PRAYAS

JEE 2025

Lecture - 04

Physics

Laws Of Motion

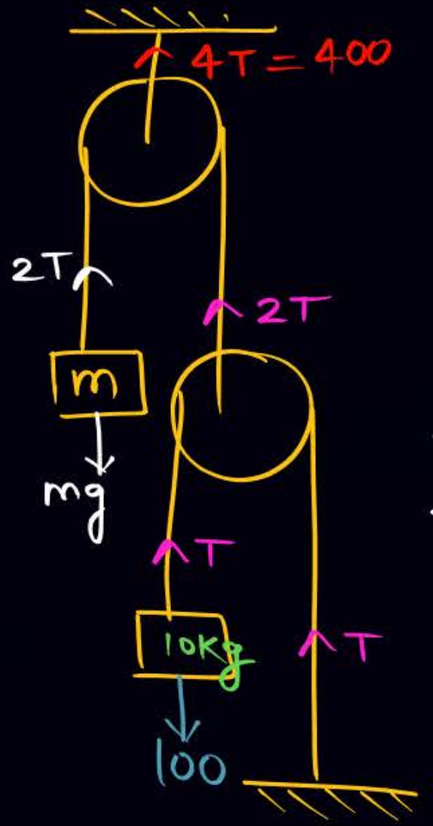
By- Saleem Ahmed Sir

Topics to be covered

1. Equilibrium
2. F = ma based ques.
3.
4.

All masses are in equilibrium find the value of unknown mass

(1)



$2T = mg$

$T = 100$

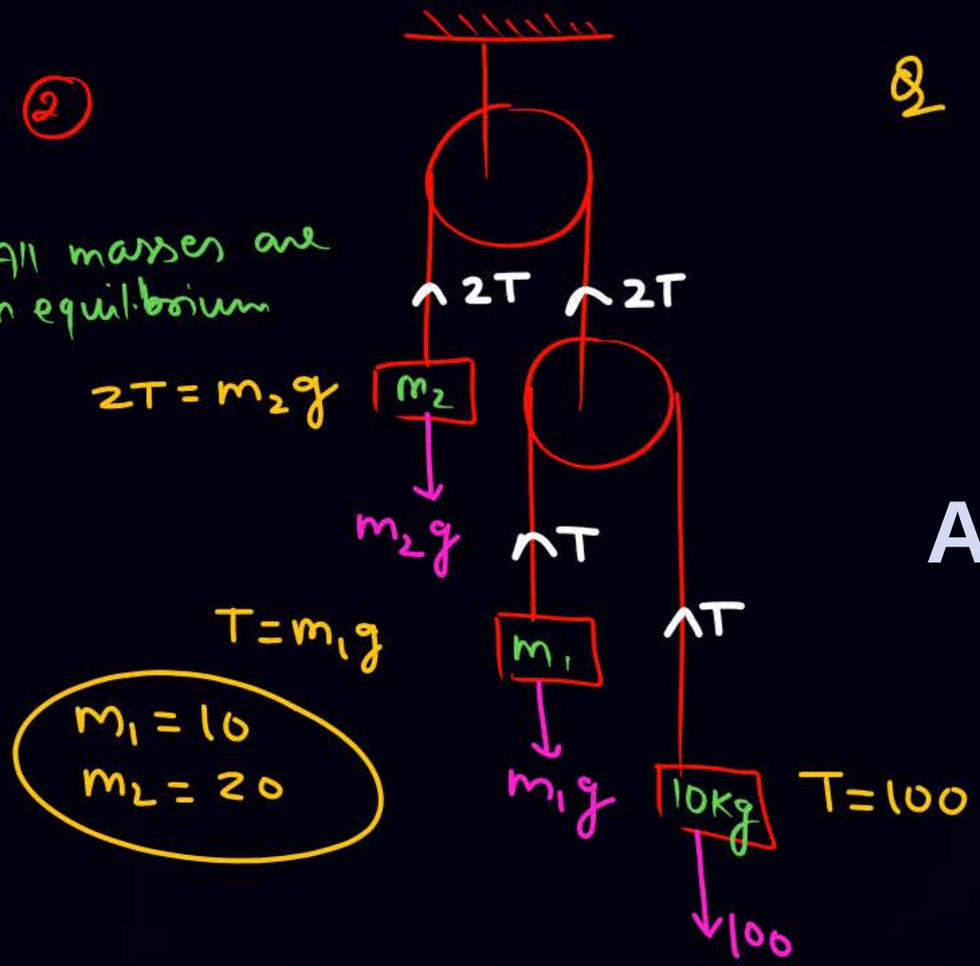
$2T = mg$

$2 \times 100 = m \times 10$

$m = 20kg$

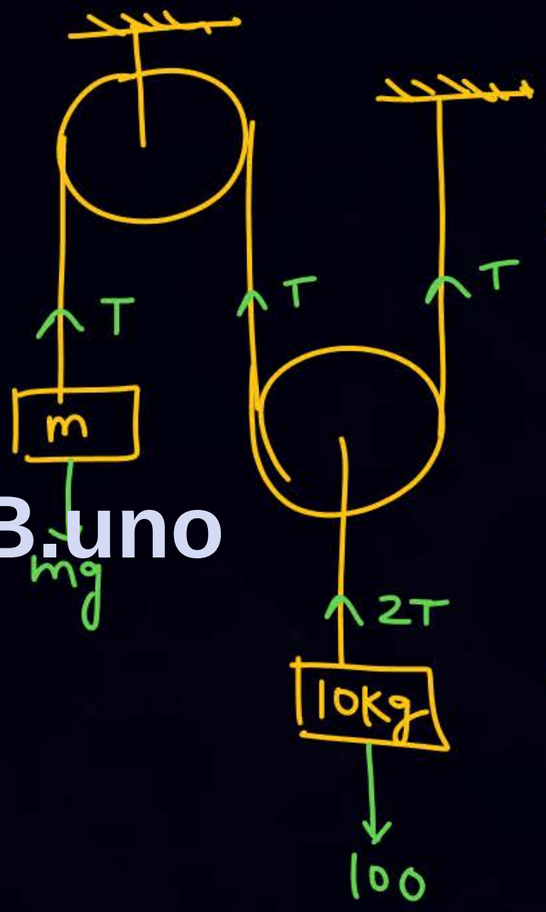
(2)

All masses are in equilibrium



$m_1 = 10$
$m_2 = 20$

Q



Both masses are in equil.

$2T = 100$, $T = 50$

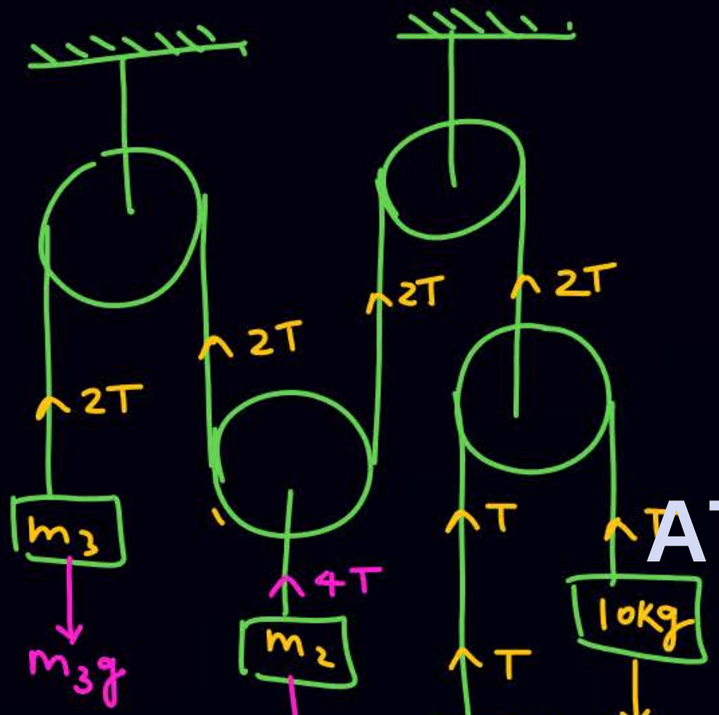
$T = mg$

$m = 5\,Kg$

Q

All masses are in equil.

find $m_1 m_2 m_3$



$2T = m_3 g$

$m_3 = 20kg$

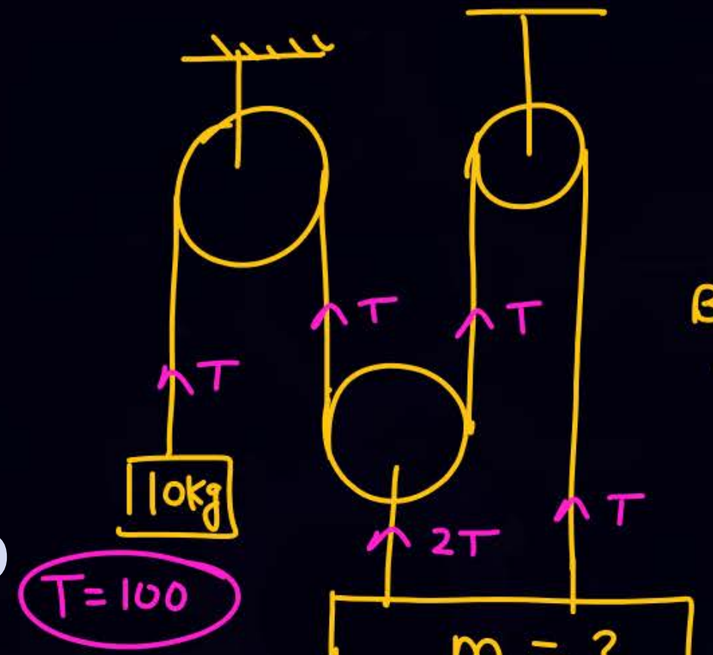
$4T = m_2 g$

$m_2 = 40kg$

T = 100

$m_1 = 10Kg$

Q



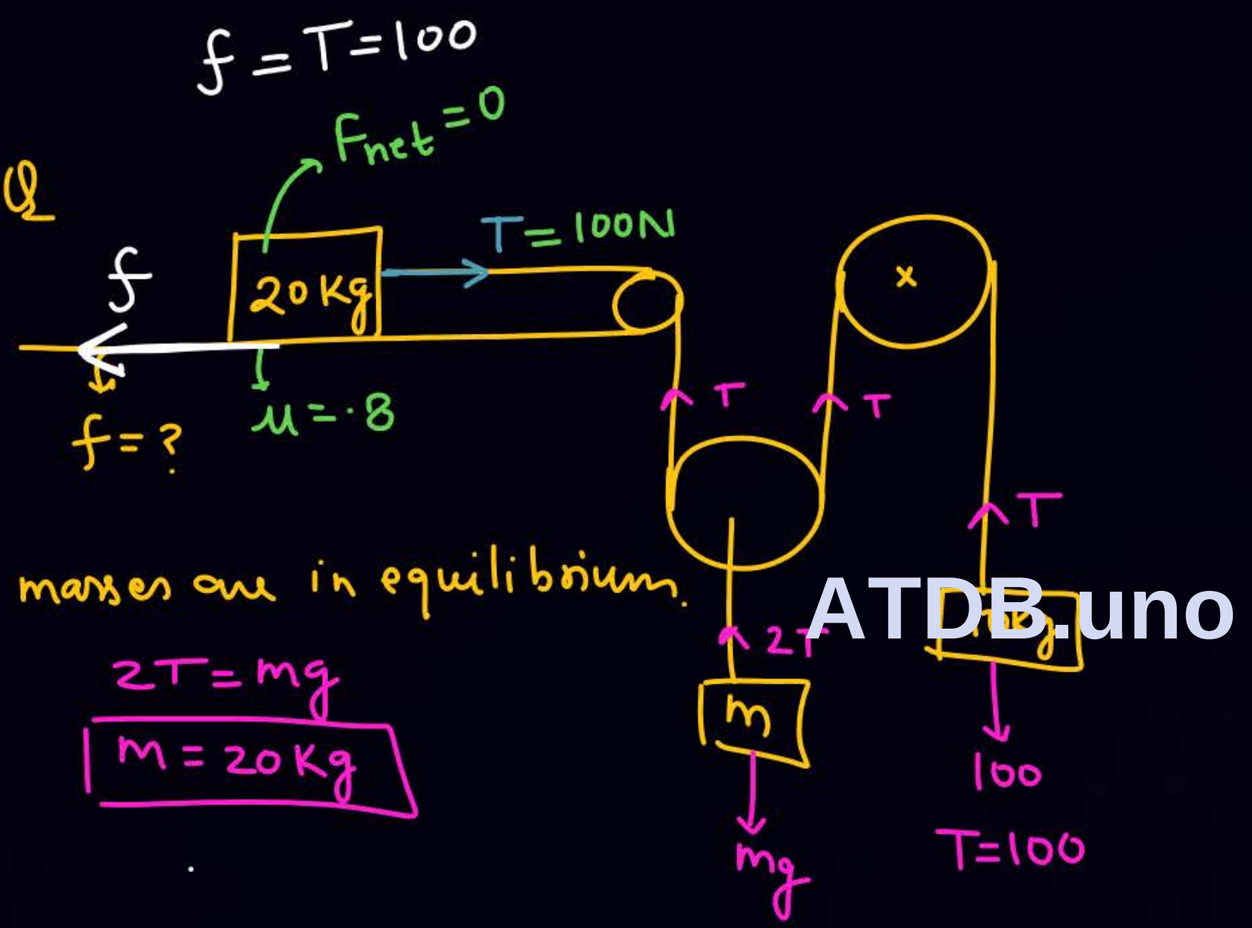
Both masses are in equil.

T = 100

$3T = mg$

$300 = mg$

$m = 30\ kg$



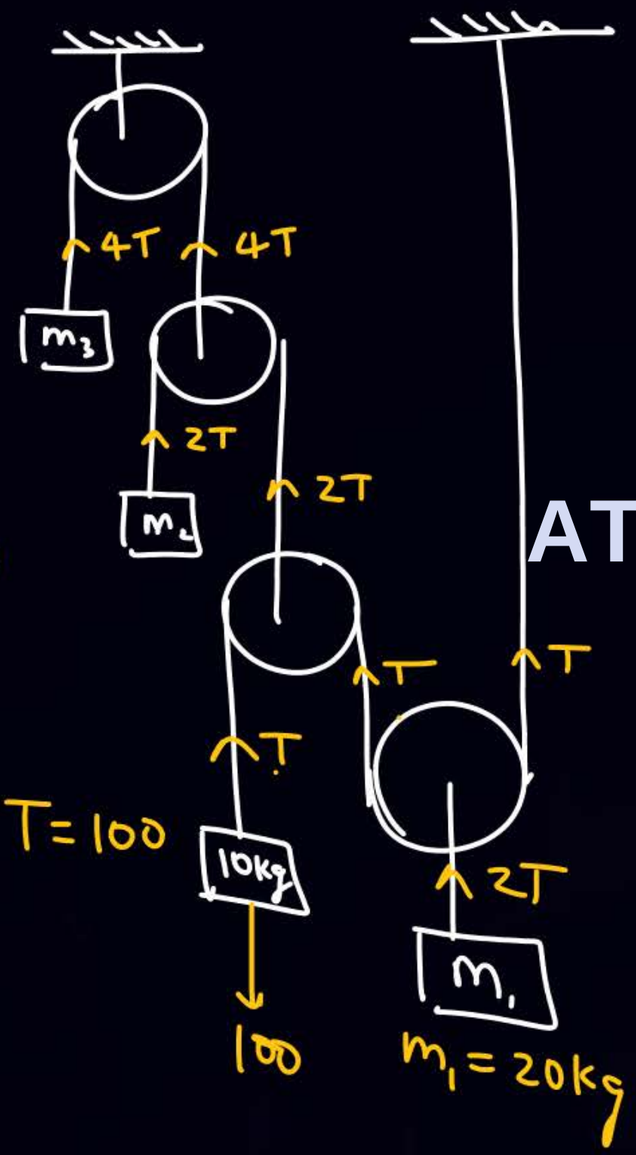
All masses are in equilibrium.

$2T = mg$

$m = 20\,Kg$

Q

All masses are in equil.

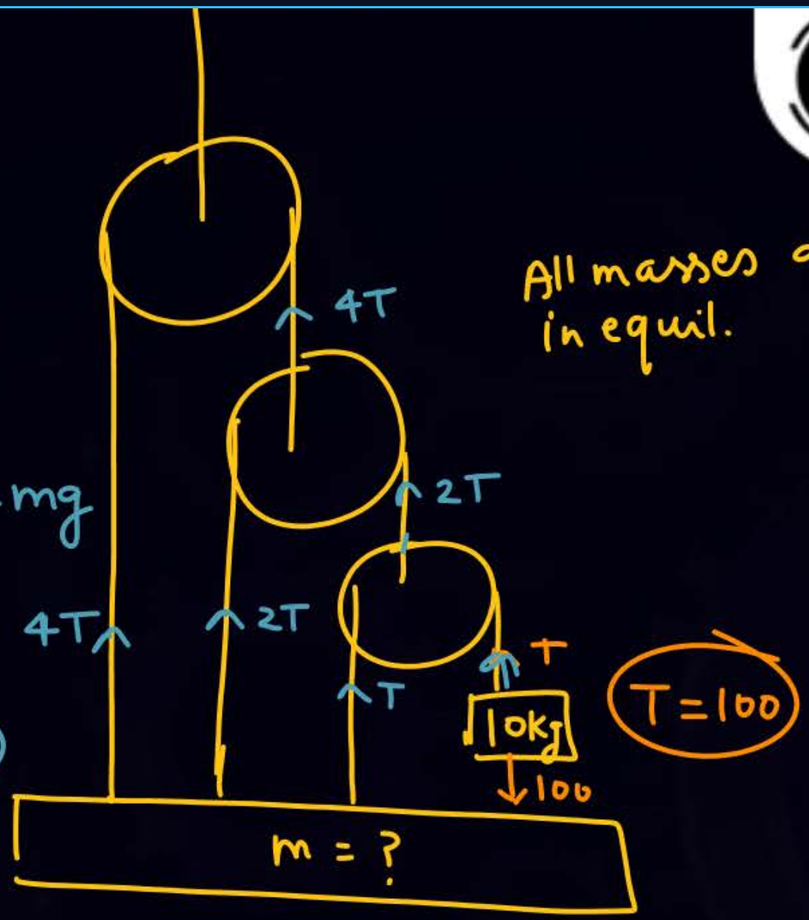


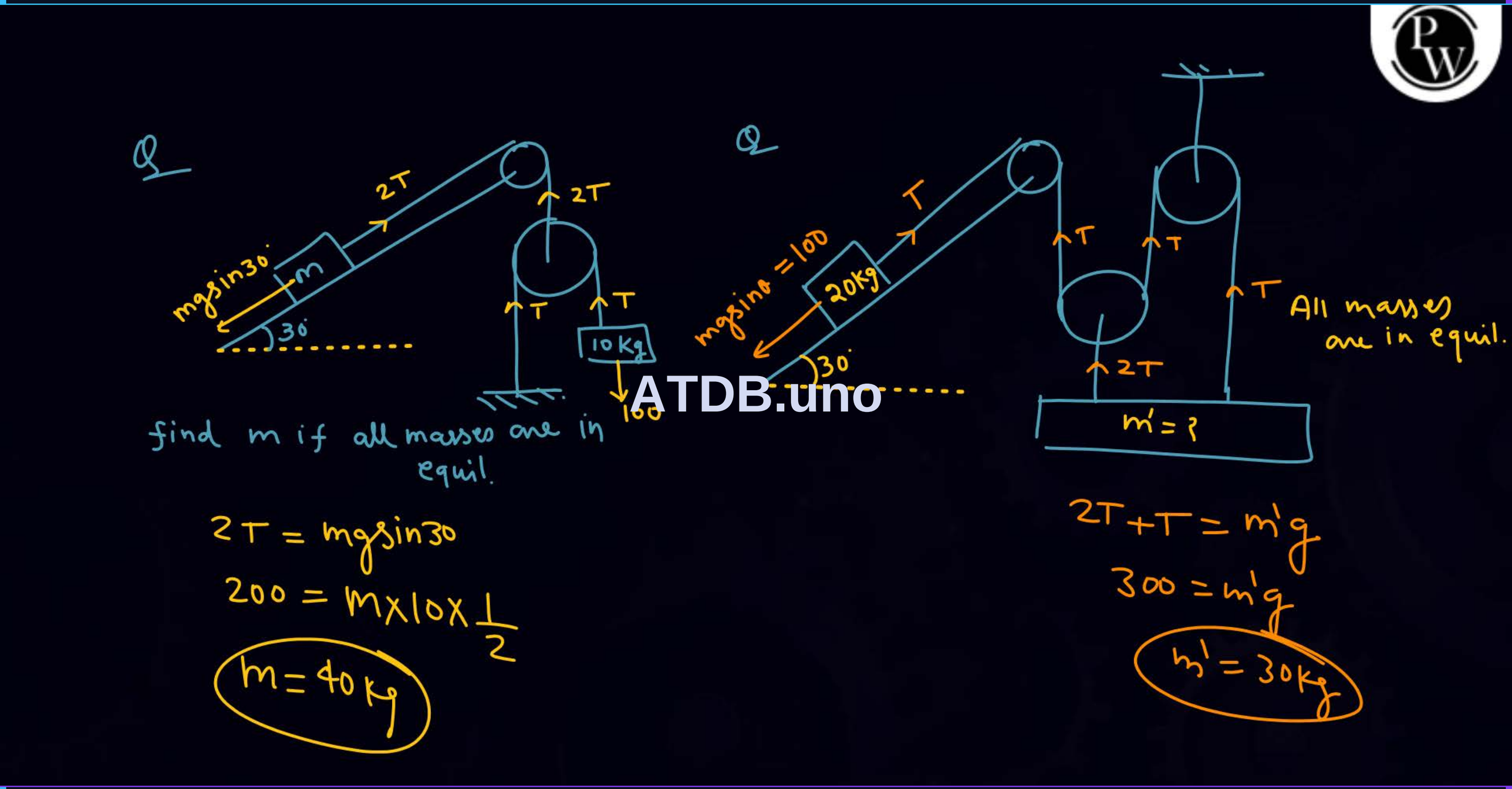
$m_2 = 20$
$m_3 = 40$

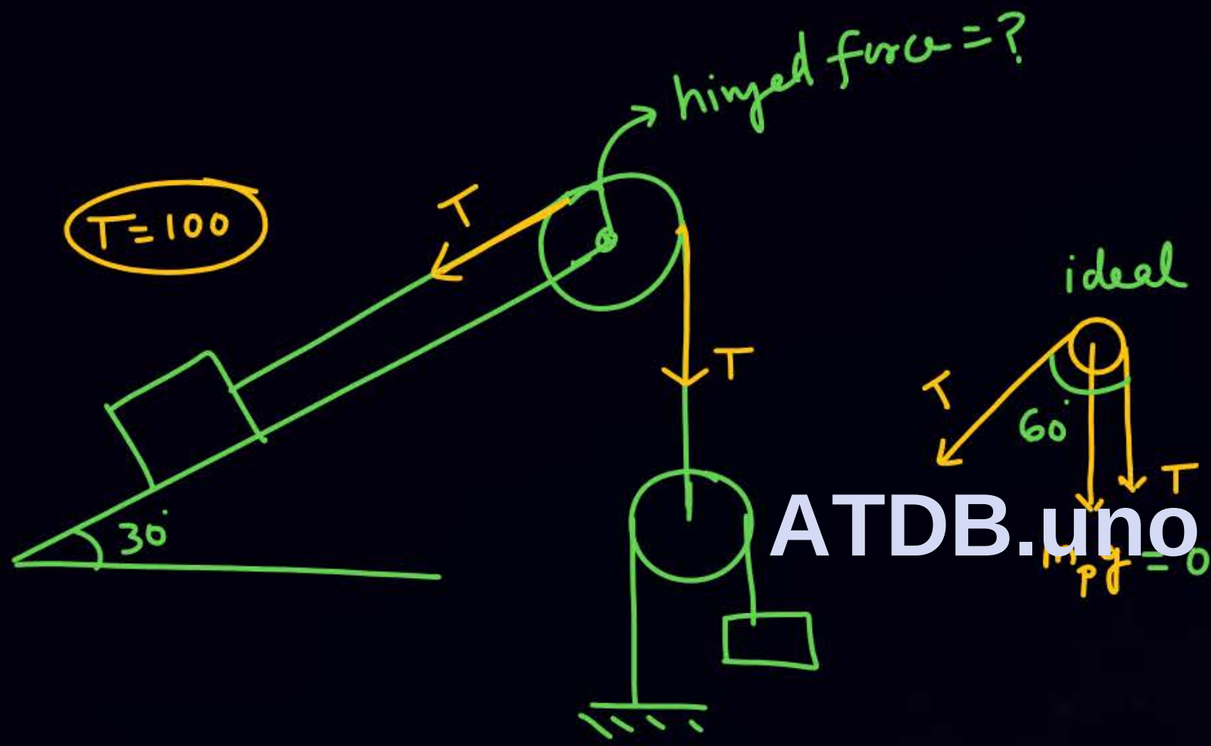
Q

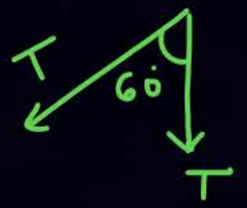
All masses are in equil.

$4T + 2T + T = mg$
$7T = mg$
$700 = mg$
$m = 70kg$



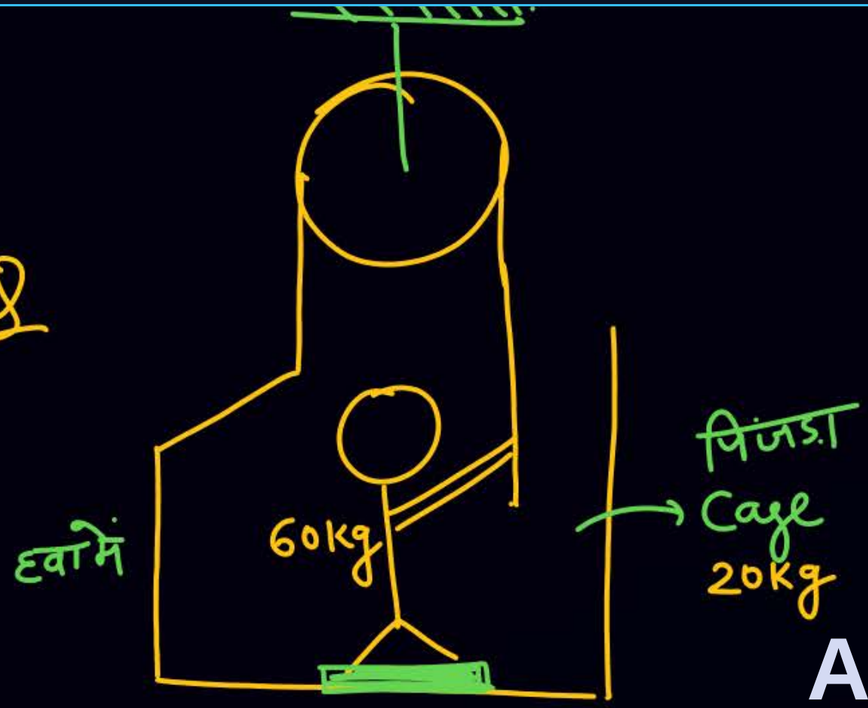






$T\sqrt{3} = 100\sqrt{3}$ = hinged force

Q



① force applied by man on रस्सी = T

② force applied by रस्सी on man = T

③ Normal contact force b/w man & पिंजड़ा = N

④ Reading of weighing machine = N

tw ⑤ what force man should apply on string so that weighing machine gives correct reading

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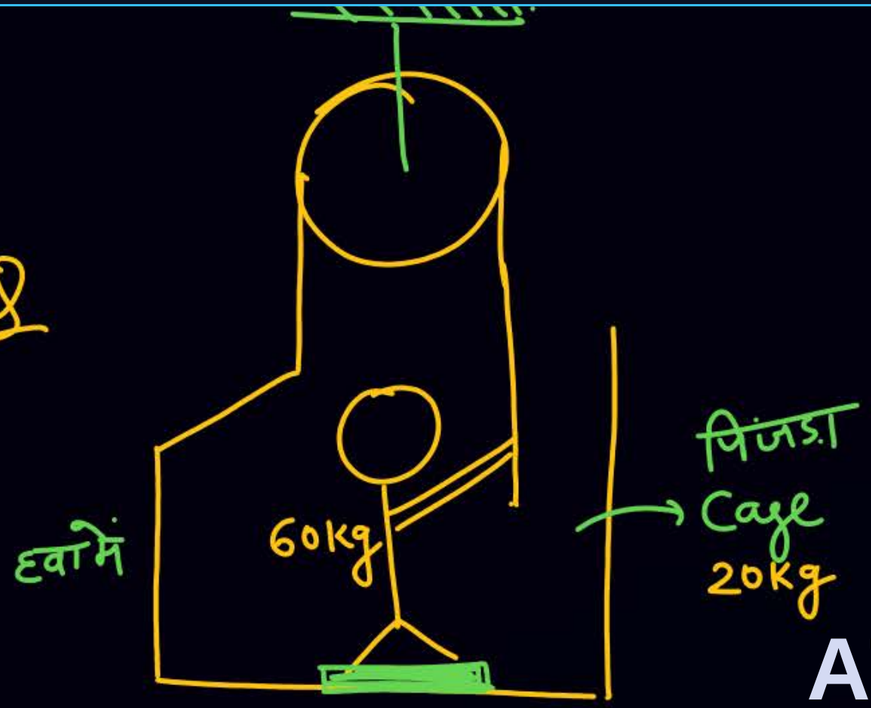
whole system is in equilibrium.

Q



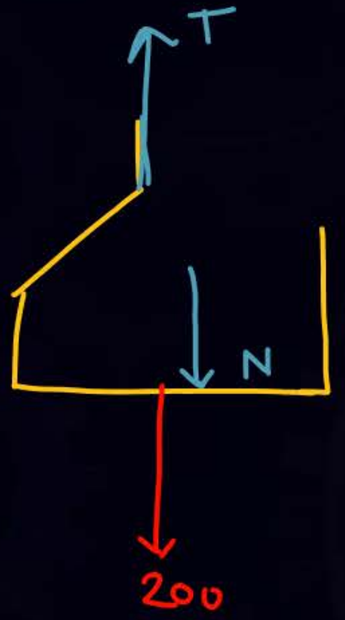
$T + N = 600$

$T = N + 200$

$2T = 800$

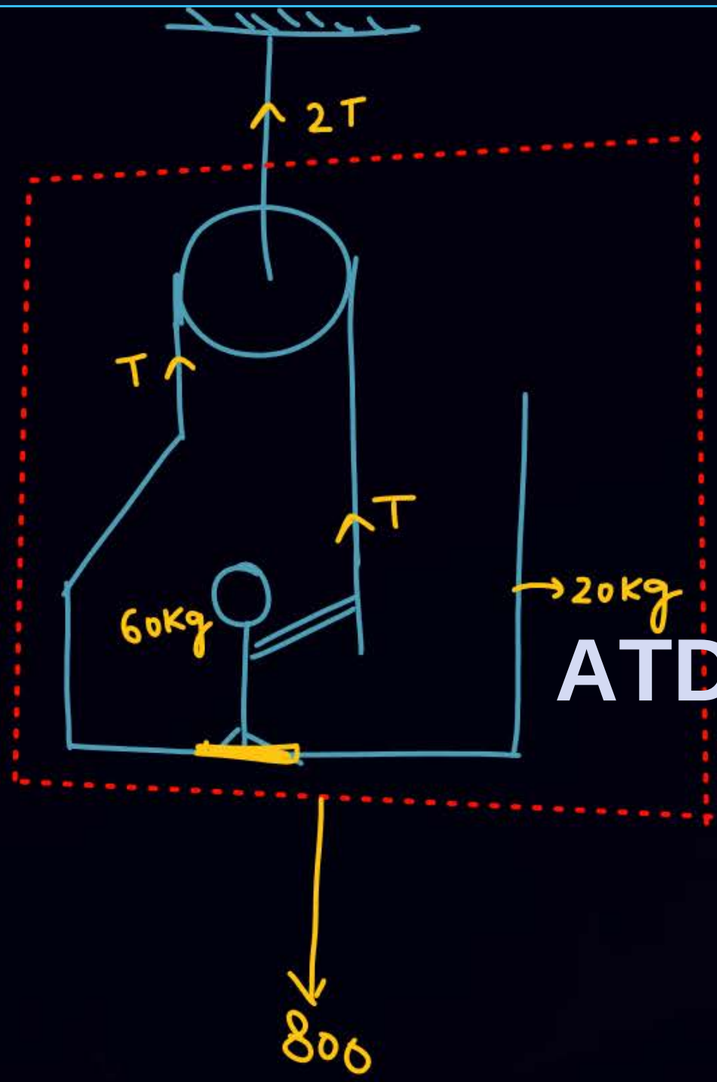
$T = 400$

$N = 200$



→ Reading of weighing machine.

whole system is in equilibrium.



$2T = 800$

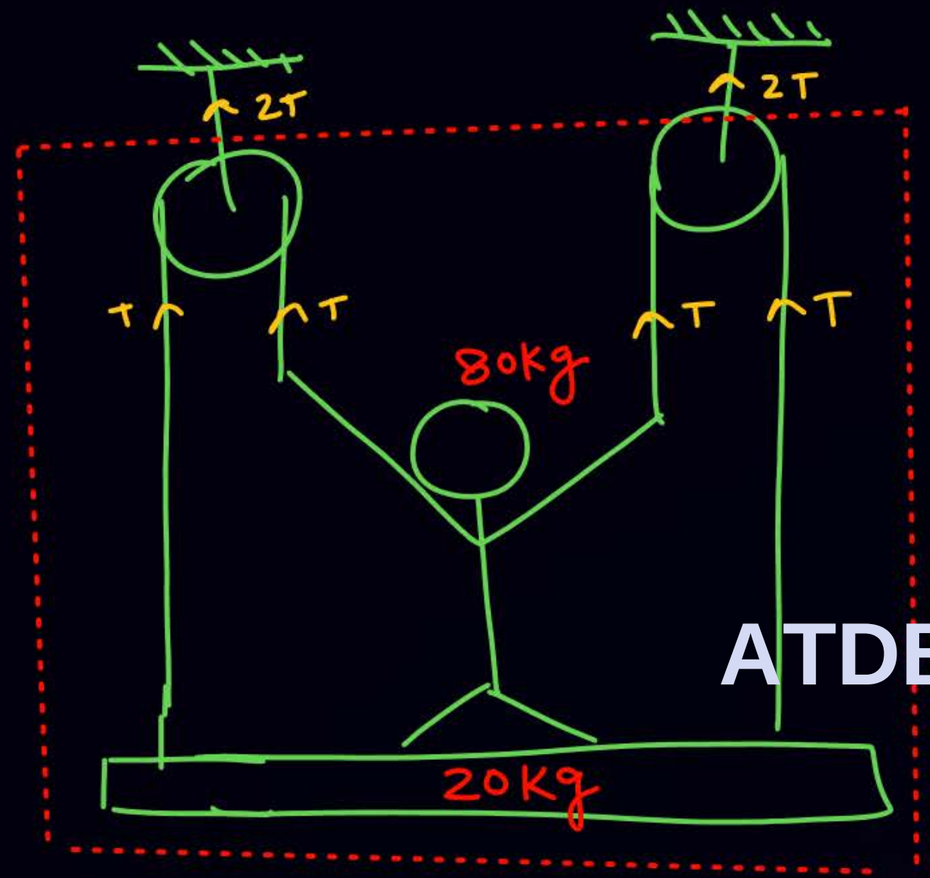
$T = 400$

$T + N = 600$

$400 + N = 600$

$N = 200$

Q



If Dharmendra Sahab applied the same force on both string. & system is in equilibrium. find

① force applied by Dharmendra Sahab on string

② Normal contact force.

$4T = (80+20)g$

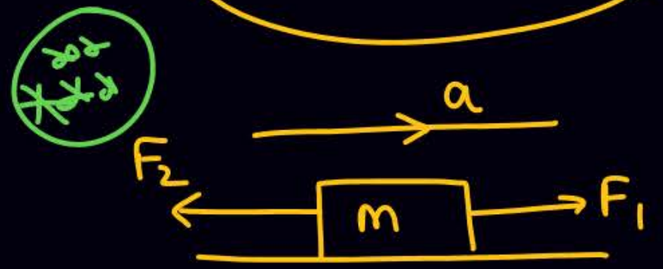
$T = 250$

$2T + N = 800$

$500 + N = 800$

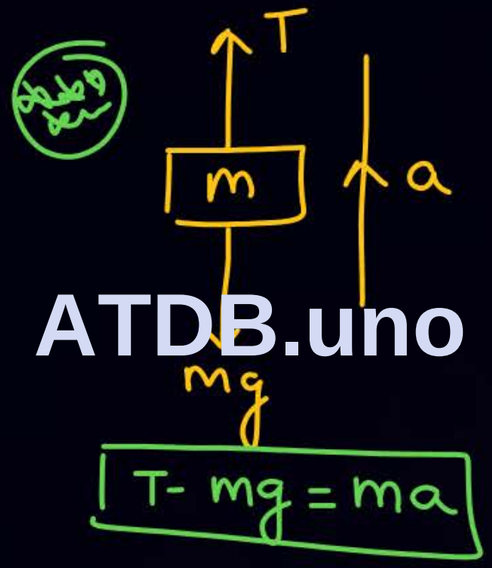
$N = 300$

$\vec{F}_{net} = m\vec{a}$



$F_1 - F_2 = ma$

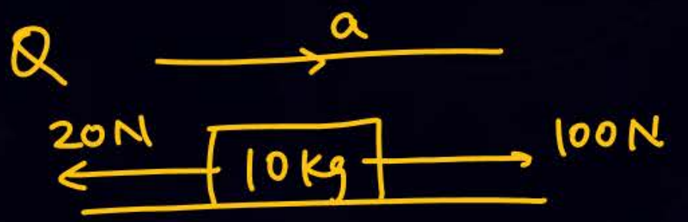
लगने वाला force नहीं है F_{net} है



$T - mg = ma$

P

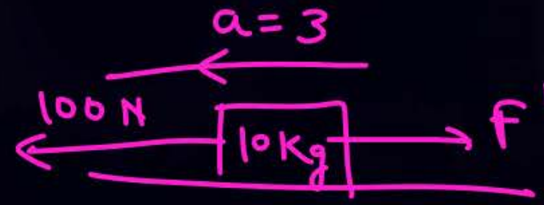
Q



$100 - 20 = 20 \times a$

$a = 8$

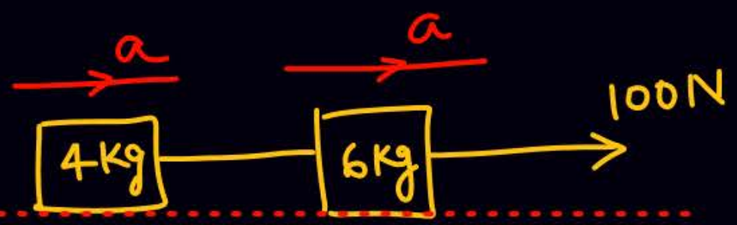
Q

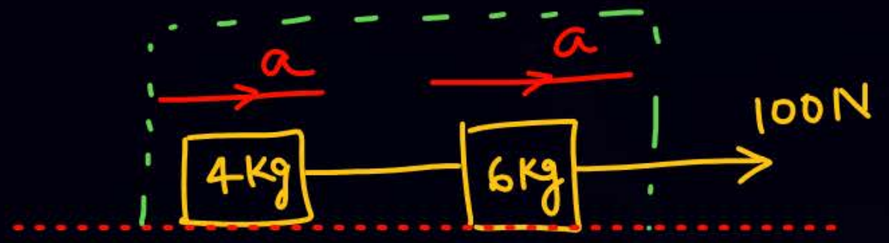


$100 - F' = 10 \times 3$

$F' = 70$

Q.





$$a = \frac{(F_{net})_{ext}}{m_{total}} = \frac{100}{4+6} = 10$$

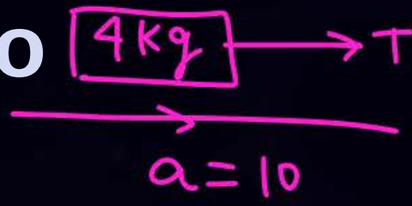
$T = 4a$ — (1)

$100 - T = 6a$ — (2)

Solve & get

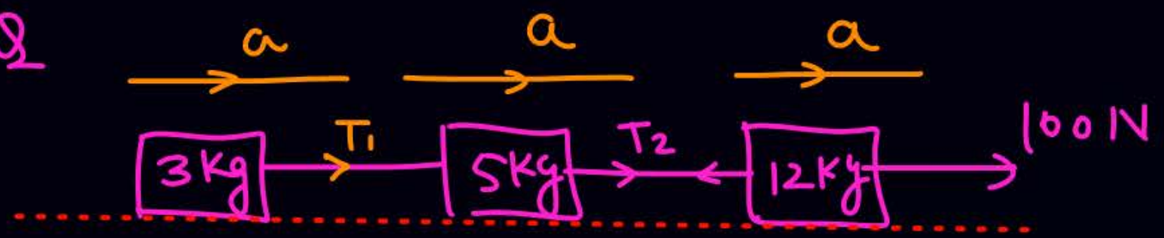
$a = 10$

$T = 40$

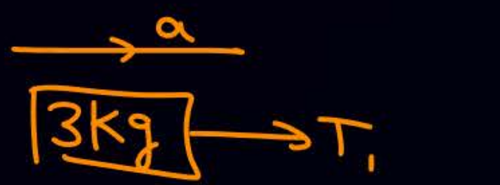


$T = 4 \times 10 = 40$

Q



$$a = \frac{100}{3+5+12} = 5$$



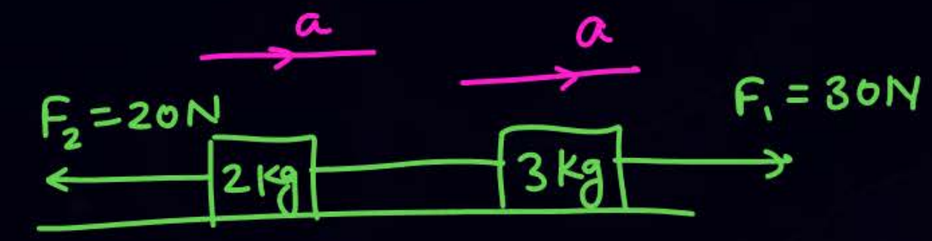
$T_1 = 3 \times 5 = 15$

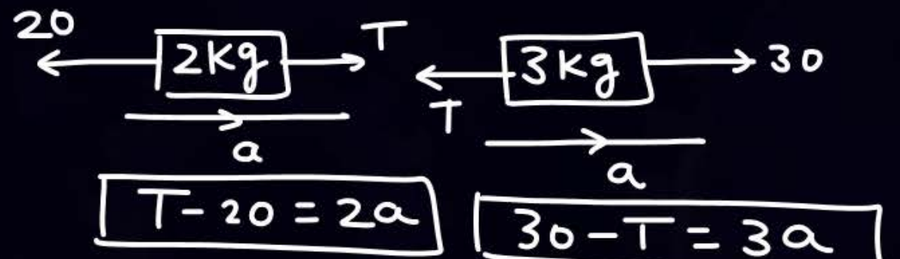
$100 - T_2 = 12a$

$100 - T_2 = 12 \times 5$

$T_2 = 40$

Q



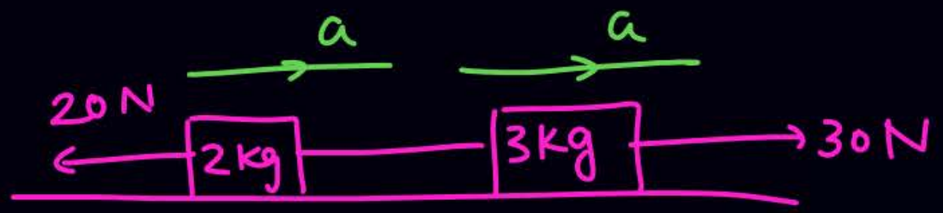


$T - 20 = 2a$

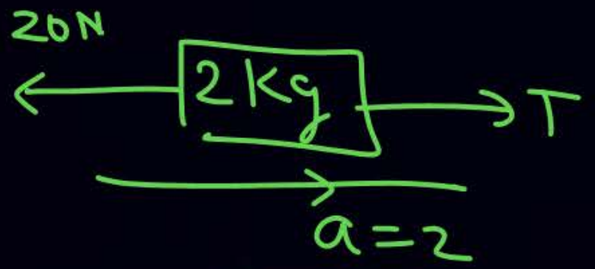
$30 - T = 3a$

$a = 2,\ T = 24$

Q

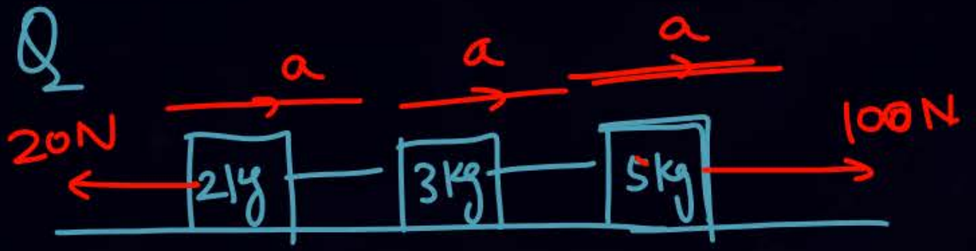


$$a = \frac{F_{net}}{M_{total}} = \frac{30-20}{2+3} = 2$$

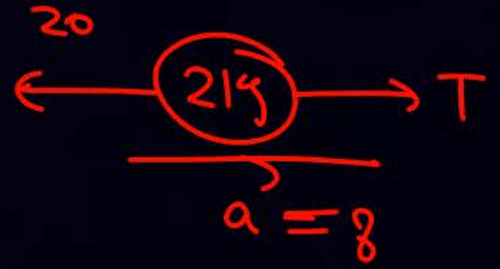


$$T-20 = 2\times2$$

Q

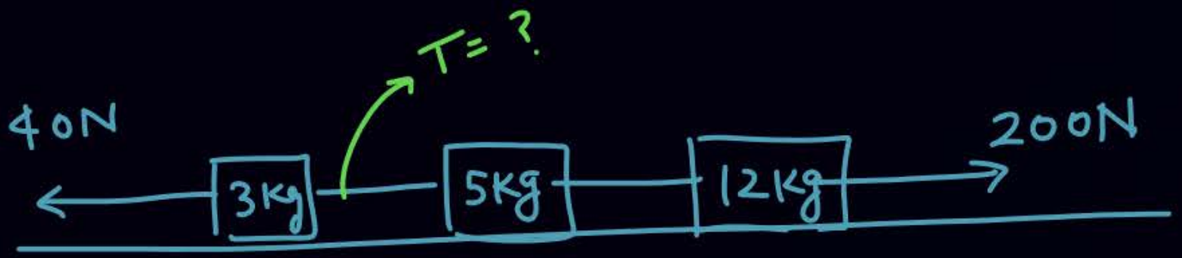


$$a = \frac{100-20}{2+3+5} = 8$$

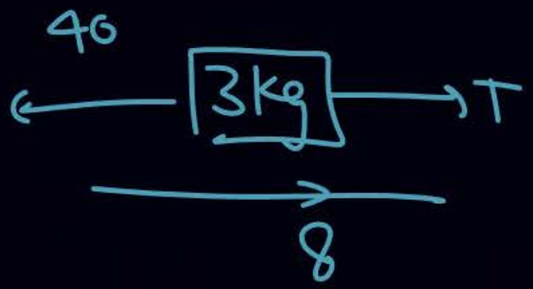


$$T-20 = 2\times8$$

Q2



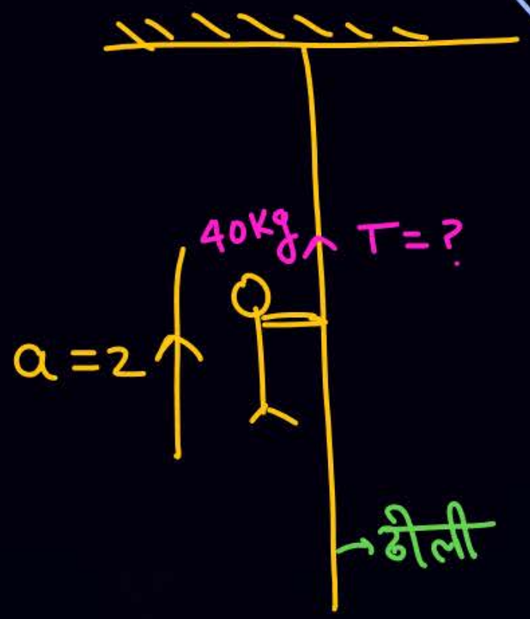
$$a = \frac{200 - 40}{20} = 8$$



$$T - 40 = 8 \times 3$$

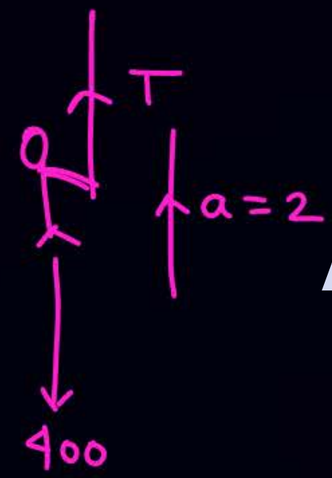
$$T = 64$$

Q



$T - 400 = 40 \times 2$

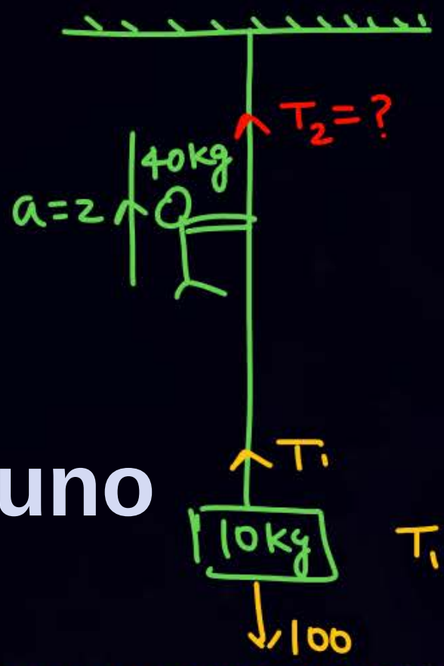
$T = 480$



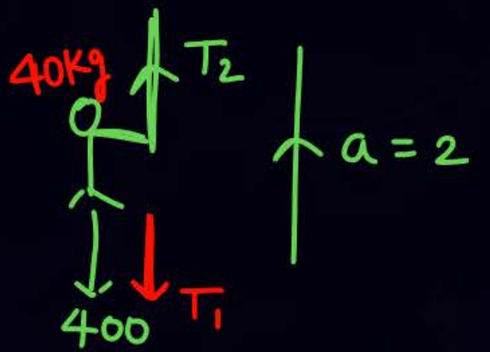
$T - 400 = 40 \times 2$

$T = 480$

Q



$T_1 = 100$



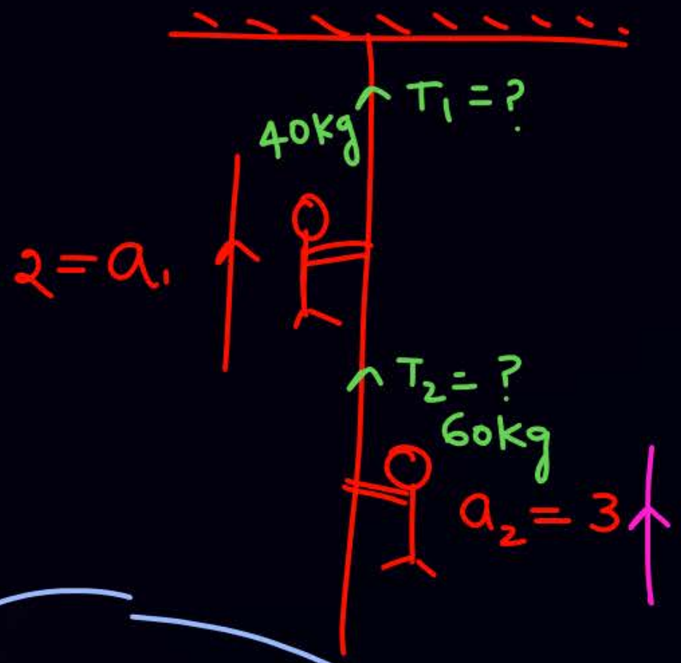
$T_2 - 400 - T_1 = 40 \times 2$

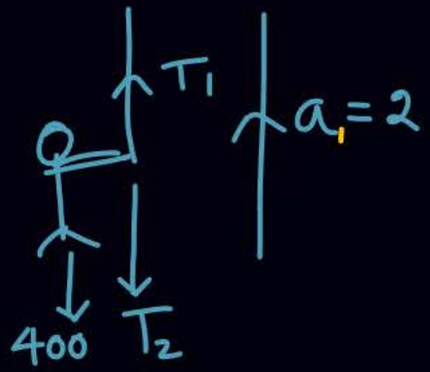
$T_2 = 580$

m2

$T_2 - 500 = 80 + 0$

Q





$T_1 - 400 - T_2 = 40 \times 2$

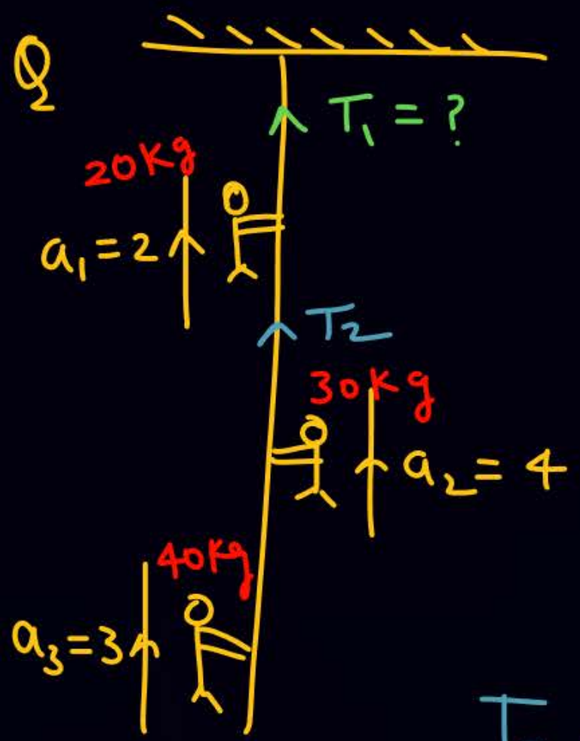
$T_1 = 400 + 780 + 80 = 1260$

$T_2 - 600 = 60 \times 3$

$\boxed{T_2 = 780}$

$T_1 - 1000 = 80 + 180$

$T_1 = 1260$

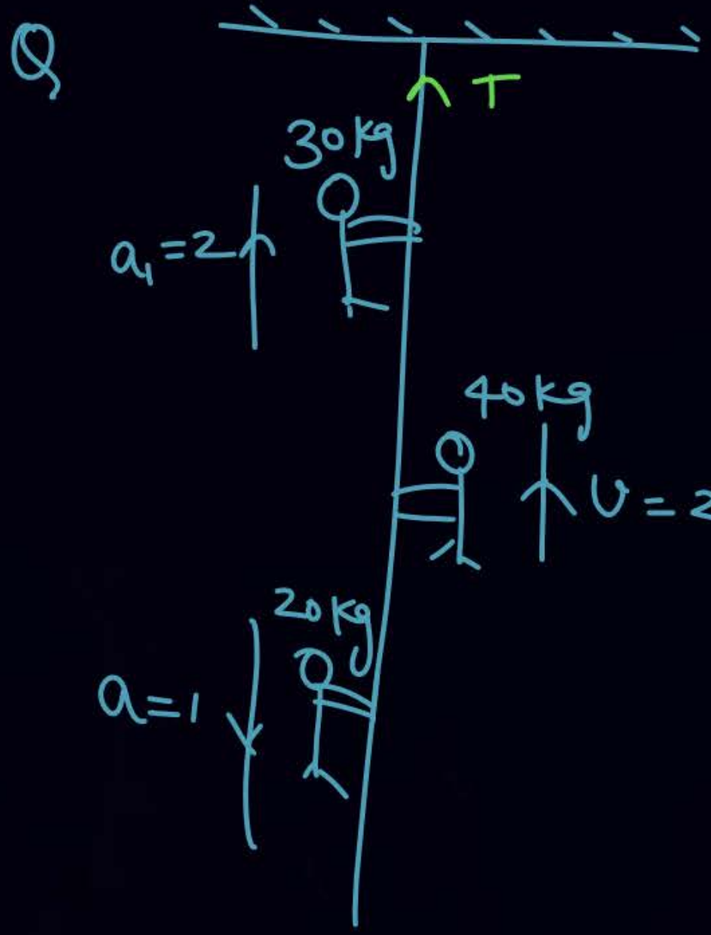


$$(\vec{F}_{net})_{ext} = m_1\vec{a}_1 + m_2\vec{a}_2 + m_3\vec{a}_3$$

$$T_1 - 900 = 20\times2 + 30\times4 + 40\times3$$

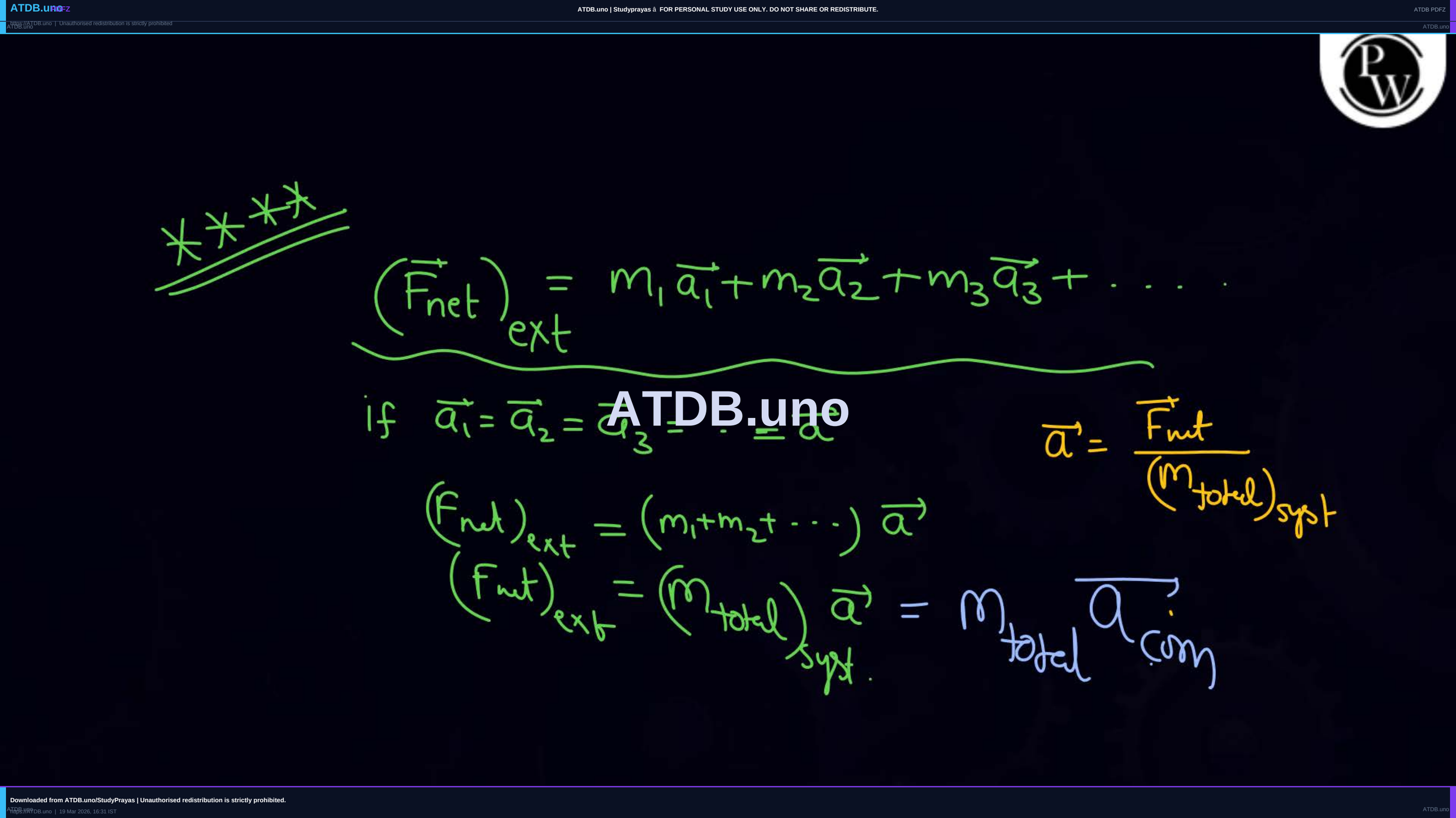
$$(= mg_{total})$$

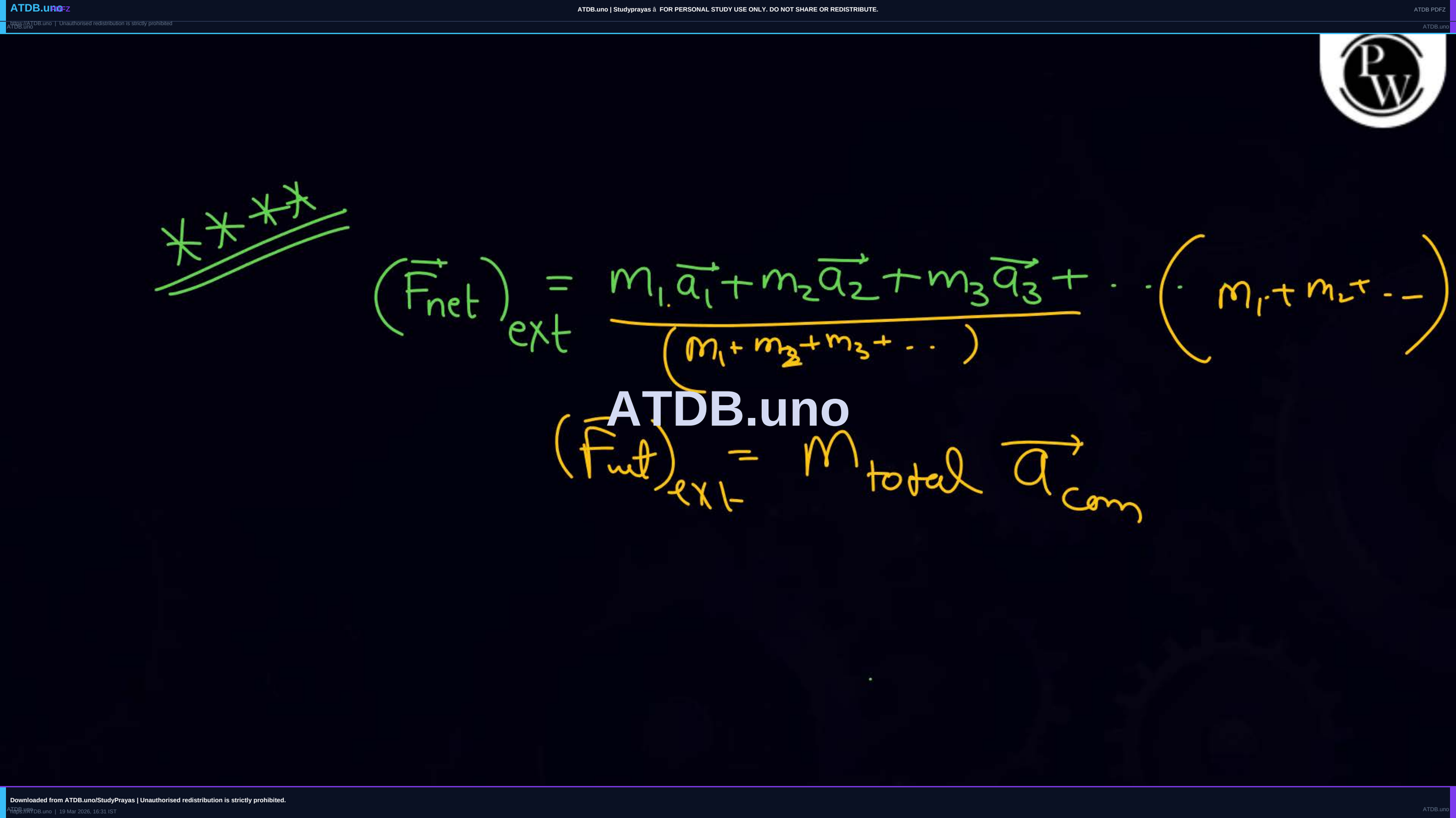
$$T_2 - 700 = 30\times4 + 40\times3$$



$$T - 900 = 60 + 0 + 20(-1)$$

$$T = 940$$





H.W .

- Revise Class Notes

- DPP-02

ATDB.uno