YAKEEN NEET 2.0

2026

Laws of Motion

PHYSICS | Lecture 10

By - Saleem Ahmed Sir

Todays Goal

- Psuedo force and questions practice

Kal ki class ka ⟶ (ques. 18) calculation mistake.

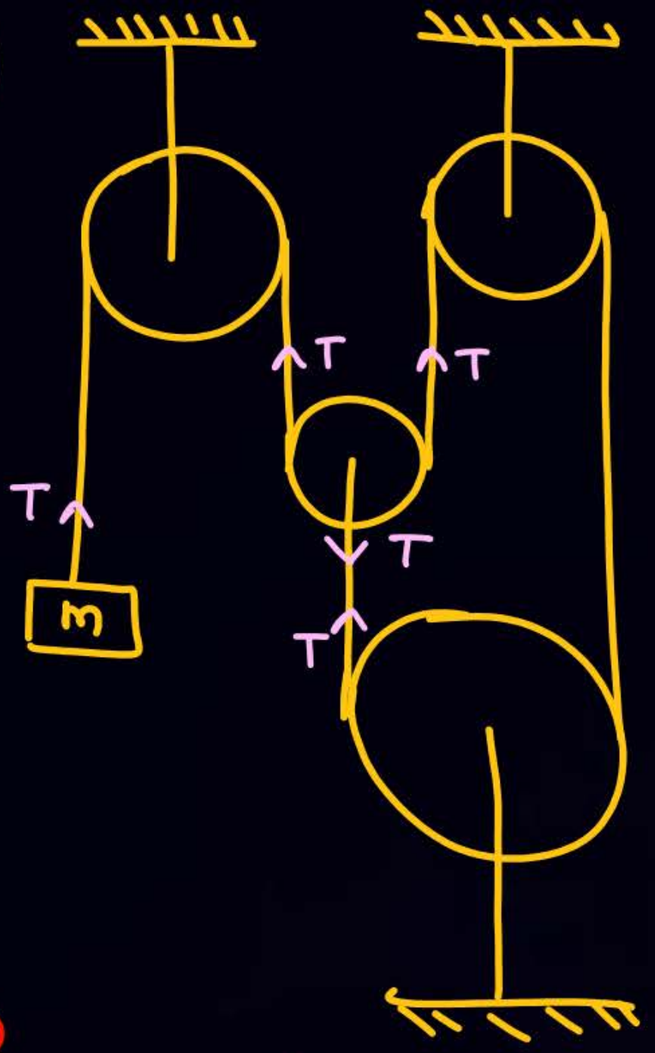
$a = \frac{2}{3}$ (open)

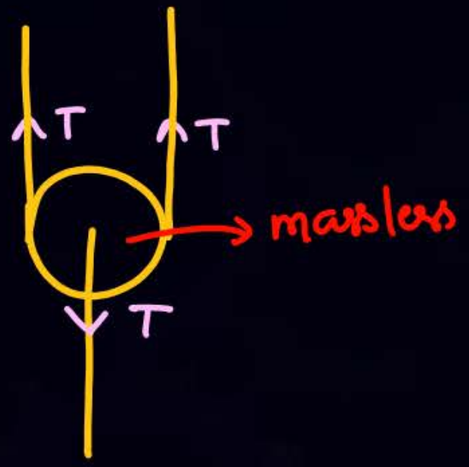
(pls correct)

Breakfast.

Q (pulley & string ideal)

find acc of block.



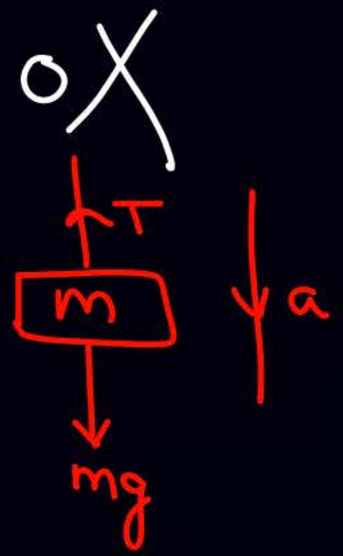


$2T = T$

$2T - T = 0$

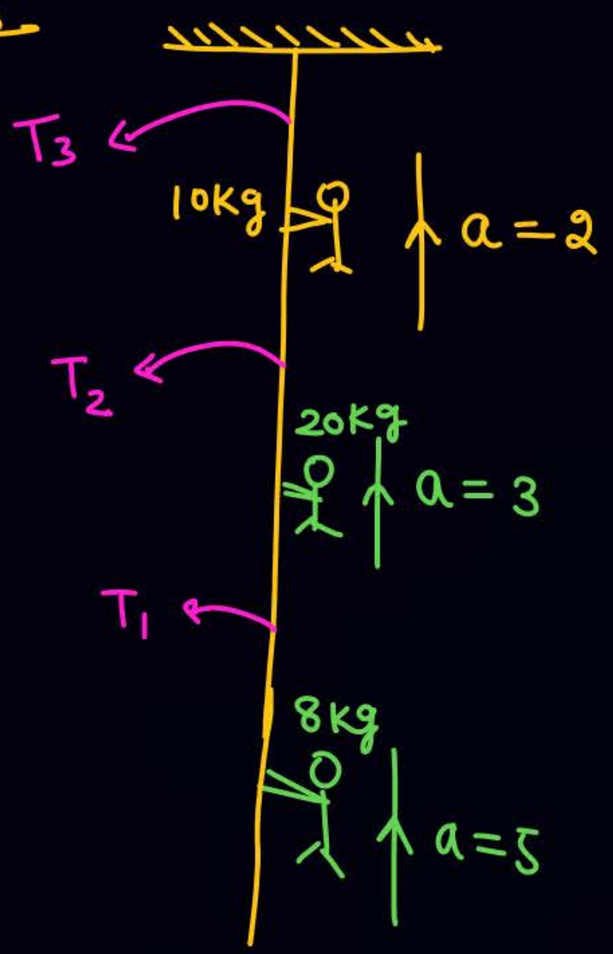
$\boxed{T = 0}$

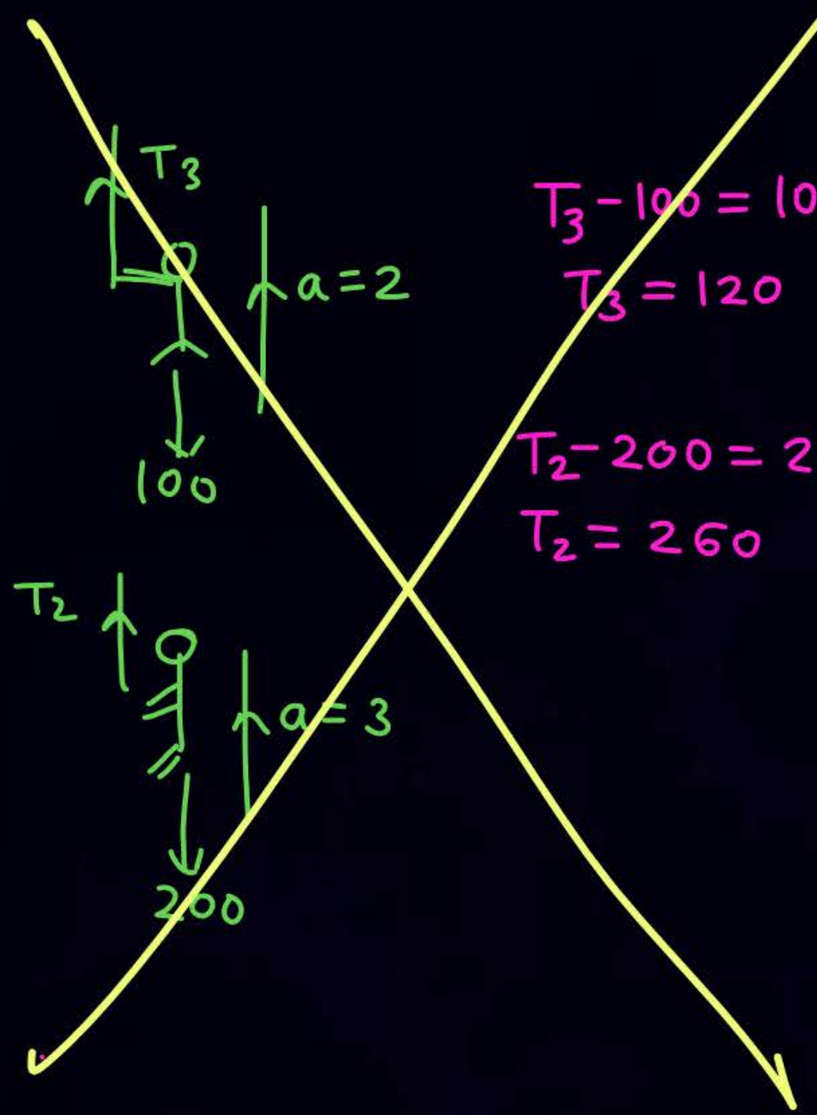
Ans



$$a = \frac{mg - T}{m} = \frac{mg - 0}{m} = g \text{ (free fall)}$$

Q





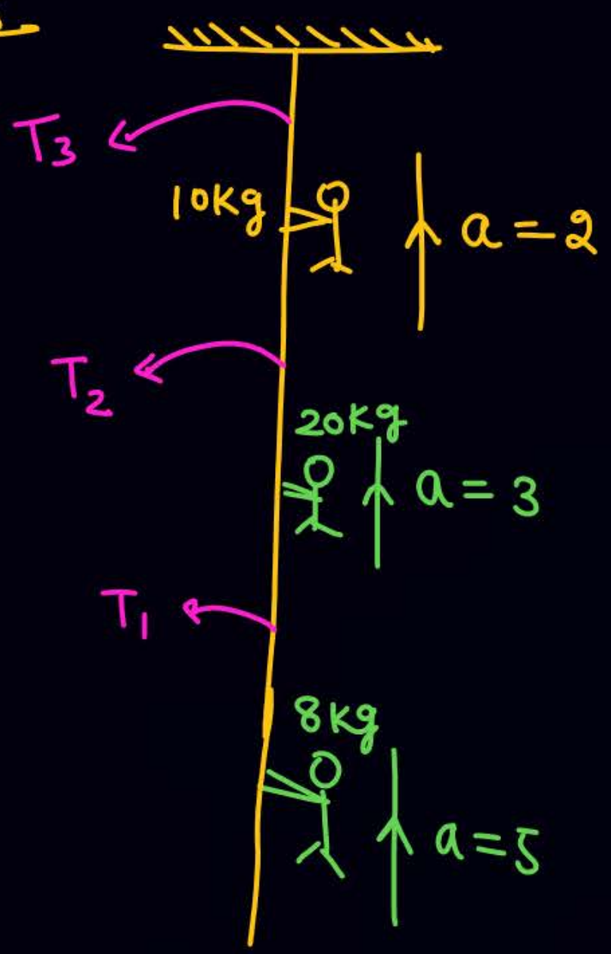
$T_3 - 100 = 10 \times 2$

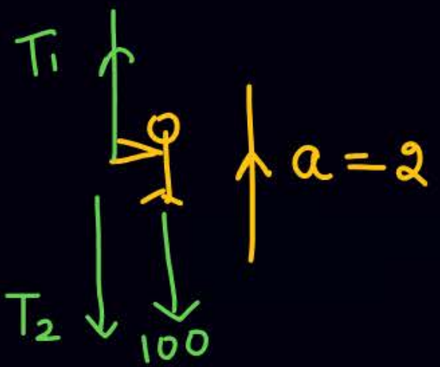
$T_3 = 120$

$T_2 - 200 = 20 \times 3$

$T_2 = 260$

Q

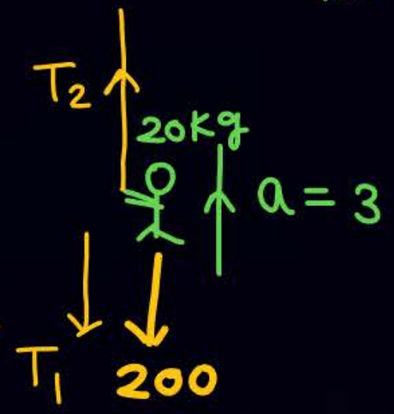




$T_1 - T_2 - 100 = 10 \times 2$

$T_1 - 380 - 100 = 20$

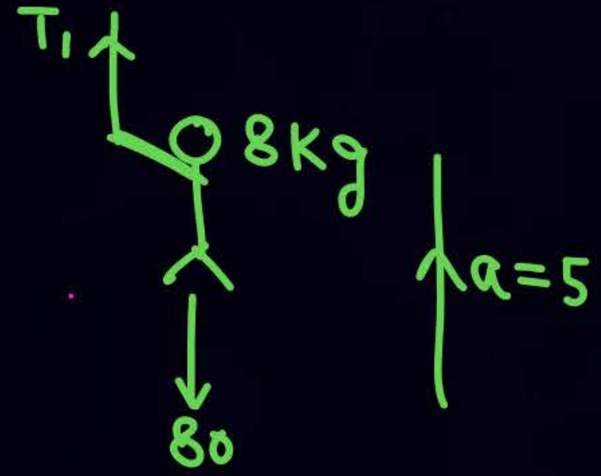
$\boxed{T_1 = 500}$



$T_2 - T_1 - 200 = 20 \times 3$

$T_2 - 120 - 200 = 60$

$\boxed{T_2 = 380}$

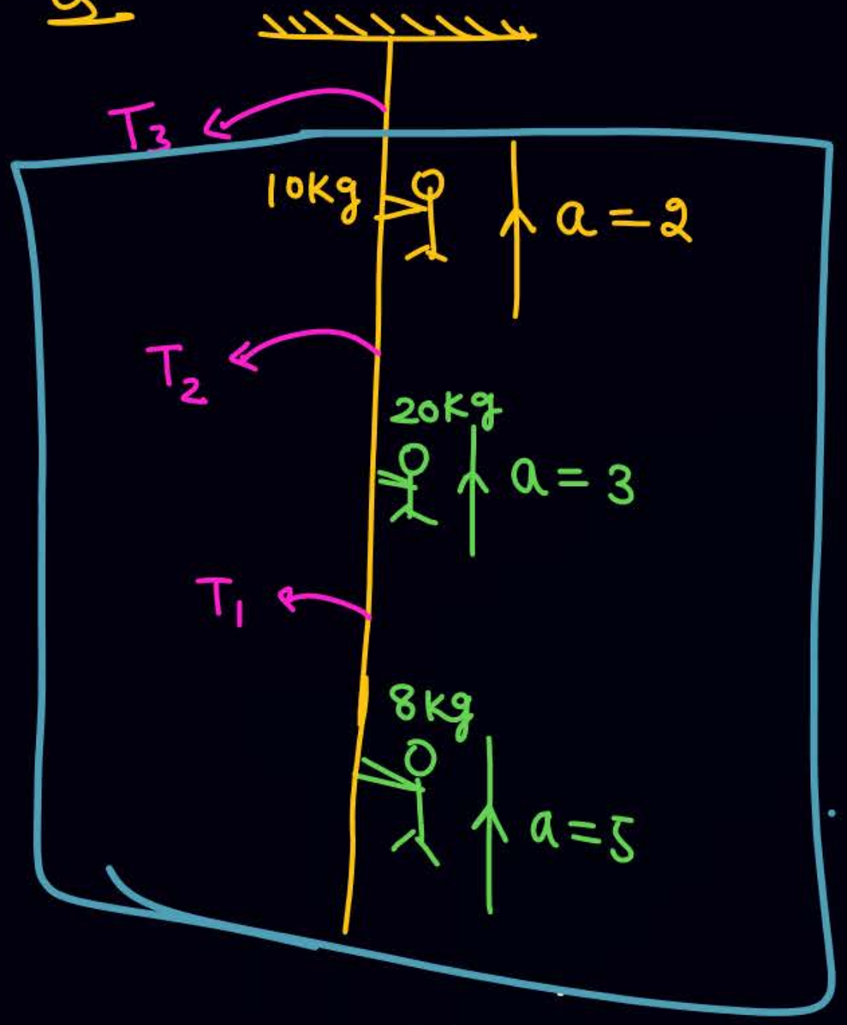


$T_1 - 80 = 8 \times 5$

$\boxed{T_1 = 120}$

Salem Bhaia special methods

Q



$$\vec{F}_{net} = m_1\vec{a}_1 + m_2\vec{a}_2 + m\vec{a}_3 + \cdots$$

$T_1 = 500$

(1) $T_3 - 380 = 10\times2 + 20\times3 + 8\times5$

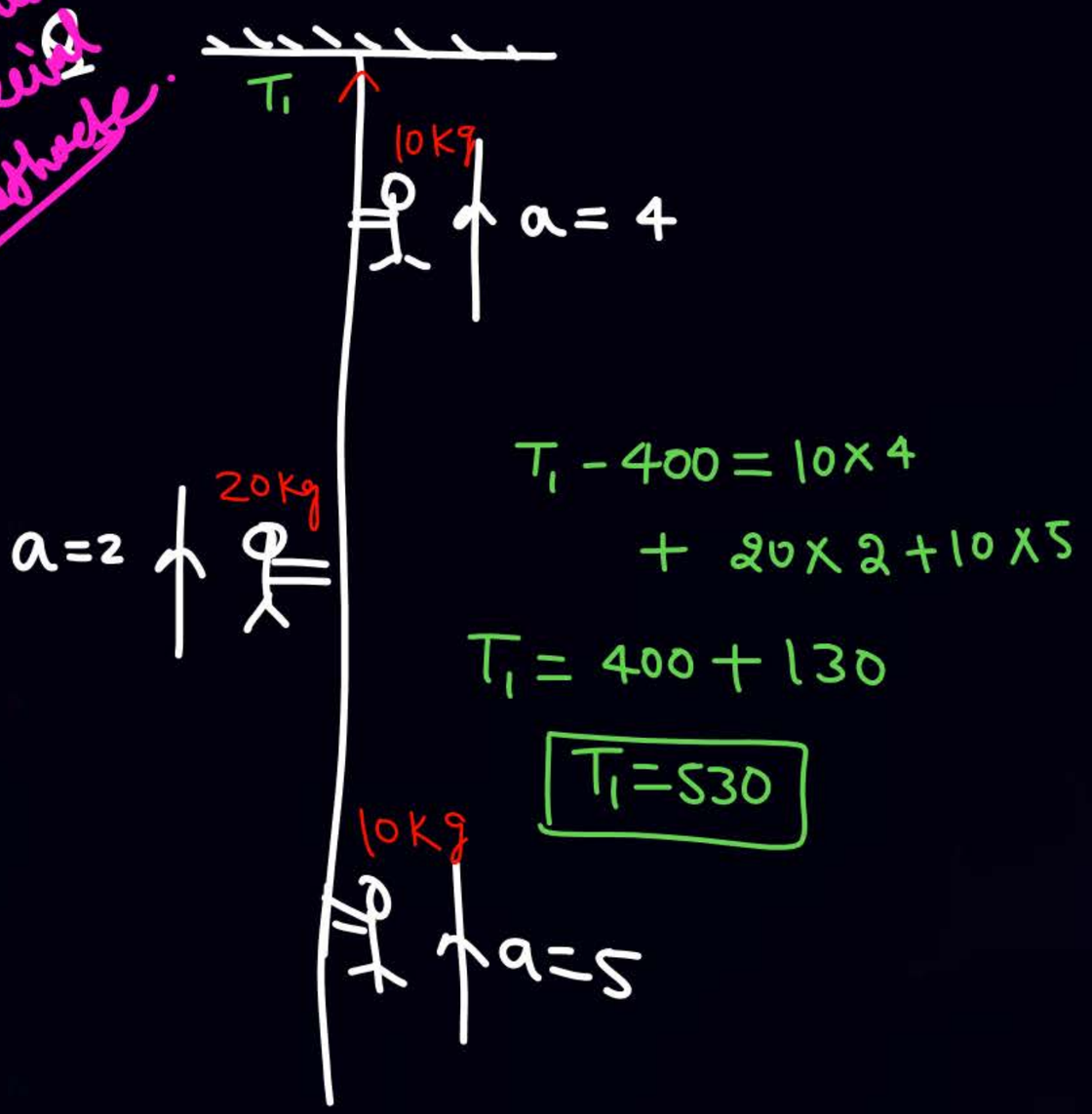
$T_3 = 500$

(2) $T_2 = ?$

$T_2 - 280 = 20\times3 + 8\times5$

$T_3 = 380$

Saleem Bhaiya Special method.

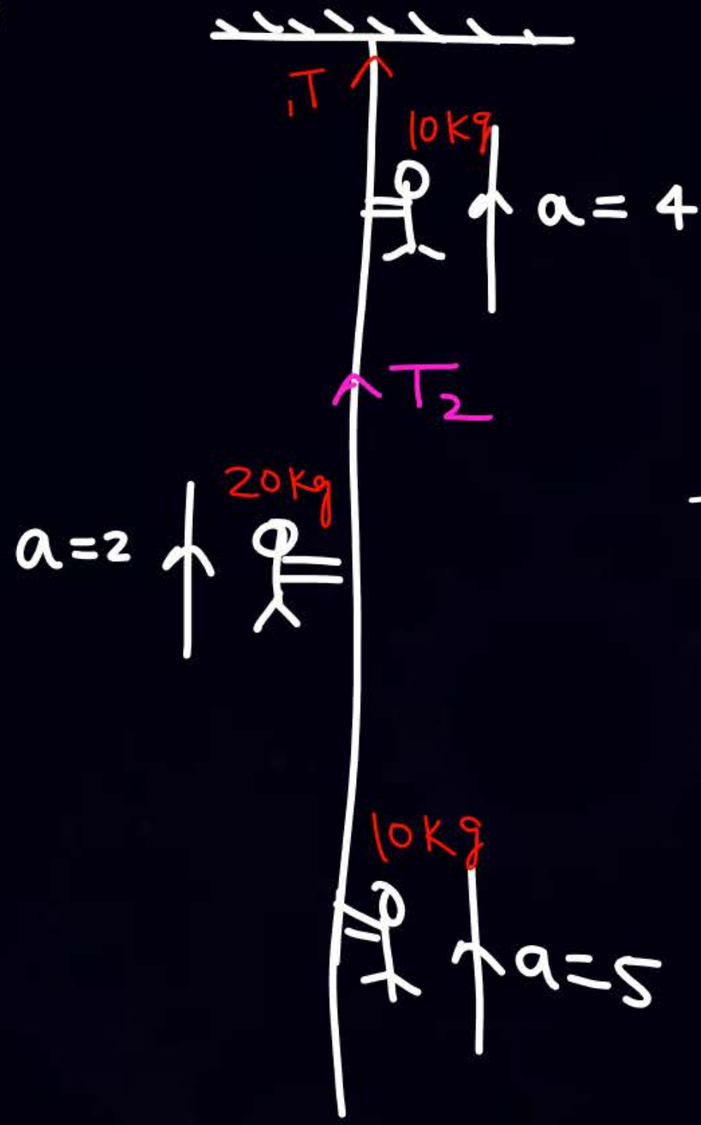


$T_1 - 400 = 10 \times 4$

$+ \ 20 \times 2 + 10 \times 5$

$T_1 = 400 + 130$

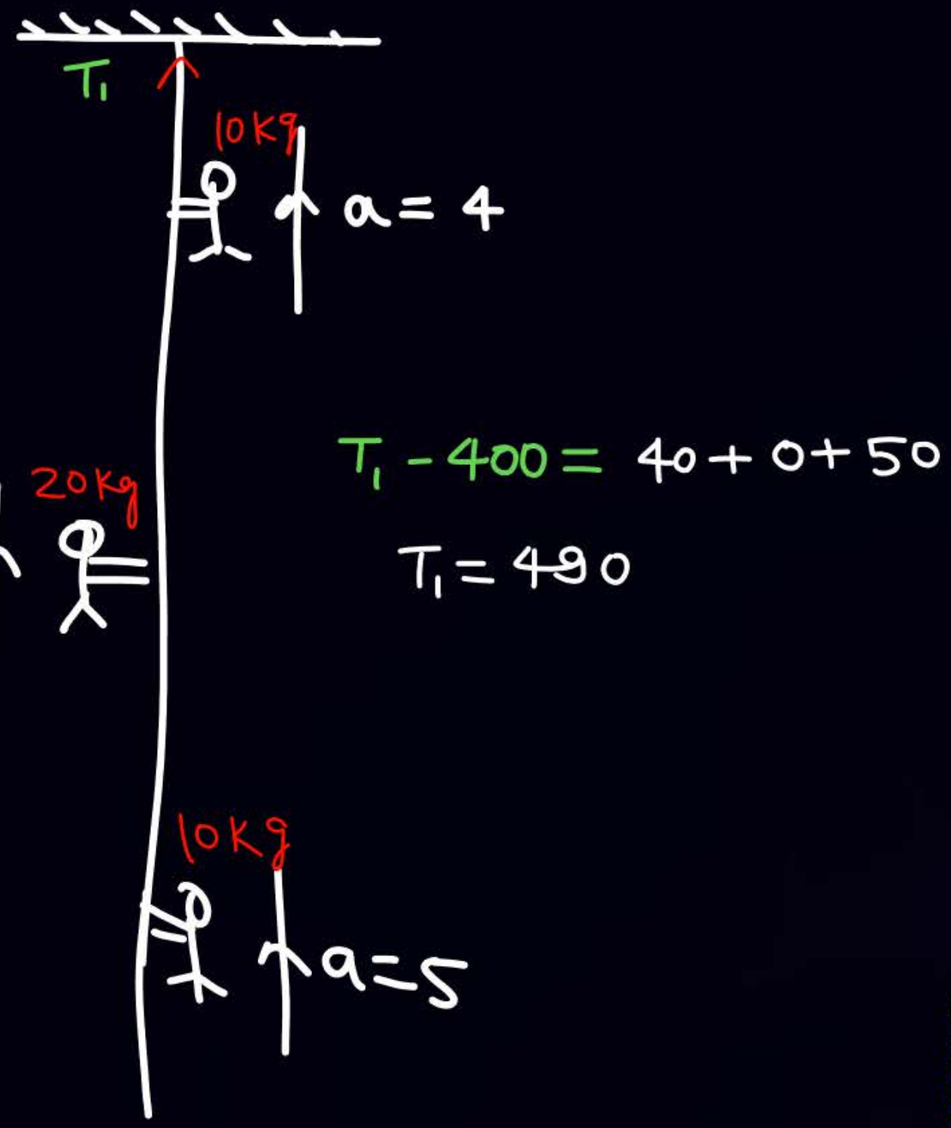
$\boxed{T_1 = 530}$



$T_2 - 300 = 40 + 50$

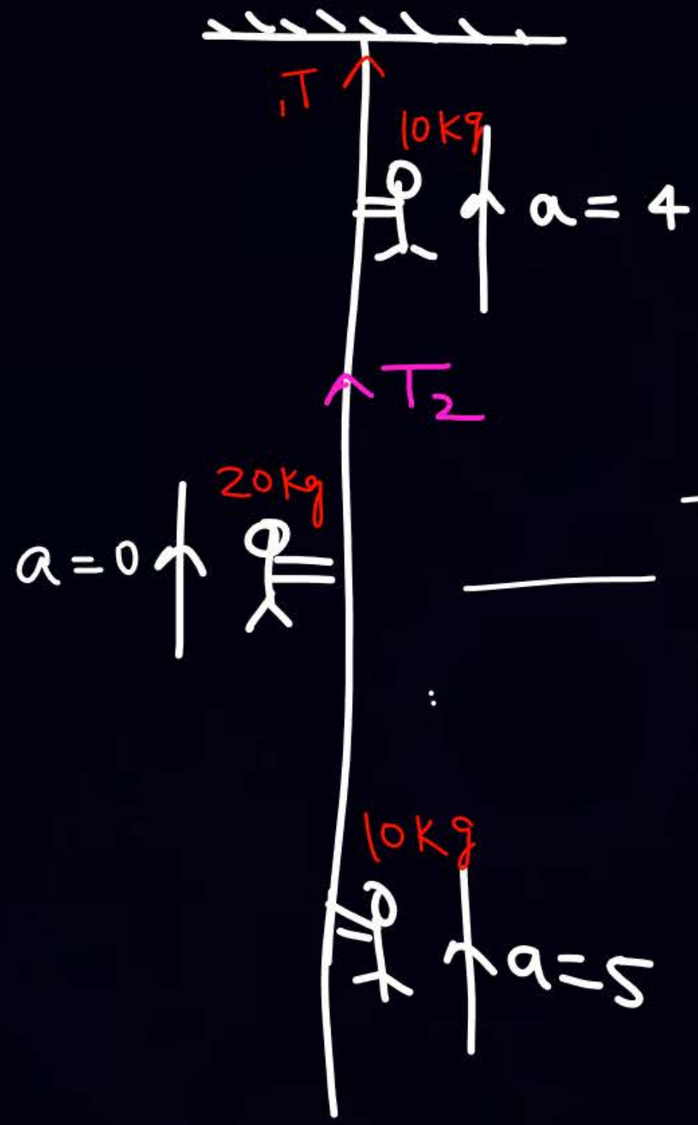
$\boxed{T_2 = 390}$

Q



$T_1 - 400 = 40 + 0 + 50$

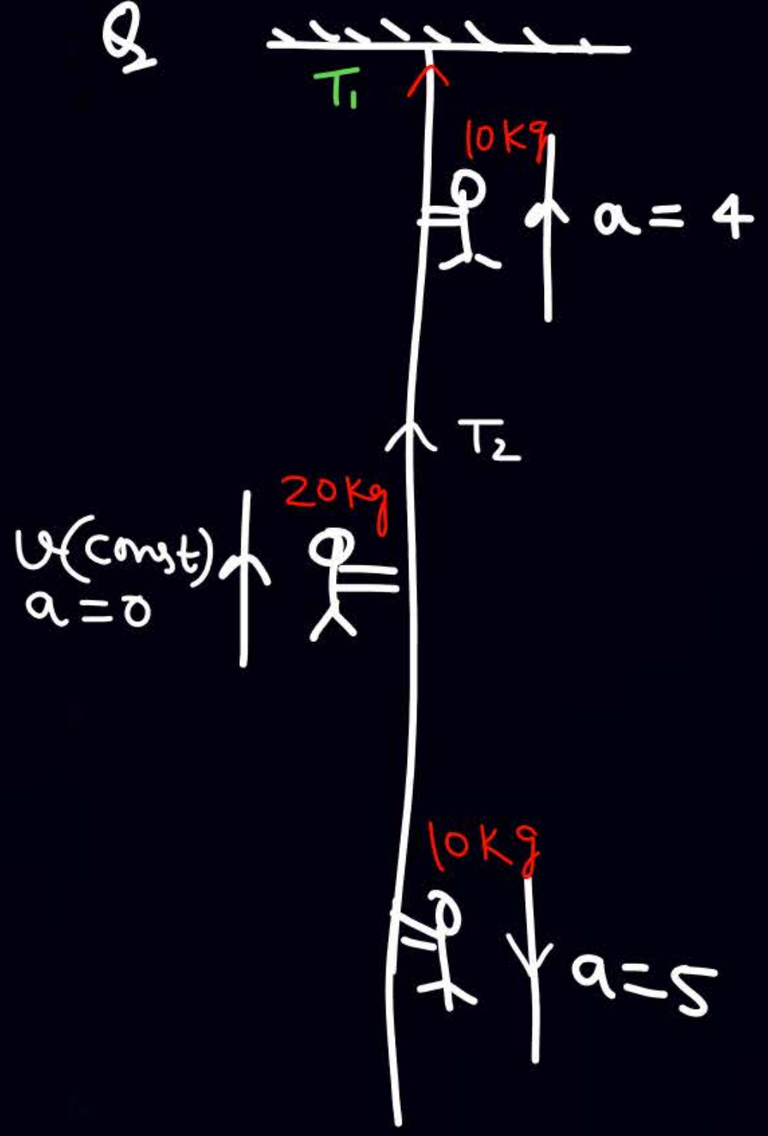
$T_1 = 490$



$T_2 - 300 = 0 + 50$

$T_2 = 350$

Q



Sol

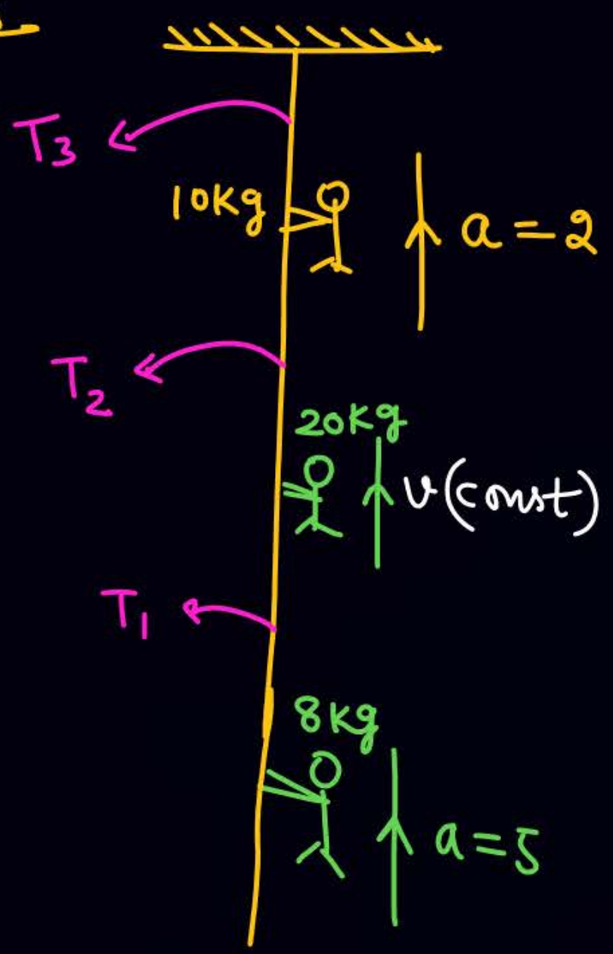
$T_1 - 400 = 10 \times 4 + 20 \times 0 - 10 \times 5$

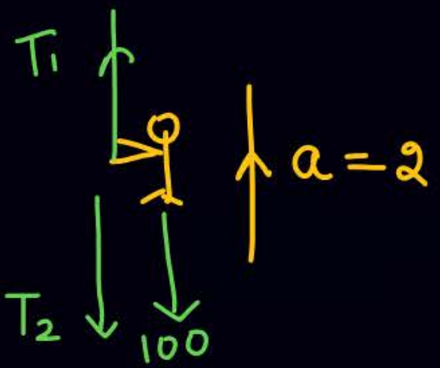
$T_1 = 390$

$T_2 - 300 = 0 - 10 \times 5$

$\boxed{T_2 = 250}$

Q

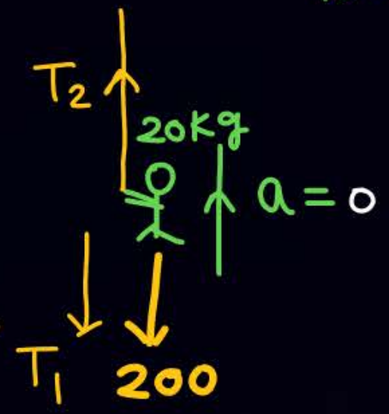




$T_1 - T_2 - 100 = 10 \times 2$

$T_1 - 320 - 100 = 20$

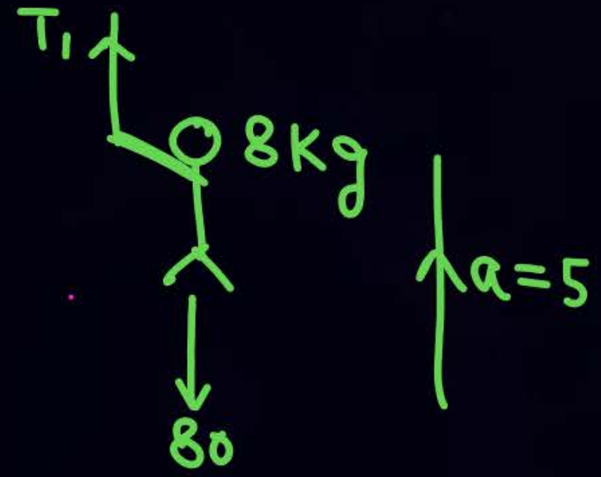
$\boxed{T_1 = 440}$



$T_2 - T_1 - 200 = 20 \times 0$

$T_2 - 120 - 200 = 0$

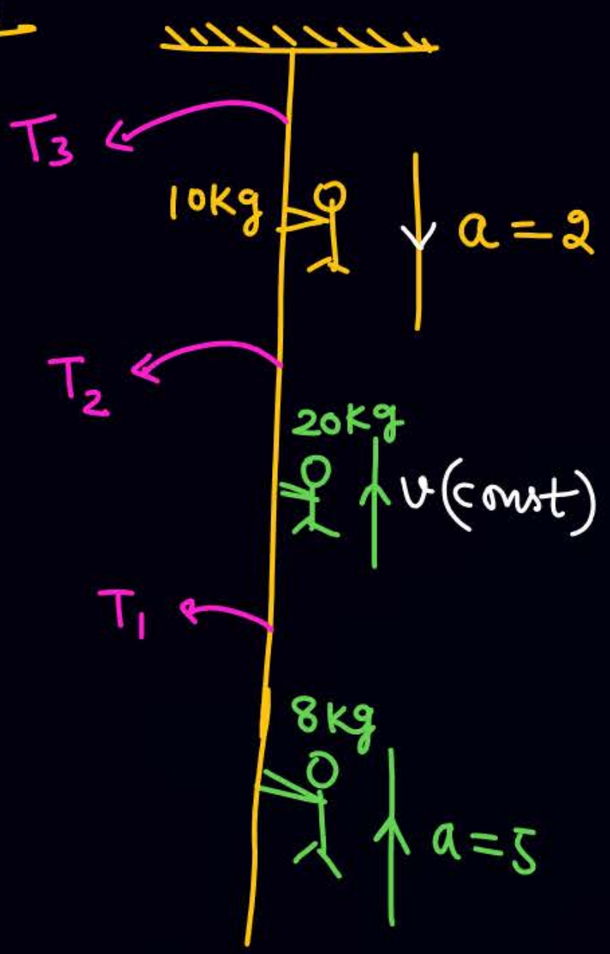
$\boxed{T_2 = 320}$

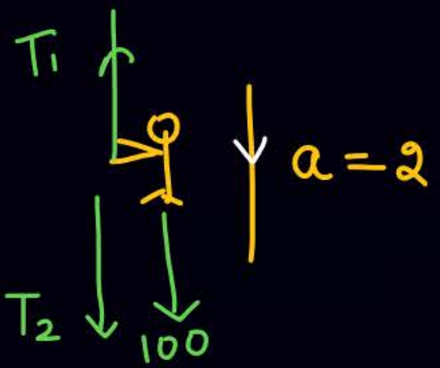


$T_1 - 80 = 8 \times 5$

$\boxed{T_1 = 120}$

Q

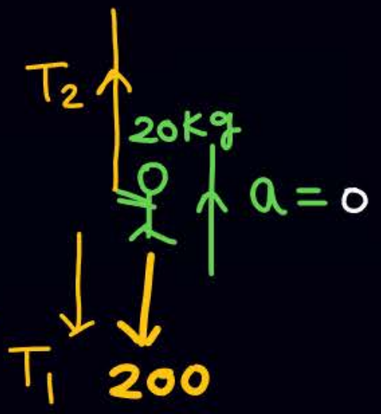




$100 + T_2 - T_1 = 10 \times 2$

$100 + 320 - T_1 = 20$

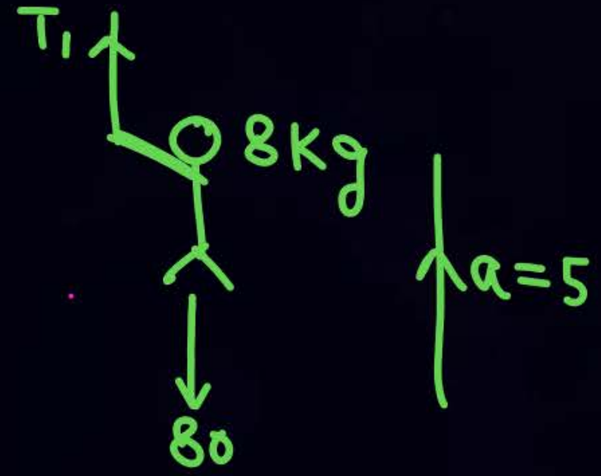
$\boxed{T_1 = 400}$



$T_2 - T_1 - 200 = 20 \times 0$

$T_2 - 120 - 200 = 0$

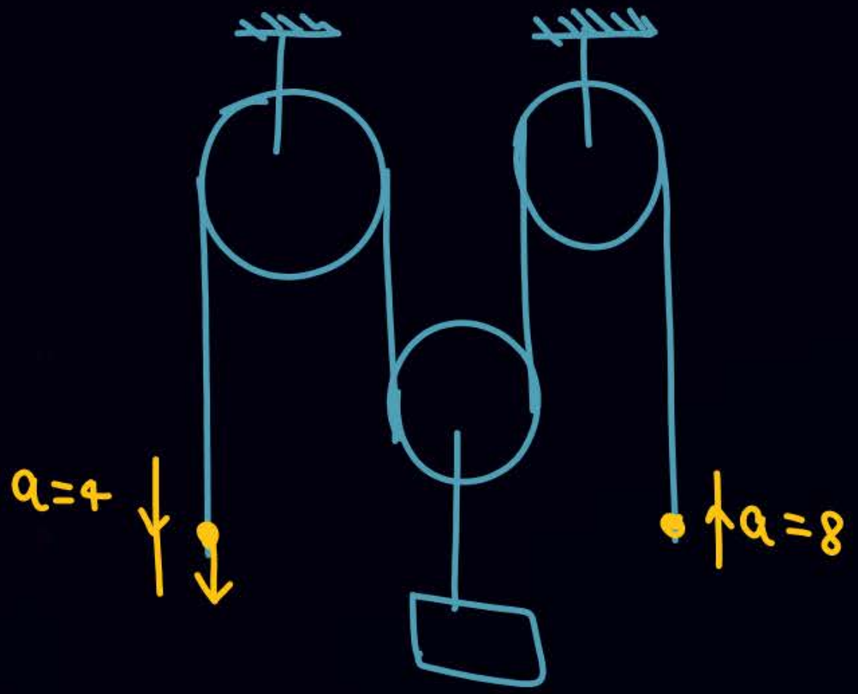
$\boxed{T_2 = 320}$



$T_1 - 80 = 8 \times 5$

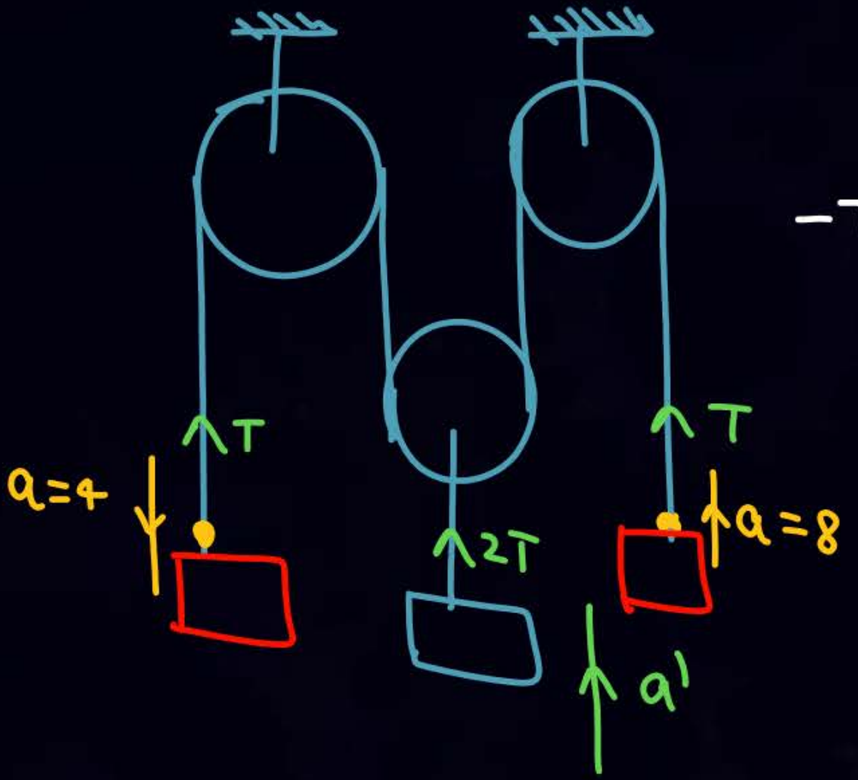
$\boxed{T_1 = 120}$

Constraint motion (Aadha adhura daigram)



SKC

'Chupchap jahan se dar lage jahan jarurat hai wahan block mar lo.

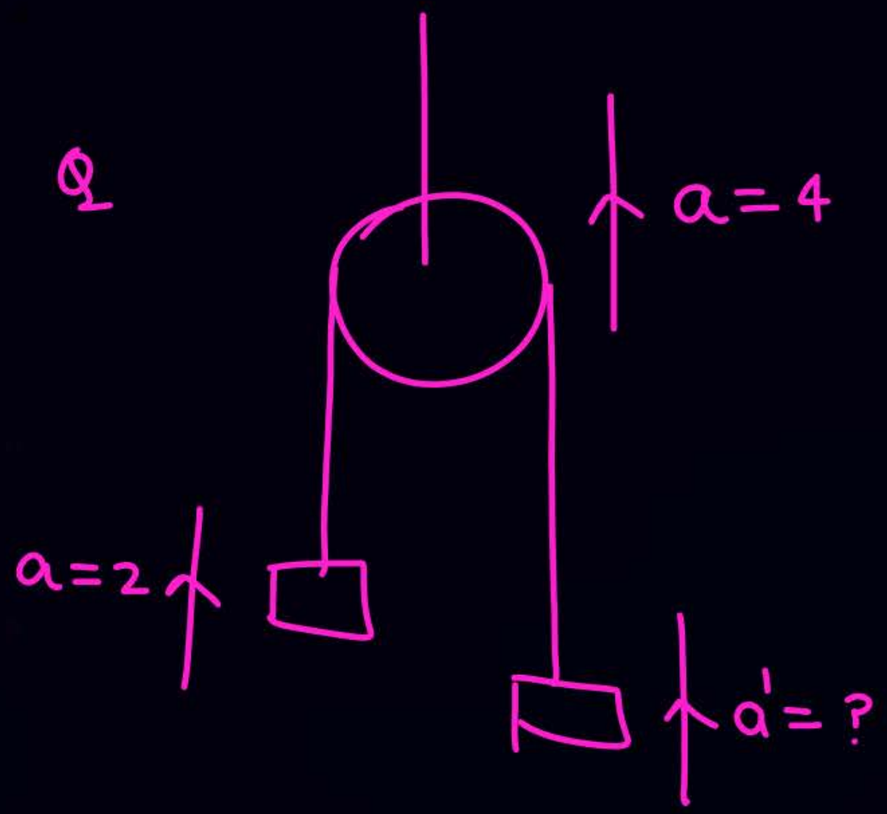


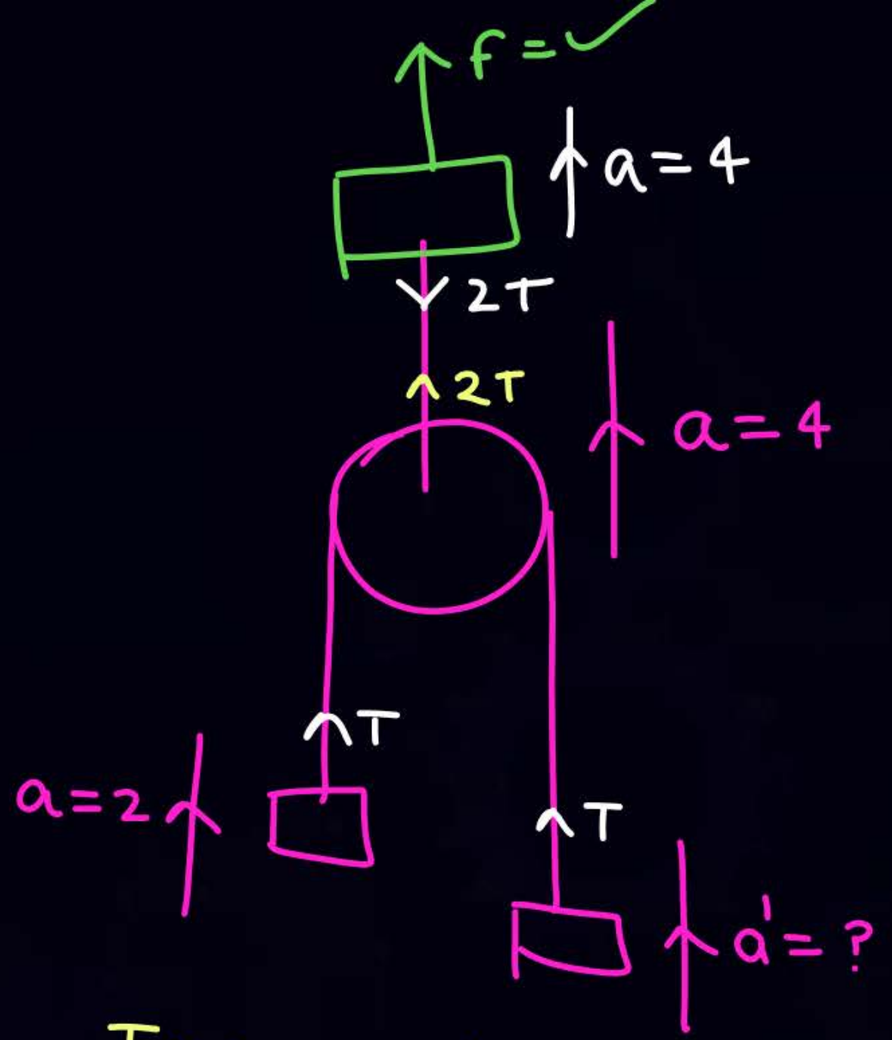
$$-T \times 4 + 2T a' + T \times 8 = 0$$

$$\boxed{a' = -2}$$

(Neeche)

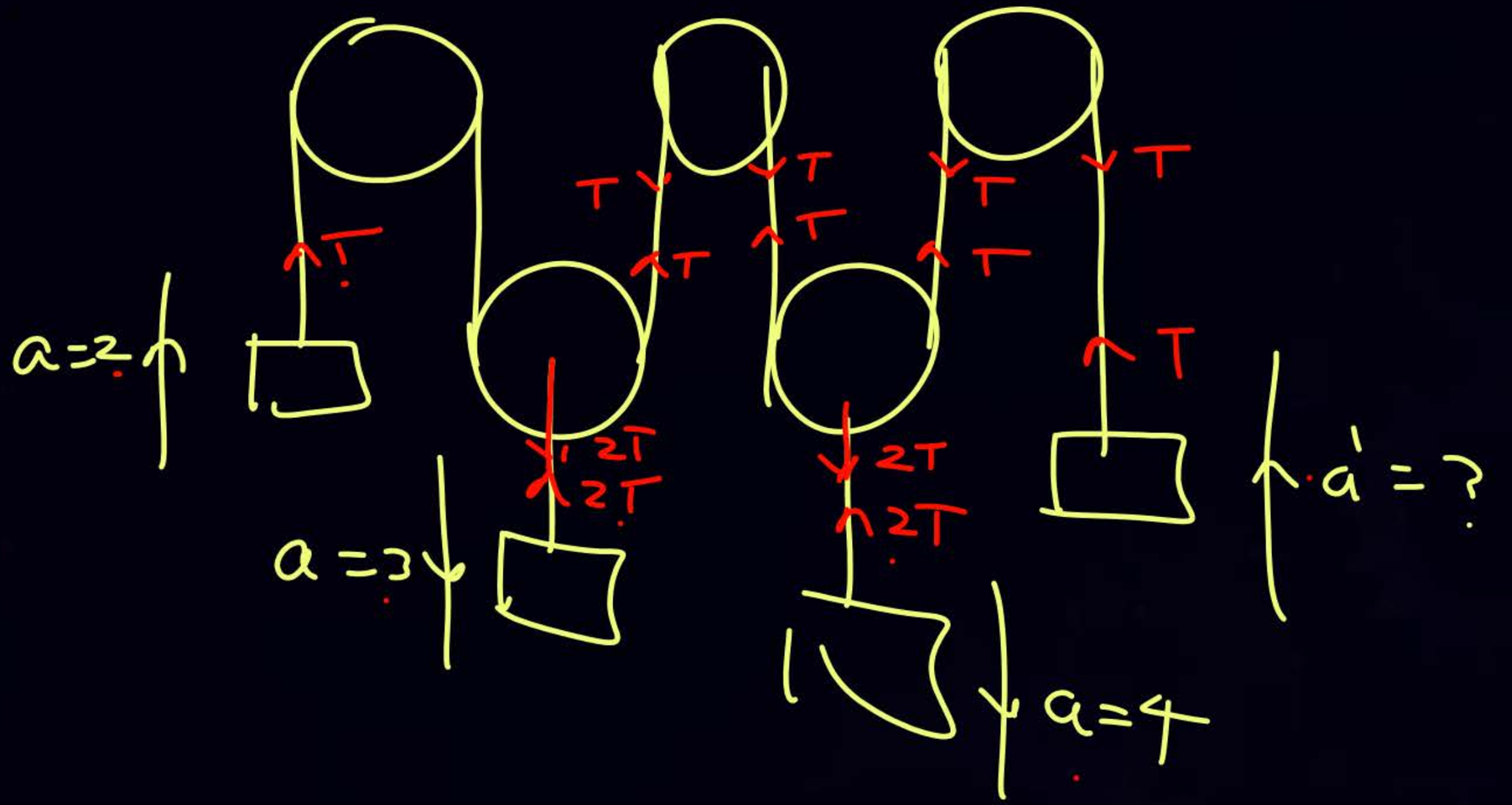
Q



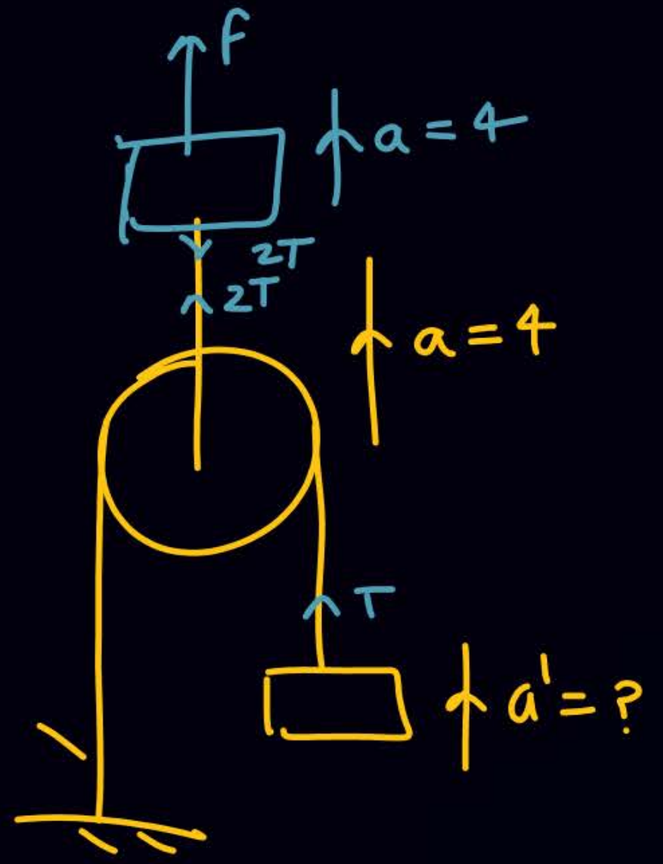


$T \times 2 + T a' - 2T \times 4 = 0$

$a' = 6$


T
T
T
T
T
T
T
T
T
T
2T
2T
2T
2T
a = 2
a = 3
a = 4
a' = ?

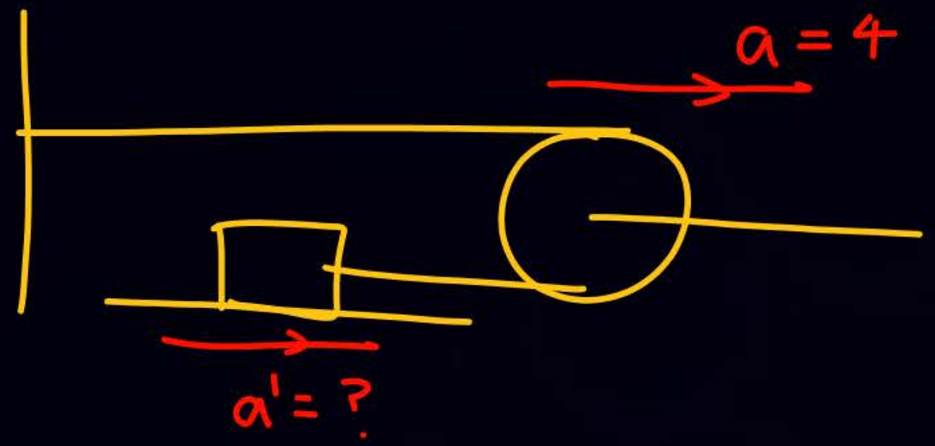
Q

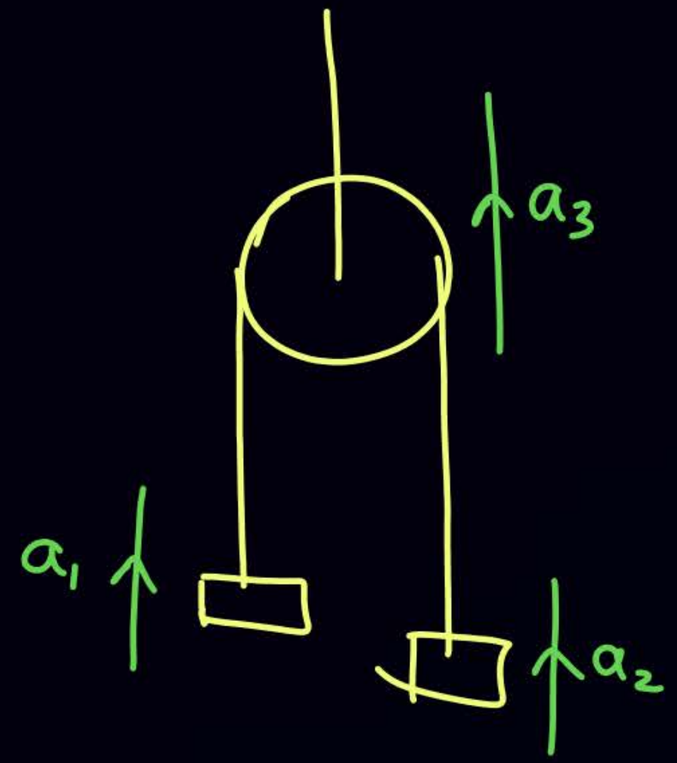


$Ta' - 2T \times 4 = 0$

$\boxed{a' = 8}$

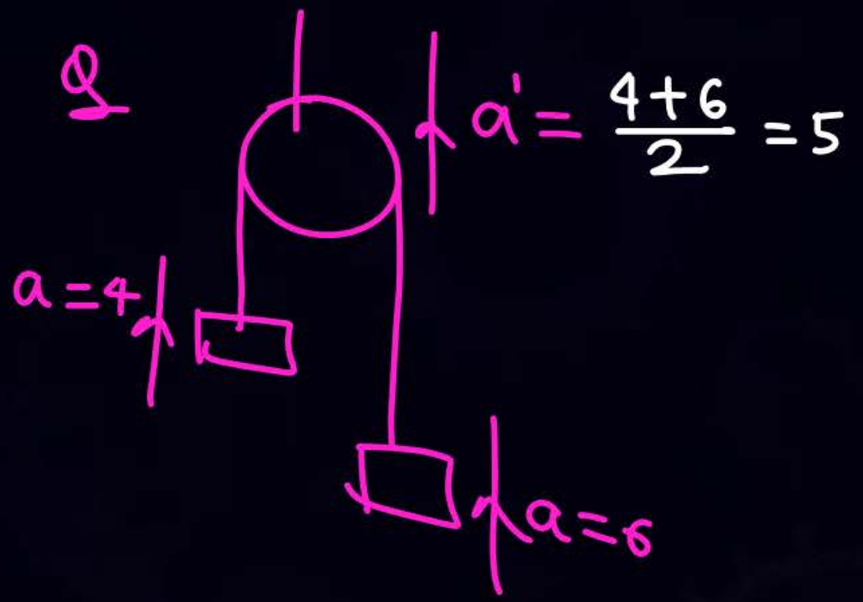
Q



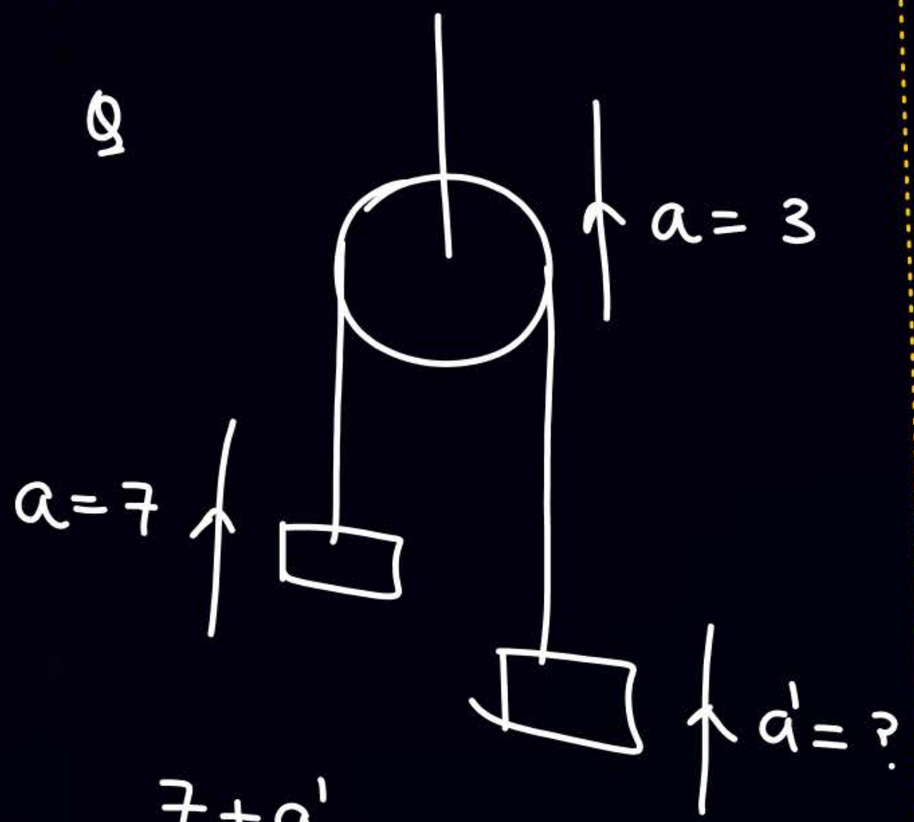


$$\frac{a_1+a_2}{2} = a_3$$

Q



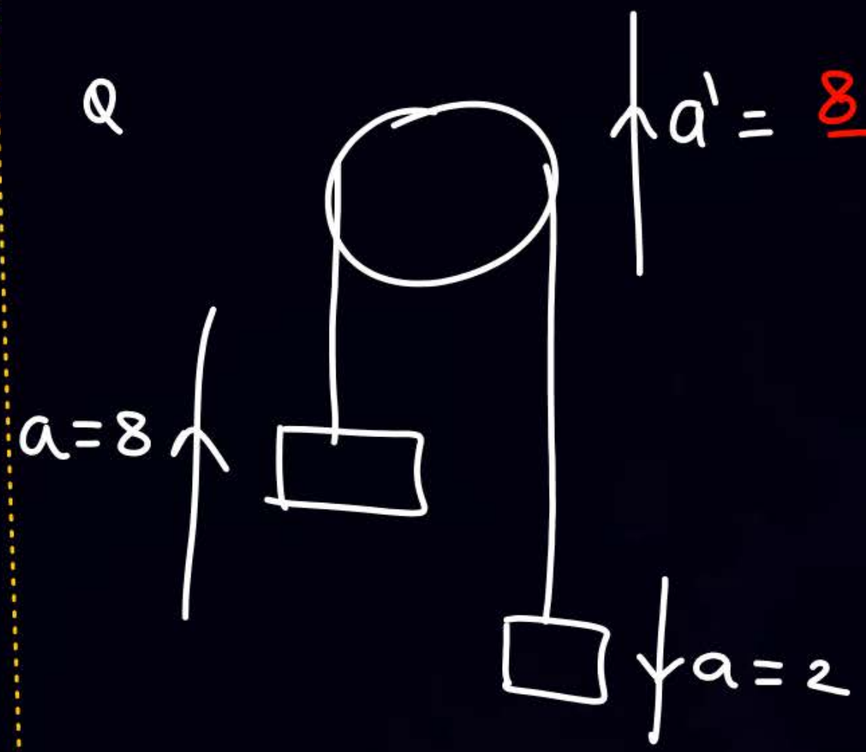
Q



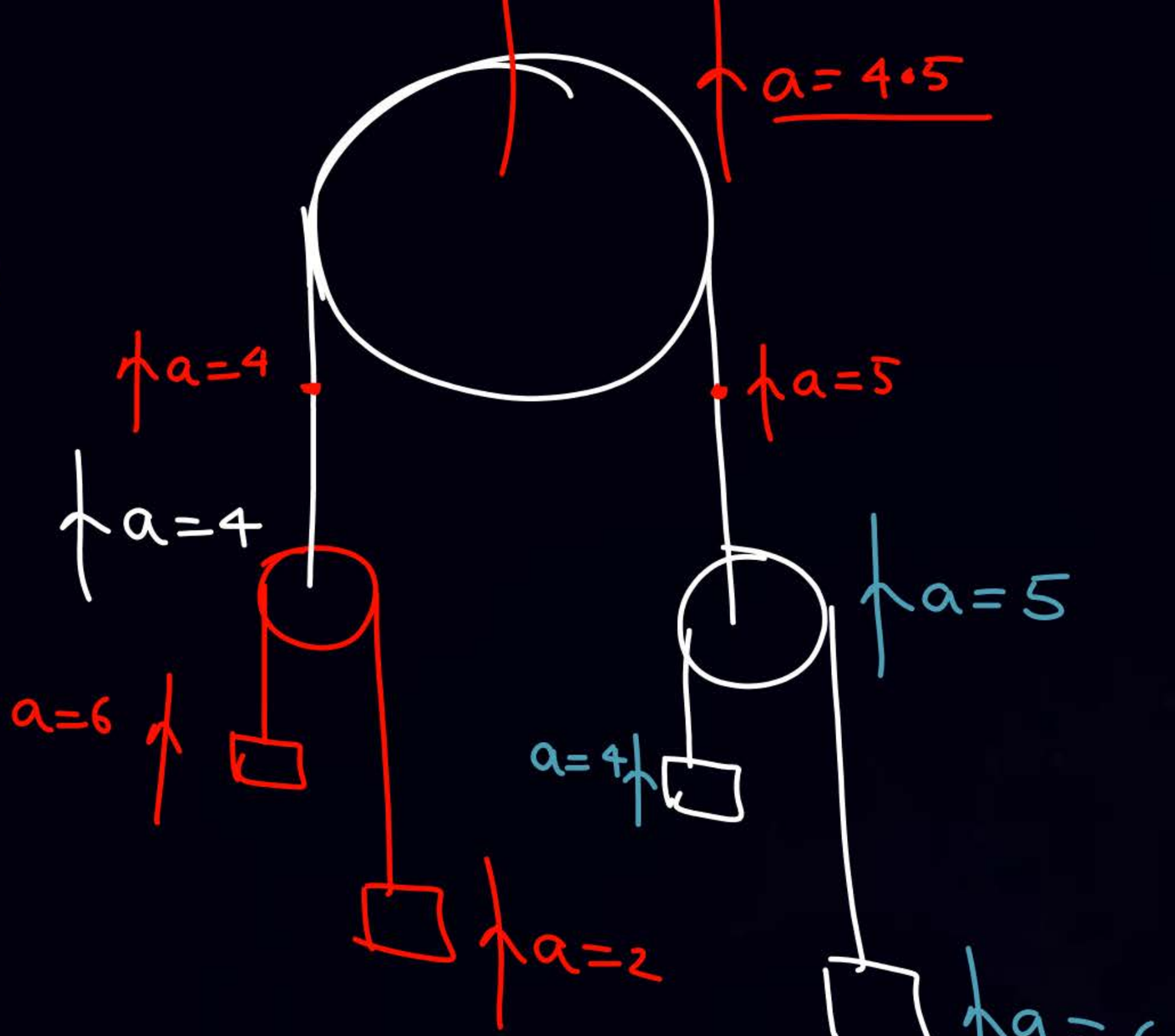
$$\frac{7+a'}{2} = 3$$

$$a' = -1$$

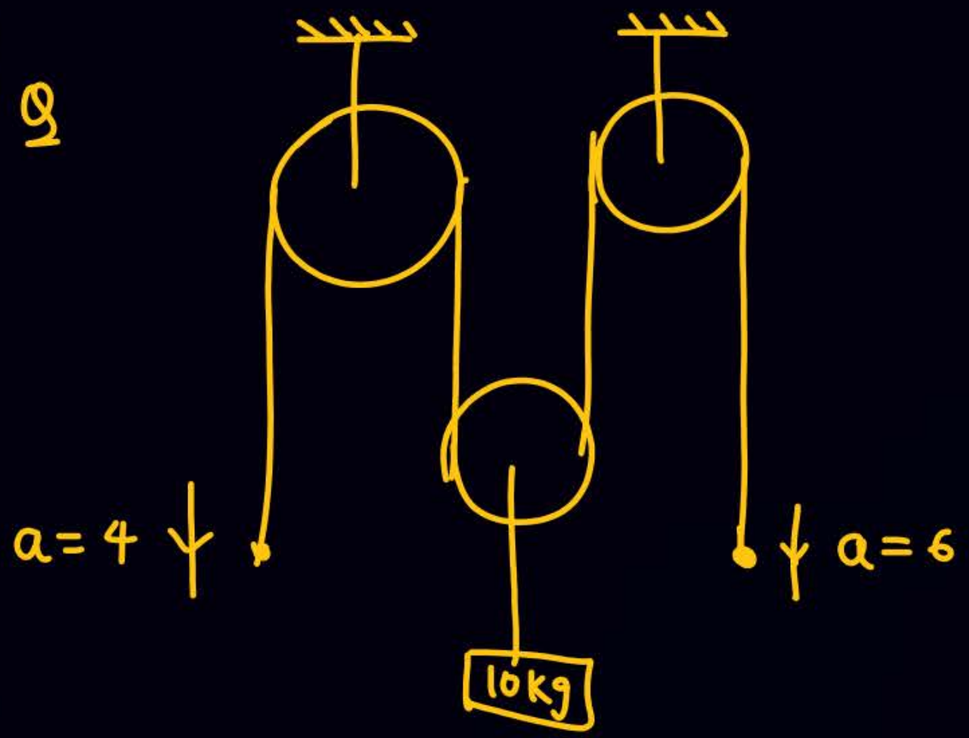
Q



Q

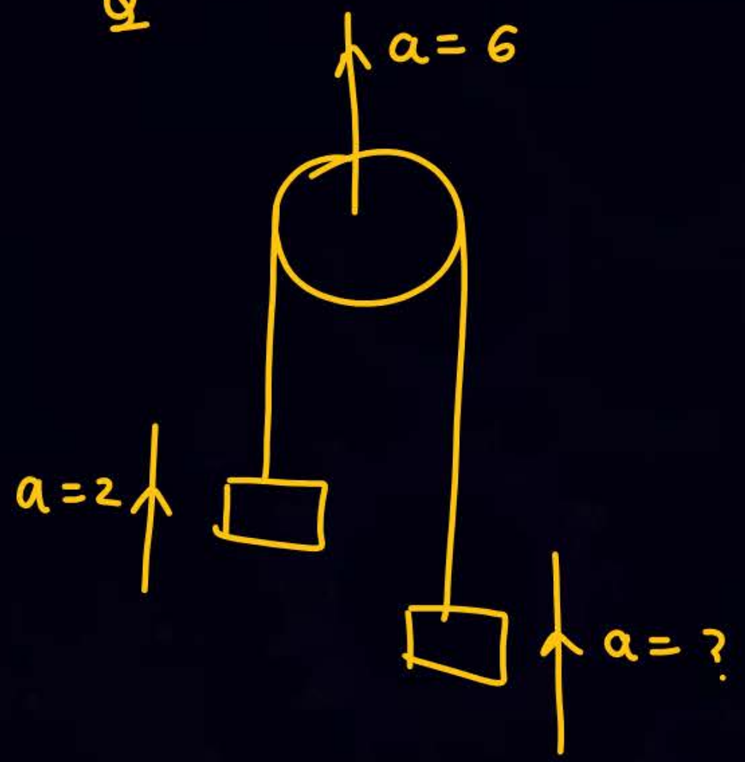


Q



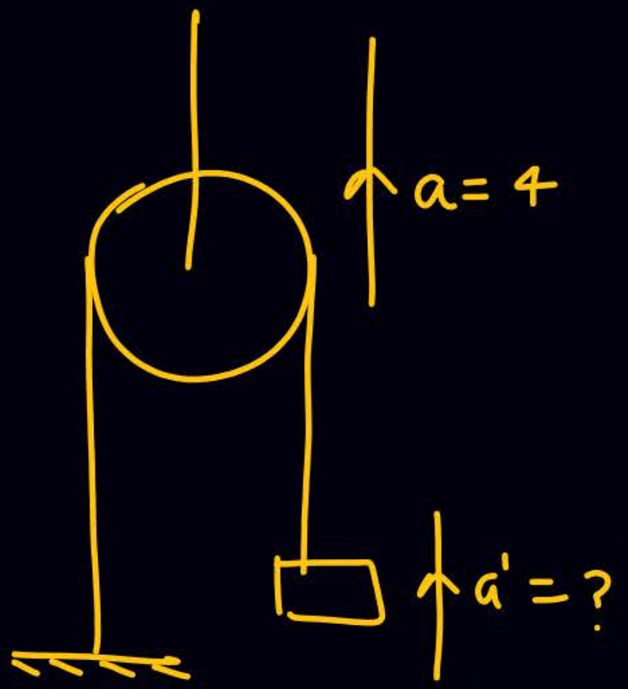
$$a_{10kg} = \frac{4+6}{2}$$

Q



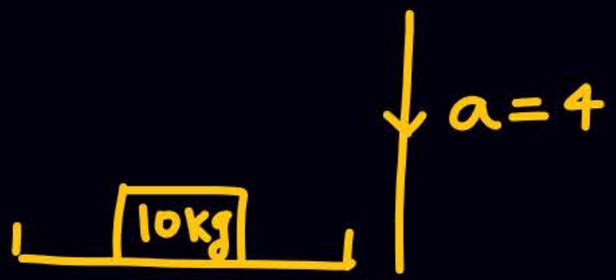
$$\frac{2+a}{2} = 6$$

Q



$$\frac{a' + 0}{2} = 4$$

$$\boxed{a' = 8}$$



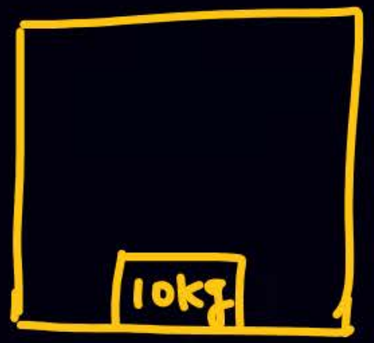
find normal contact force.

Sol

$100 - N = 10 \times 4$

$100 - N = 40$

$N = 100 - 40 = 60$

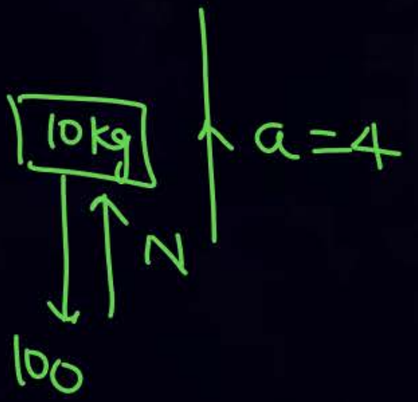


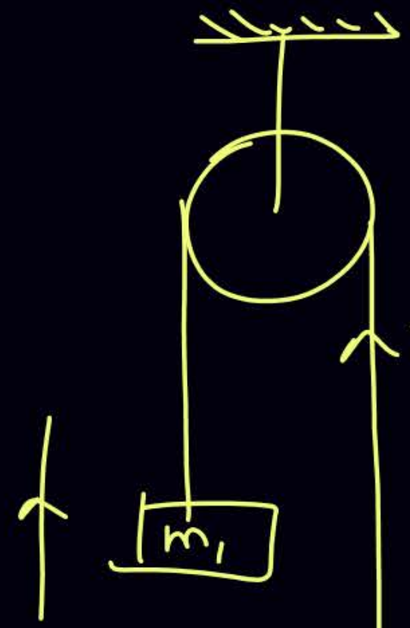
find normal contact force.

Sol

$N - 100 = 10 \times 4$

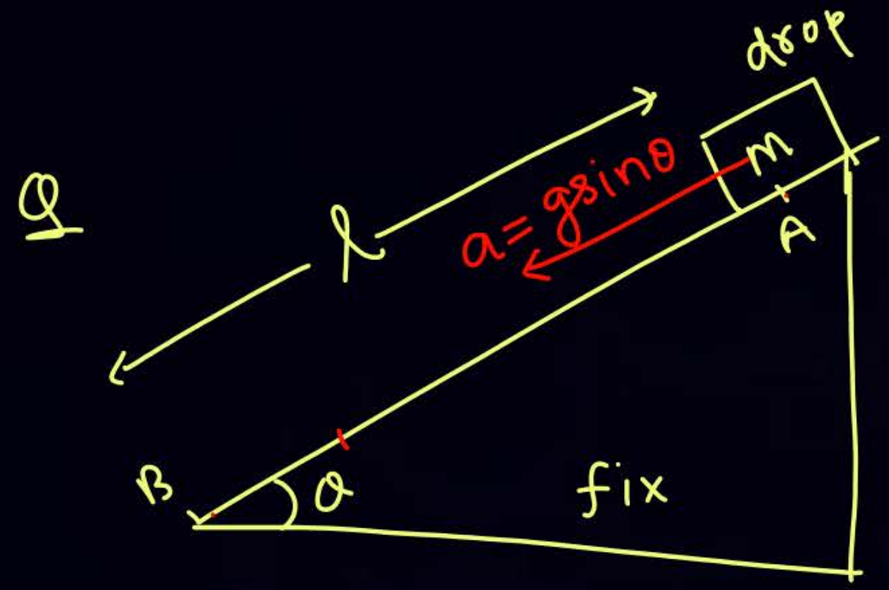
$N = 140$





$$T = \left(\frac{2m_1m_2}{m_1+m_2}\right)g$$

$$a = \frac{m_2g - m_1g}{m_2+m_2}$$

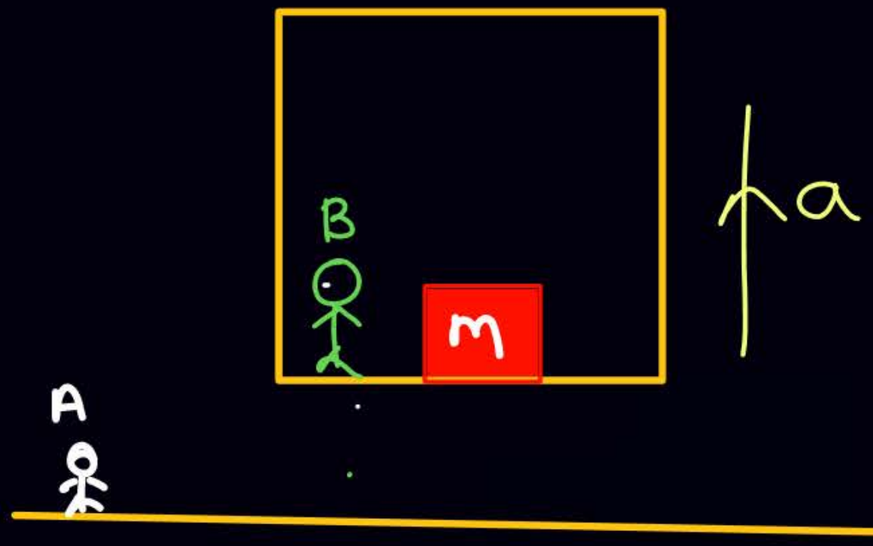


$t_{A\to B} = ?$

$$s = ut + \frac{1}{2}at^2 = 0 + \frac{1}{2}g\sin\theta \cdot t^2$$

$$t = \sqrt{\frac{2\ell}{g\sin\theta}}$$

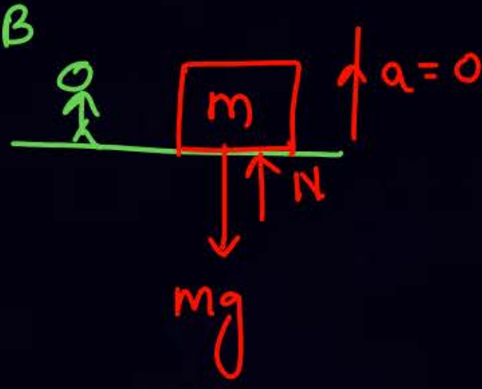
Psedo force.



wrt B / wrt Lift

$N - mg = m \times 0$

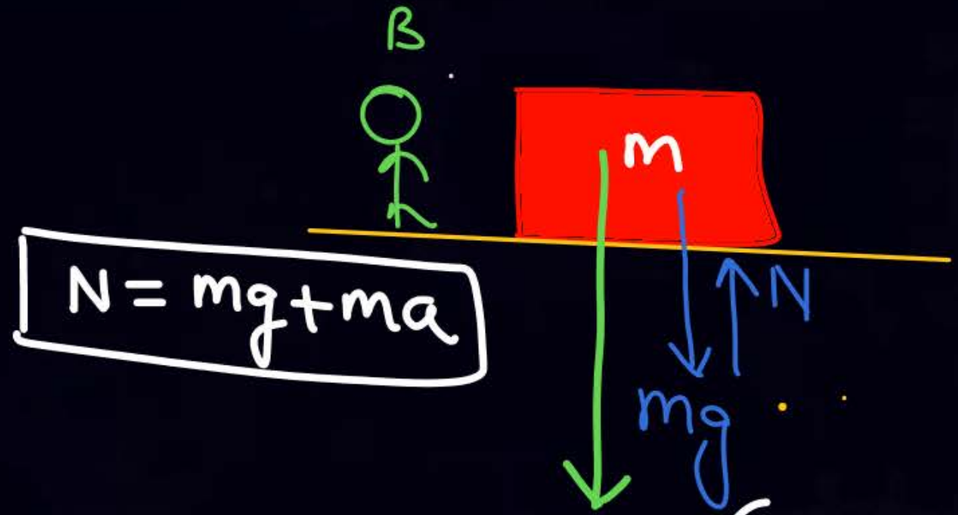
$N_B = mg$



wrt ground.

$N - mg = ma$

$N_A = mg + ma$



$N = mg + ma$

ma (pseudo force)

Inertial frame ⟶ Esa frame jahan se NLM is applicable.
(a=0, v⟶const, Rest) wrt ground.

Non inertial frame ⟶ NLM Valid Nahi

- Esa frame jahan se NLM failed & not directly applicable.
- All the acc. frame wrt ground are non-inertial frame.

a ≡ खतरा

In order to validate NLM in non-inertial frame. we must apply an psedo force on the block.

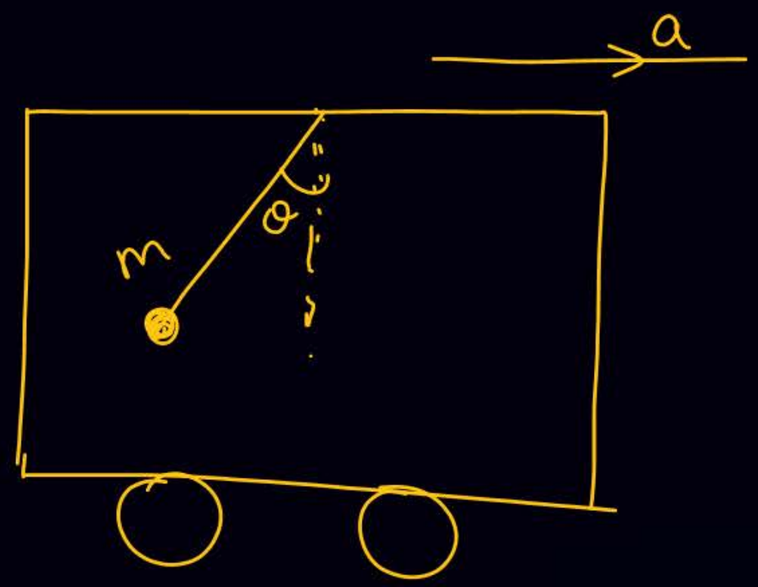
$$\vec{F}_{psedo} = -m_{block}\,\vec{a}_{NIF}$$

SKC

$F_{psedo} = m_{block}\, a_{Aadmi}$ (magnitude)

→ Aadmi ke acc ke opposite

Q



find $\theta = ?$

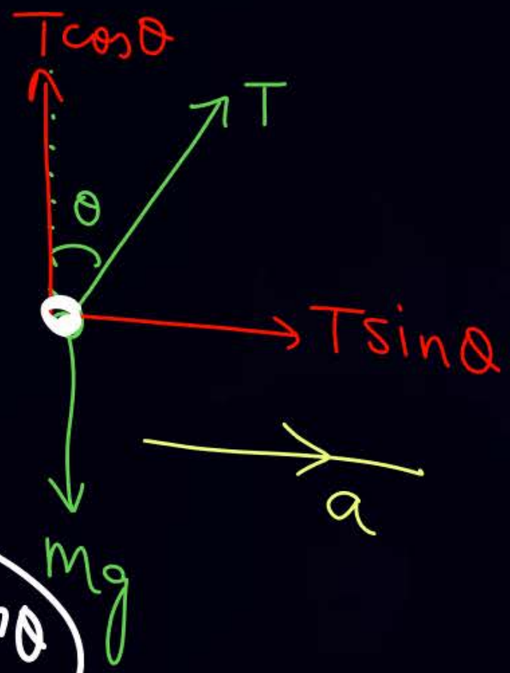
Sol^n (wrt ground)

$T\sin\theta = ma$

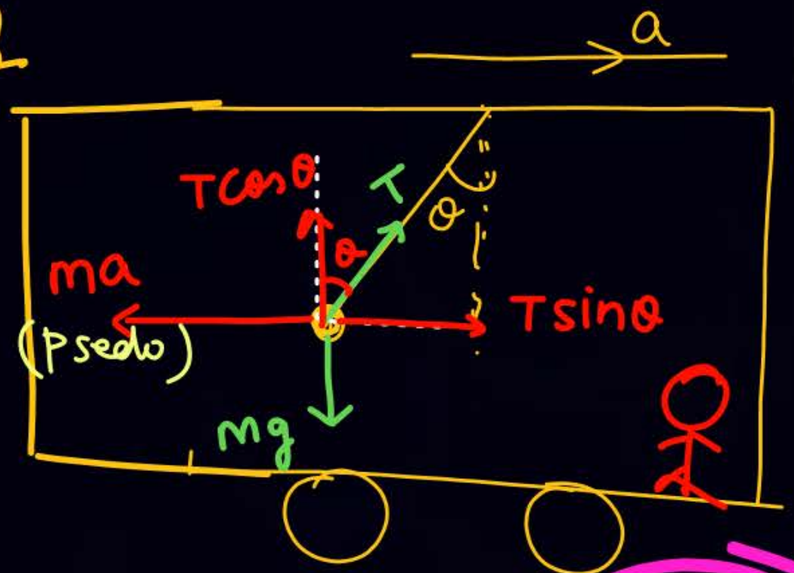
$T\cos\theta = mg$

$\tan\theta = \frac{a}{g}$

$a = g\tan\theta$



Q



$T\sin\theta = ma$

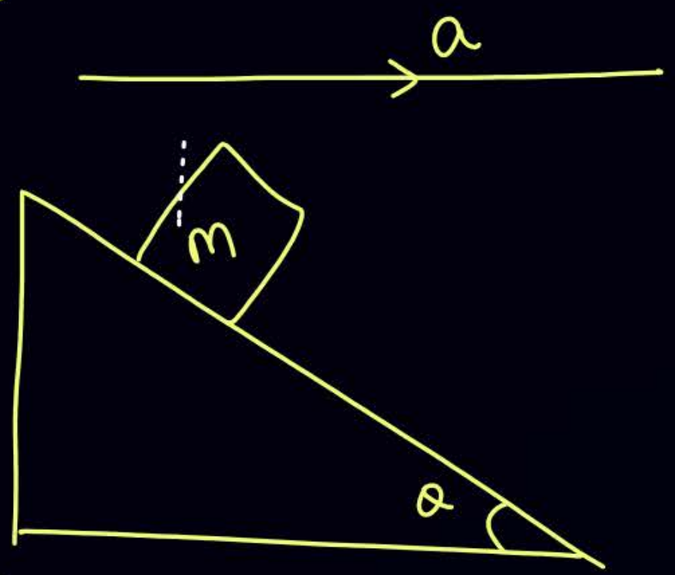
$T\cos\theta = mg$

$\tan\theta = \frac{a}{g}$

$a = g\tan\theta$

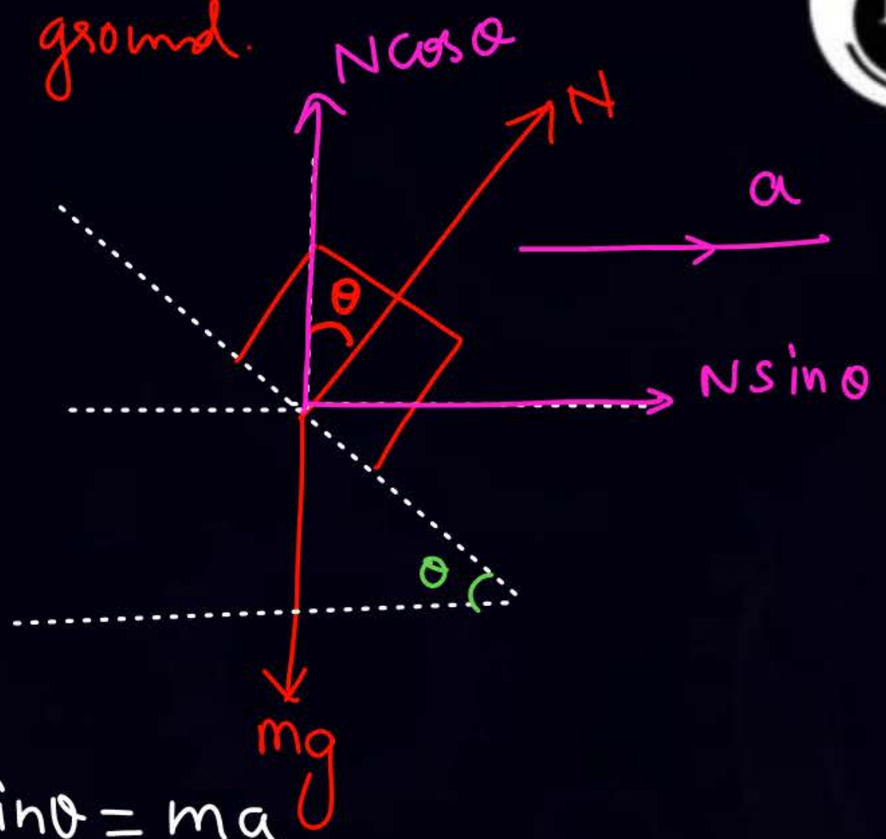
wrt car

Q



find value of α so that block remains at rest wrt wedge.

Sol^n wrt ground.



$N\sin\theta = ma$

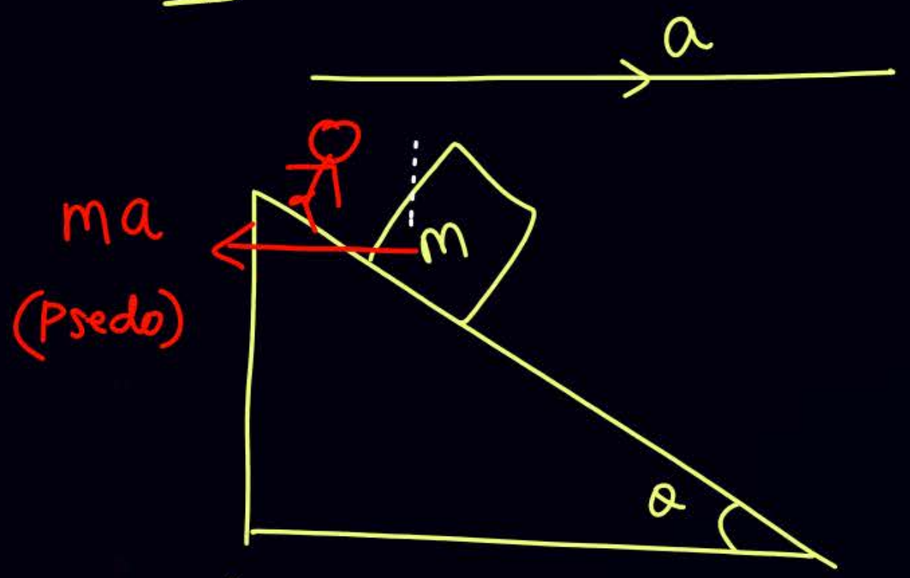
$N\cos\theta = mg$

$$\tan\theta = \frac{a}{g}$$

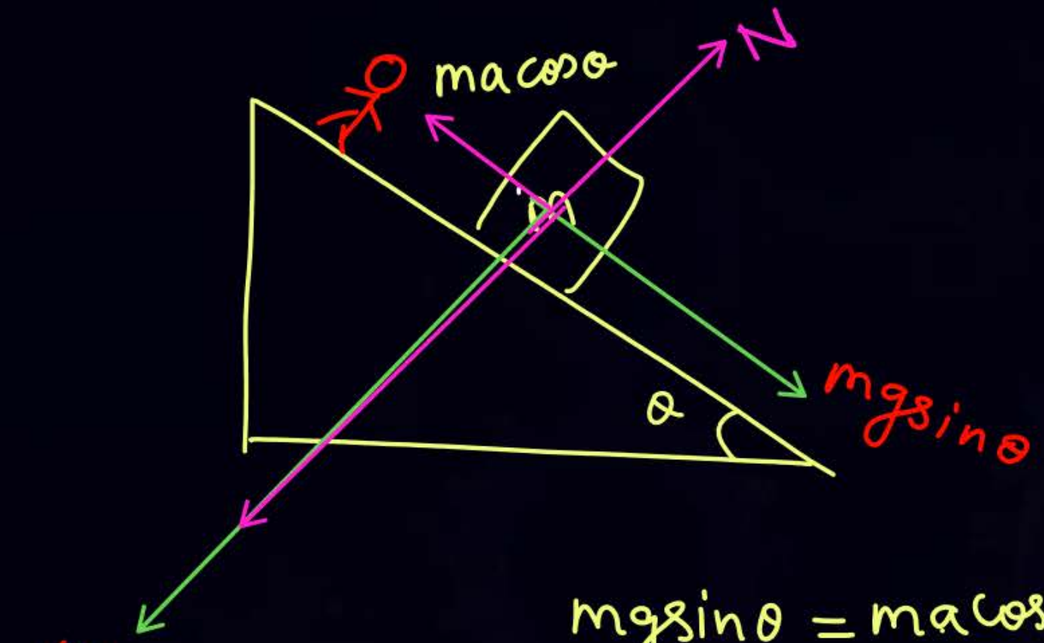
$$a = g\tan\theta$$

wrt wedge.

Q



find value of θ so that block remains at rest wrt wedge.

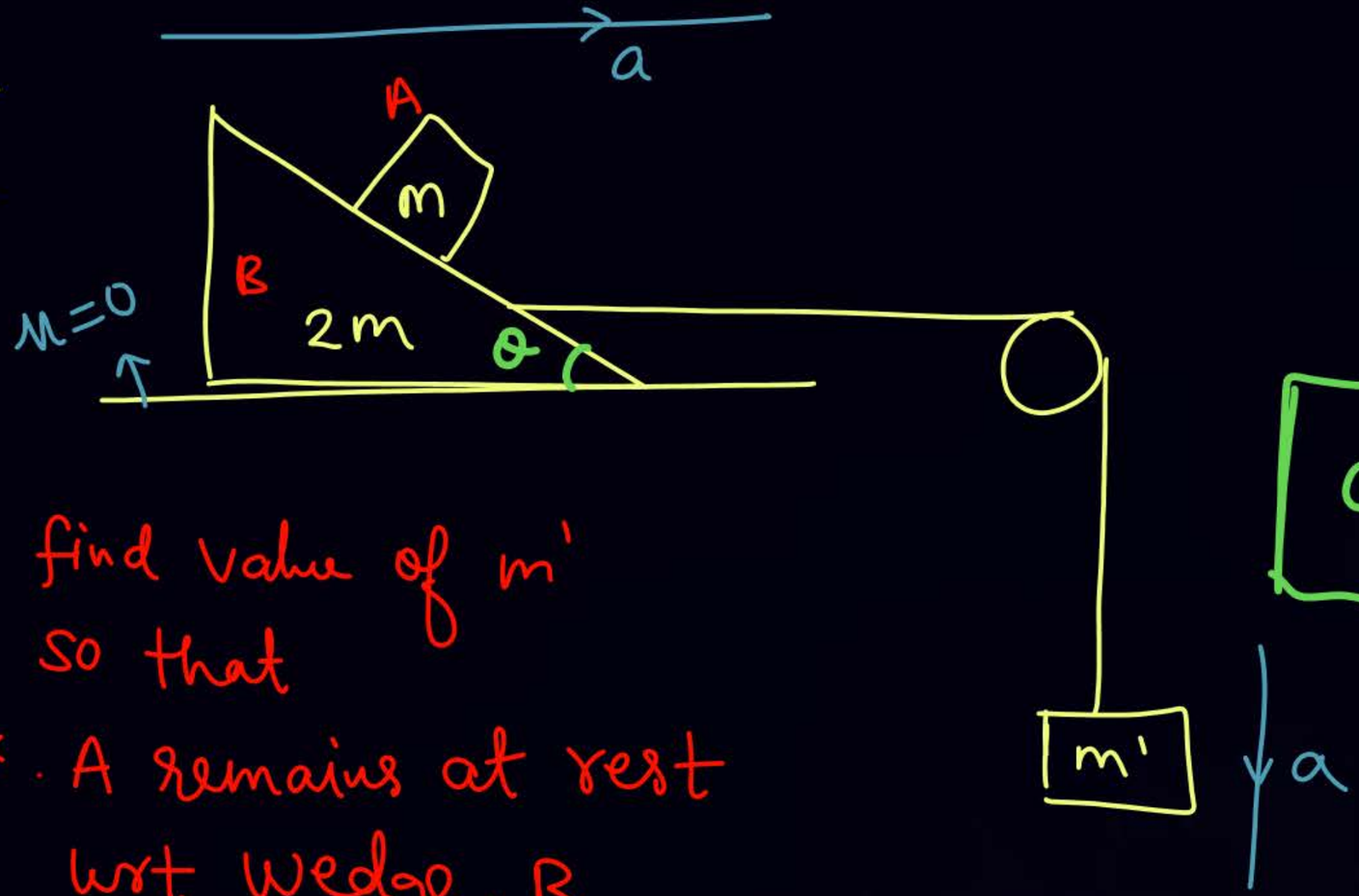


$mg\sin\theta = ma\cos\theta$

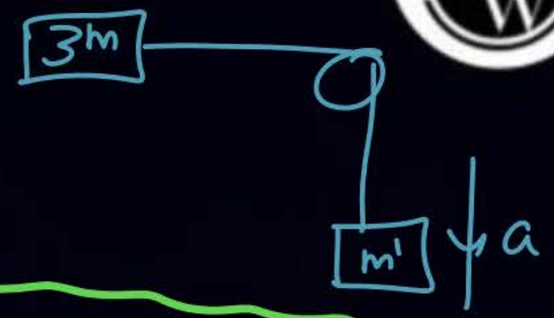
$$\boxed{a = g\tan\theta}$$

$N = mg\cos\theta + ma\sin\theta$

Hew
Q

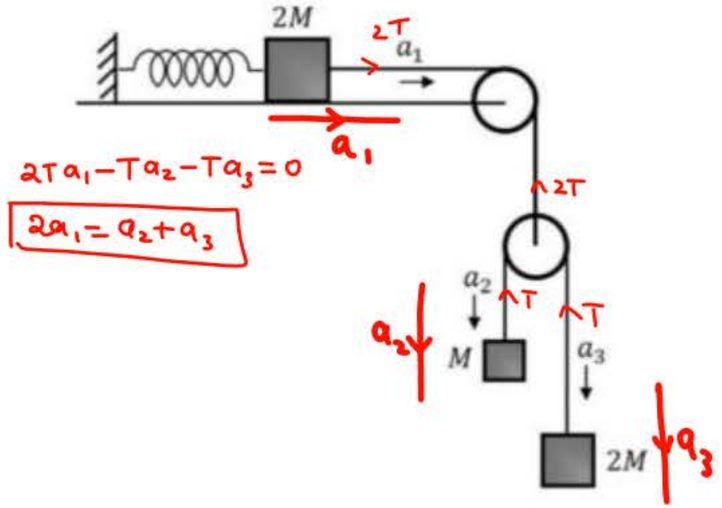


find value of m'
so that
block A remains at rest
wrt wedge B



$$a = \frac{m'g}{m+2m+m'} = g\tan\theta$$

Q.2 A block of mass $2M$ is attached to a massless spring with spring-constant k. This block is connected to two other blocks of masses M and $2M$ using two massless pulleys and strings. The accelerations of the blocks are a_1, a_2 and a_3 as shown in the figure. The system is released from rest with the spring in its unstretched state. The maximum extension of the spring is x_0. Which of the following option(s) is/are correct?
[g is the acceleration due to gravity. Neglect friction]



(A) $x_0 = \frac{4Mg}{k}$

(B) When spring achieves an extension of $\frac{x_0}{2}$ for the first time, the speed of the block connected to the spring is $3g\sqrt{\frac{M}{5k}}$

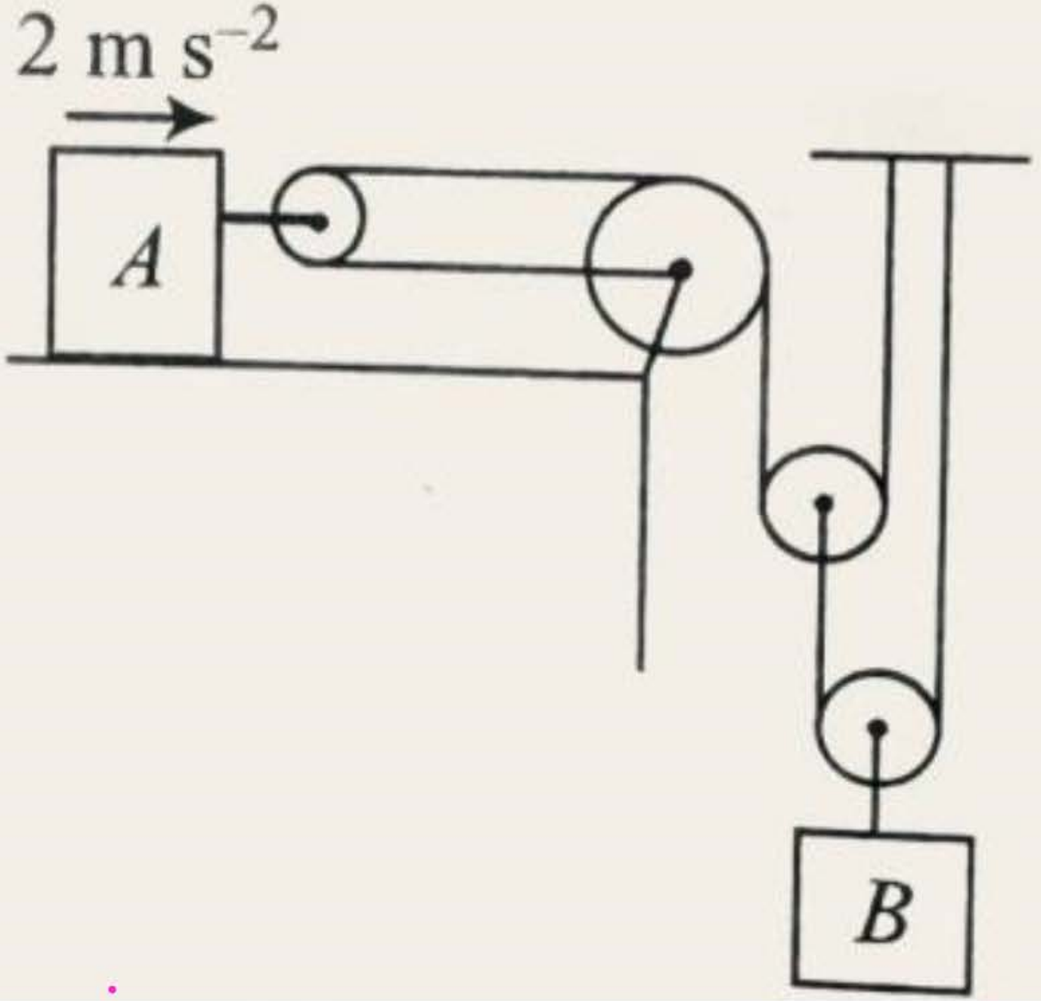
(C) At an extension of $\frac{x_0}{4}$ of the spring, the magnitude of acceleration of the block connected to the spring is $\frac{3g}{10}$

(D) $a_2 - a_1 = a_1 - a_3$

$a_2 + a_3 = 2a_1$

In the given figure, find the acceleration of B, if the acceleration of A is $2\ \text{m s}^{-2}$.

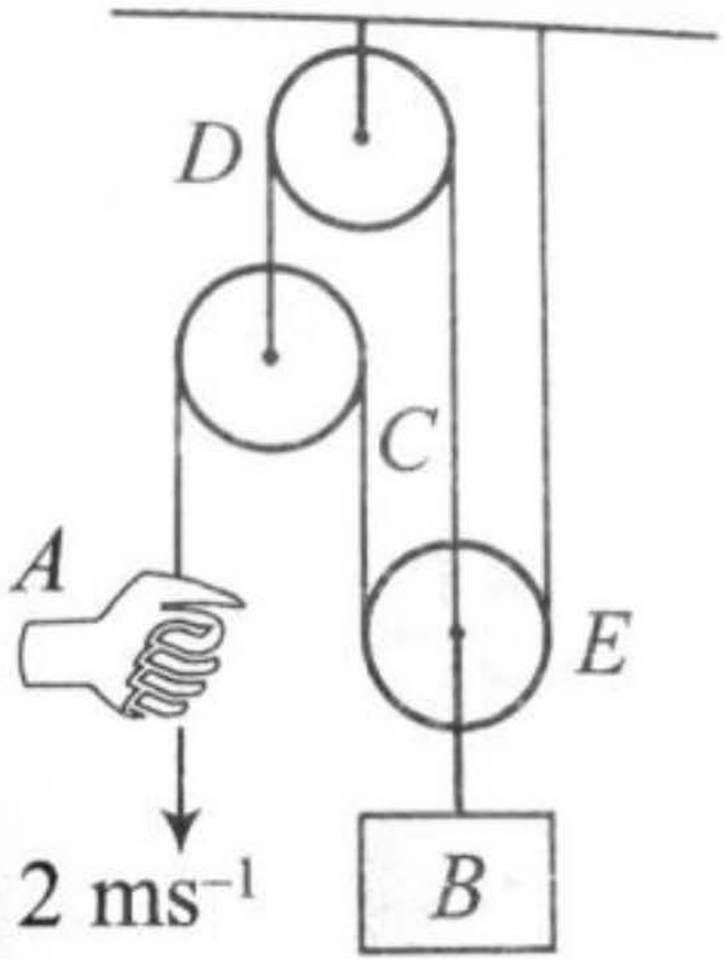
HW



Ans - 1

5. Determine the speed with which block B rises in figure if the end of the chord at A is pulled down with a speed of $2\ \mathrm{m\,s^{-1}}$.

H/w



Ans. S

INERTIAL FRAME / NON INERTIAL FRAME

Inertial Frame

वो frome where NLM are valid.

★ Rest wrt ground or moving with const velocity. wrt ground.

Non Inertial Frame (NIF)

वो frame where NLM fails & directly not applicable.

★ all the accelerated frame wrt ground are NIF

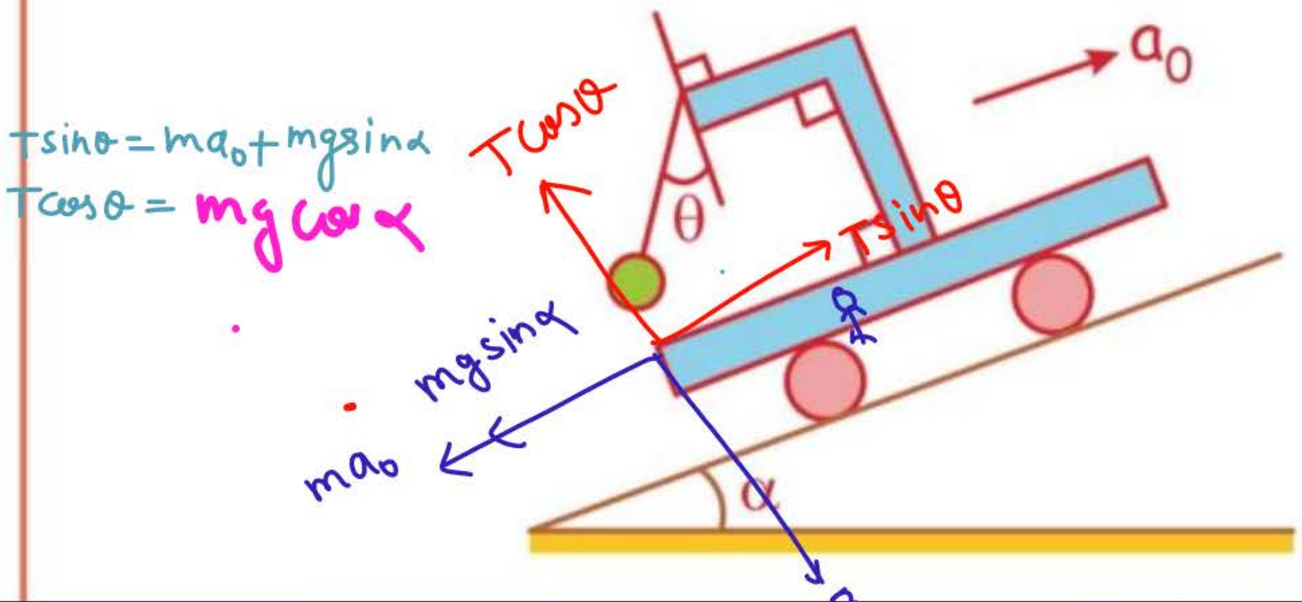
★ अगर a है $\Rightarrow$ Non - inertial.

★ In order to validate NLM eqn in a non inertial frame, we must apply a correction factor called pseudo force.

* $\vec{F}_{pseudo} = -M_{block}\vec{a}_{observer} = -M_{block}\vec{a}_{NIF}$

Tension एक real force है यह हर frame में same रहेगा।

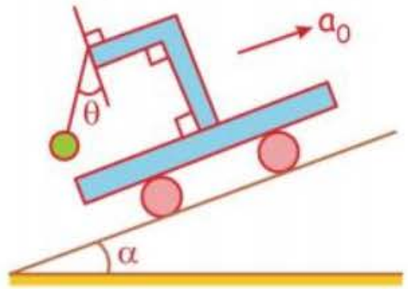
Q. A pendulum of mass m hangs from a support fixed to a trolley. The direction of the string when the trolley rolls up a plane of inclination α with acceleration a_0 is (String and bob remain fixed with respect to trolley)



$T\sin\theta = ma_0 + mg\sin\alpha$

$T\cos\theta = mg\cos\alpha$

Q. A pendulum of mass m hangs from a support fixed to a trolley. The direction of the string when the trolley rolls up a plane of inclination α with acceleration a_0 is (String and bob remain fixed with respect to trolley)

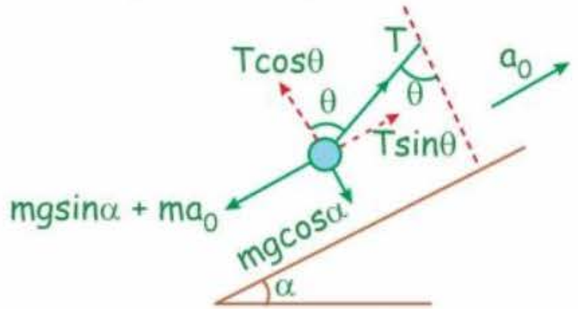


Sol. Balancing forces in the frame of trolley (non-inertial frame)

$T \sin\theta = m(g \sin\alpha + a_0)$

$T \cos\theta = mg \cos\alpha$

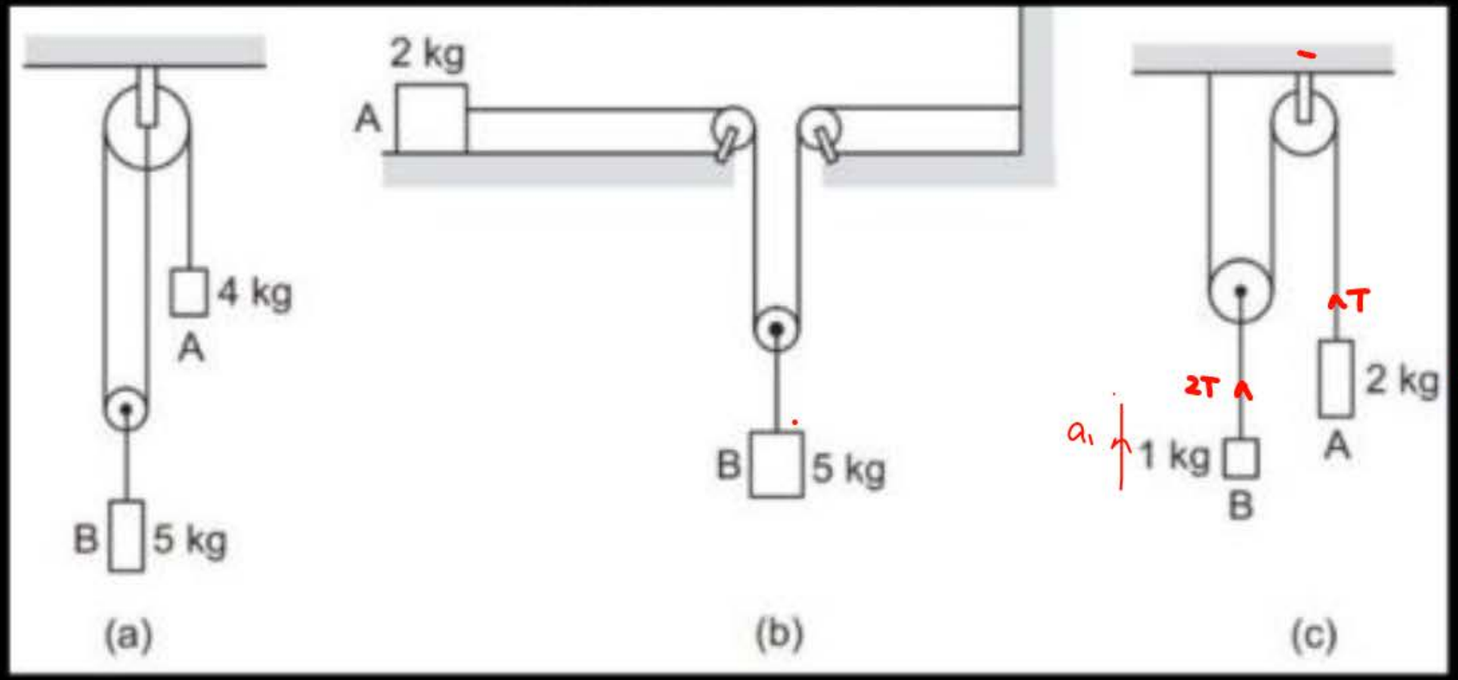
$$\Rightarrow \tan\theta = \left(\frac{g\sin\alpha + a_0}{g\cos\alpha}\right)$$



$$\theta = \tan^{-1}\left(\frac{g\sin\alpha + a_0}{g\cos\alpha}\right)$$

HW

Find the acceleration of the blocks A and B in the three situations shown in figure (5-E17).



$a_2 + 2a_1 = 0$

$\frac{T-20}{2} + 2\left(\frac{2T-10}{1}\right) = 0$

$T - 20 + 8T - 40 = 0$

$7T = 60$

$T = \frac{60}{7}$

$a_2 = \frac{\frac{60}{7} - 20}{2}$

Ans:

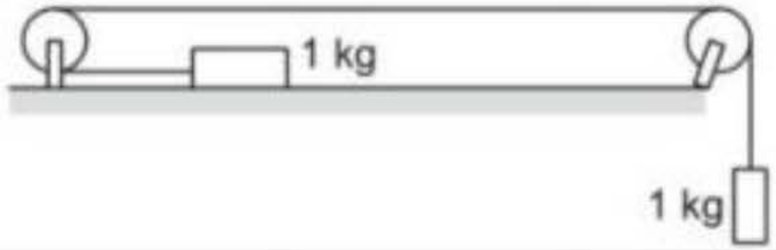
(a) $\frac{2}{7}g$ downward, $\frac{g}{7}$ upward

(b) $\frac{10}{13}g$ forward, $\frac{5}{13}g$ downward

(c) $\frac{2}{3}g$ downward, $\frac{g}{3}$ upward

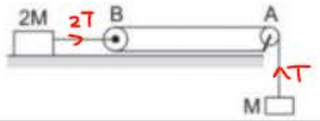
HW

Calculate the tension in the string shown in figure (5-E13). The pulley and the string are light and all surfaces are frictionless. Take $g = 10\ \text{m/s}^2$.



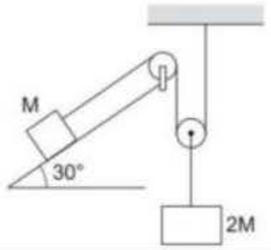
Ans: (5 N)

(b) Find the tension in the string. (c) Calculate the force exerted by the clamp on the pulley A in the figure.



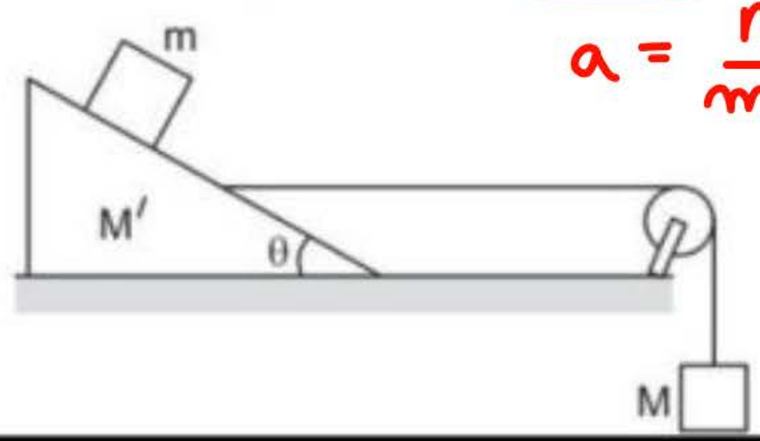
Ans: (a) $2g/3$, (b) $Mg/3$, (c) $\sqrt{2}\,Mg/3$ at an angle of 45° with the horizontal

Find the acceleration of the block of mass M in the situation shown in figure (5-E15). All the surfaces are frictionless and the pulleys and the string are light.



Ans: g/3 up the plane

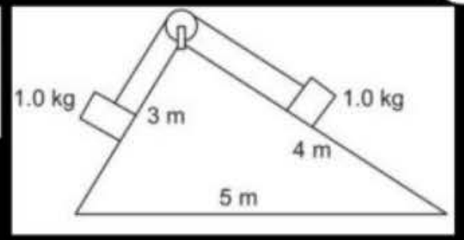
Find the mass M of the hanging block in figure (5-E16) which will prevent the smaller block from slipping over the triangular block. All the surfaces are frictionless and the strings and the pulleys are light.



$$a = \frac{mg}{m+M'+M} = g\tan\theta$$

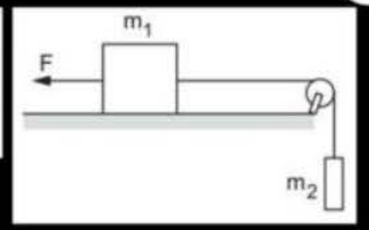
Ans: $\dfrac{M'+m}{\cot\theta - 1}$

Consider the situation shown in figure (5-E9). All the surfaces are frictionless and the string and the pulley are light. Find the magnitude of the acceleration of the two blocks.



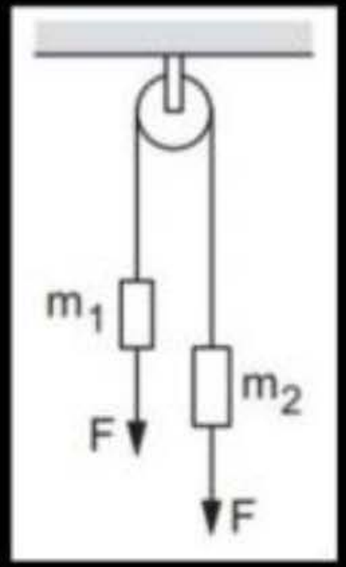
Ans: (g/10)

A constant force $F = m_2 g/2$ is applied on the block of mass m_1 as shown in figure (5-E10). The string and the pulley are light and the surface of the table is smooth. Find the acceleration of m_1.



Ans: $\frac{m_2 g}{2(m_1 + m_2)}$ towards right

In figure (5-E11) $m_1 = 5$ kg, $m_2 = 2$ kg and $F = 1$ N. Find the acceleration of either block. Describe the motion of m_1 if the string breaks but F continues to act.



Ans: 4.3 m/s^2, moves downward with acceleration g + 0.2 m/s^2

SKC

देख भाई मुद्दे की बात ये है की

1. Ground के respect मे अगर किसी frame के पास acc है तो वो non-inertial frame है, अगर उस frame मे जाके हम directly NLM की eqn लिखे तो eqn गलत आई।
   तो newton law की इज्जत बचाने के लिए हमने एक जबरदस्ती का force लगाया जो की सच्ची मुच्ची मे नही लग रहा है (false force, pseudo force) ताकी हम NIF मे बिंदास NLM eqn लिख सके।
2. Pseudo force = (Mass of block) × (Acc of NIF)
   और इसकी direction NIF के acc की direction के opposite
3. ये समझलो कि ये NSP (ताड़ने) का licsence/किराया है मतलब जब भी कभी accelerated lift, wedge, car, balloon पर जाकर मजे लेने हो तो सबसे पहले block पर pseudo force लगा दो और फिर मजा लो..... physics का
4. अगर आप ground पर खड़े होकर ques solve कर रहे है तो pseudo force की जरूरत नही है Bcz in this case pseudo force = 0
5. Ques चाहे ground पर खड़े होकर solve करो या NIF/acc wedge, car मे बैठ कर ans same आएगा मतलब सारे ques बिना pseudo force के ground frame भी solve किए जा सकते है।

Todays Goal

- Ques attached in this ppt
- PYQ NEET Sheet will be uploaded solve them
  - must try all ques.

THANK YOU