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Lecture - 05

Physics

Laws Of Motion

By- Saleem Ahmed Sir

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Topics *to be covered*

1. Ques Practice on $F = ma$
2.
3.
4.

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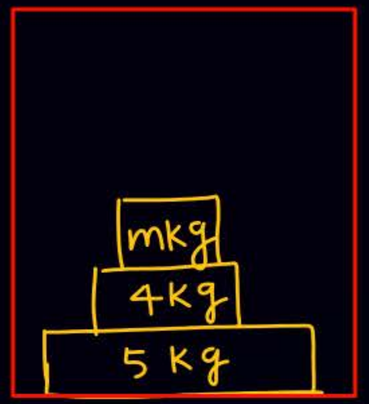
(1)



$a = 3 m/s^2$

$(F_{net}) = ma$

$= 4 \times 3 = 12$

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find F_{net} on 4 Kg block.

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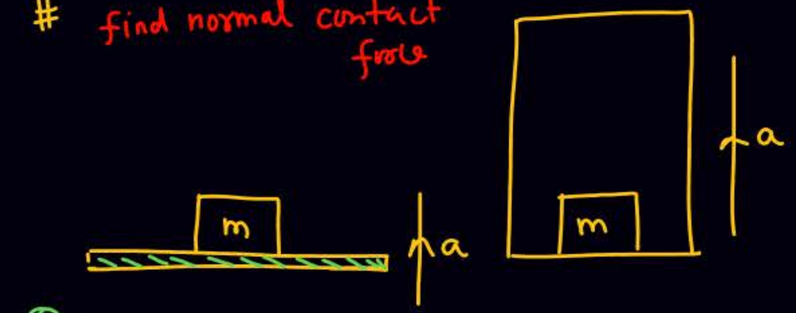
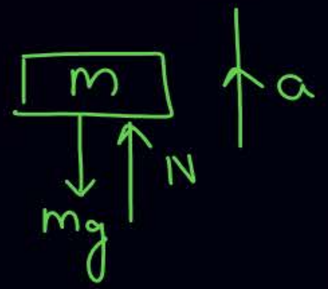
find normal contact force



$N - mg = ma$

$N = mg + ma$



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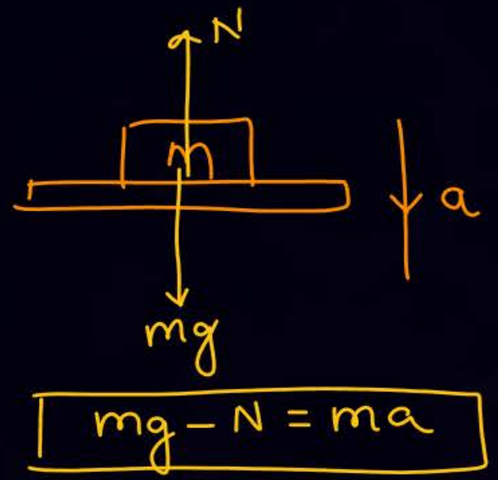

$mg - N = ma$

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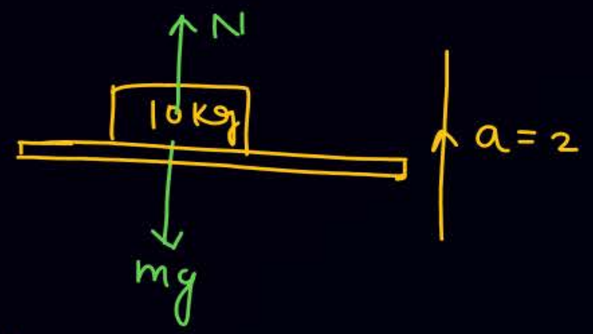
SKC

Q find normal contact force in following case.

(1)

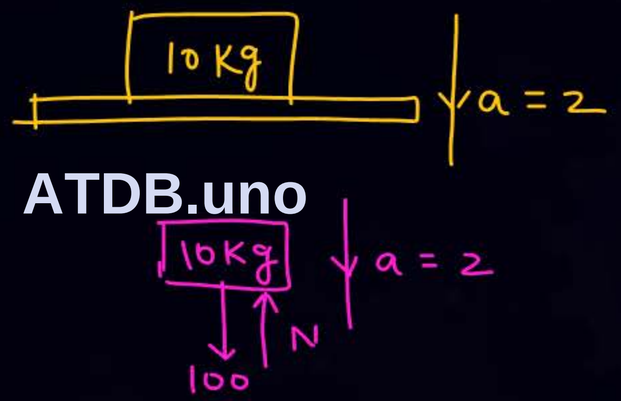


$N - mg = ma$

$N - 100 = 10 \times 2$

$\boxed{N = 120}$

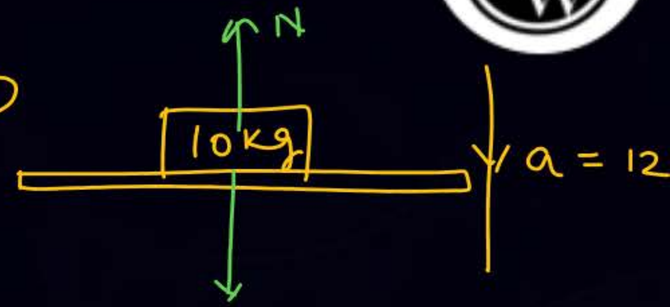
(2)



$100 - N = 10 \times 2$

$N = 80$

(3)



$mg = 100$

$mg - N = ma$

$100 - N = 10 \times 12$

$N = 100 - 120$

$\boxed{N = -20}$

$N = 0$ Contact loose

$a_{block} = g$ (नीचे)

$\parallel$

हवा

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Q

$$\vec{F}_{ext} = m_1\vec{a}_1 + m_2\vec{a}_2$$

$$150 = 10a' + 20 \times 4$$

$$\boxed{a' = 7}$$

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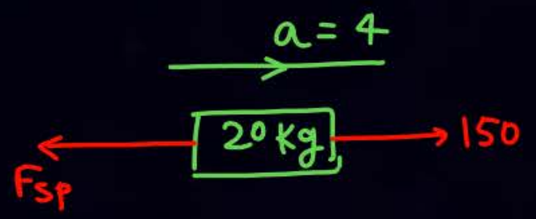
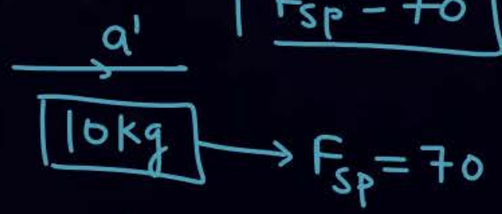


$$150 - F_{sp} = 20 \times 4$$

$$\boxed{F_{sp} = 70}$$



$$a' = \frac{70}{10} = 7$$

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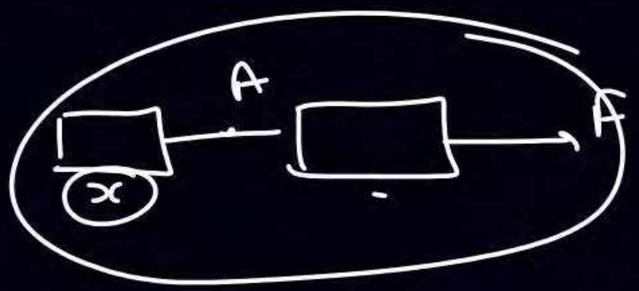
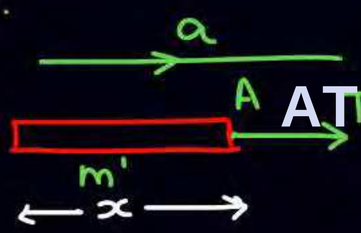
Q (mass वाली रस्सी) / rod (Uniform)



find Tension at A.

Sol^{n}

$$a = \frac{F}{m}$$



$$T = m'a$$

$$T = \left(\frac{m}{L}x\right)\frac{F}{m} = \frac{Fx}{L}$$

$L \longrightarrow m$

$1 \longrightarrow \frac{m}{L}$

$x \longrightarrow \frac{m}{L}x$

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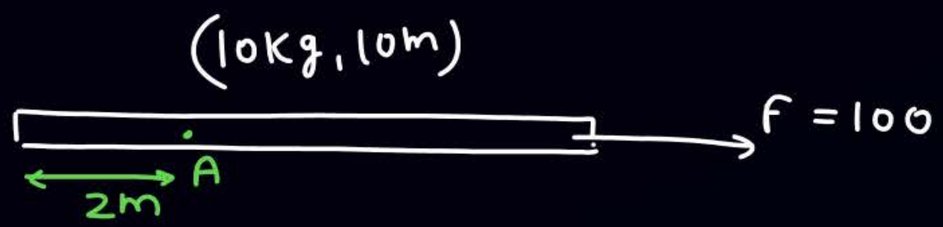

$$a = \frac{100}{10} = 10$$

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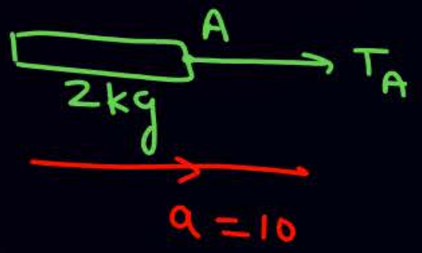

$T_A = 2 \times 10$

$= 20$

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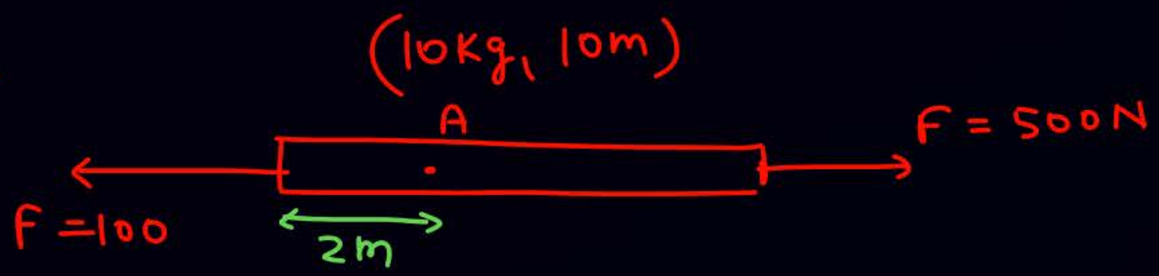

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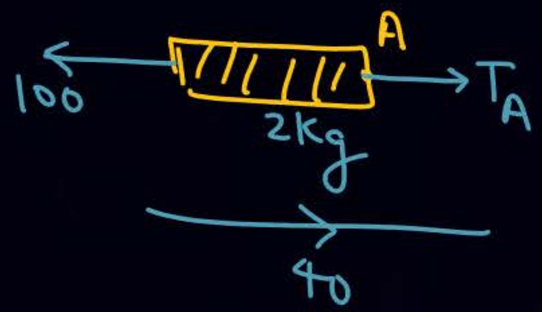
find tension at point A.

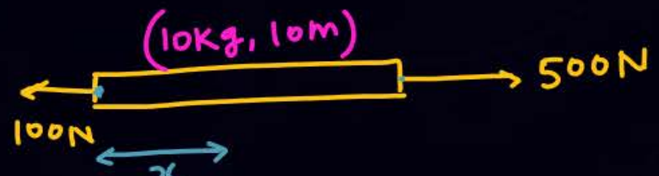
Sol^n

$$a = \frac{500 - 100}{10} = 40$$



$$T_A - 100 = 2 \times 40$$

$$T_A = 180$$



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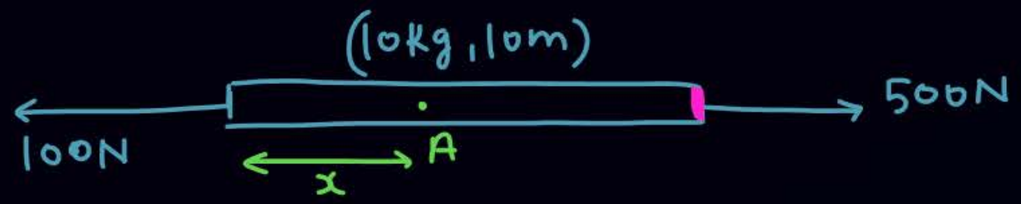
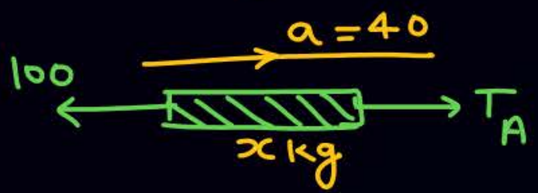
(b)





$$T_A - 100 = x \times 40$$

$$\boxed{T_A = 40x + 100}$$

10m ⟶ 10kg

1m ⟶ 1kg

x ⟶ x kg

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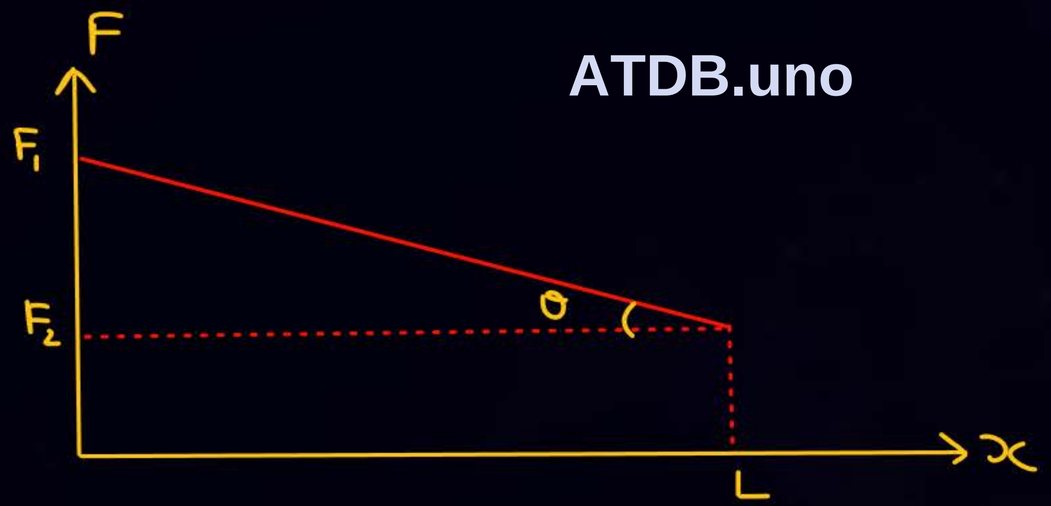
$$a = \frac{F_1 - F_2}{m}$$

$F_1 > F_2$ (given)



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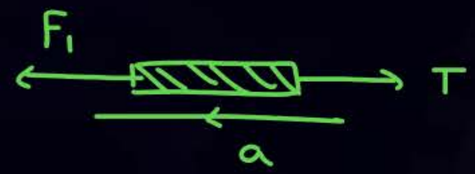
$$a = \frac{F_1 - F_2}{m}$$



$$F_1 - T = m'a = \frac{m}{L} x \cdot \left(\frac{F_1 - F_2}{m}\right)$$

$$F_1 = T + (F_1 - F_2)\frac{x}{L}$$

$$T = -(F_1 - F_2)\frac{x}{L} + F_1$$

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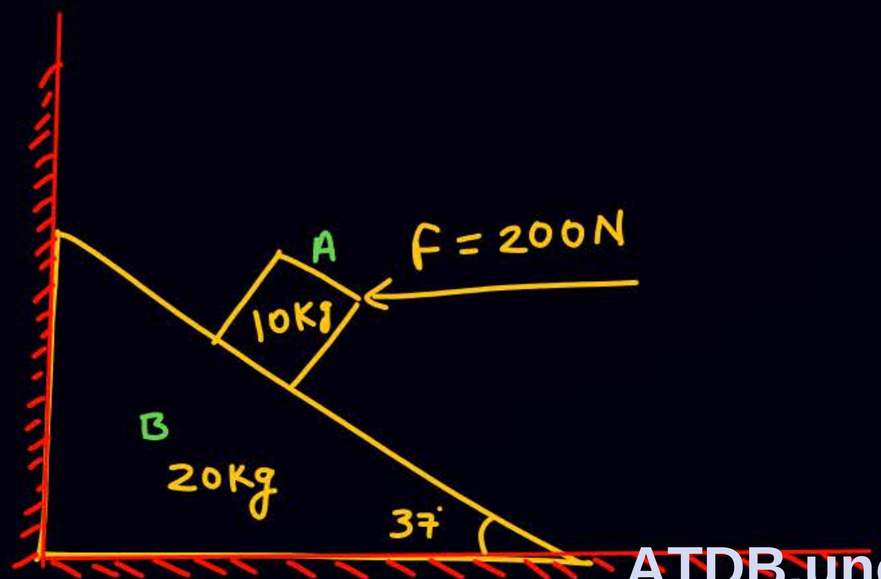

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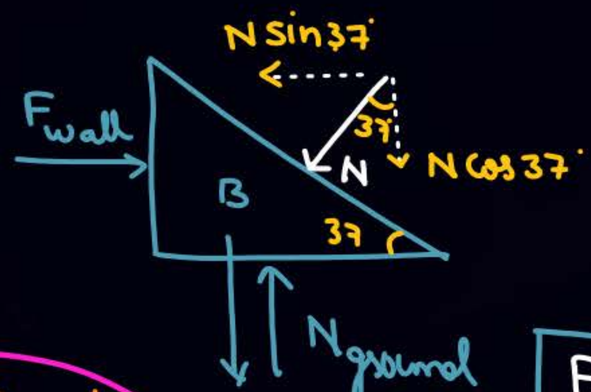
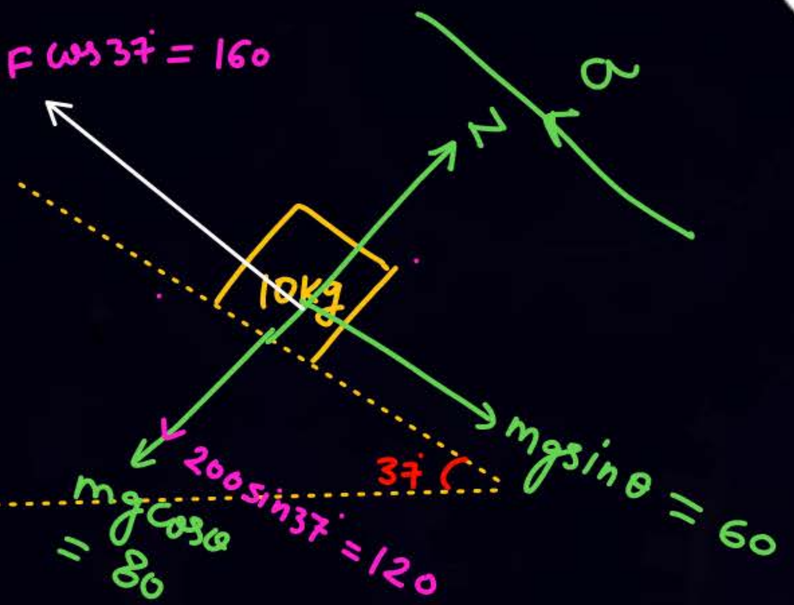
① $a_{block} = 10$

② F_{wall}

③ N_{ground}

④ $N_{common} = 200$





$$a = \frac{160 - 60}{10} = 10$$

$$N = 120 + 80 = 200 = N_{common}$$

$$N_{gro.} = 200 + N\cos 37°$$
$$= 200 + 200 \times \frac{4}{5} = 360$$

$$F_{wall} = N\sin 37°$$
$$= 200 \times \frac{3}{5} = 120$$

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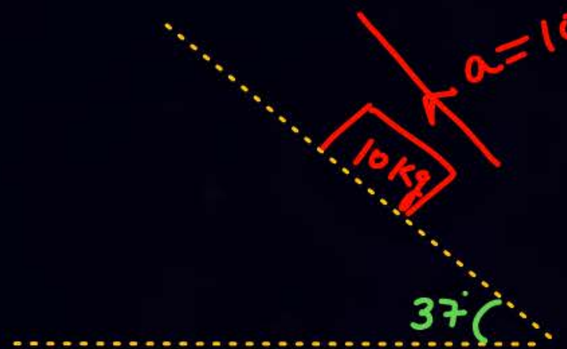

$$\boxed{\vec{a}_A = -8\hat{i} + 6\hat{j}}$$

$$\boxed{\vec{a}_B = 0}$$

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$\cancel{N_g = 300}$

$\cancel{N_{wall} = 200}$

Equil. में नहीं है

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

$N_{wall} - 200 = 10 \times (-8) + 20 \times 0$

$$\boxed{N_{wall} = 120}$$

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

$N_g - 300 = 10 \times 6 + 20 \times 0$

$$\boxed{N_g = 360}$$

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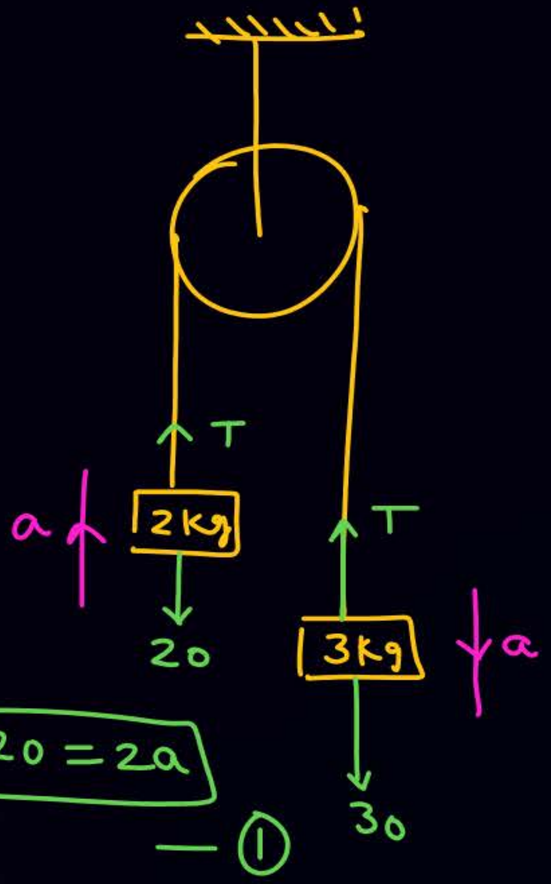

$T - 20 = 2a$ — (1)

$30 - T = 3a$ — (2)

$a = 2$

$T = 24$

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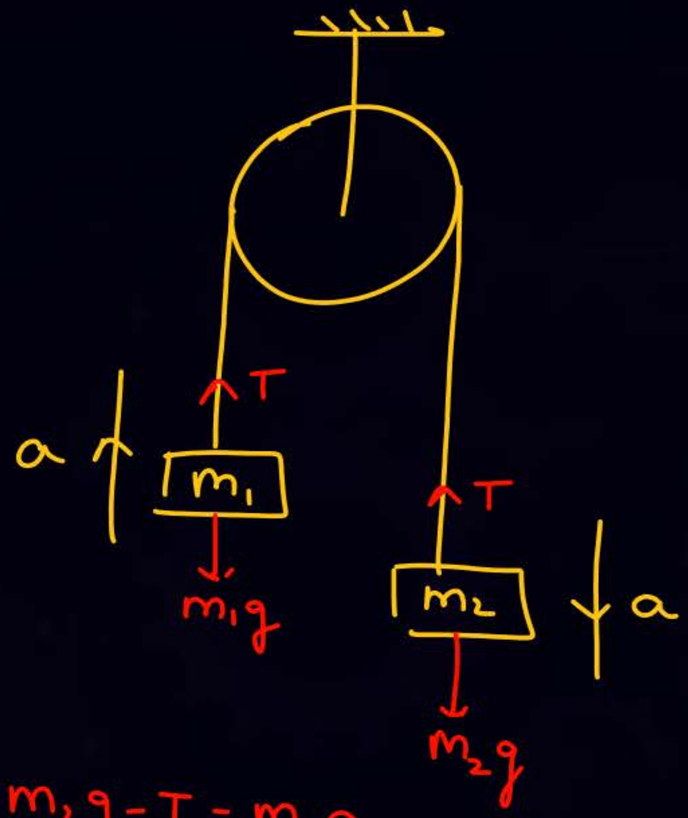

$m_2 g - T = m_2 a$

$T - m_1 g = m_1 a$

$a = \frac{m_2 g - m_1 g}{m_1 + m_2}$

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

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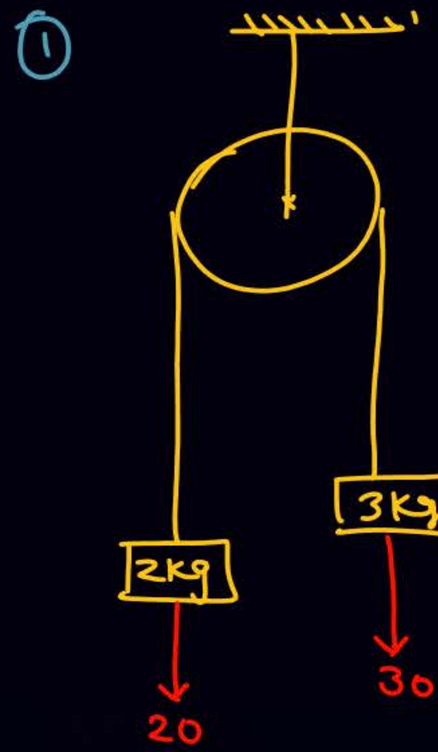
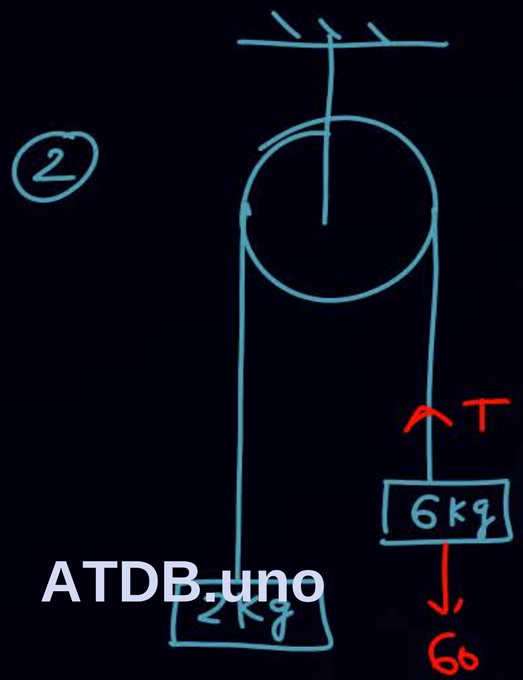


$$a = \frac{30-20}{2+3} = 2$$



$$a = \frac{60-20}{8} = \frac{40}{8} = 5$$

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$$60 - T = 6 \times a$$

$$60 - T = 6 \times 5$$

$$T = 30$$

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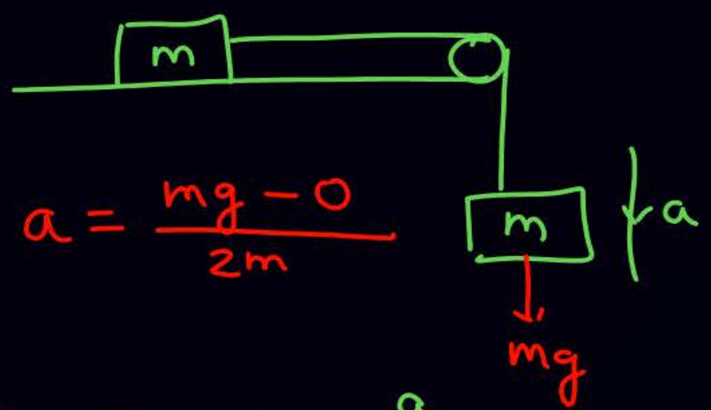
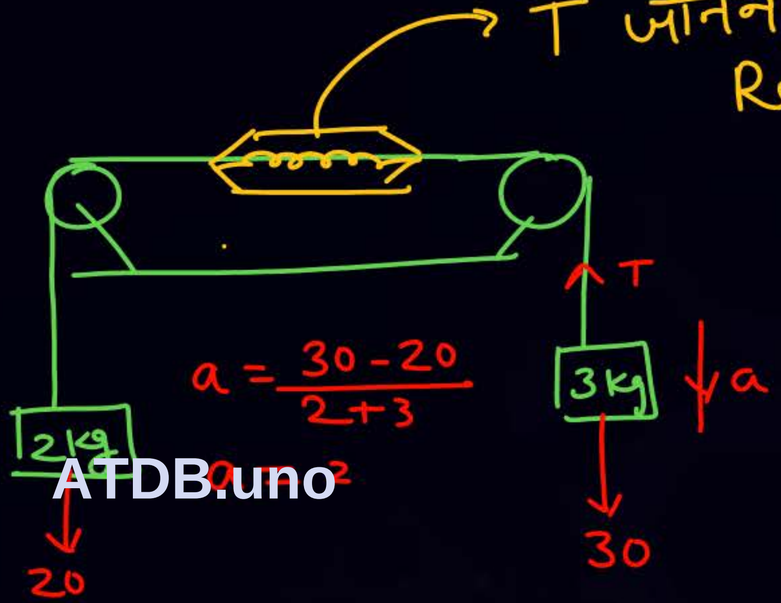
Q



$$a = \frac{mg - 0}{2m}$$

Q



T जानना चाहता है

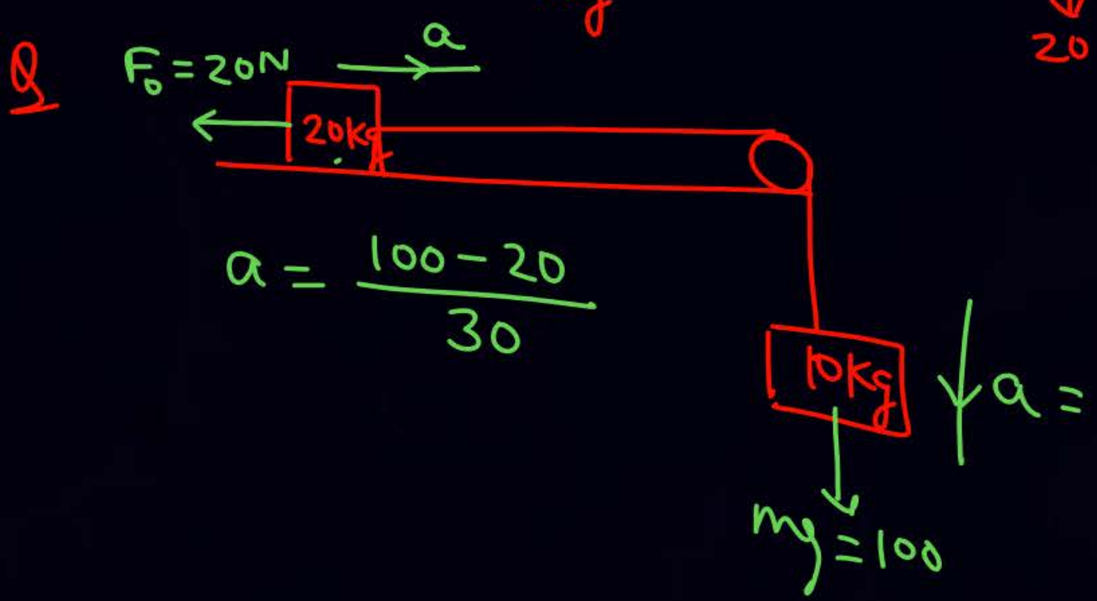
Reading ⇒ 24

$$a = \frac{30 - 20}{2 + 3}$$

$$30 - T = 3 \times a$$

$$T = 24$$

Q



$$a = \frac{100 - 20}{30}$$

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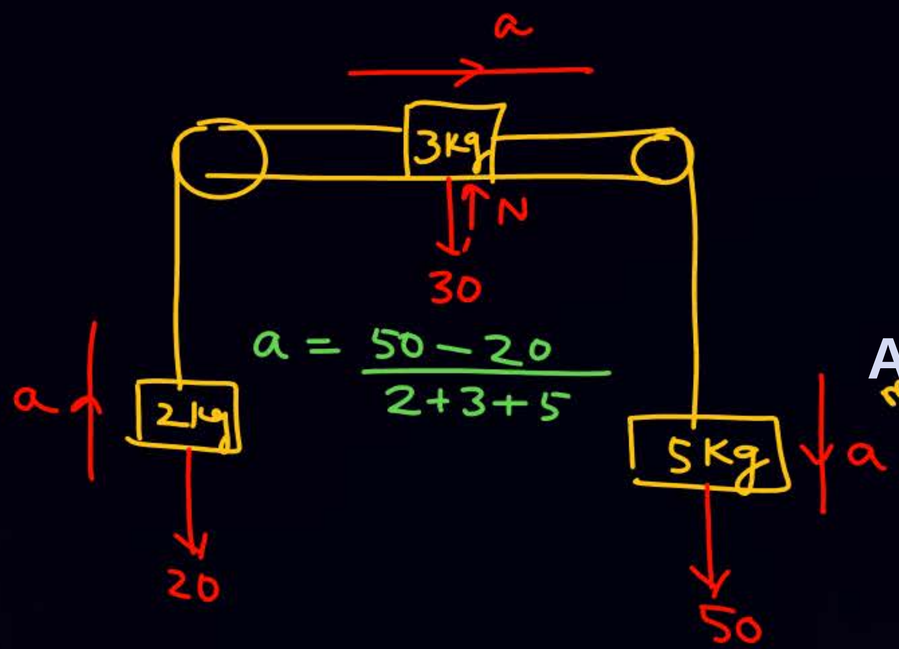
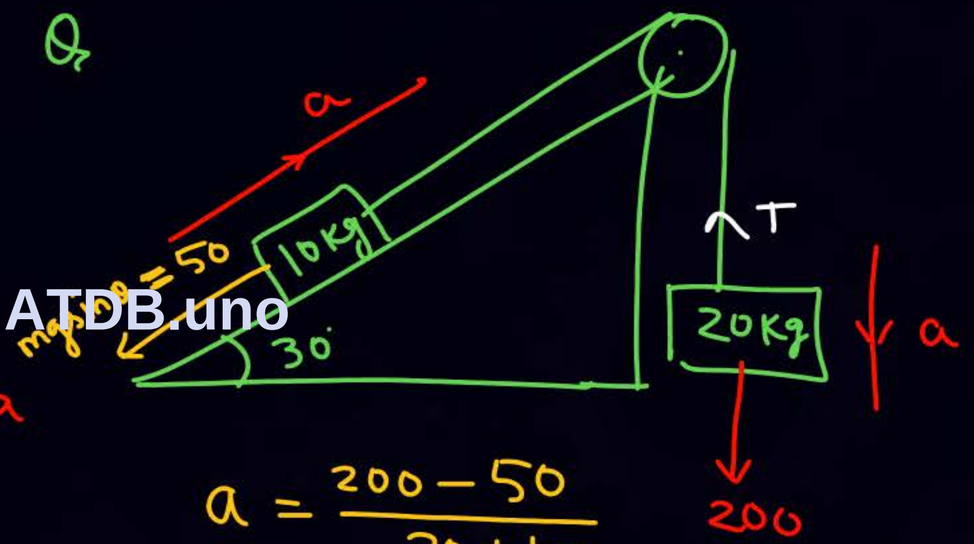


$$a = \frac{50-20}{2+3+5}$$

Q



$$a = \frac{200-50}{20+10}$$

$$200 - T = 20a$$

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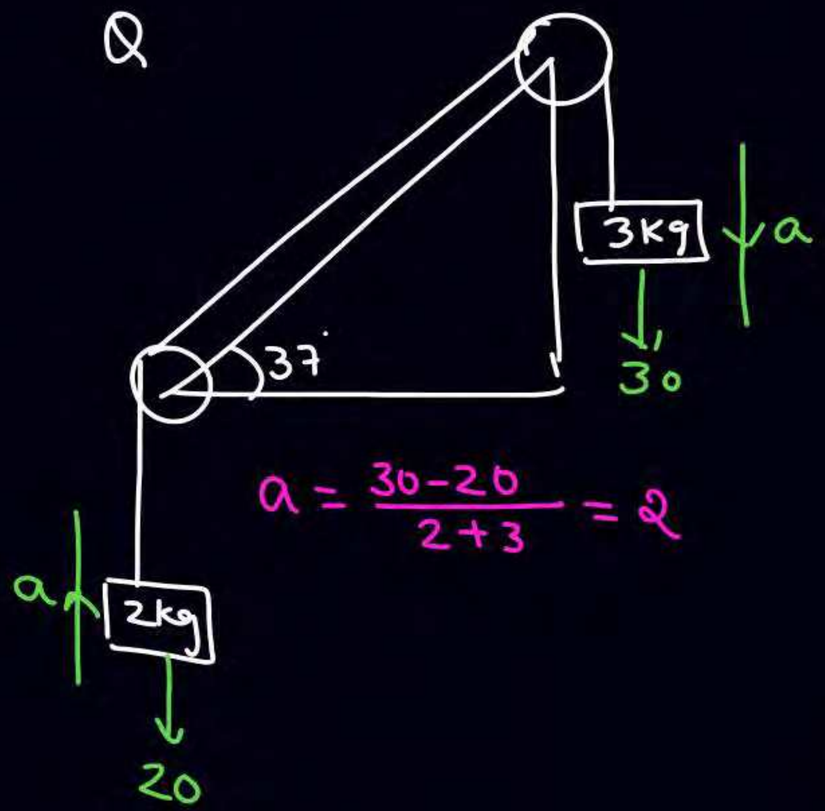
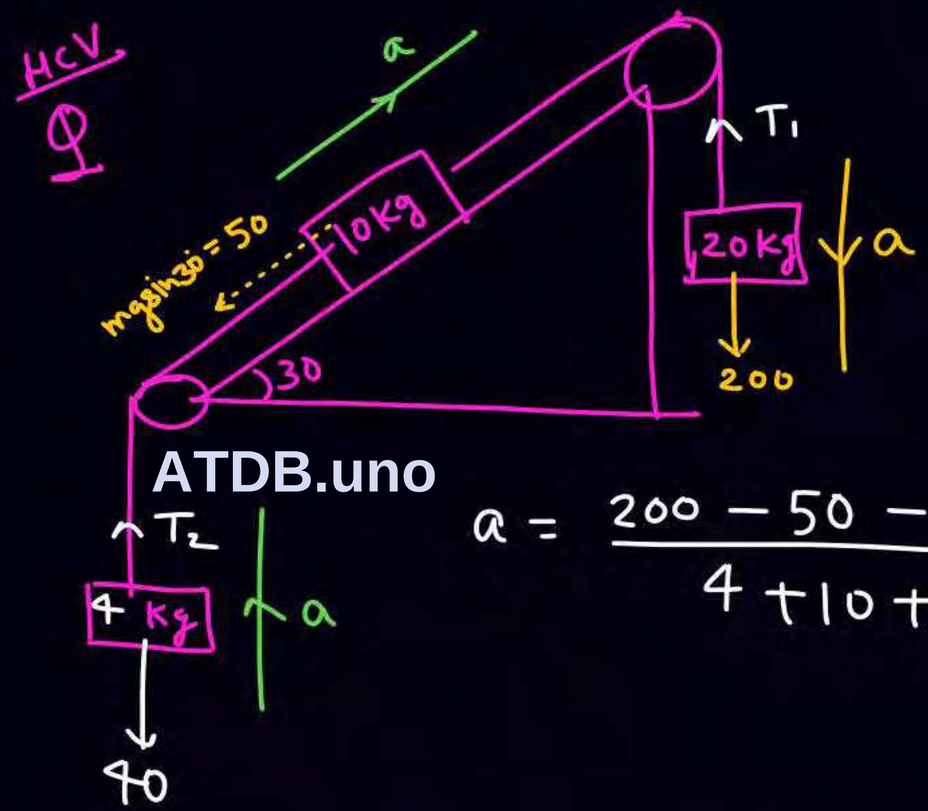
Q



$$a = \frac{30-20}{2+3} = 2$$

HCV

Q



$$200 - T_1 = 20a$$

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$$a = \frac{200 - 50 - 40}{4 + 10 + 20}$$

$$T_2 - 40 = 4a$$

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Homework

- DPP-03
- HCV → 39, 42, 35, 26, 27
- module

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