

PRAYAS

JEE 2025

ATDB.uno

Lecture - 6

Physics

Laws Of Motion

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Topics *to be covered*

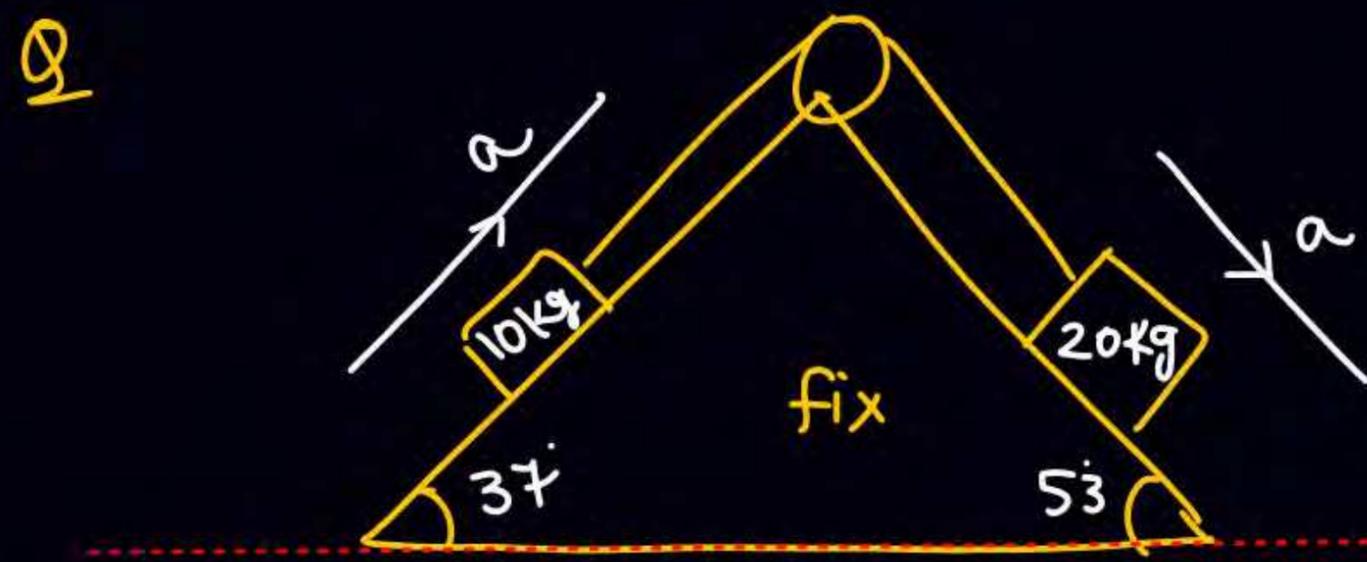
1 Questions Practice On $F=ma$ (Part- 02)

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2 *Spring force.*

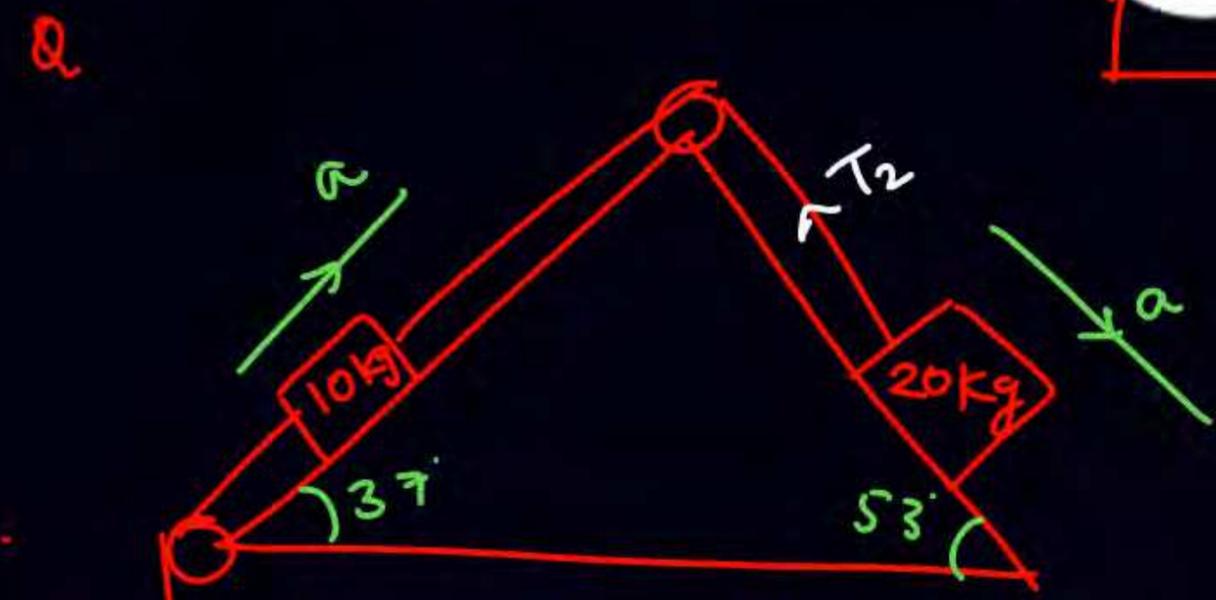
3

4



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

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



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

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

$$\begin{matrix} T_1 = 100 \\ T_2 = 160 \end{matrix}$$

$$a_{com} = 0$$



Q

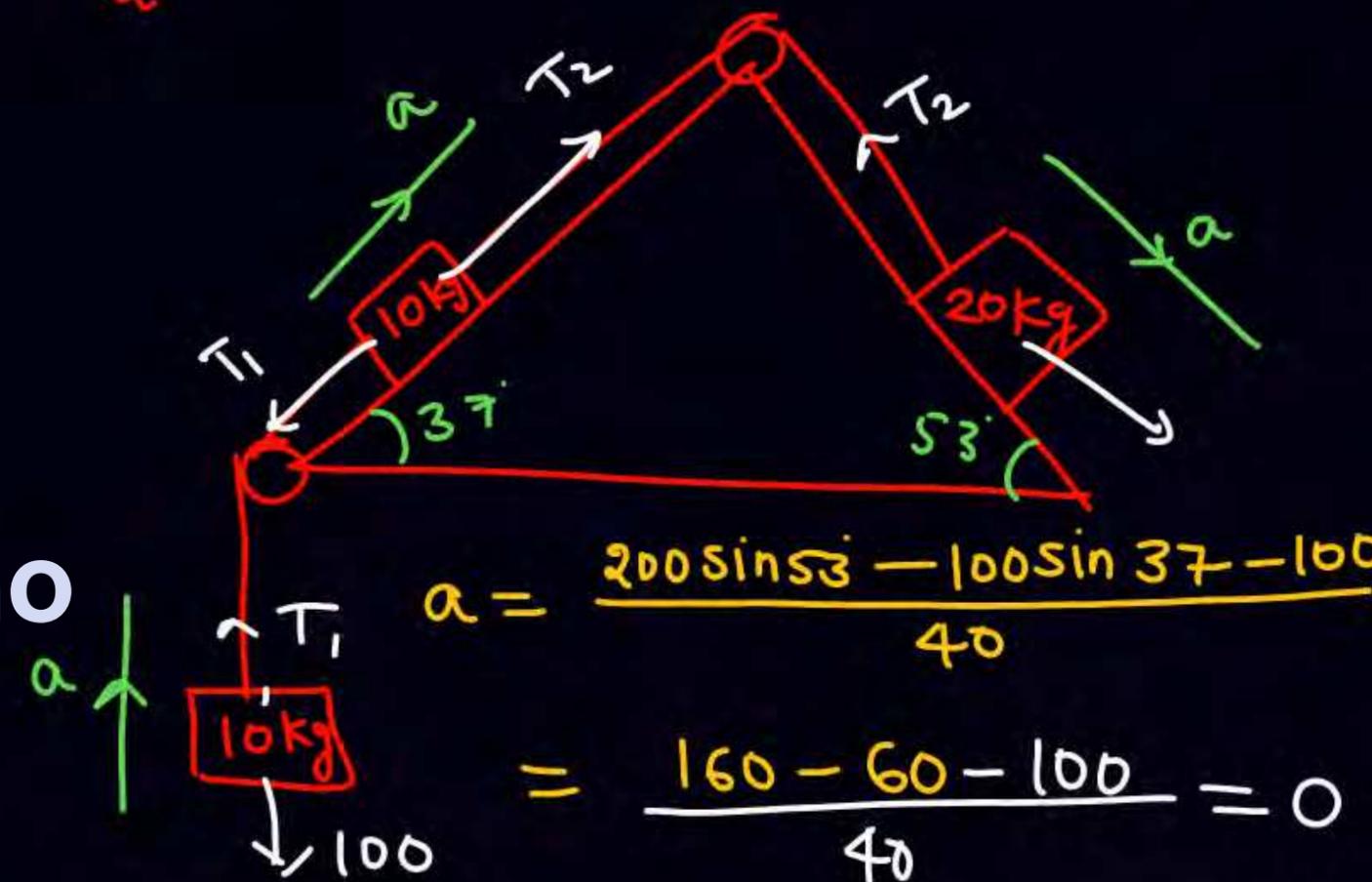
$$T_1 - 100 = 10a \quad \text{--- (1)}$$

$$160 - T_2 = 20a \quad \text{--- (2)}$$

$$T_2 - T_1 - 60 = 10a \quad \text{--- (3)}$$

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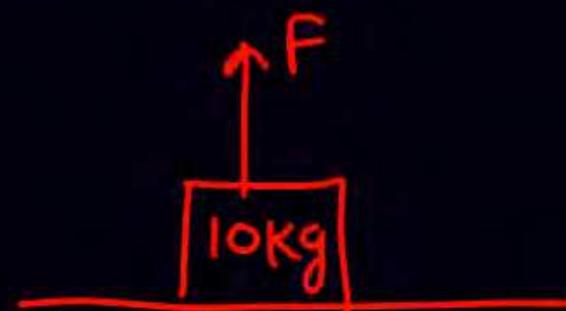
Q





उठने वाले Qus List off

①



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find min force so that block left off / loose contact

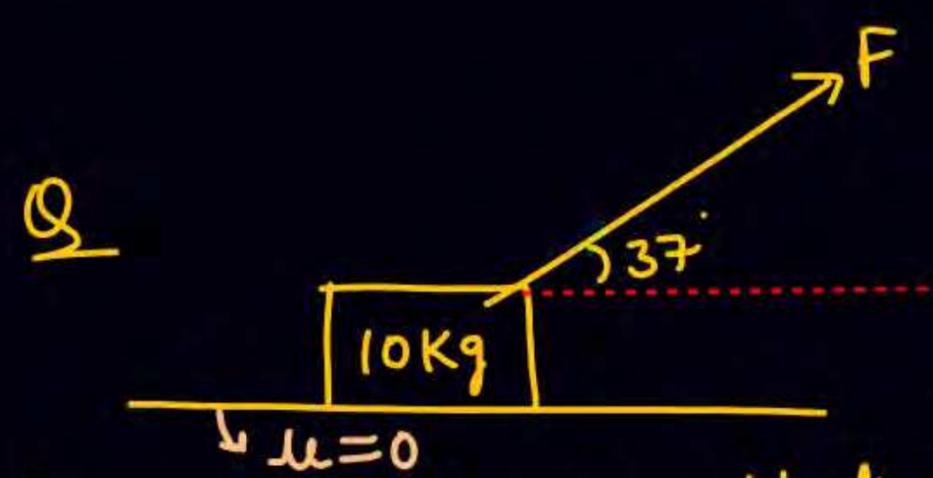


$$F + N = 100$$

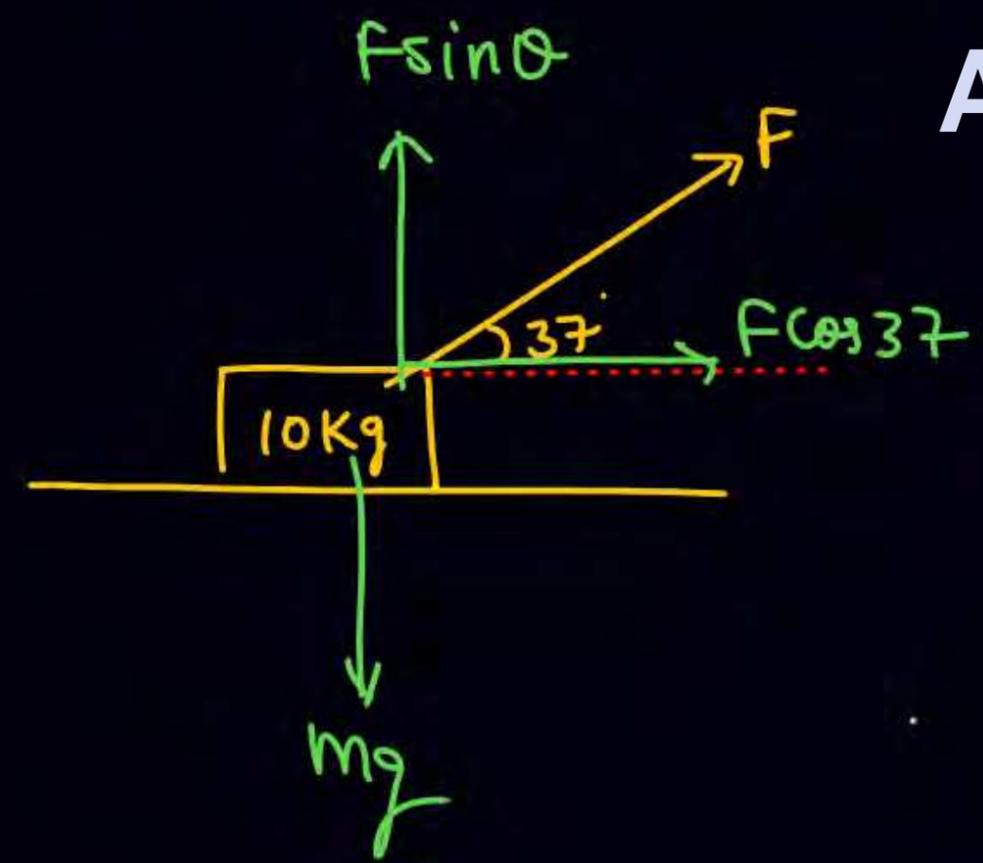
$$F = 100$$

$$F > 100 \rightarrow \text{Ans}$$

Ans $F = 100$



① F_{min} so that 10kg block lift off.



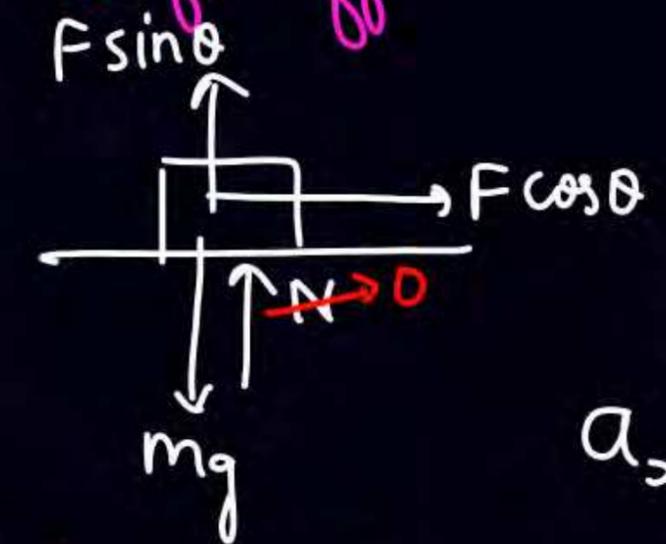
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$$F \sin 37^\circ = mg$$

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

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

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



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

$$F \sin 37^\circ = 100$$

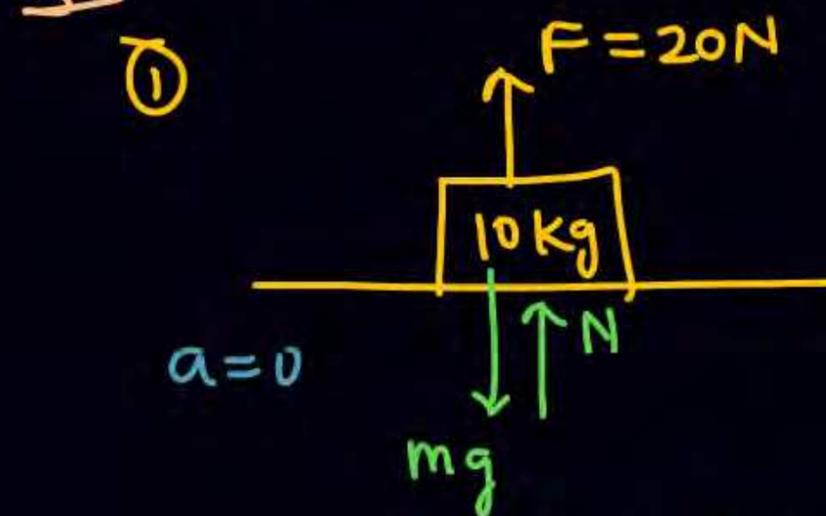
$$F = \frac{500}{3}$$

$$a_x = \frac{500}{3} \times \frac{4}{5} \times \frac{1}{10}$$

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



Q find acc & Normal in following case

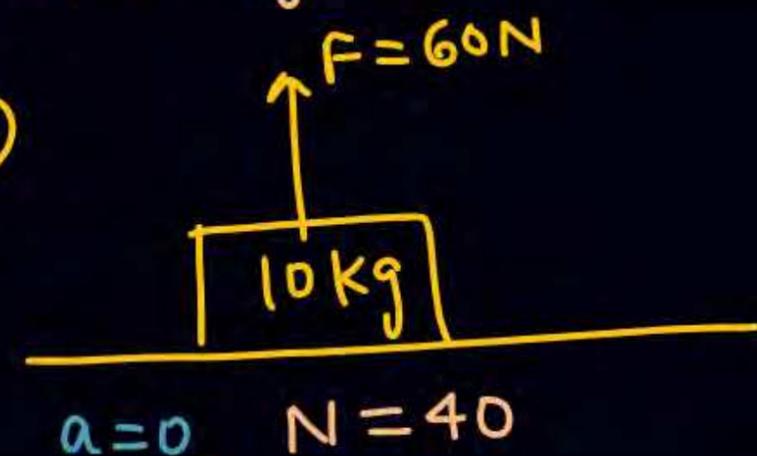


$$F + N = mg$$

$$20 + N = 100$$

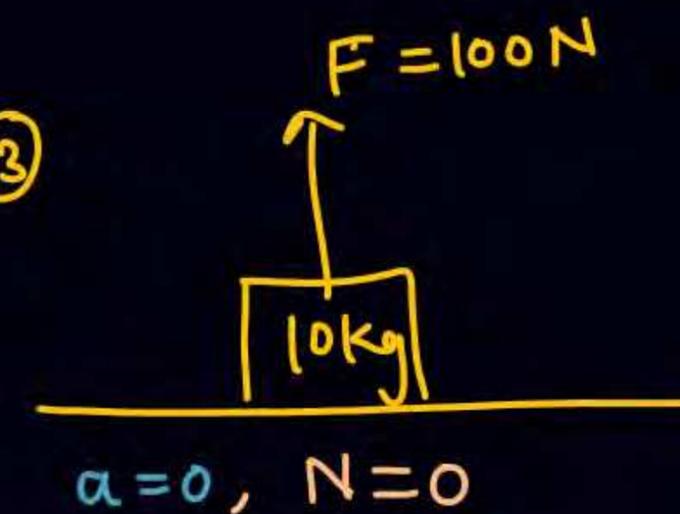
$$N = 80$$

②

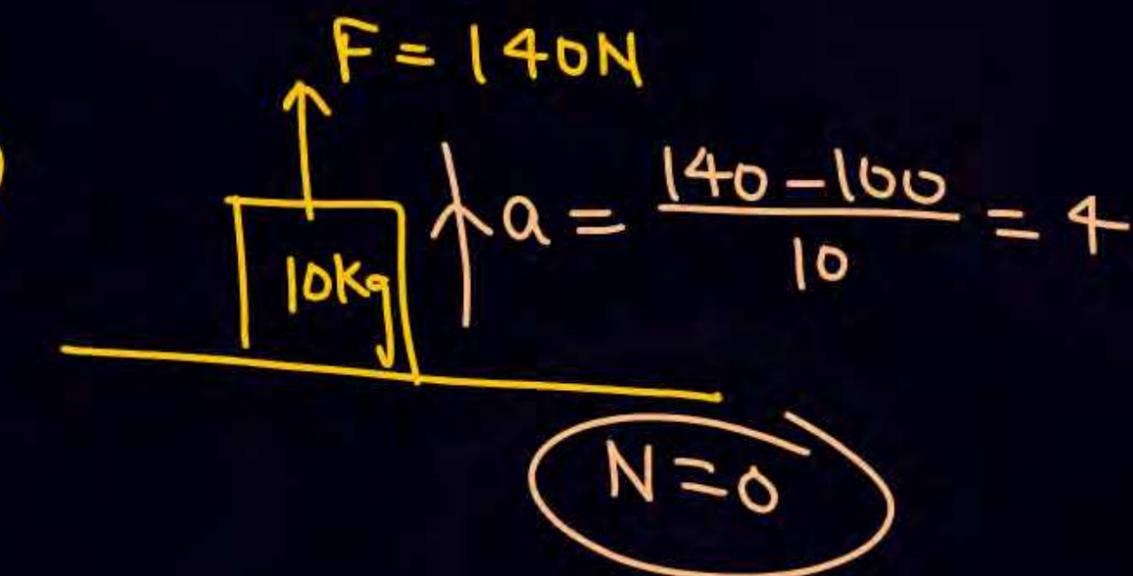


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③

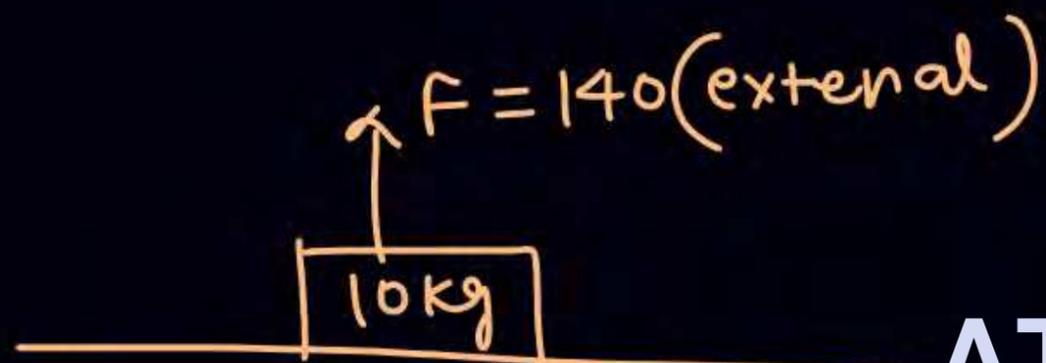


④



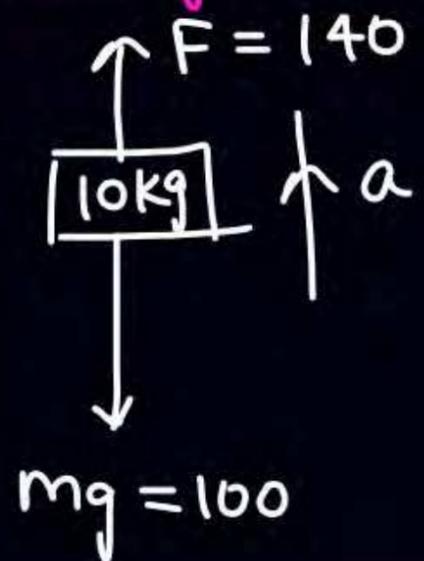


(5)



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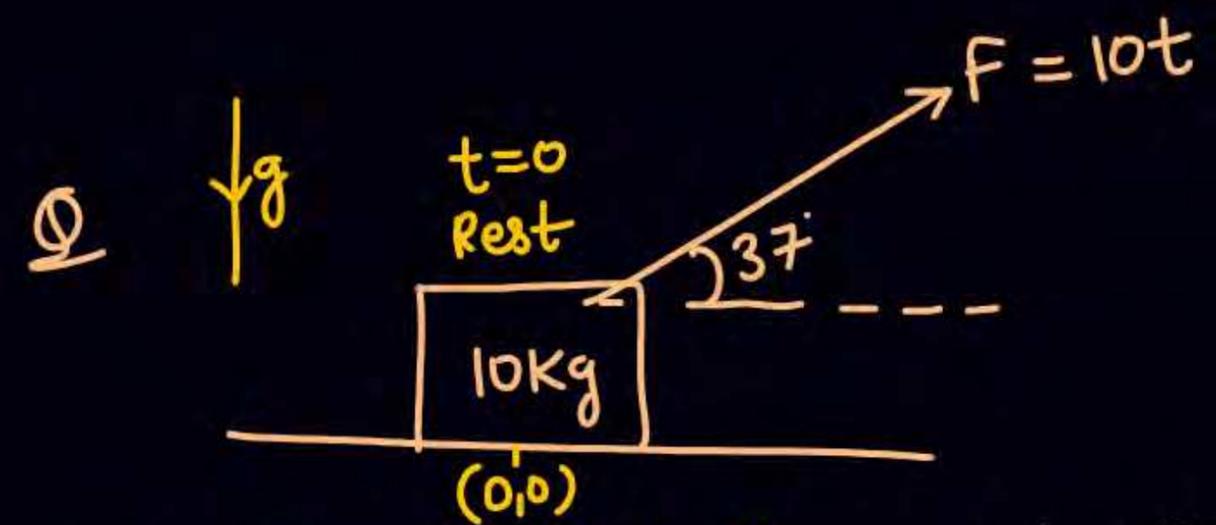
find velocity at $t = 10 \text{ sec}$



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

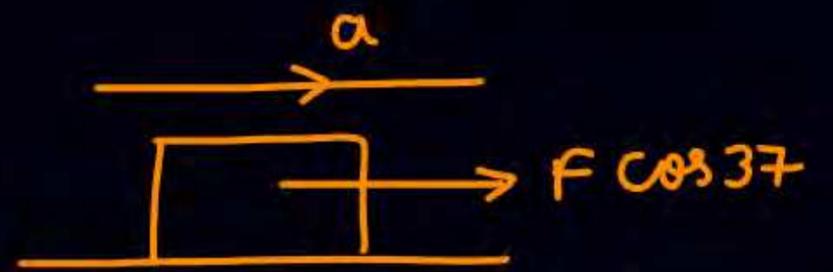
$$v = 0 + 4 \times 10 = 40$$

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



① $F = \frac{500}{3} = 10t$
 $t = 50/3$

② $a = \frac{F \cos 37}{m}$
 $a = \frac{40}{3}$



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

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- ① when block lift off. $\rightarrow t = 50/3$
- ② acc of block when it lift off
- * ③ Velocity of block when it lift off:

$dv = a dt$

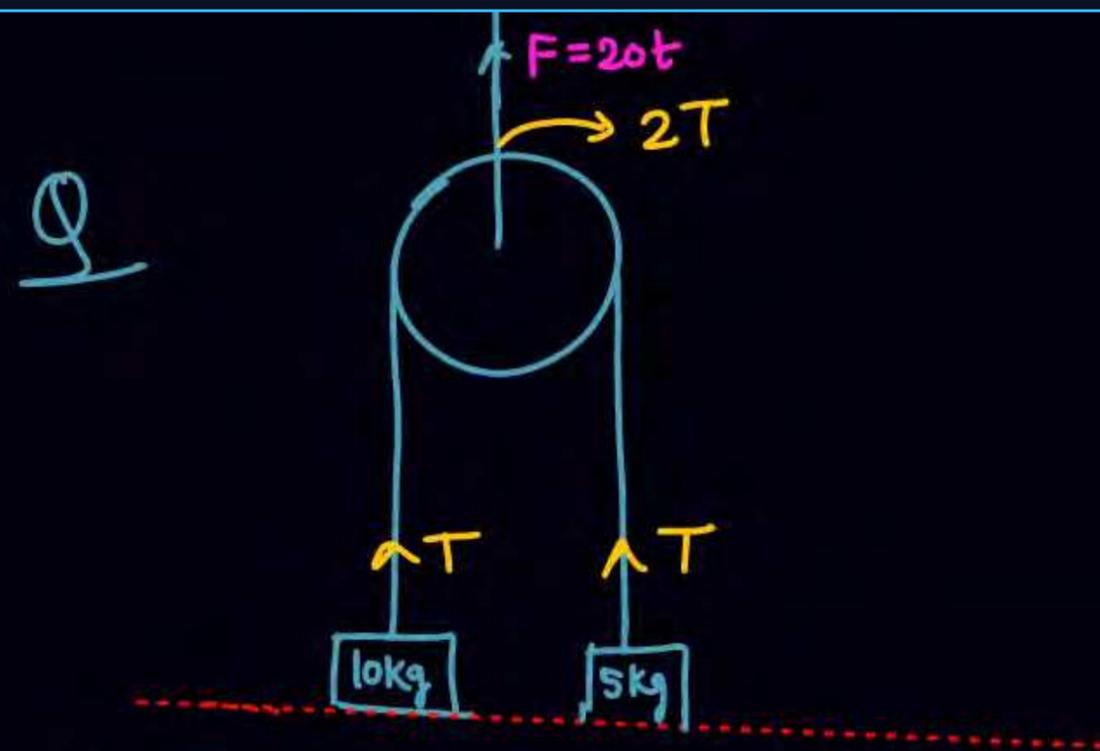
$\int_0^v dv = \int_0^t \frac{4t}{5} dt$

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

$v_y = 0$

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

$v_x = \frac{2}{5} \times \left(\frac{50}{3}\right)^2 = \frac{2}{5} \times \frac{2500}{9}$
 $= \frac{1000}{9}$



Solⁿ

$$2T = F = 20t$$

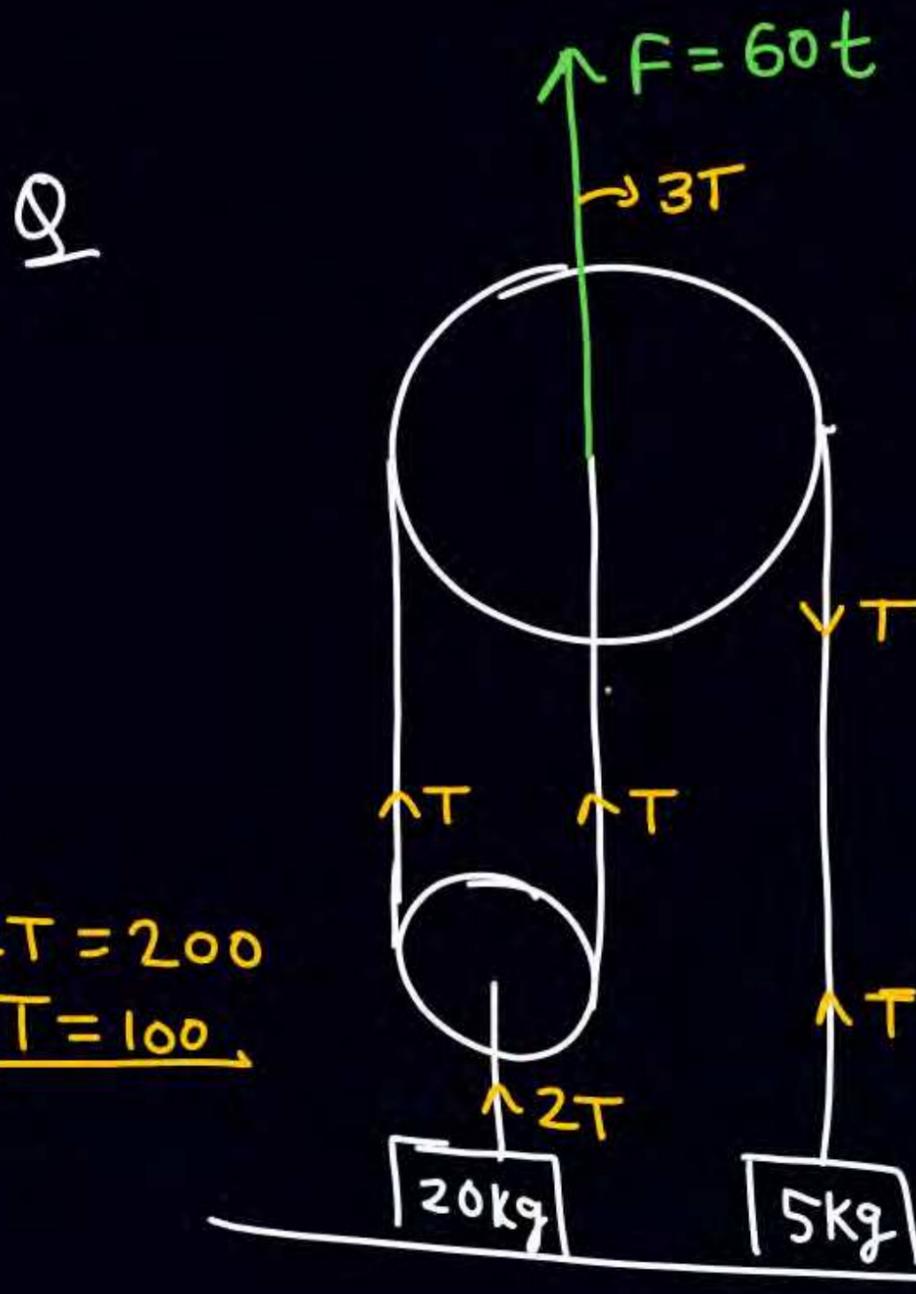
$$T = 10t$$

- ① $T = 50$ when $T = 50 = 10t$
 $t = 5 \text{ sec}$
- ② $T = 100, t = 10 \text{ sec}$
- ③

- ① find when 5kg block lift off
- ② " " 10kg " " "
- ③ find acc of 5kg block when 10kg block just lift off.

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

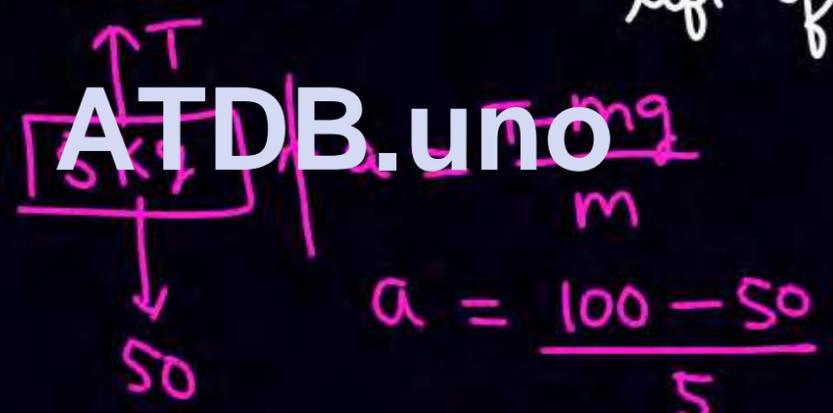


find acc of 5kg block
when 20kg block just lift off

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

$$300 = 60t$$

$$t = 5\text{sec} = 20\text{kg block left off}$$

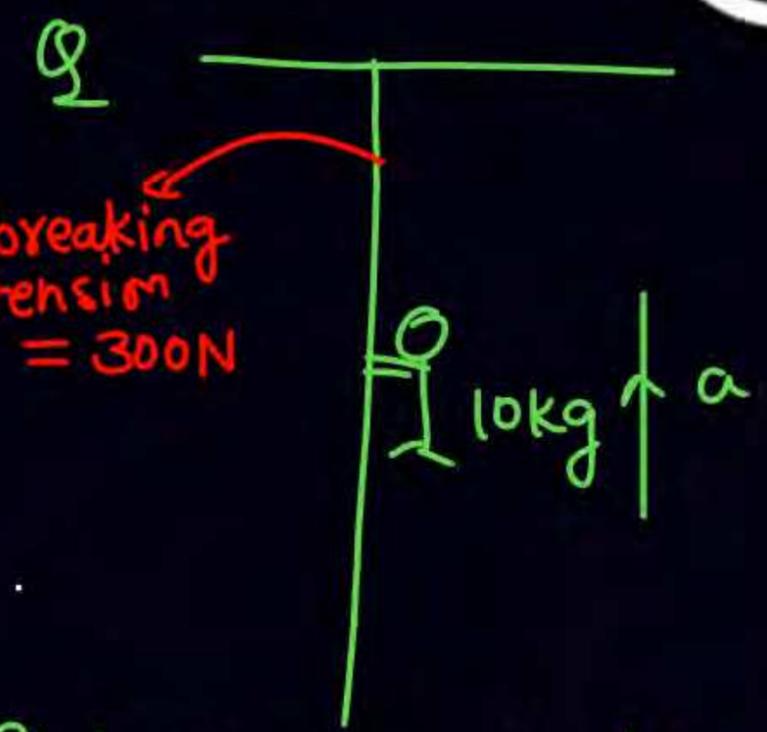


$$a = \frac{100 - 50}{5}$$

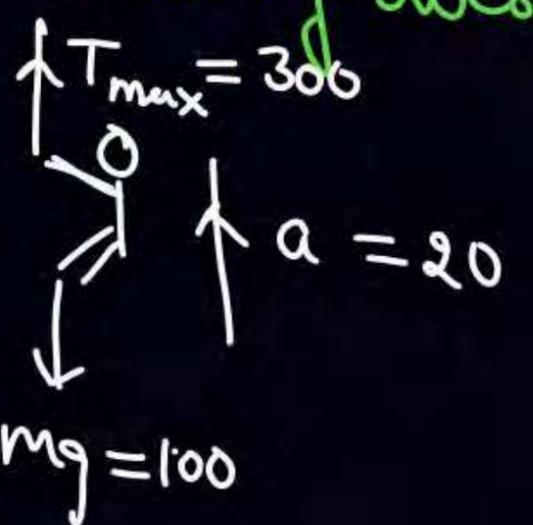
$$a = 10$$

$$2T = 200$$

$$T = 100$$



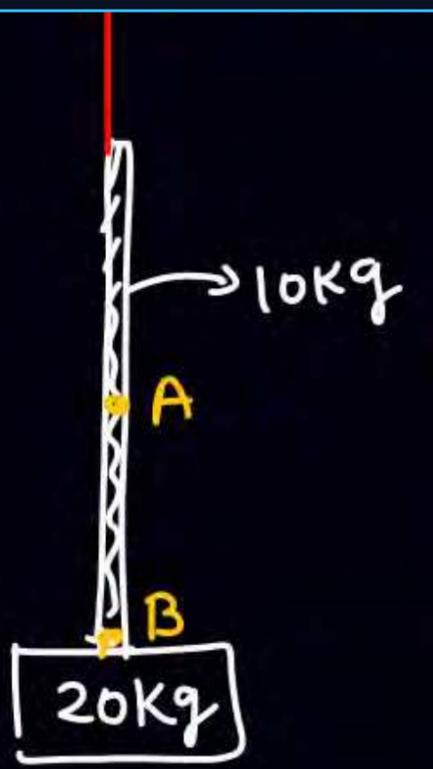
find max acc. of b\u00e4r so that string does not break





Q

- ① find acc of (rod + mass)
- ② find T_A & T_B



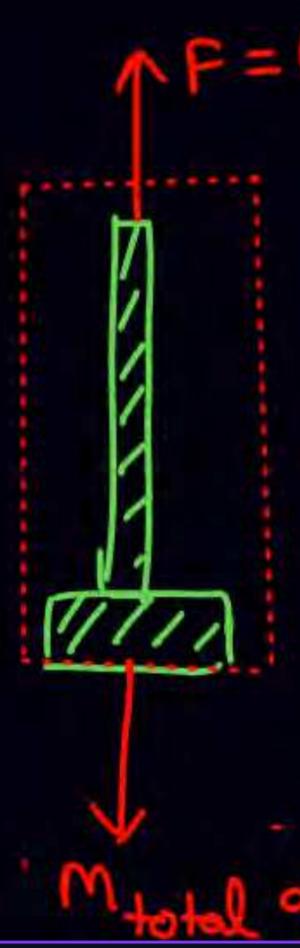
solⁿ ②



$$T_A - 250 = 25a$$

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

solⁿ



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

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

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

ATDB.uno ③

$$T_B - 200 = 20a$$

SKC
 trap \equiv mg नहीं मूलना है



Q

- ① find acc of (rod + mass)
- ② find T_A & T_B



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

$$a = \frac{1000 - 300 - 360}{30}$$

a

Solⁿ

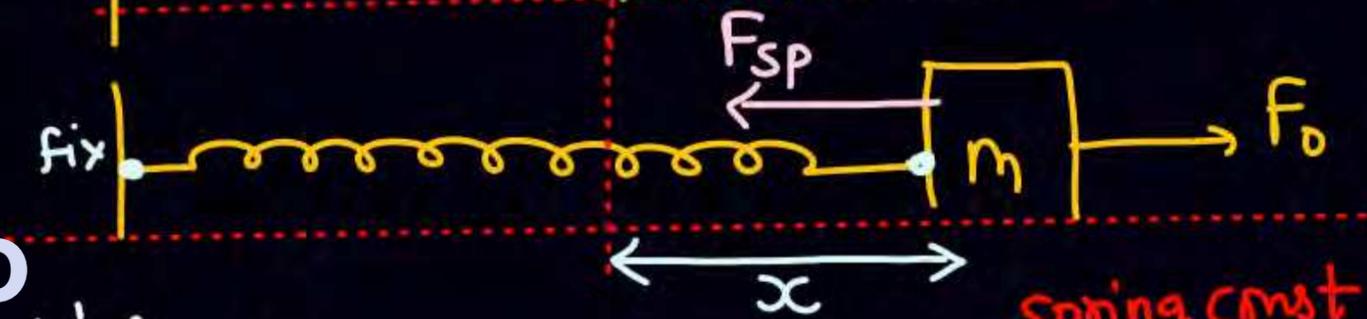
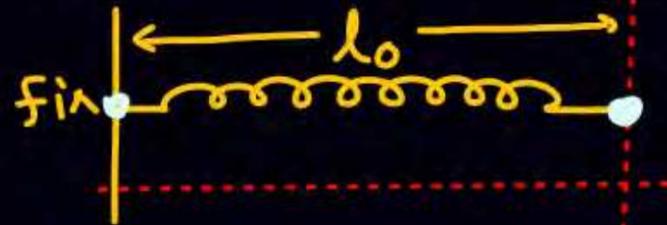
P



Ideal Spring



- pitch same
- massless
- (Natural length \equiv original length, Relaxed length)



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Hook's law

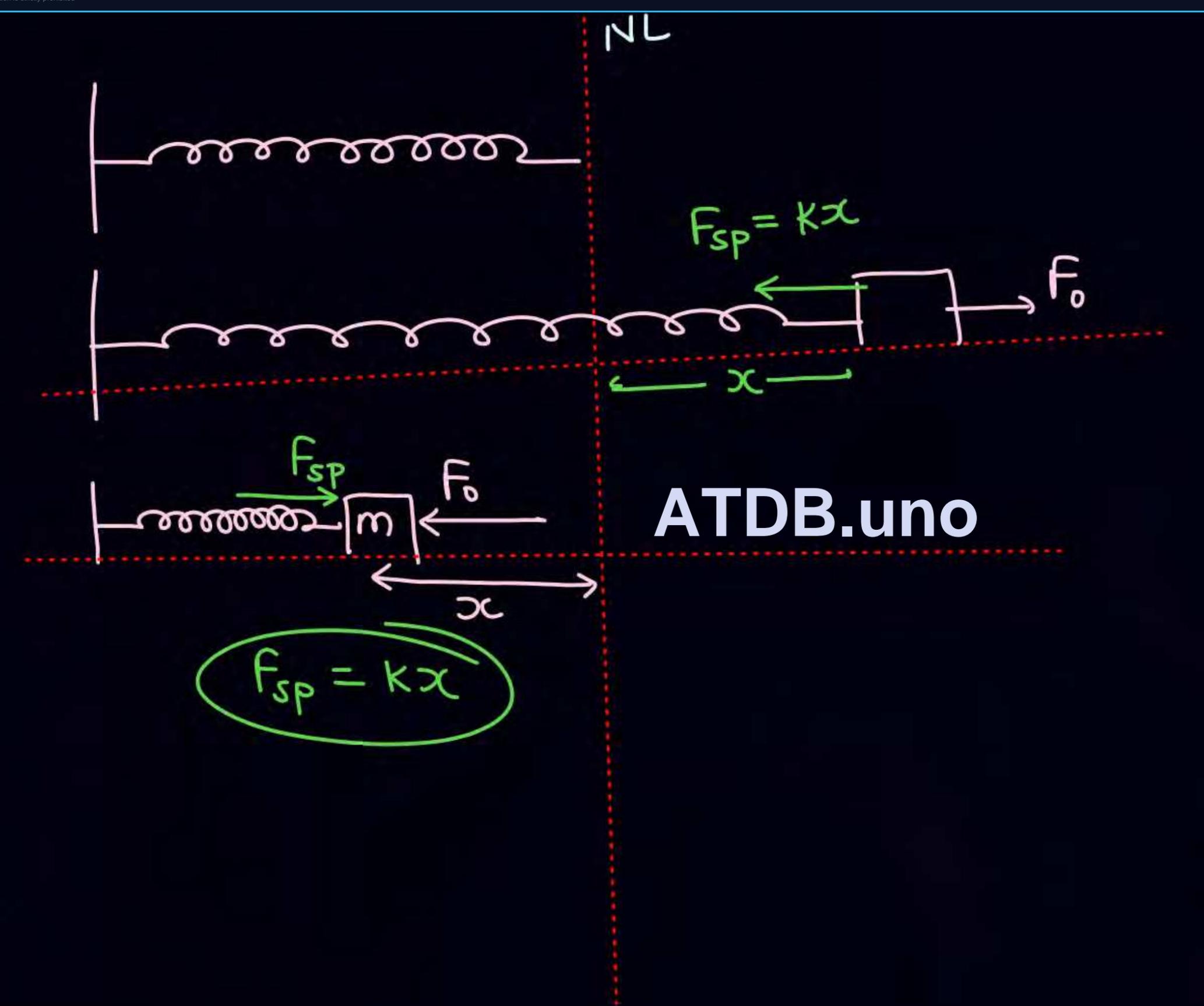
$F_{\text{Spring}} \propto x$

$F_{\text{SP}} = kx$
(magnitude)

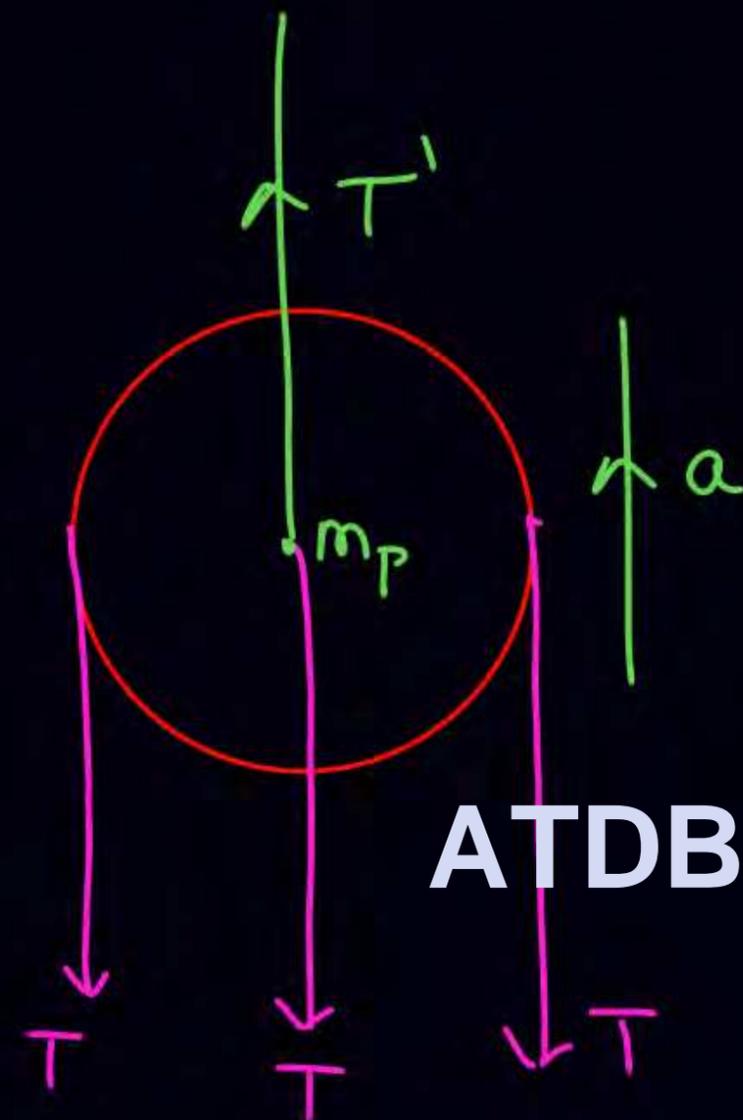
$\vec{F}_{\text{SP}} = -k\vec{x}$

(Towards natural length)

Spring const



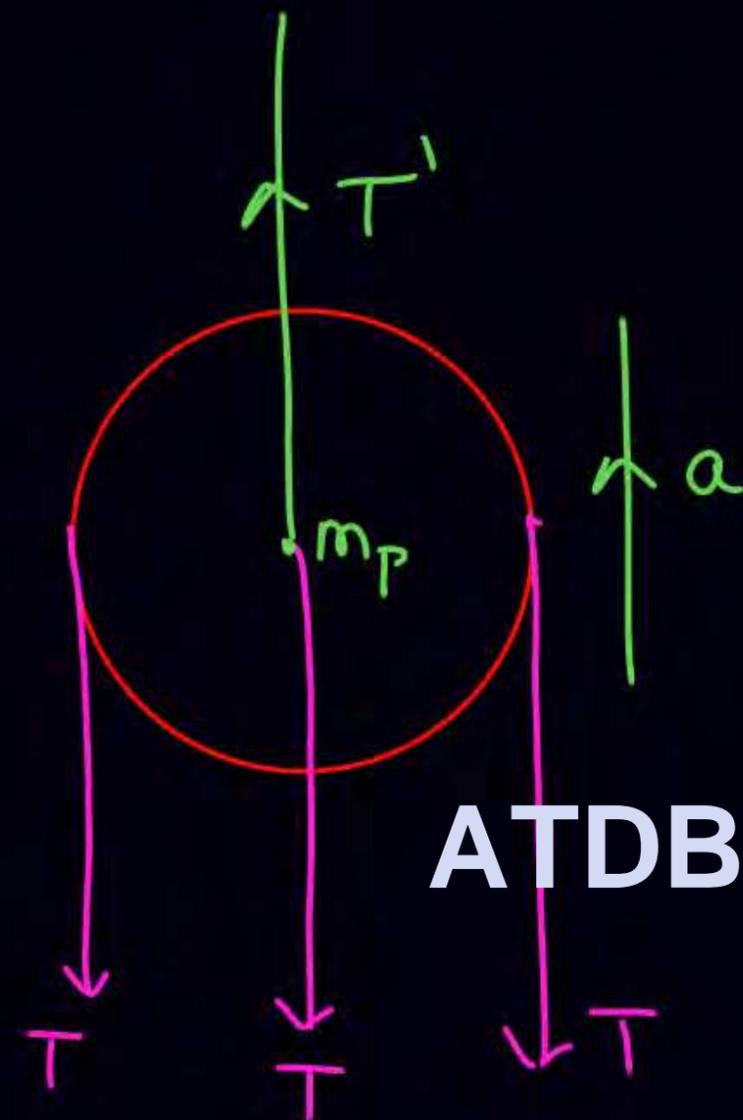
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$$T' - m_p g - T - T - T = m_p a$$

$$T' = 3T$$

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

$$T' = 3T$$

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Homework

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

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- HCV will give tomorrow.



Module H.W

Tuesday \Rightarrow (Prarambh) \Rightarrow 4, 6, 9, 10, 11, (11-20)

Prabal \Rightarrow (3-8), 11, 10

Wednesday Prabal \Rightarrow 12, 13, 14, 42, 48,

Prakshit (JA) \Rightarrow 1, 3, 4,

Pya \Rightarrow 1, 2, 4, 10, 12,

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THANK YOU

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