PRAYAS

JEE 2025

Lecture - 6

Physics

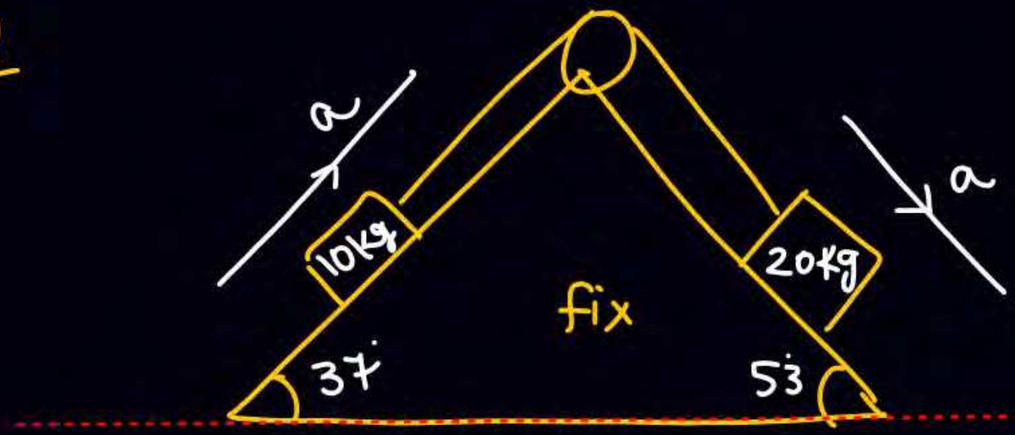
Laws Of Motion

By- Saleem Ahmed Sir

Topics *to be covered*

1. Questions Practice On F=ma (Part- 02)
2. Spring force.
3.
4.

Q

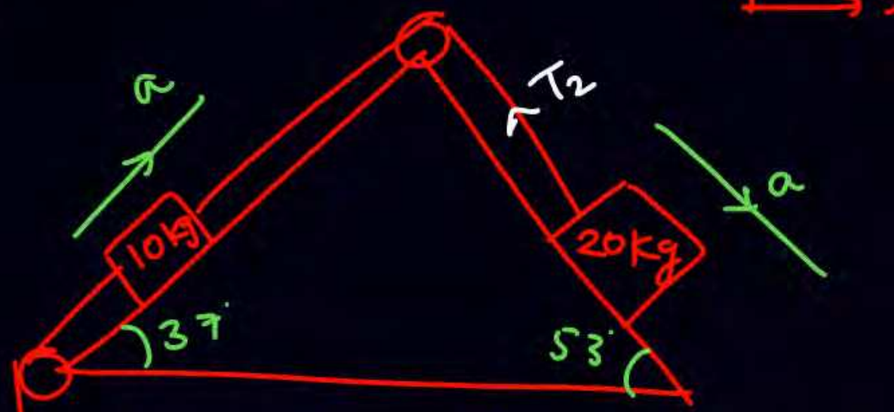


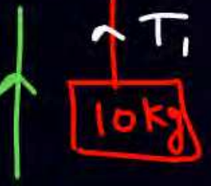
$$a = \frac{200\sin 53^\circ - 100\sin 37^\circ}{10+20}$$

$$\vec{a}_{cm} = \frac{m_1\vec{a}_1 + m_2\vec{a}_2 + m_3\vec{a}_3}{m_1+m_2+m_3}$$

Q

$|a_{com}| = ?$





$$a = \frac{200\sin 53^\circ - 100\sin 37^\circ - 100}{40}$$

$$= \frac{160 - 60 - 100}{40} = 0$$

$T_1 = 100$

$T_2 = 160$

$a_{com} = 0$

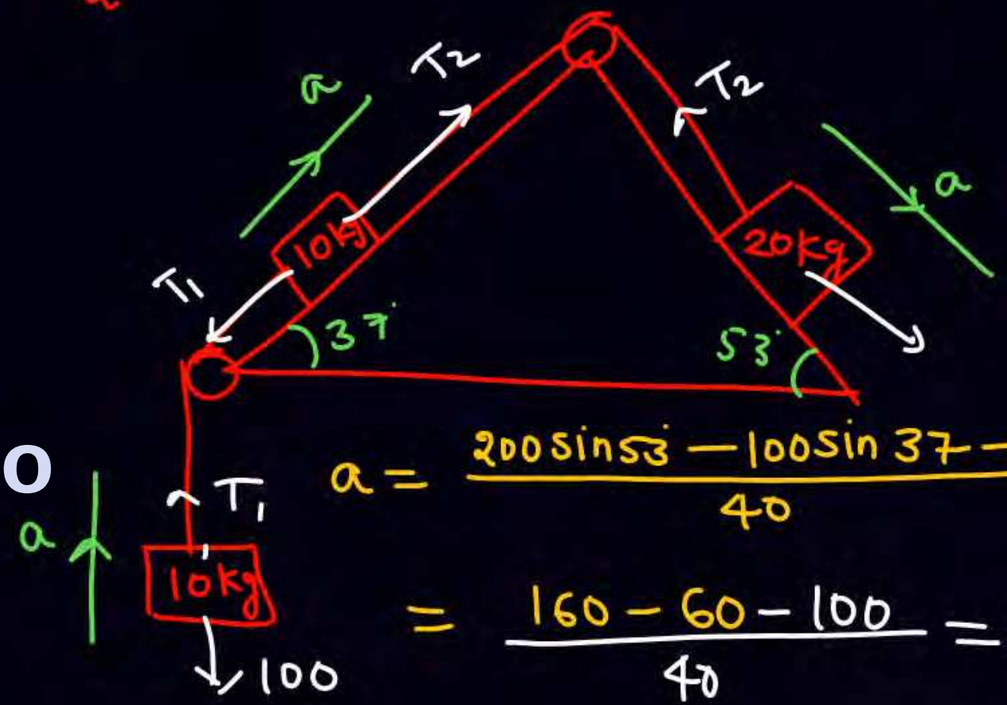
Q

$T_1 - 100 = 10a$ —— (1)

$160 - T_2 = 20a$ —— (2)

$T_2 - T_1 - 60 = 10a$ —— (3)

Q

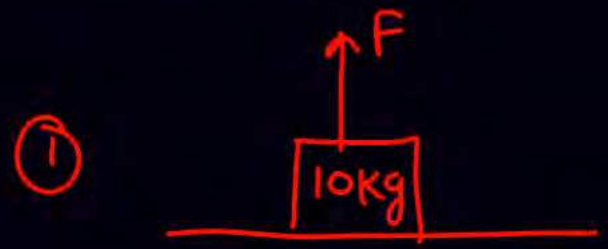


$$a = \frac{200\sin 53 - 100\sin 37 - 100}{40}$$

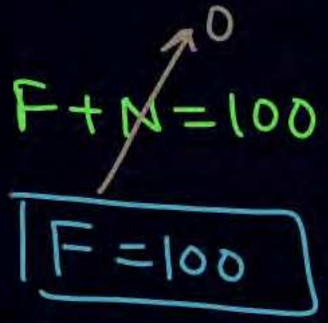
$$= \frac{160 - 60 - 100}{40} = 0$$

उठने वाले Qus

Lift off



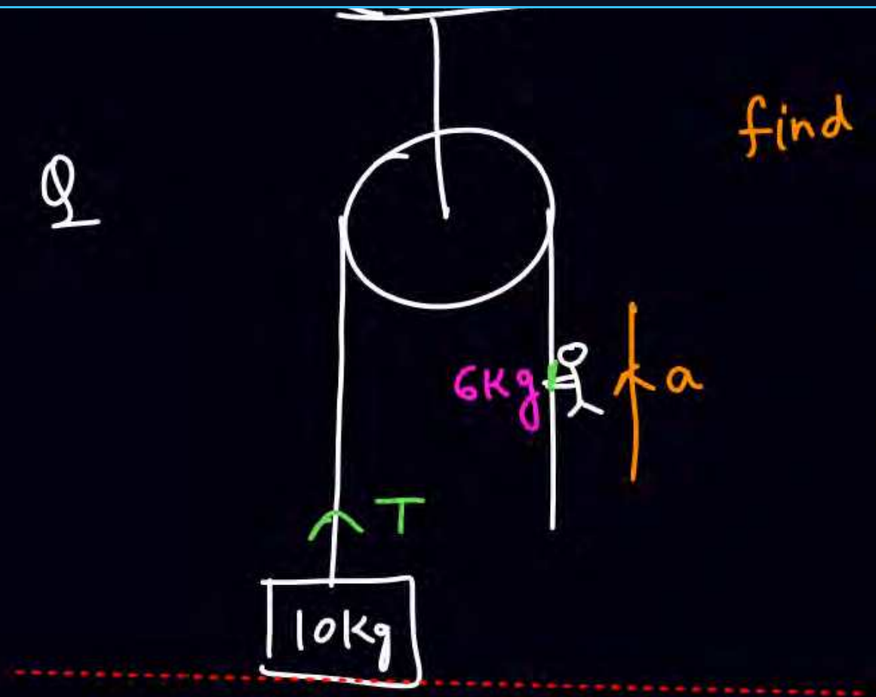
① find min force so that block lift off / loose contact



$F > 100$ → Ans

Ans $F = 100$

Q



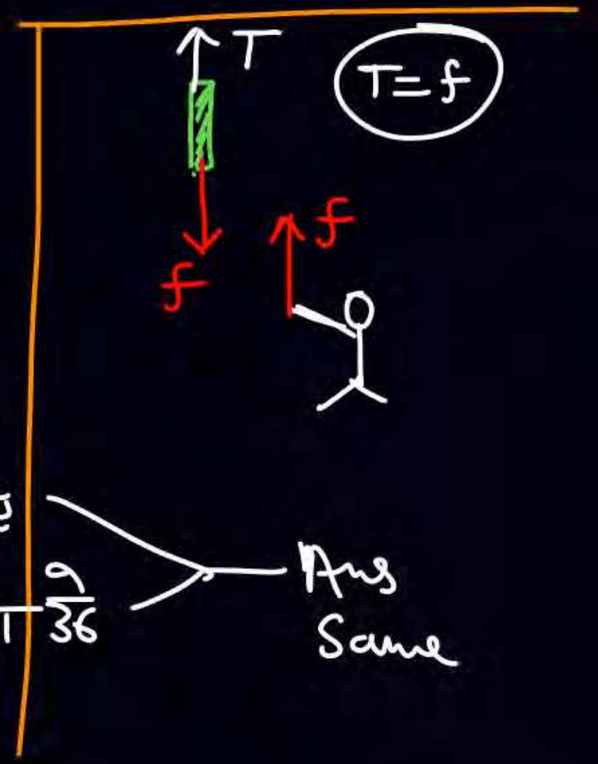
find min acc of बंदर in upward so that mass lift off dir^{n}

$T = 100$

$T - mg = ma$ (बंदर)

$100 - 60 = 6 \times a$

$a = \frac{40}{6} = \frac{20}{3}$



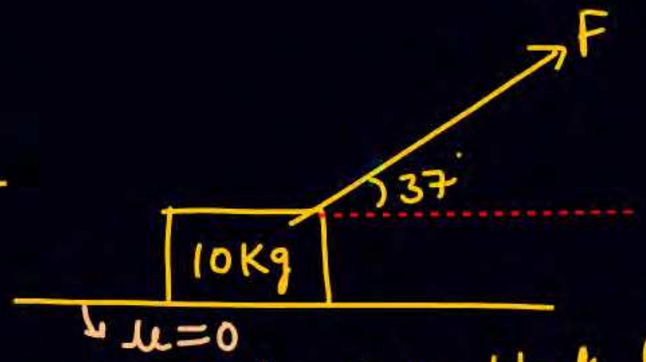
Qus language ⇒ ① find a_{min} so that mass उठ जाए

② find a_{max} so that mass ना उठे

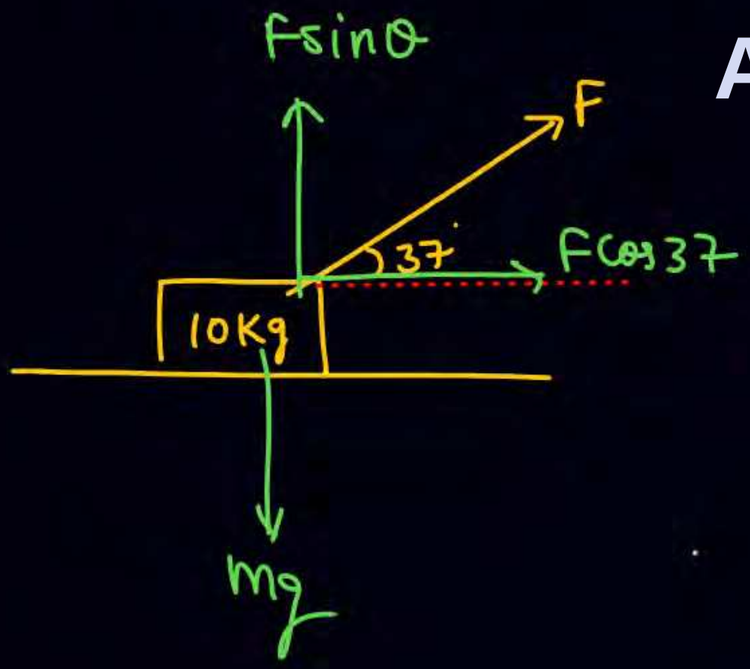
Ans Same

//

Q



① Fmin so that 10kg block lift off.

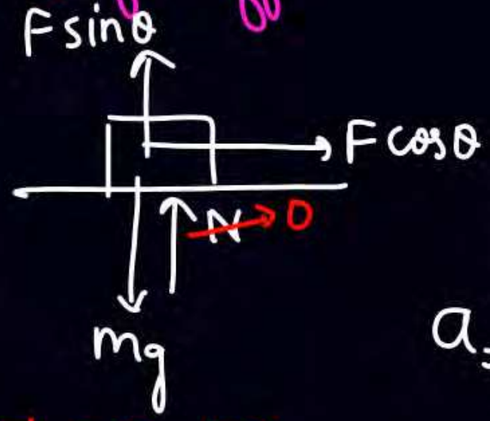


$F\sin 37 = mg$

$F \times \frac{3}{5} = 100$

$F = \frac{500}{3}$

② If we increase value of force gradually from zero. find acc of block when block just lift off



$F\sin 37^\circ = 100$

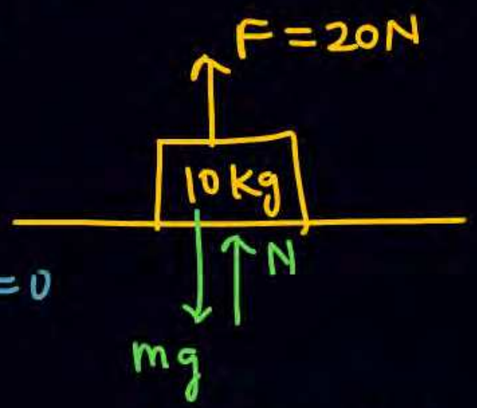
$F = \frac{500}{3}$

$a_x = \frac{F\cos\theta}{m}$

$a_x = \frac{500}{3} \times \frac{4}{5} \times 10$

$a_x = \frac{40}{3}$

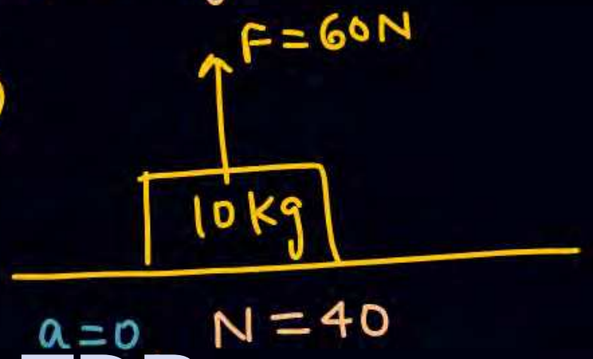
Q find acc & Normal in following case

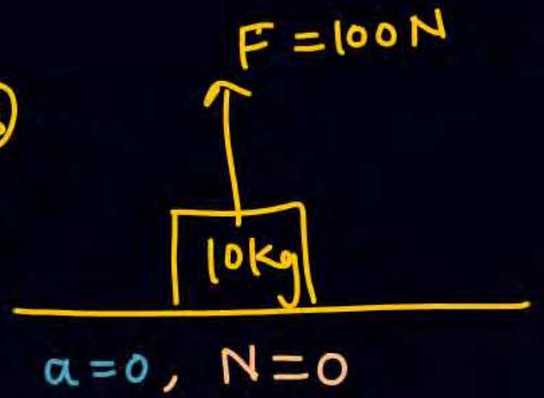
① 

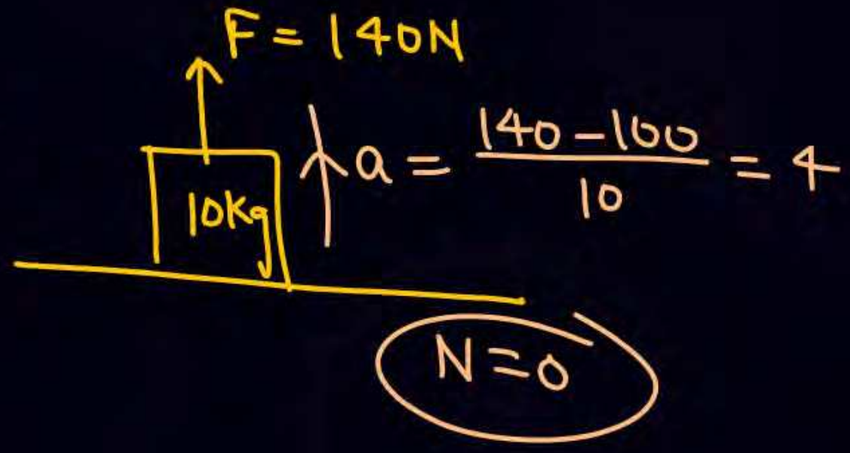
$F + N = mg$

$20 + N = 100$

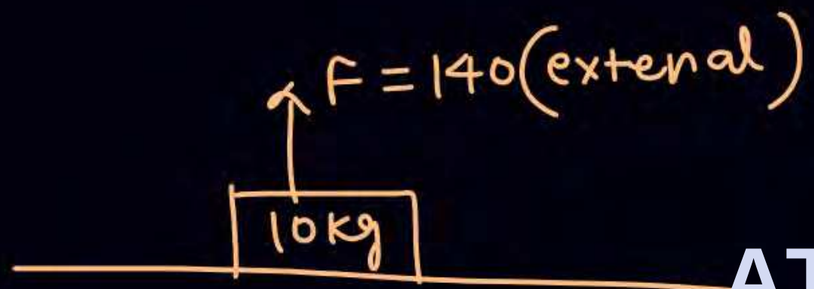
$N = 80$

② 

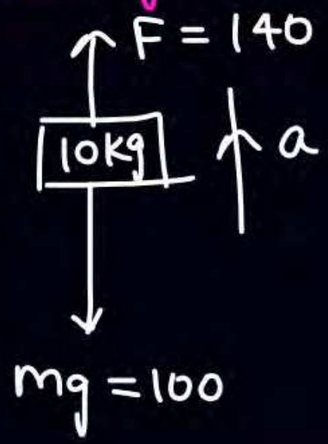
③ 

④ 

(5)



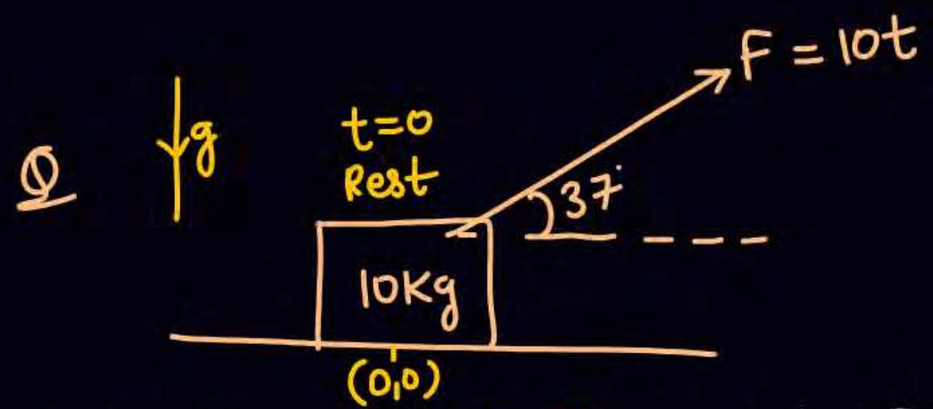
find velocity at t = 10sec



$$a = \frac{140 - 100}{10} = 4 = \text{Const}$$

$$v = 0 + 4 \times 10 = 40$$

$$y = 0 + \frac{1}{2} \times 4 \times 10^2 = 200$$



① when block lift off ⟶ $t = 50/3$

② acc of block when it liftoff

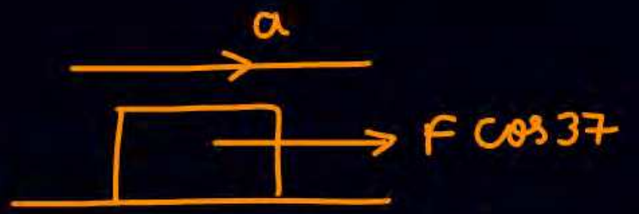
③ Velocity of block when it lift off:

① $F = \frac{500}{3} = 10t$

$t = 50/3$

② $a = \frac{F\cos 37}{m}$

$a = \frac{40}{3}$



$a = \frac{F\cos 37}{m} = \frac{10t \times \frac{4}{5}}{10} = \frac{4t}{5} = a$

$\int dv = \int a\,dt$

$\int_0^v dv = \int_0^t \frac{4t}{5} dt$

$v = \frac{2t^2}{5}$

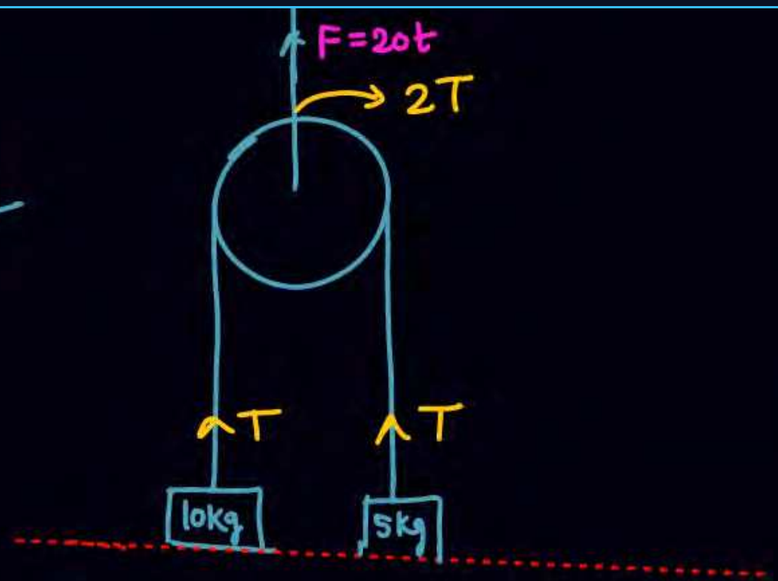
$t = \frac{50}{3}$

$v_x = \frac{2}{5} \times \left(\frac{50}{3}\right)^2 = \frac{2}{5} \times \frac{2500}{9}$

$= \frac{1000}{9}$

$v_y = 0$

∴



Q

Sol^{n} $2T = F = 20t$

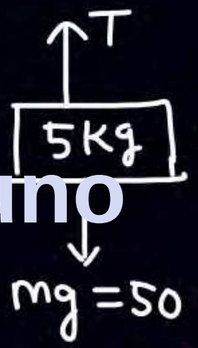
$T = 10t$

① $T = 50$ when $T = 50 = 10t$

$t = 5$ sec

② $T = 100$, $t = 10$ sec

③



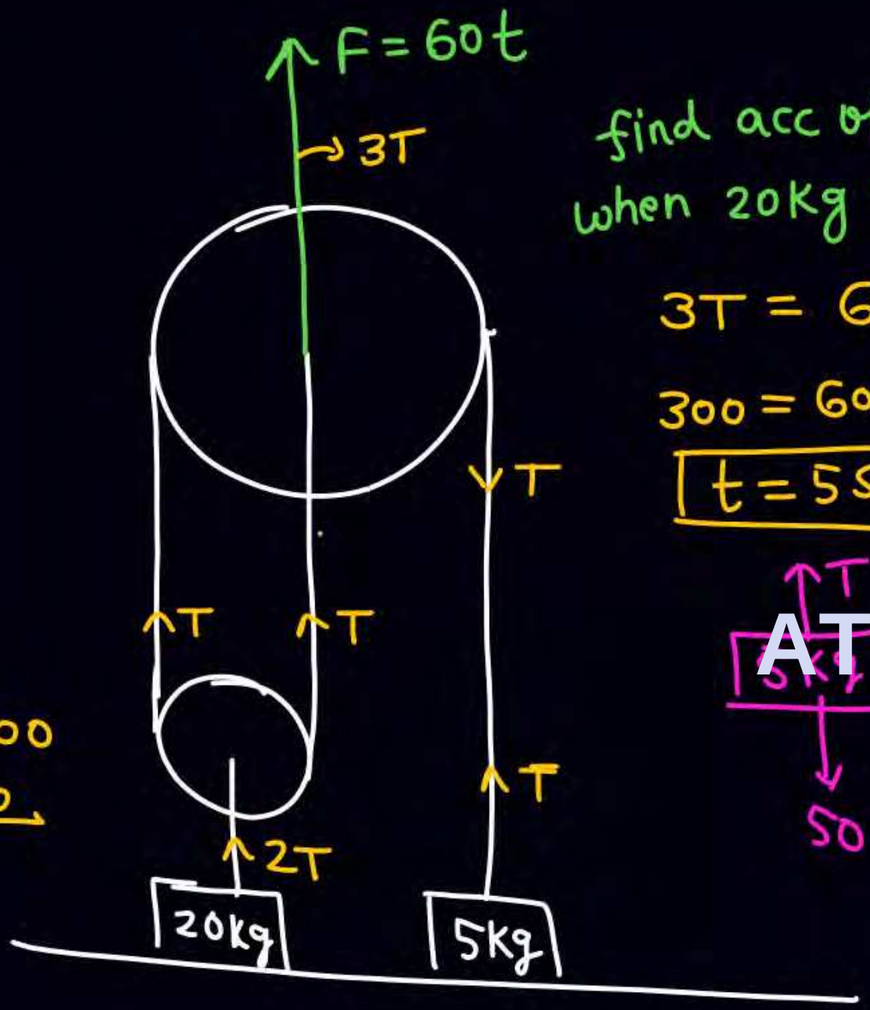
$a = \frac{T - mg}{m} = \frac{100 - 50}{5} = 10$

① find when 5kg block lift off

② " " 10kg " " "

③ find acc of 5kg block when 10kg block just lift off.

Q



$2T = 200$

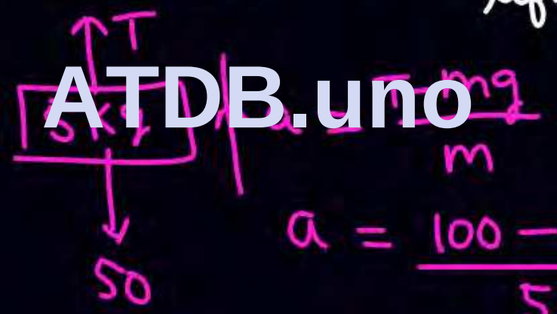
$T = 100$

find acc of 5kg block when 20kg block just lift off

$3T = 60t$, $T = 100$

$300 = 60t$

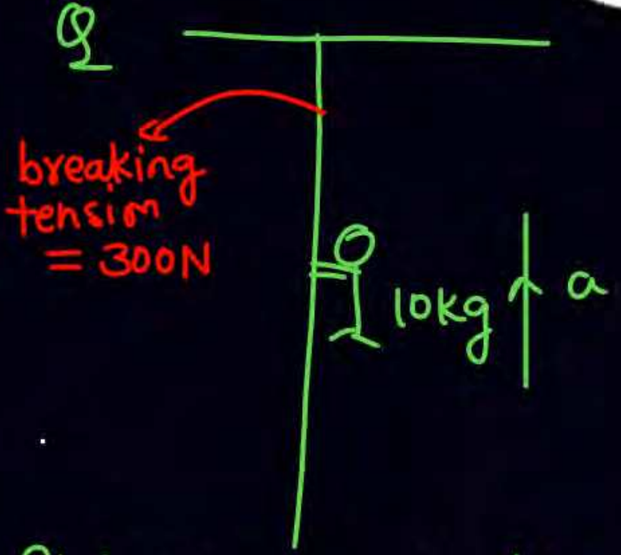
$t = 5\,sec$ = 20kg block lift off



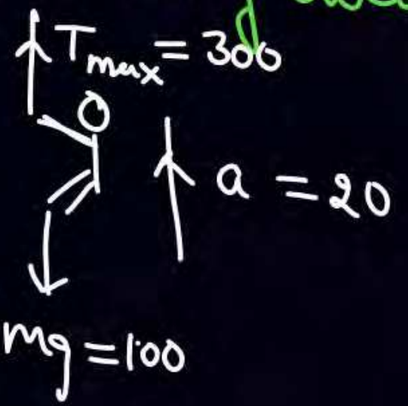
$a = \frac{100 - 50}{5}$

$a = 10$

Q



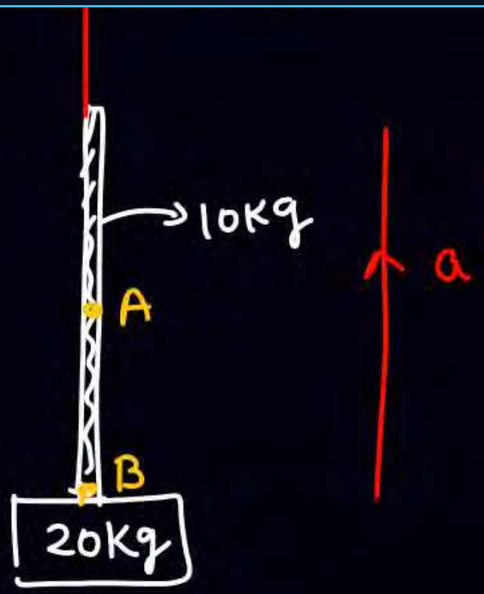
find max acc. of बंदर so that string doesnot break



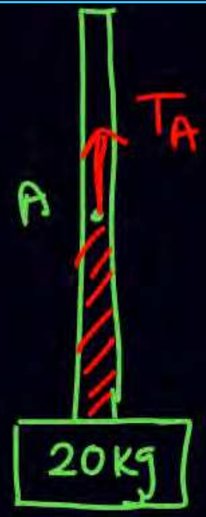
Q

① find acc of (rod + mass)

② find T_A & T_B



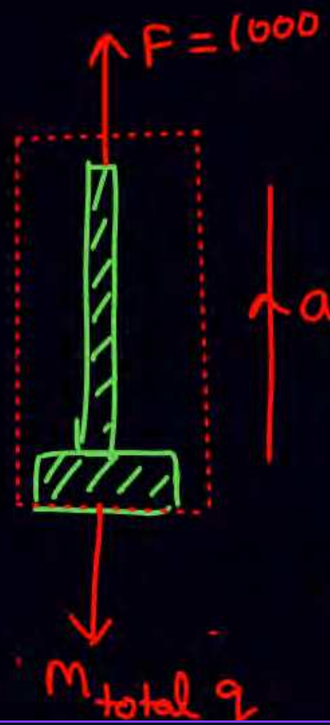
Sol" ②



$T_A - 250 = 25a$

$T_A = 250 + 25 \times \frac{70}{3}$

Sol"



$$a = \frac{F - m_{total}\,g}{m_{total}}$$

$$= \frac{1000 - 300}{30}$$

$$a = \frac{70}{3}$$

③ $T_B - 200 = 20a$

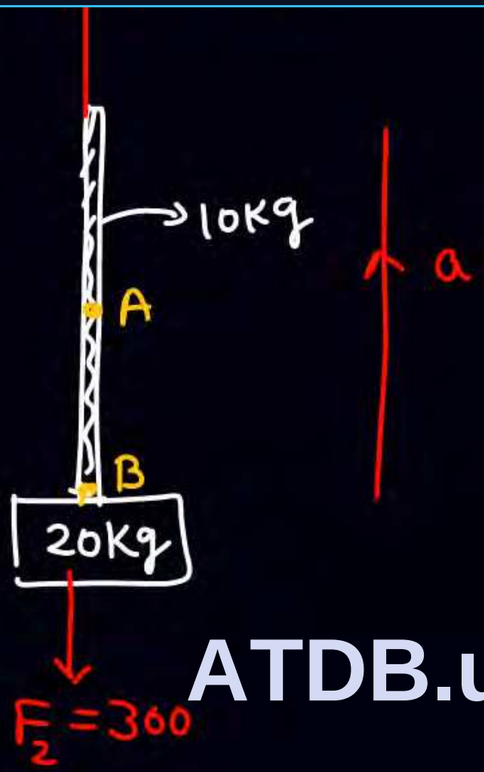
SKC

trap ≡ mg नहीं भूलना है

Q

① find acc of (rod + mass)

② find T_A & T_B



Sol

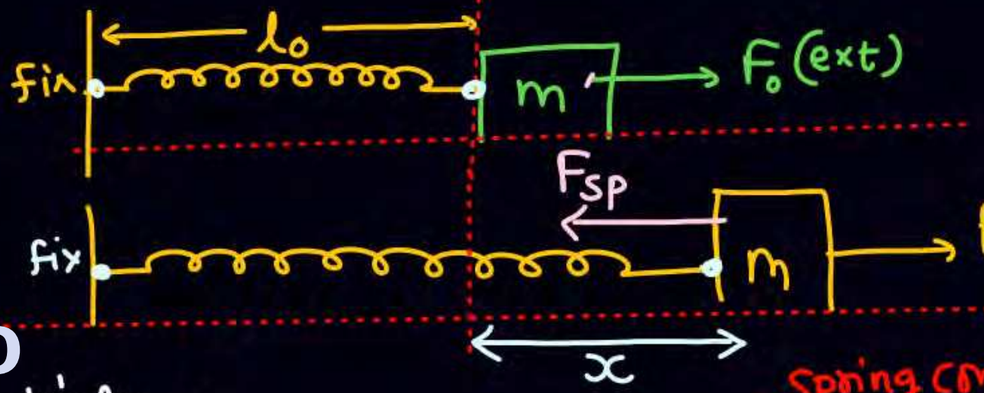
a

$$a = \frac{F_1 - F_2 - m_{total}\,g}{m_{total}}$$

$$a = \frac{1000 - 300 - 300}{30}$$

Ideal spring

- pitch same
- massless
- (Natural length ≡ original length, Relaxed length)



Hooke's law

$F_{spring} \propto x$

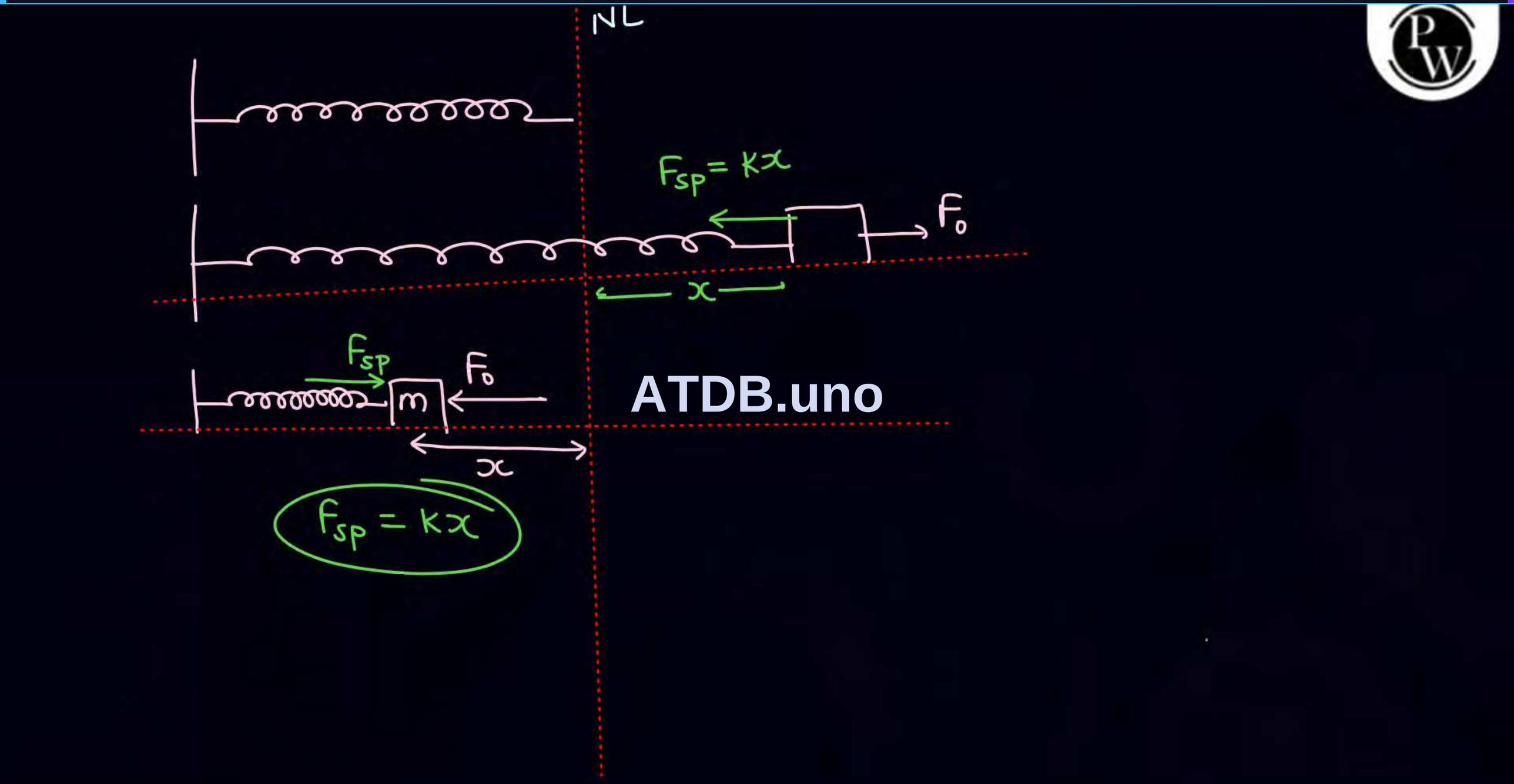
$F_{sp} = kx$

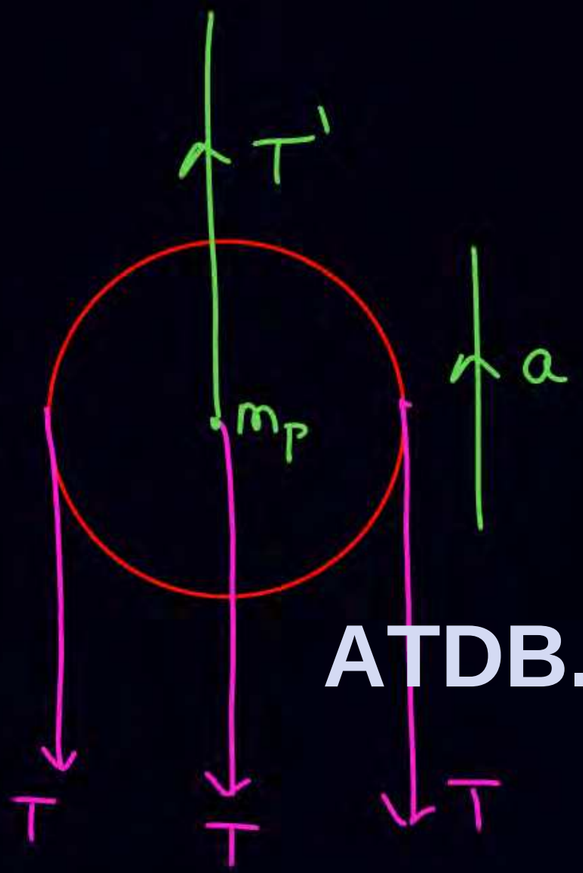
(magnitude)

Spring const

$\vec{F}_{SP} = -k\vec{x}$

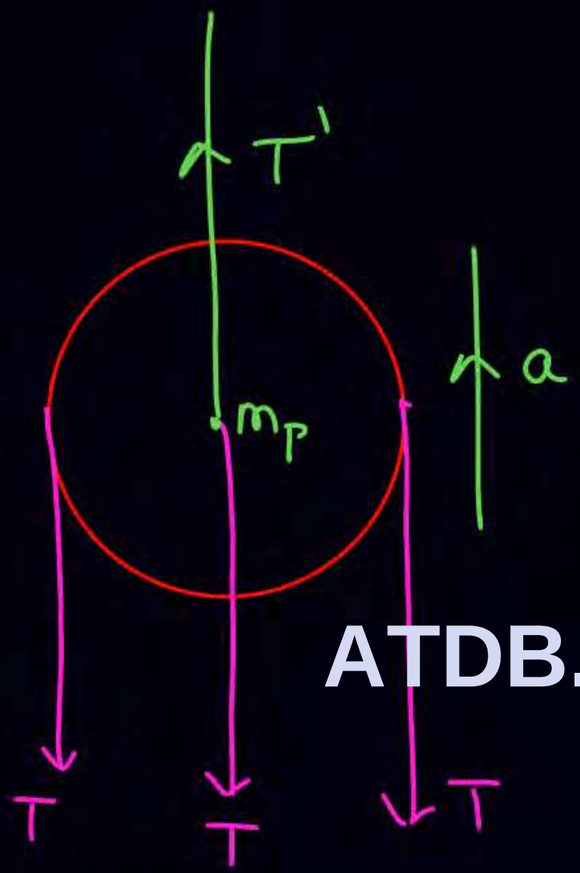
(Towards natural length)





$$T' - m_p g - T - T - T = m_p a$$

$$T' = 3T$$



$$T' - m_p g - T - T - T = m_p a$$

$$T' = 3T$$

Home Work

- DPP (next)
- module H.W (Next page)

- Hcv will give tommorow.

Module H.W

Tuesday ⇒ (Prarambh) ⇒ 4, 6, 9, 10, 11, (11 – 20)

Prabal ⇒ (3 – 8), 11, 10

Wednesday Prabal ⇒ 12, 13, 14, 42, 48,

Pratikshit (JA) ⇒ 1, 3, 4

PYQ ⇒ 1, 2, 4, 10, 12,