
0
Gaurav Puri
2 hours ago
MAZZA AAYA....DANDWAT PRANAM.....SIR.... Kushi mein AANSU NIKAL GAYAY..... REGARDS....U R BEST TEACHER OF PHYSICS ON EARTH
0


Muskan Mehra A...
2 hours ago
sir it is my 4 th drop but aaj tak physics itna ache se kabhi samajh nahi jitna ab samajh aarha hai and questions bhi solve ho rahe hai...thanku so much sir..kash pehele hi aapse padhne ka mauka kabhi Mila hota....but this year definitely I will clear neet 2026 ...once again thanks a lot sir....
1
shagun
2 hours ago
Thanku soooooooo much sir no.1 teacher in whole world
0


VIVEK
2 hours ago
sir literally aankhon m aanshu aagye piche ke saare chapters backlog m hai isi chapter se start kr rha hu nlm se BILKUL HOPE NHI TH START KRNE SE PEHLE ab bdhiya lag rha
thank u so much sir
LOVE U SIR
4
Soumyodeep Ghos...
2 hours ago
Kal tak mai pulley se dar ta raha, ab pulley dekh kar hasi aa rahi hai. Thank you so much Sir for this amazing lecture
1


10:10
5G
Laws of motion 03 : Pulley system...
Video
Comments
Popular Doubts
Awaiting Doubts
Shared Doubt
Popu Mama
an hour ago
sir aap evening m bhi ek lecture le liya kro please 🥺🥺 sir bhut mza aata hai aapki class m pdhne m💚💚💚💚💚💚💚💚💚💚💚💚
Eshita Sharma
an hour ago
Thankuu U sir ji 💚💚💚💚💚
0
Shifa Zehra
an hour ago
thanku soo much sir ❤️🥺
0
Paromita Pal
an hour ago
Saleemians KADDU GANNG OP 🕯️💚🪲🌻🦕🦕💚💚💚
2
Neha
an hour ago
physics ko literally sir aapne itna easy bna diya h believe hi nhi hota ki ek Saal phle Mera physics kha pr Tha or ab kha pe h thank you sir
0
type your comment here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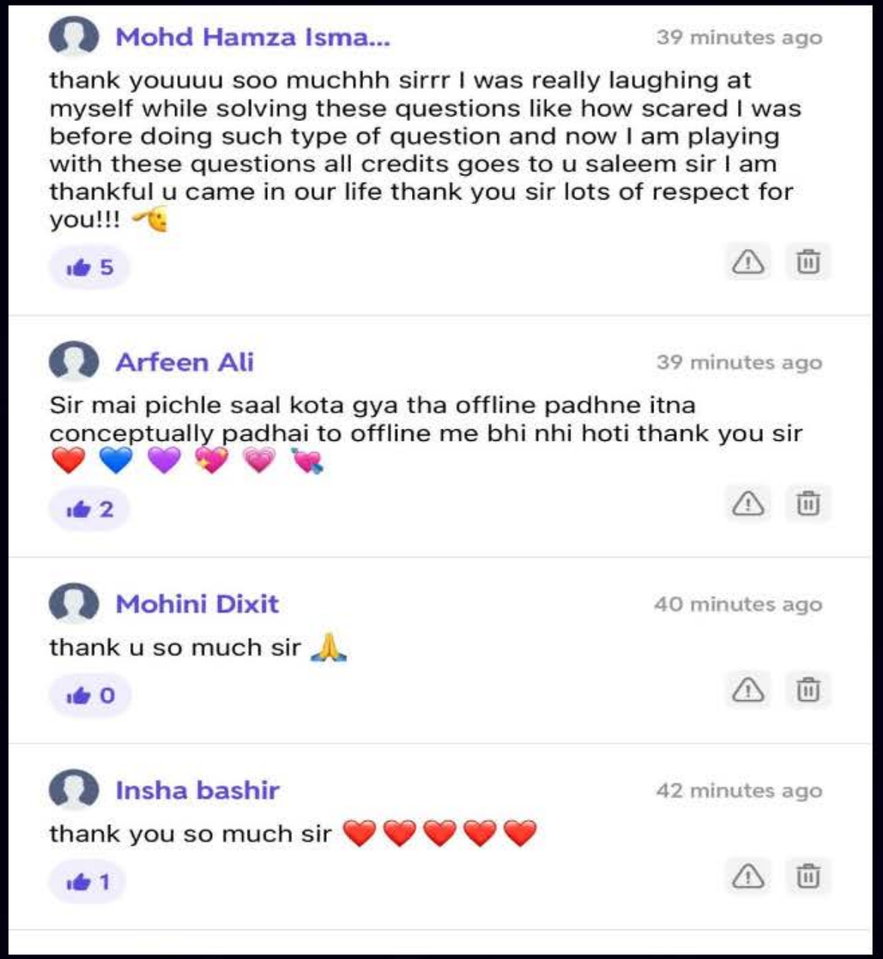
Mehwish Wani
an hour ago
"Thank you so much, Alakh Sir, ❤️for assigning Saleem Bhai ❤️ as our teacher for physics. Earlier, physics seemed really tough, but now it feels very easy. Thank you, Saleem Bhai ❤️. Many students used to struggle with physics in NEET, but now it's all possible.🔥❤️
6
Popu Mama
an hour ago
tuti tuti 🤣🤣🤣
0


Mohd Hamza Isma...
39 minutes ago
thank youuuu soo muchhh sirrr I was really laughing at myself while solving these questions like how scared I was before doing such type of question and now I am playing with these questions all credits goes to u saleem sir I am thankful u came in our life thank you sir lots of respect for you!!! 🫡
5
Arfeen Ali
39 minutes ago
Sir mai pichle saal kota gya tha offline padhne itna conceptually padhai to offline me bhi nhi hoti thank you sir ❤️💙💜💖💗💘
2
Mohini Dixit
40 minutes ago
thank u so much sir 🙏
0
Insha bashir
42 minutes ago
thank you so much sir ❤️❤️❤️❤️❤️
1

Bhawna Verma — 23 minutes ago

sir bht emotional feel ho rha h aaj ka lecture bhtt bhtt acha lga literally esii feel kbhi nhi aayi NLM chapter ki ...thankyou so much guruji 💚💚💚 you are the best Saleen bhaiya last k questions me to aag hi lga di sir apne 💯💯💯💯

0

Kanha Dhawai — 27 minutes ago

sir sach m bhut dar lgta tha phle yeh question dekhker.....or aaj bhut simple lag rhe h thank you so much sir...

0

Jai Shri Ram — 27 minutes ago

freestyle coach of physics

0

Aradhya Gupta — 27 minutes ago

sir aap itna achha padhate hai ki mn krta sirf physics hi padhu ..... thank uu so much sir 🙏..... love from Lucknow 🤞🏻

1

Keshav Medics — 17 minutes ago

sir jii appse physics padhkar mere aankhon me aansu aa gaye sach me mera doctor banne ka sapna aap se hi poora hoga . bilkul sir aapse physics padhna mere life ka and neet journey ka best decision tha . and bas ab ishi decision ko AIIMS TAK PAHUCHANA HAI . ab lag raha hai ki Mera bhi sapna pura ho

1

Jai Pratap Sing... — 18 minutes ago

ab aa raha h physics padhne ka maja Malik Kaha the Ab tkkk

1

Saksham — 18 minutes ago

Saleem sir k aage koi Bol sakta hai kya 😎 True magician of physics

1

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1

Translation Equilibrium $\longrightarrow F_{net} = 0 \longrightarrow a = 0$

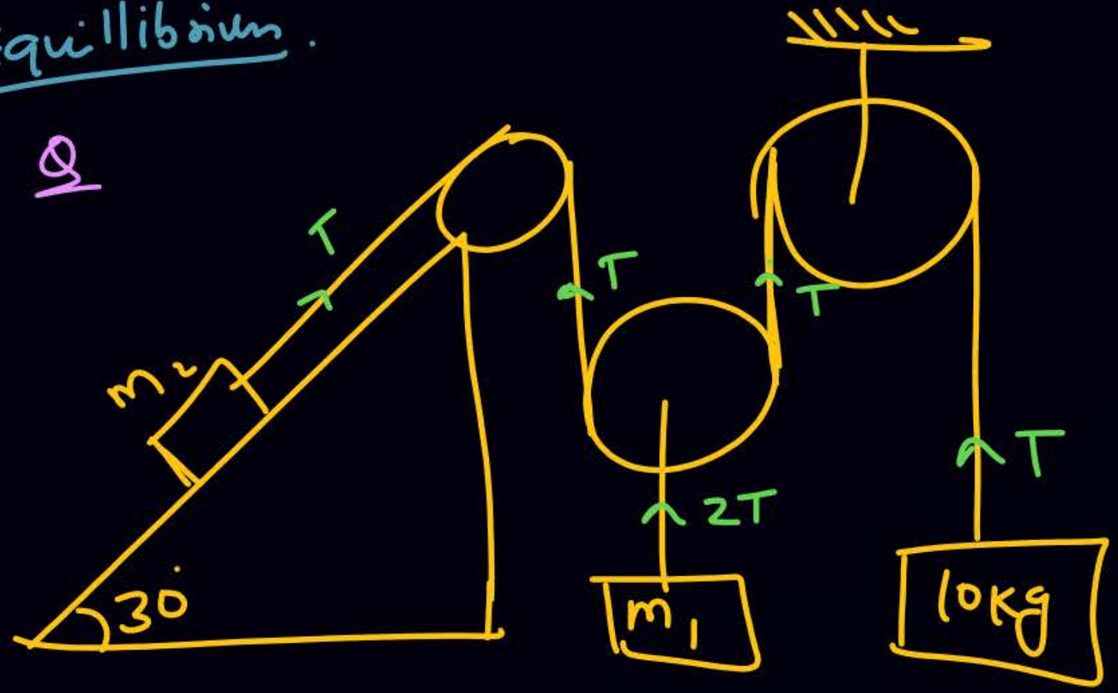
- Rest Rest Rest
- $\vec{v} \longrightarrow$ const (st. line path)

Rotational equil. $\longrightarrow \tau_{net} = 0$

$\longrightarrow$ बाद में Rotation में पढ़ेंगे

# Equilibrium.

Q




$T = 100$

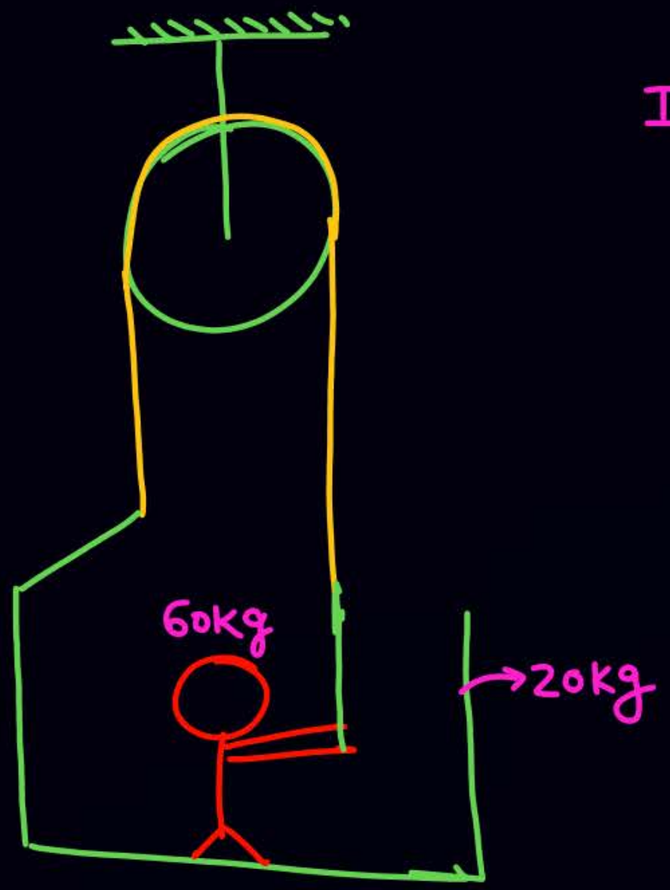
$2T = m_1 g$

$m_1 = 20\,kg$

$m_2 g \sin 30 = 100$

$m_2 = 20\,kg$

EXP NEET 2024



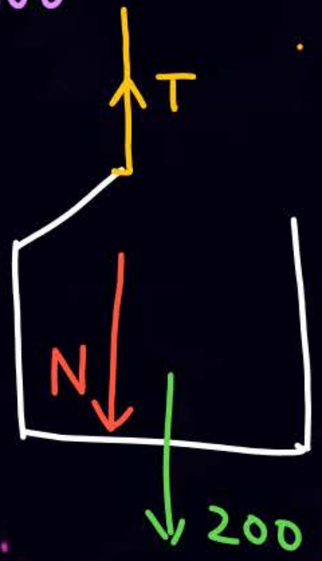

If system is in equilibrium.
find ① T ② Normal contact force b/w man & pinjda ..

हवा

Soln

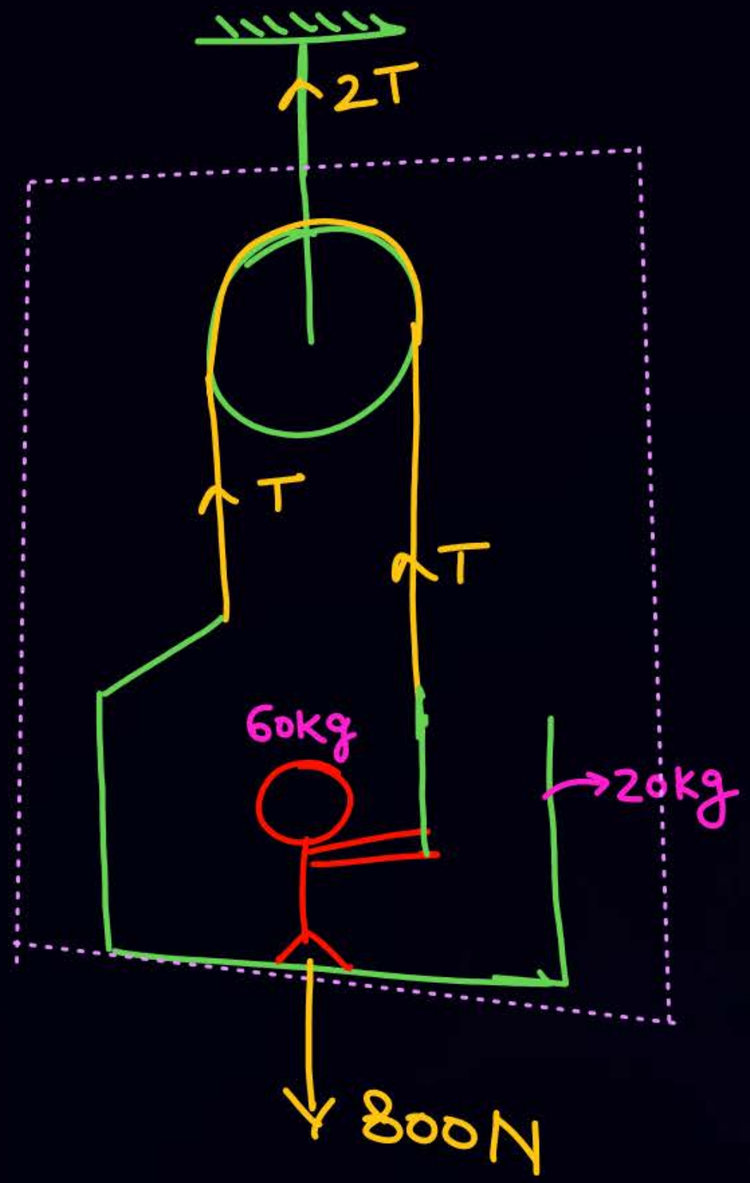

$T + N = 600$
$T = N + 200$

Solve & get $N = 200$, $T = 400$



EXP NEET 2024

SKC Mathematics




$2T = 800$

$T = 400$


$T + N = 600$

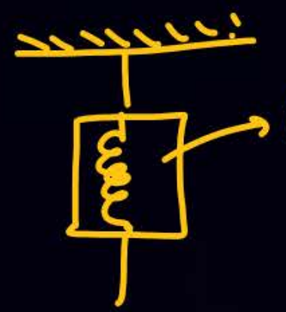
$400 + N = 600$

$N = 200$

हवा

SKC box

* T puchne ka tareeka . . .



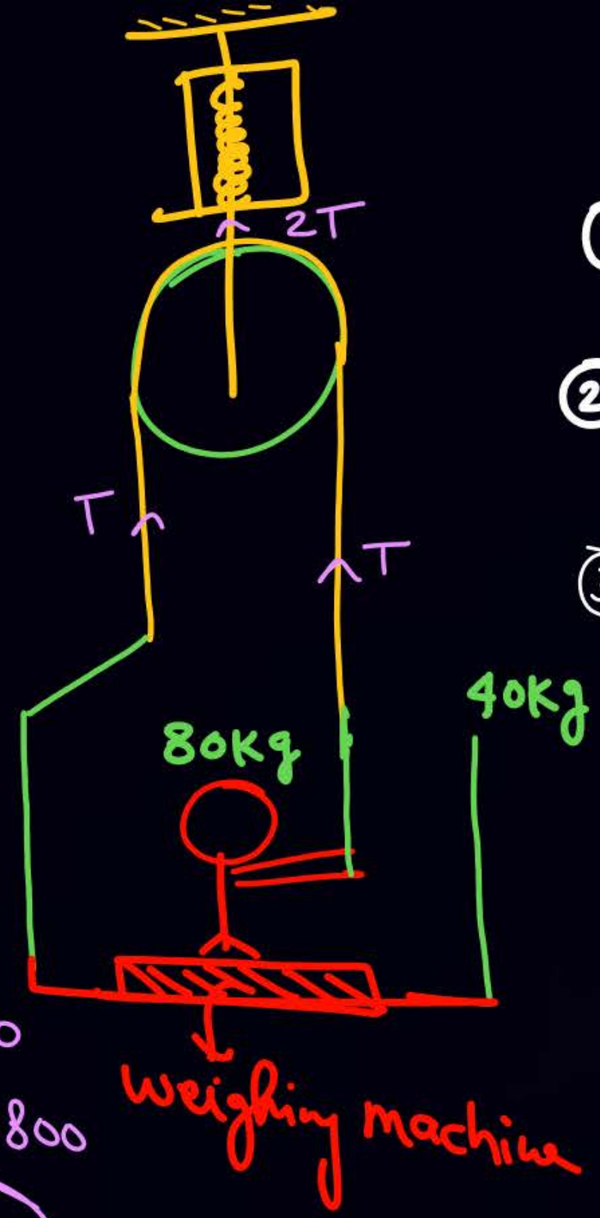
→ Reading of spring balance.

* N puchne ka tareeka

→ Reading of weighing machine.

SSSB language

NEET 26 E+P




If system is in equilibrium.

① Reading weighing machine $= N = 200N$

② Reading of spring balance $= 2T = 1200N$

③ By how much amount of force man is pulling the string. $= T = 600N$

④ force applied by string on man $= T = 600N$

⑤ force applied by string on cieling $= 2T = 1200N$

$2T = 1200$

$T = 600$


$T + N = 800$

$600 + N = 800$

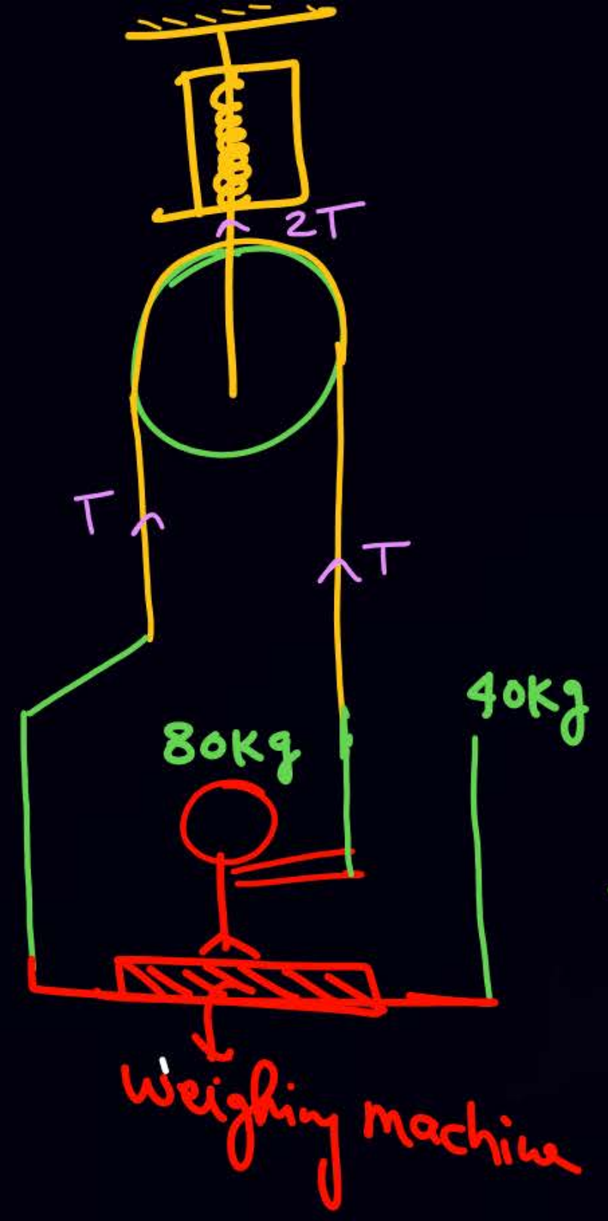
$N = 200$

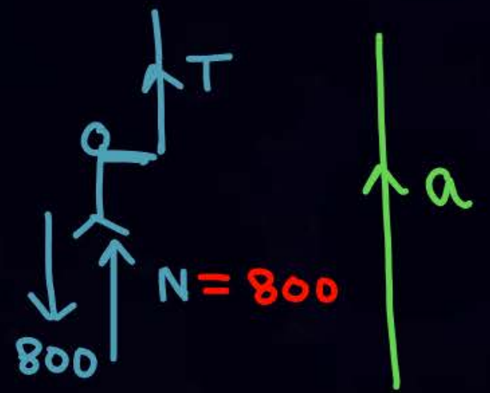
SSSB language

NEET 26 E+P

(3 Din ke bad)

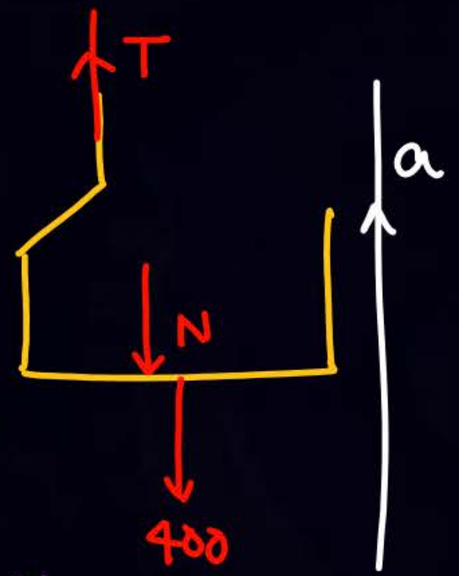
⑥ By how much force man should apply on string so that weighing machine shows true reading.




$T + 800 - 800 = 80a$

$T = 80a$ — ①



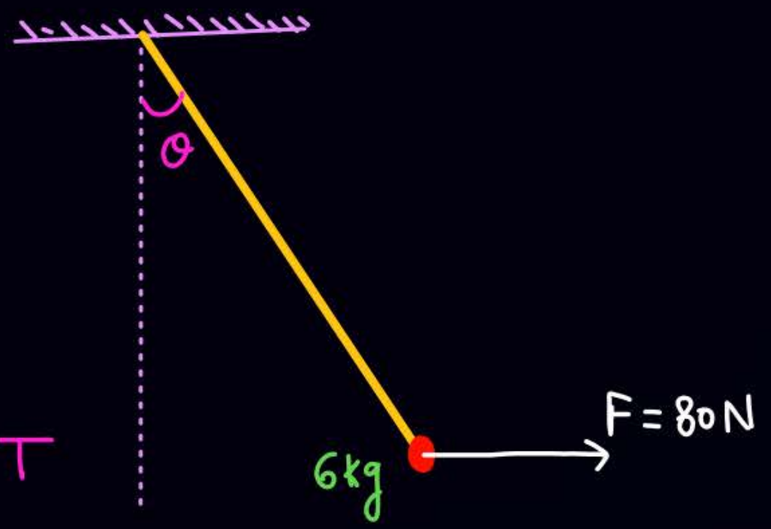

$T - N - 400 = 40a$

$T - 800 - 400 = 40a$

$T = 1200 + 40a$ — ②

Solve & get ⇒ $T = 2400$

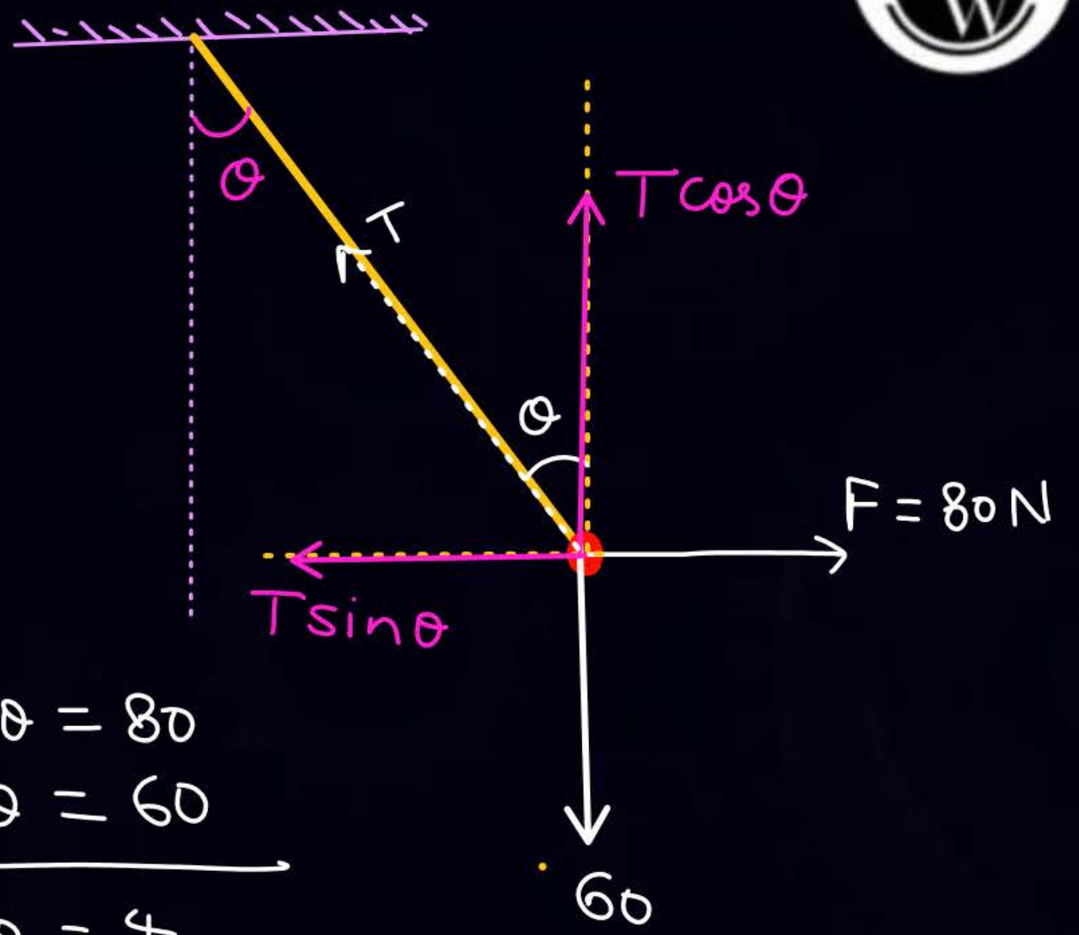
Q




mass is in equilibrium.

find θ & T

Sol^n




$T\sin\theta = 80$

$T\cos\theta = 60$

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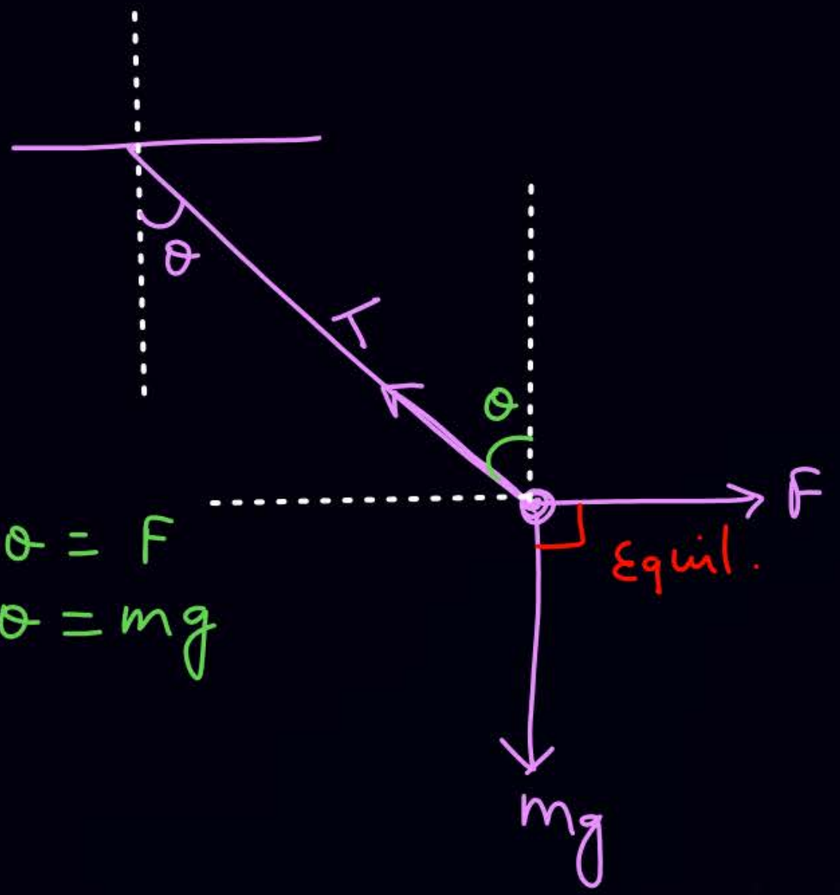
$\tan\theta = \frac{4}{3}$

$\theta = 53^\circ$

$T\sin 53 = 80$

$T = 100$




$T\sin\theta = F$

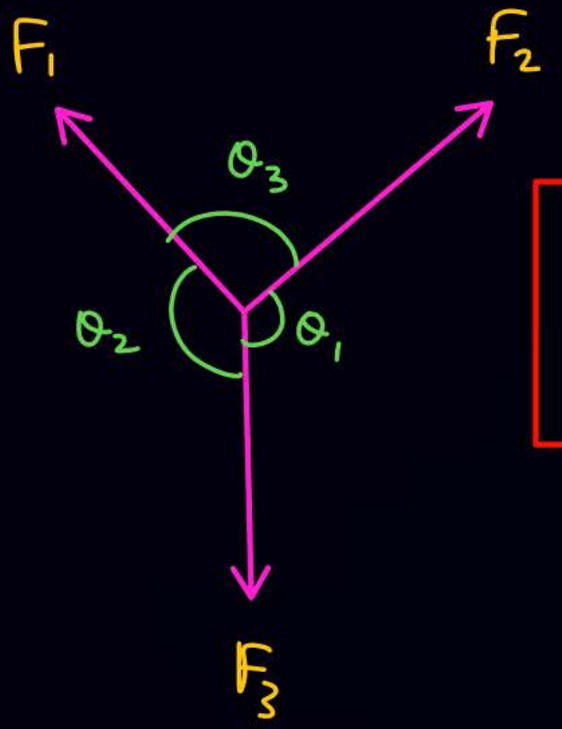
$T\cos\theta = mg$

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

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

note

# Lami's theorem

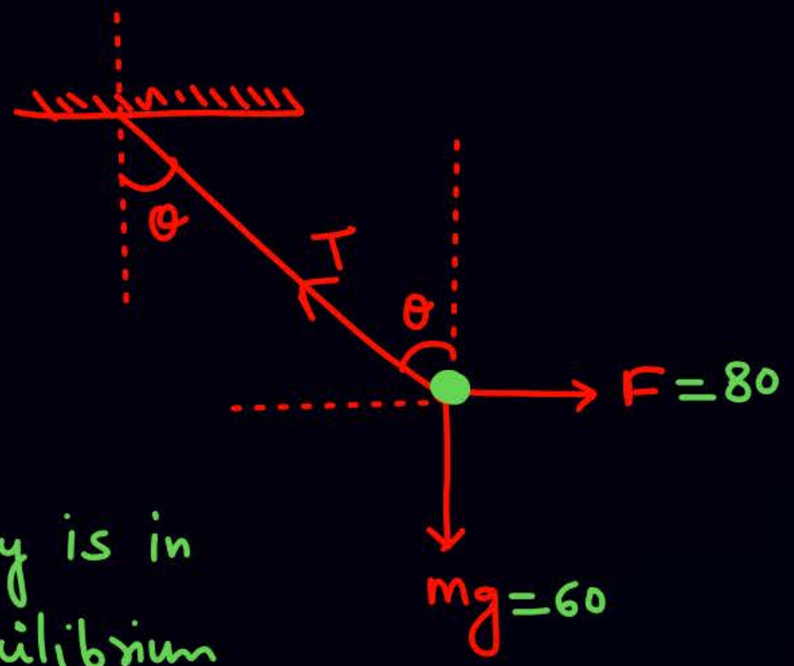



If $\vec{F_1} + \vec{F_2} + \vec{F_3} = 0$

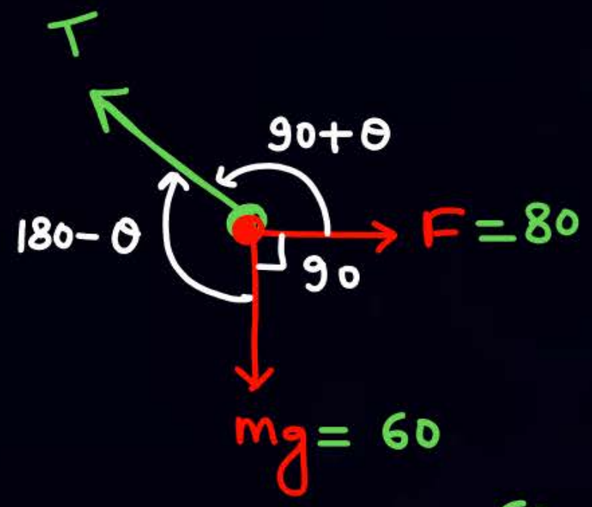
Body is in equil.

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

Q




Body is in equilibrium




Ratio

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

$\theta = 53$

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

$$\frac{T}{1} = \frac{80}{\sin\theta}$$

$T\sin\theta = 80$ — (1)

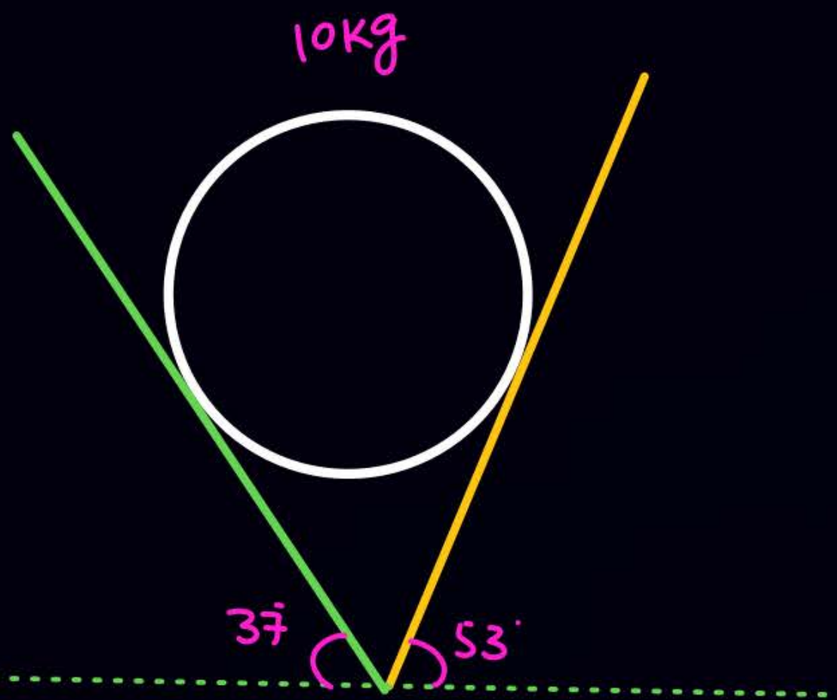
$$\frac{T}{1} = \frac{60}{\cos\theta}$$

$T\cos\theta = 60$ — (2)

SKC op****

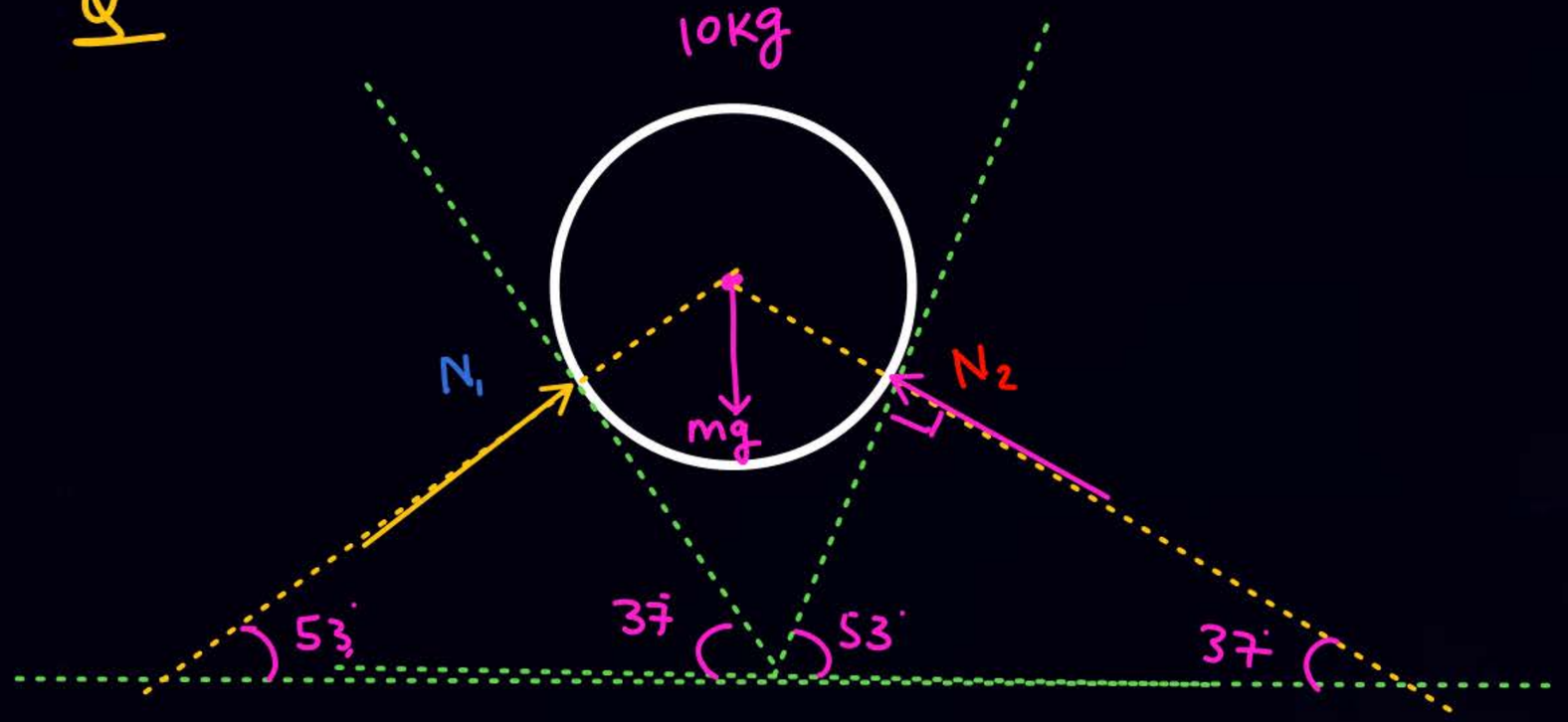
jab bhi kabhi humse N/T puchega... hum FBD Banayenge

Q

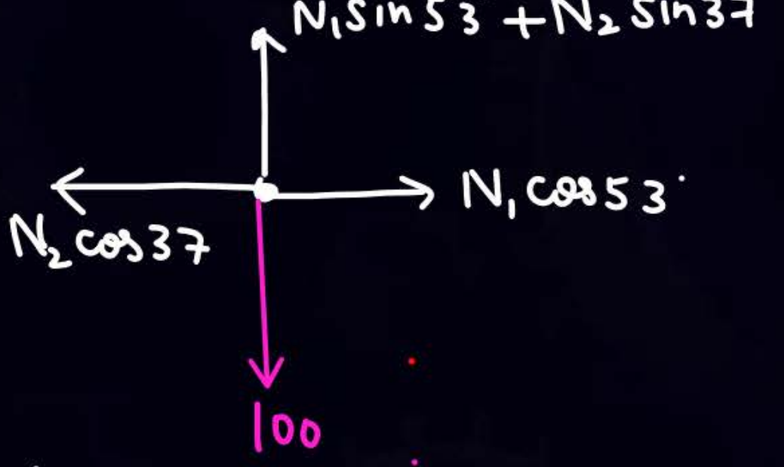



find the Normal force between ball & inclined.

Q





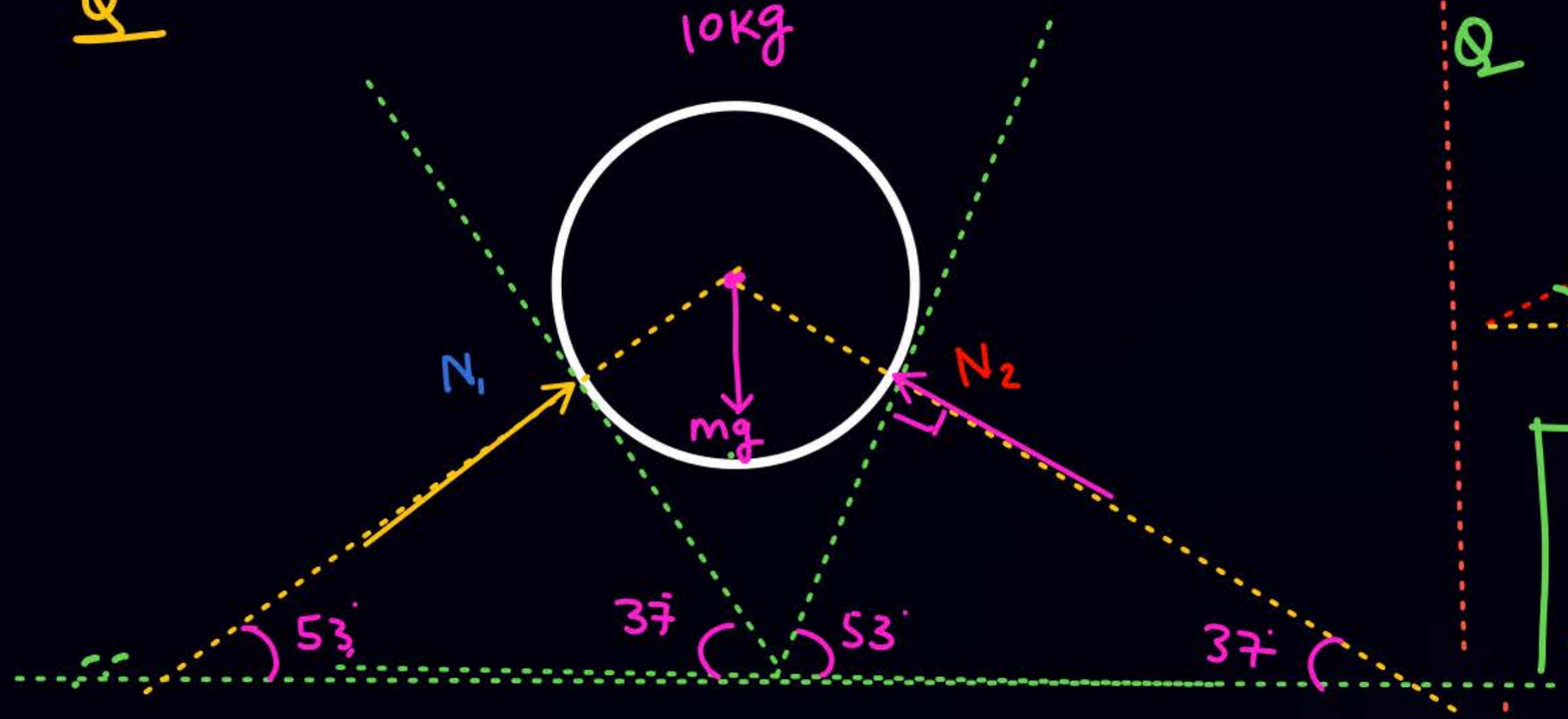



① $N_1 \cos 53 = N_2 \cos 37$

② $N_1 \sin 53^\circ + N_2 \sin 37^\circ = 100$

Solve & get $N_1 = 80$, $N_2 = 60$

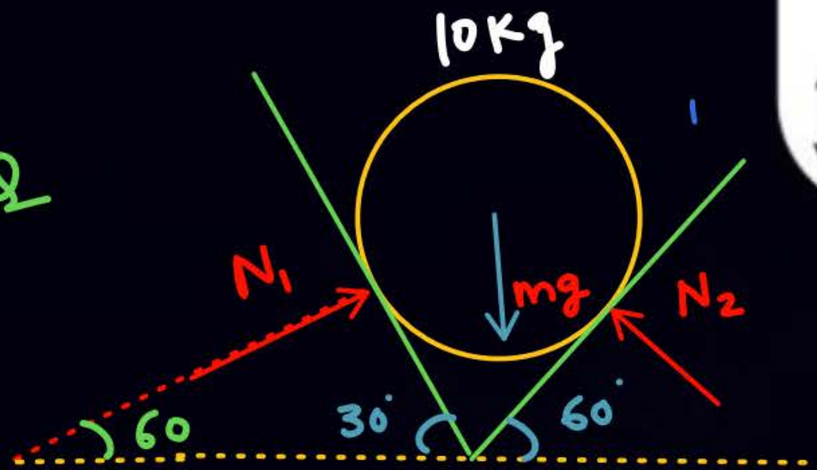
Q




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

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

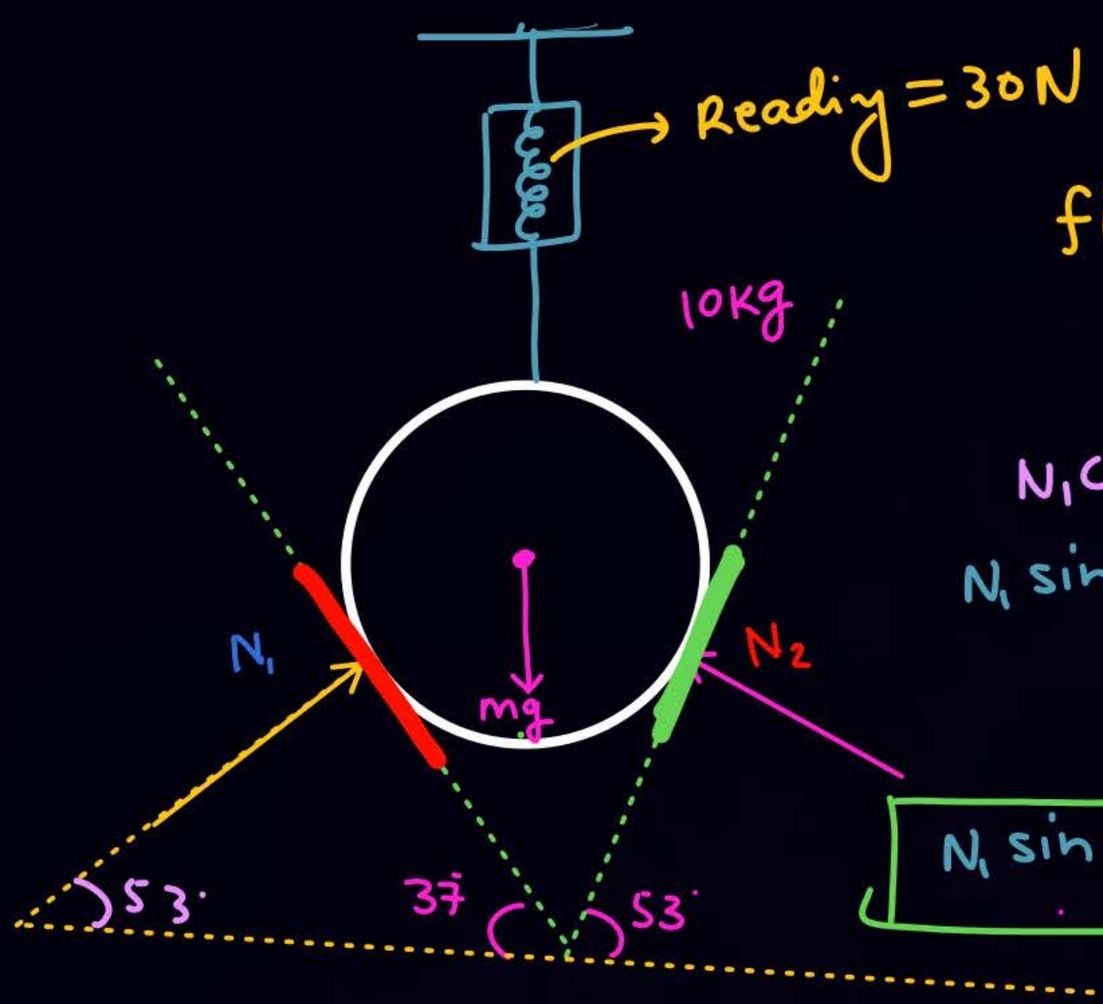
Q




$$N_1 \cos 60 = N_2 \cos 30$$

$$N_1 \sin 60 + N_2 \sin 30 = 100$$

Q




find $N_1$ & $N_2$

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

$N_1 \sin 53 + N_2 \sin 37 + 30 = 100$

$N_1 \sin 53 + N_2 \sin 37 = 70$


## Homework

- Kinematics KPP (PYQ) ≡ just see atleast.
- KPP (for NLM) (Lets move to NLM)
  → will be upload today evening.

# THANK YOU