YAKEEN NEET 2.0

2026

Laws of Motion

Physics | Lecture – 03

By- Manish Raj (MR Sir)

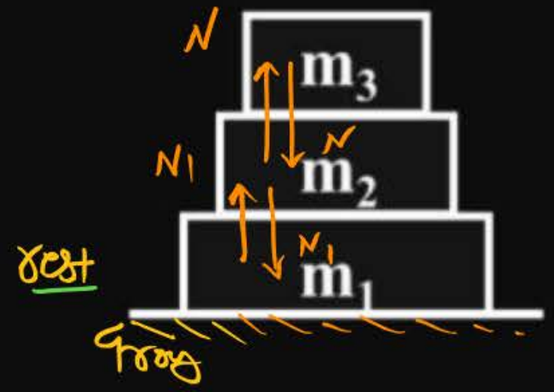
Todays Goal

Questions on equilibrium.

→ Based on normal and tension.

H/W

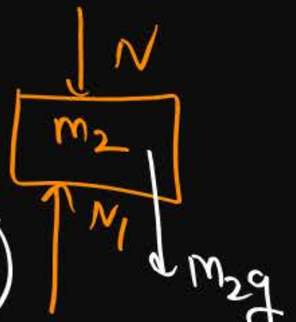
(1) find net force on m_2



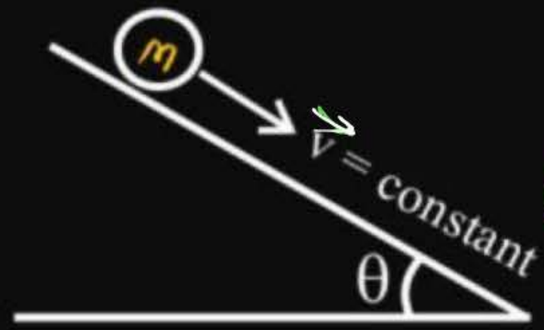
$(F_{net}) = 0$

rest

$N_1 = N + m_2 g$



(2) find net force on (m)



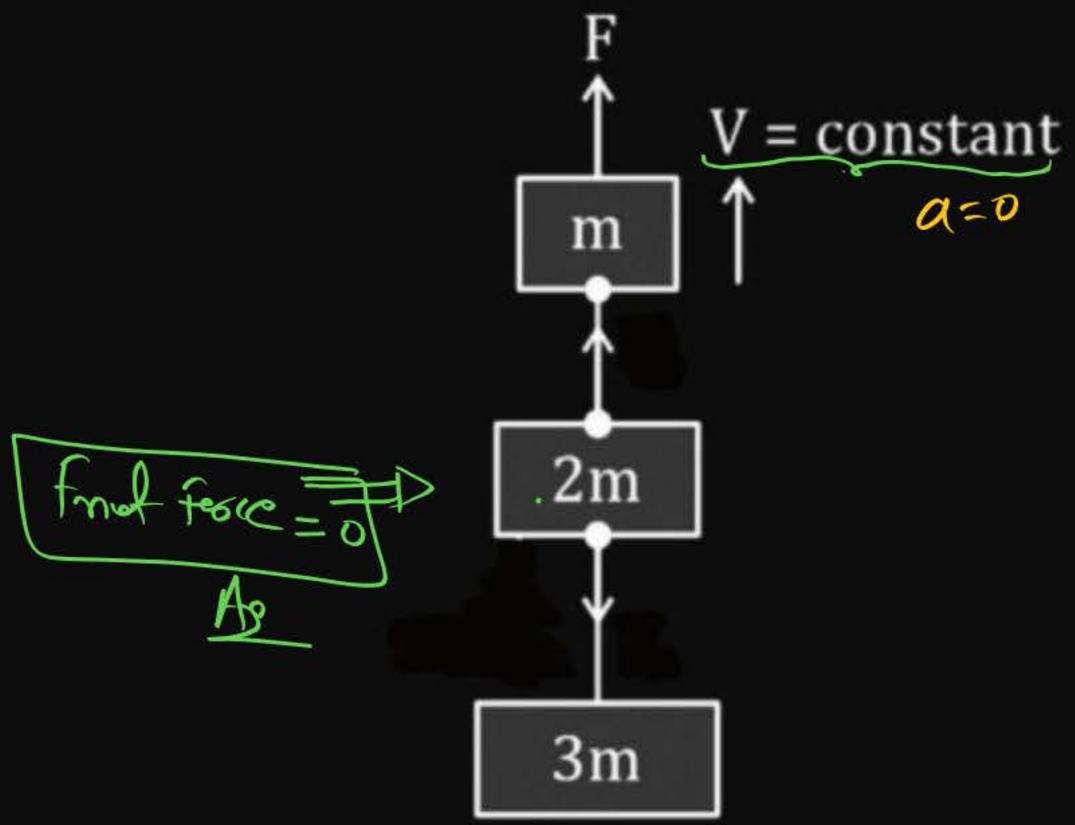
$a = 0$ $F_{net} = 0$ on m

Question

Find net force on 2m.

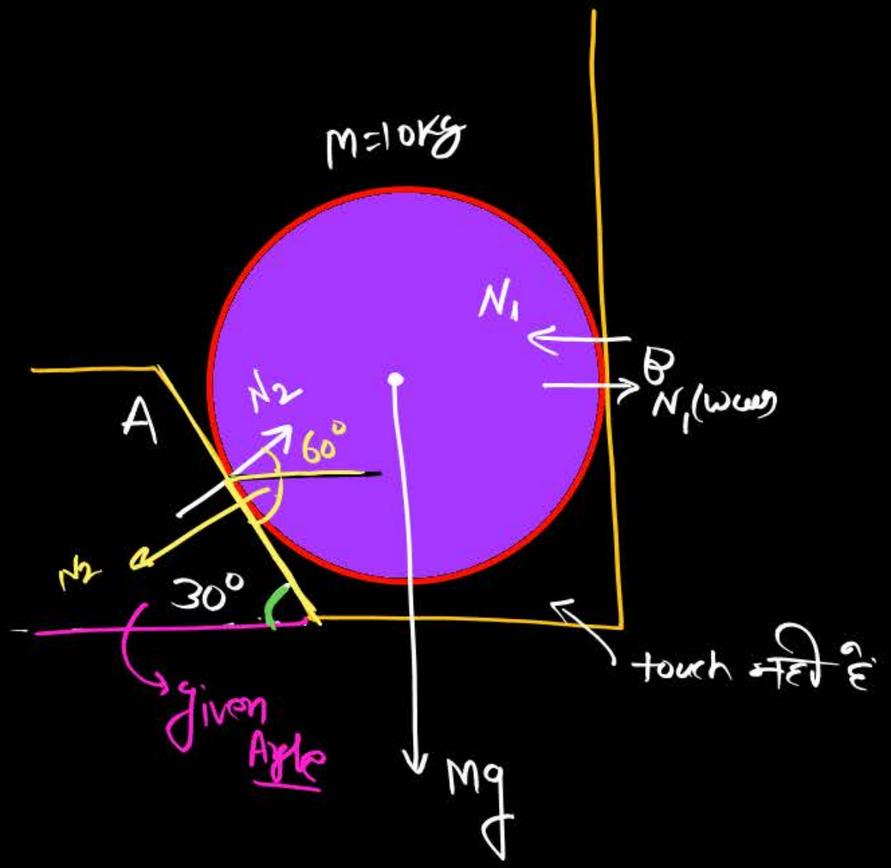
[NEET-2013]

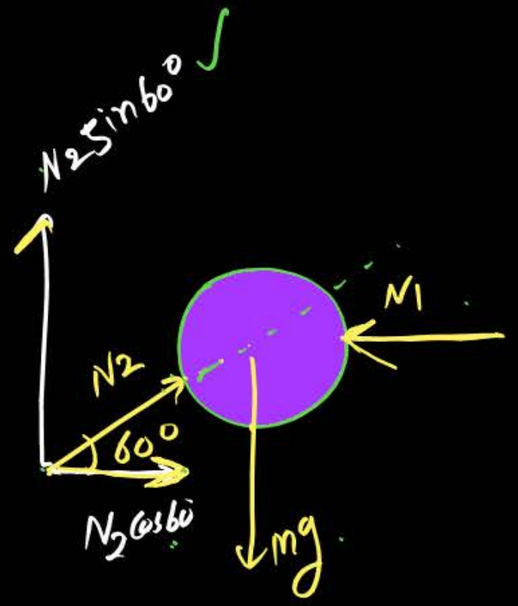
(3)



Sphere of mass 10 kg then find Normal at A & B.

(4)





rest $F_y = 0$

$N_2 \sin 60 = mg$

$N_2 \frac{\sqrt{3}}{2} = 10 \times 10$

$N_2 = \frac{200}{\sqrt{3}}$ AB

$F_x = 0$

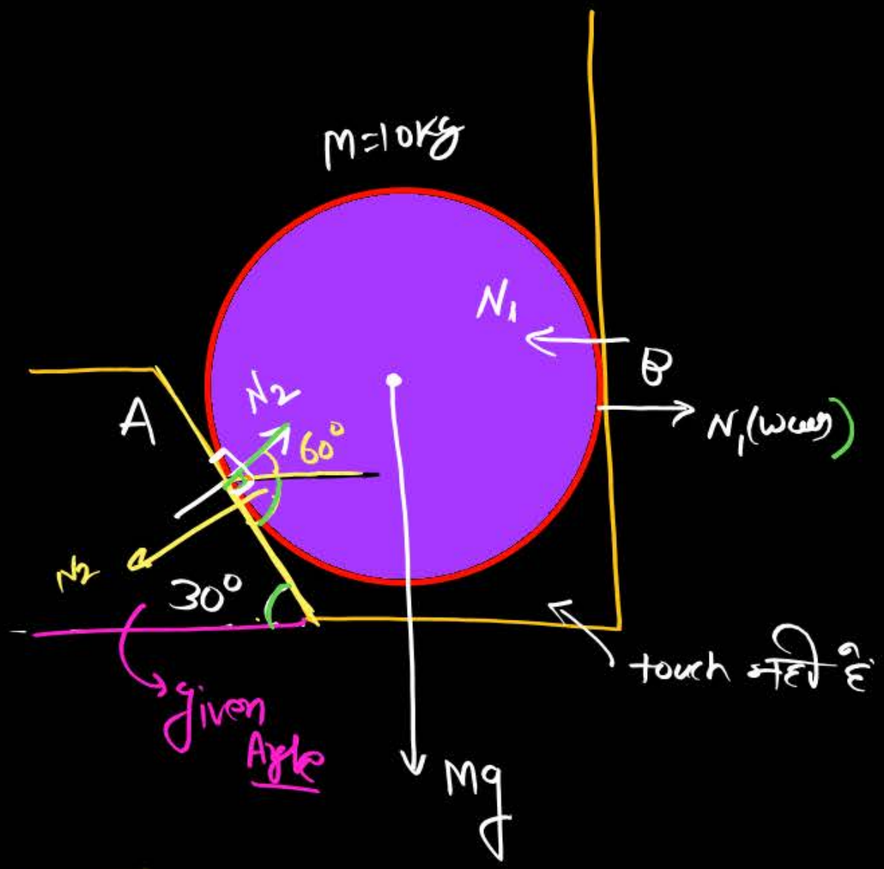
$N_1 = N_2 \cos 60$

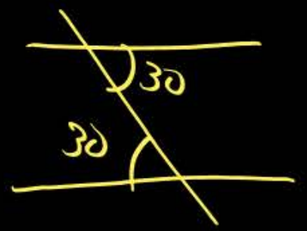
$= \frac{200}{\sqrt{3}} \times \frac{1}{2}$

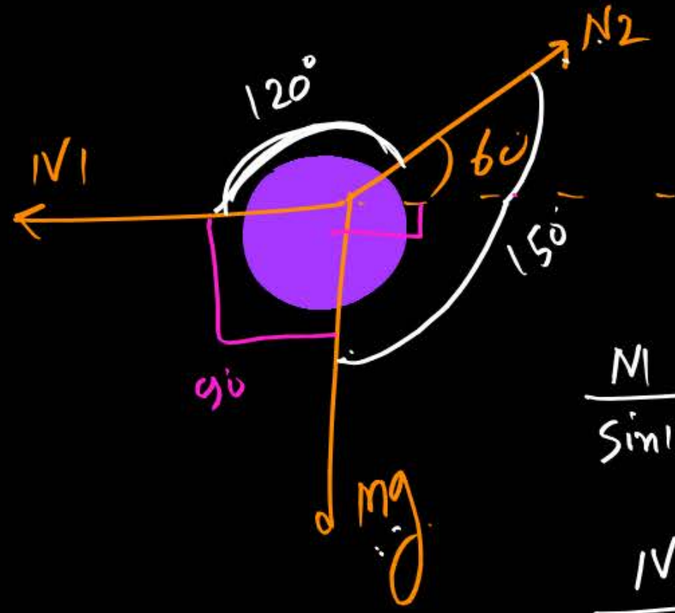
$= \frac{100}{\sqrt{3}}$

Sphere of mass 10 kg then find Normal at A & B.

(4)





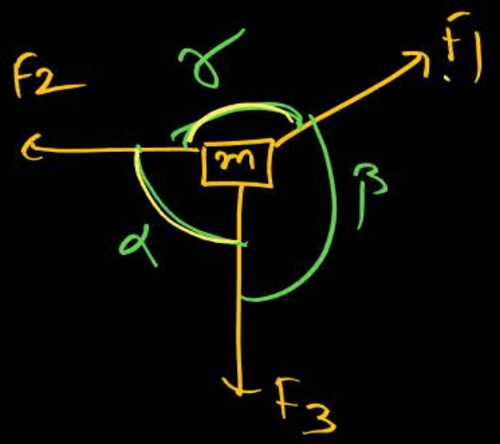


$$\frac{N_1}{\sin 150^\circ} = \frac{mg}{\sin 120^\circ}$$

$$\frac{N_1}{\frac{1}{2}} = \frac{10 \times 10}{\frac{\sqrt{3}}{2}}$$

$$N_1 = \frac{100}{\sqrt{3}}$$

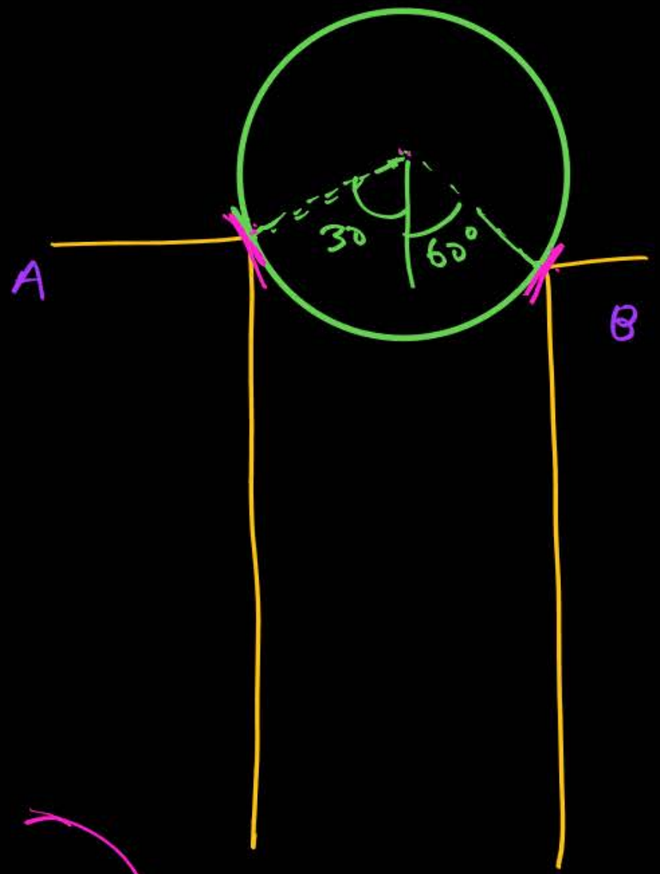
Lamis theorm



If $F_1 + F_2 + F_3 = 0$

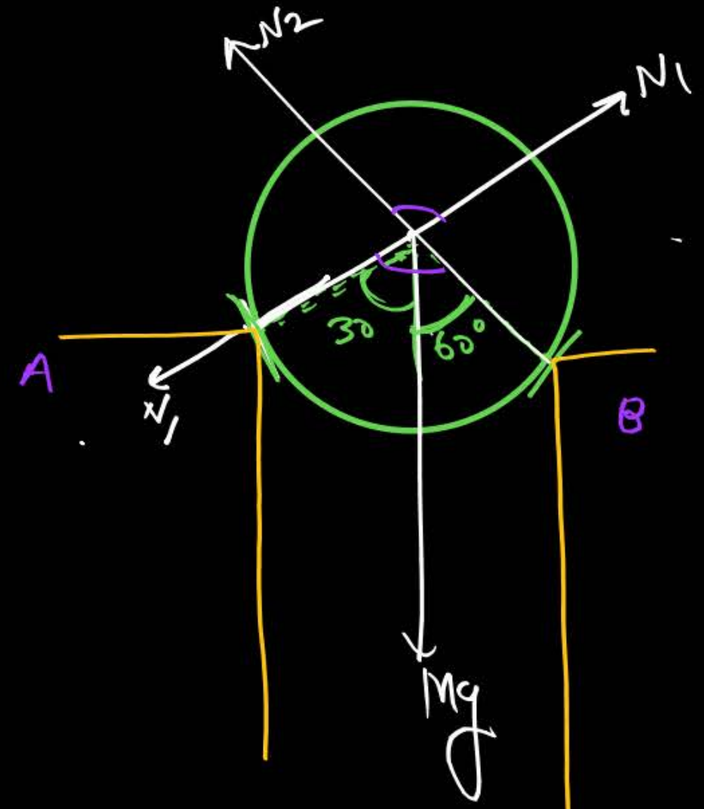
$$\frac{F_1}{\sin\alpha} = \frac{F_2}{\sin\beta} = \frac{F_3}{\sin\gamma} \quad *$$

(5)



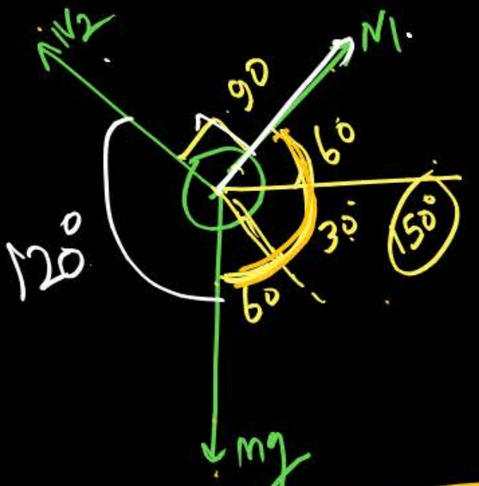
Sphere of mass 10 kg.

find Normal at 'A' & 'B'



$$\frac{N_2}{\sin 150} = \frac{mg}{\sin 90}$$

$$N_2 = \frac{1}{2} \times 10 \times 10 = 50\,N$$

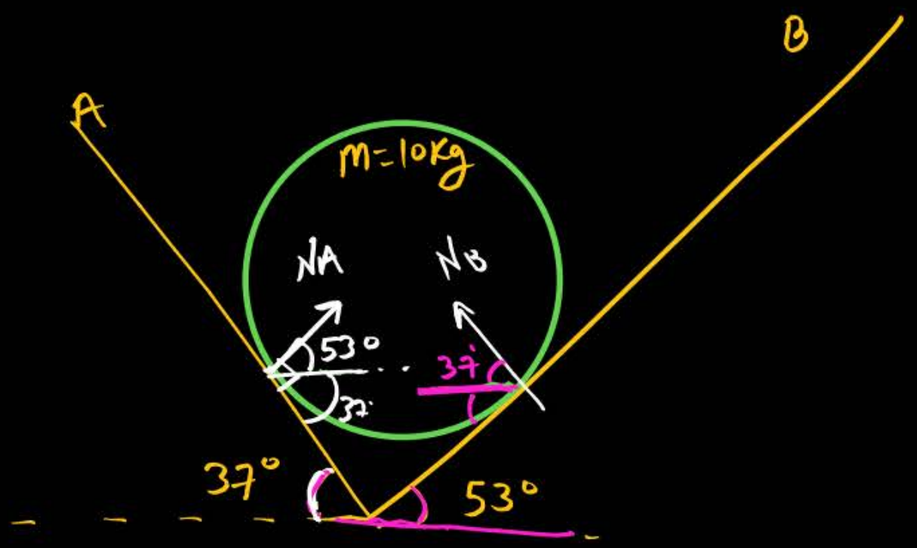


$$\frac{N_1}{\sin 120} = \frac{mg}{\sin 90}$$

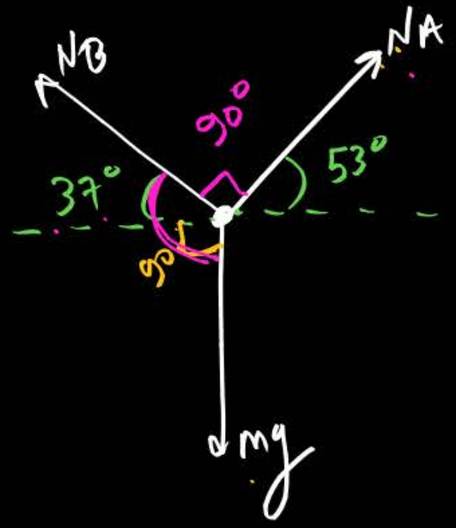
$$\frac{N_1}{\frac{\sqrt{3}}{2}} = \frac{mg}{1}$$

$$N_1 = mg\frac{\sqrt{3}}{2}$$

(6) Find N_A & N_B.



Same



$$\frac{N_A}{\sin 127^\circ} = \frac{mg}{\sin 90^\circ}$$

$$\frac{N_A}{\frac{4}{5}} = \frac{10 \times 10}{1}$$

$$N_A = \frac{4}{5} \times 100^{20}$$

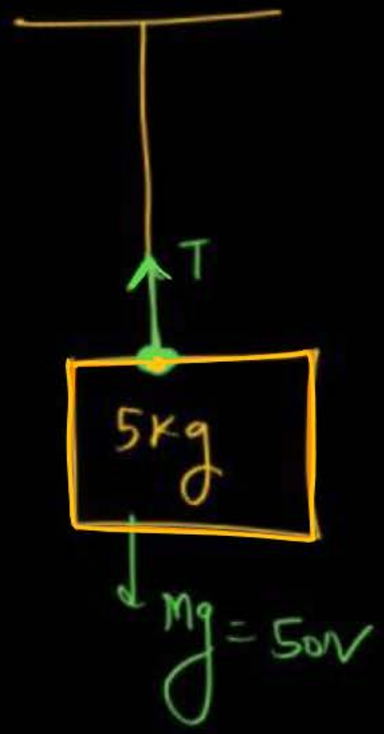
$$N_A = 80\,N$$

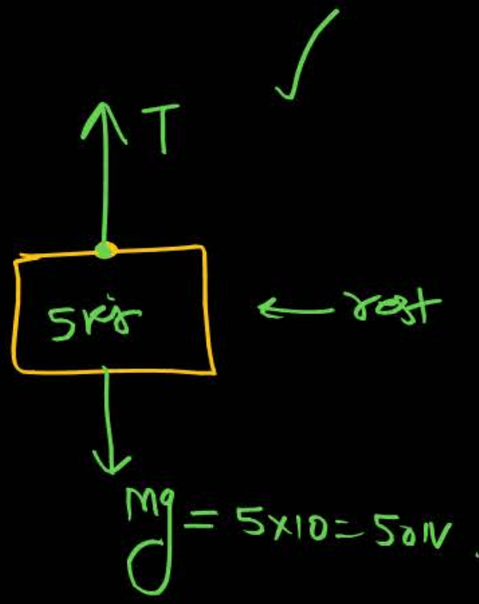
(*) $\sin 127^\circ = \frac{4}{5}$

$\sin(143^\circ) = \frac{3}{5}$

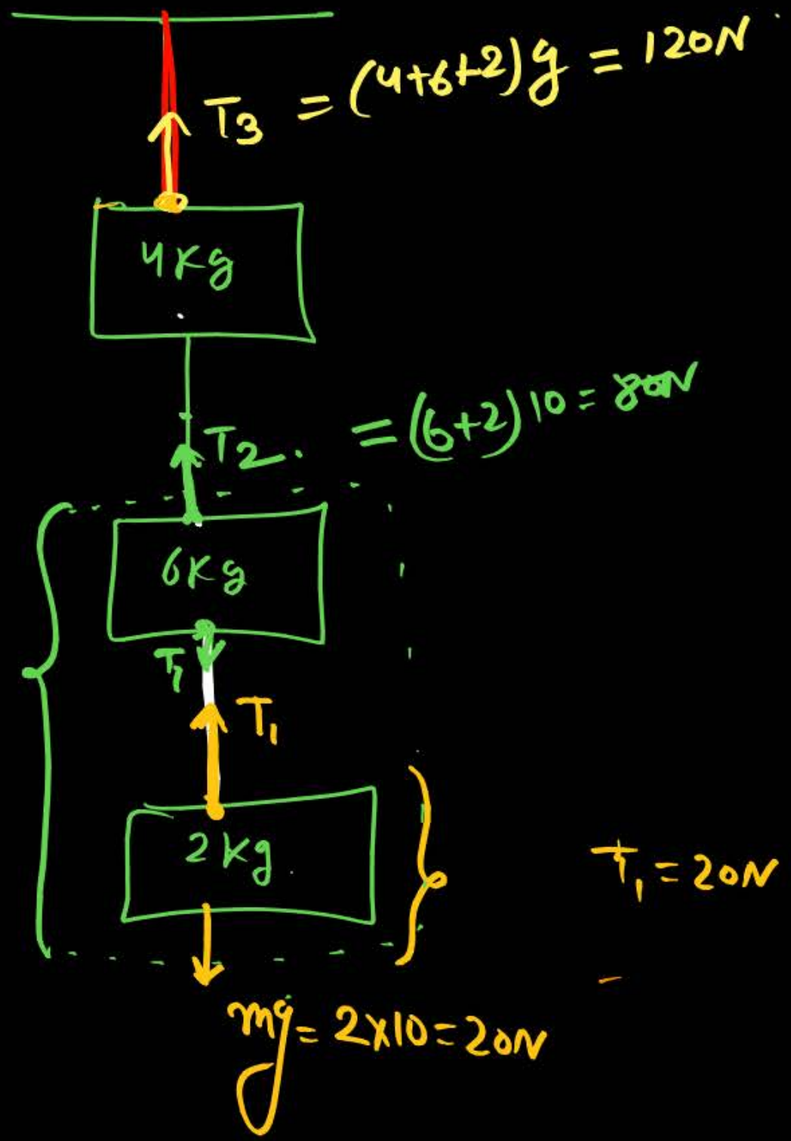
kal ces.

(7)

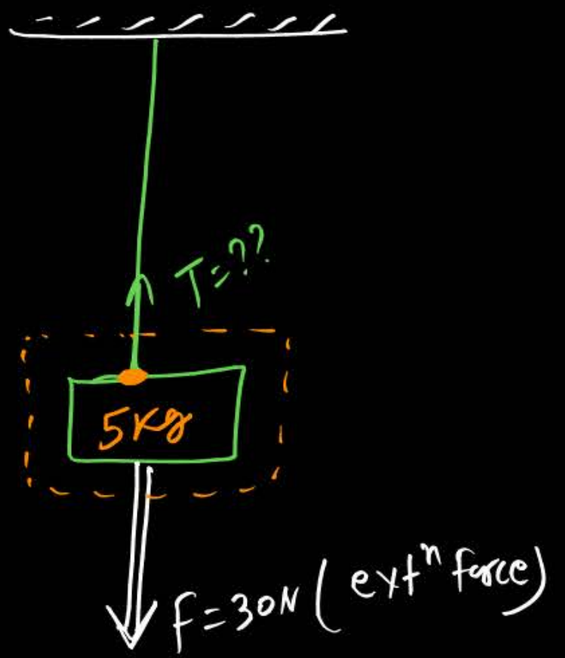




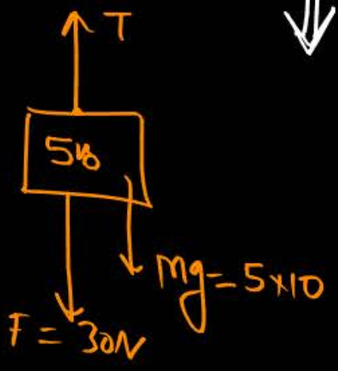
(8)



(9)

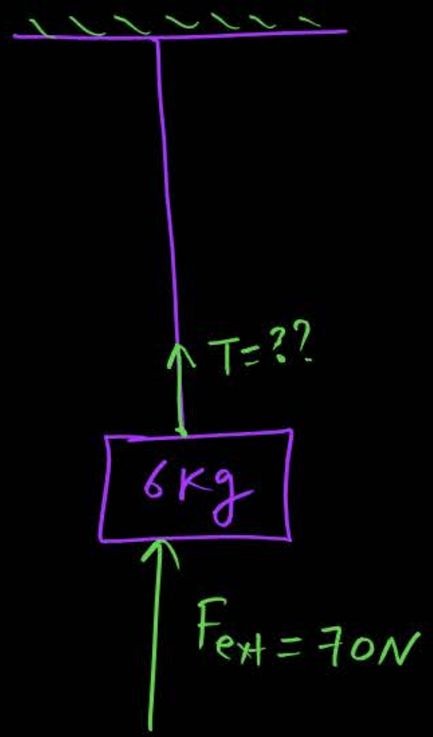


Object is in equlibrium



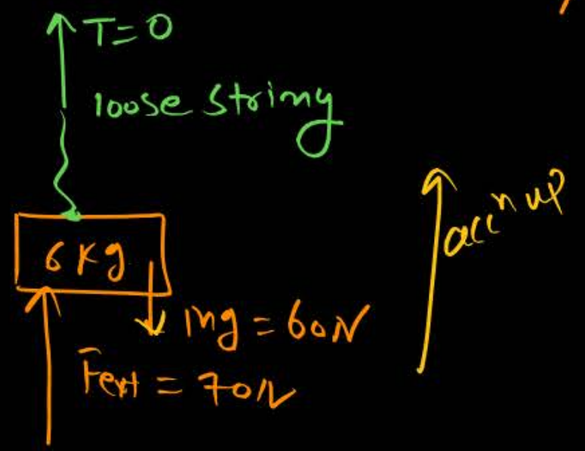
$T = (50+30) = 80$ Newton

(10)

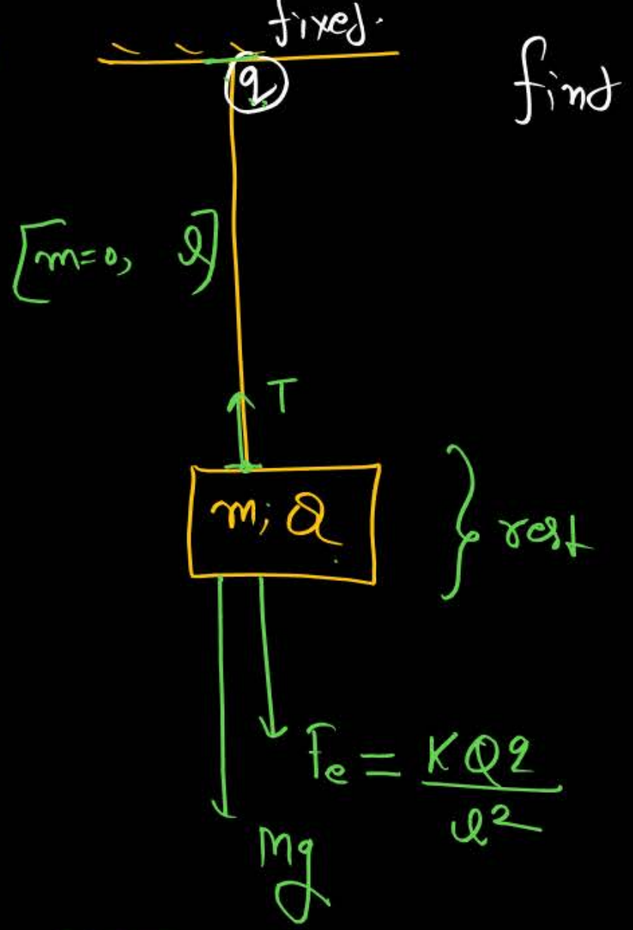


find T in this string

10 N ✗ scam hai



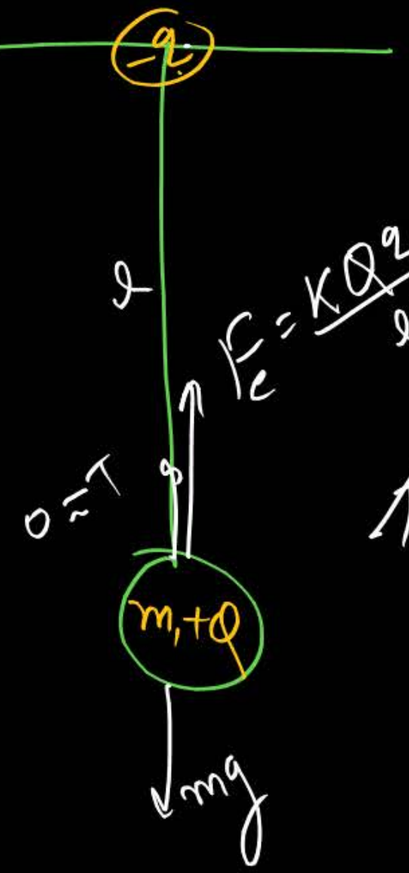
(11)



find Tension in string ??

$$mg + \frac{KQq}{l^2} = T$$

(12)



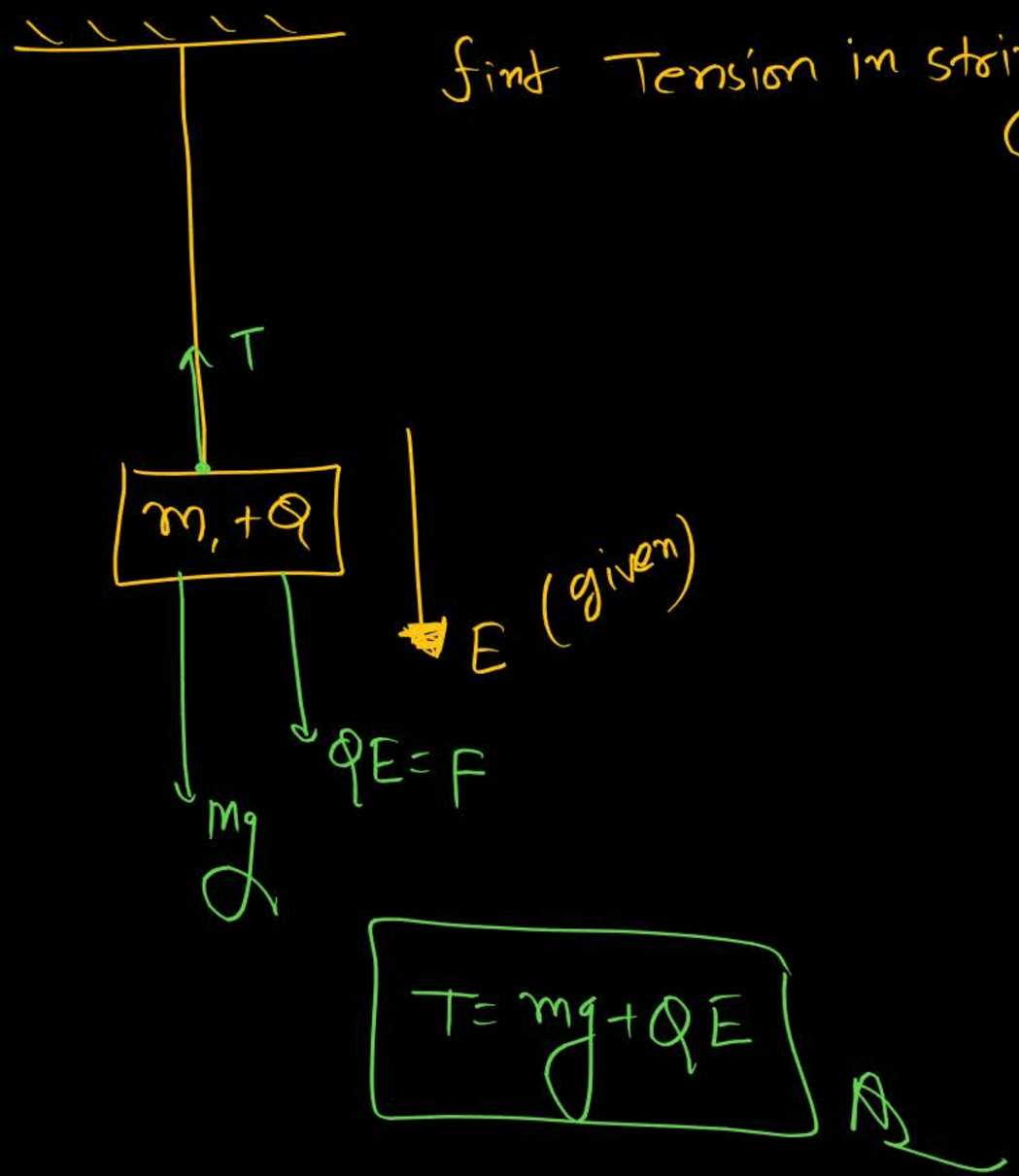
find m(min^m) so that Tension in string becomes zero.

$$f^{0} + F_e = mg_{min}$$

$$F_e = mg$$

$$m = \frac{F_e}{g} = \frac{KQq}{l^2 g}$$

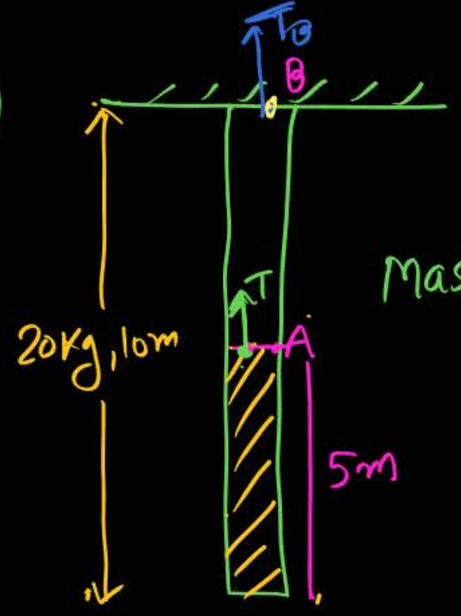
(13) find Tension in string ??



$T = mg + QE$

A

(14)



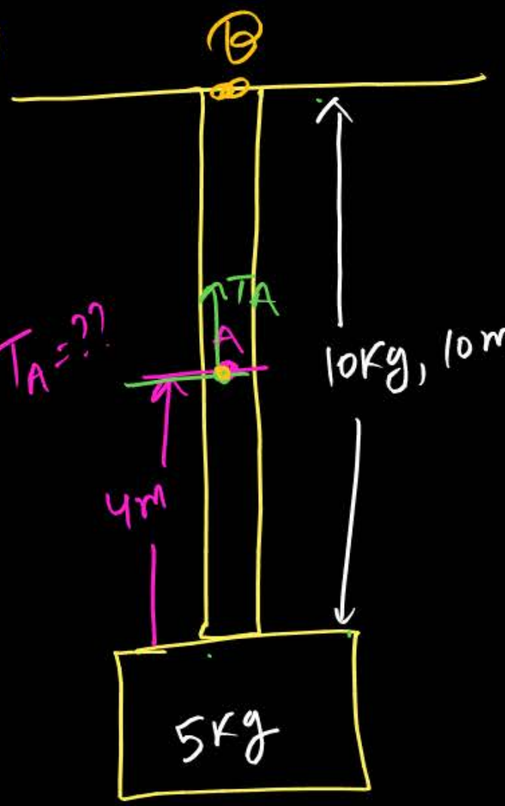
Massive string.

MR* Box
$T = (\text{offset wale total mass ka mg})$

$T_B = 200N$

$T = 100N$

(15)



$T_A = 90N$

$T_B = 150N$

10m ⟶ 10kg

1m ⟶ $\frac{10}{10}$ kg

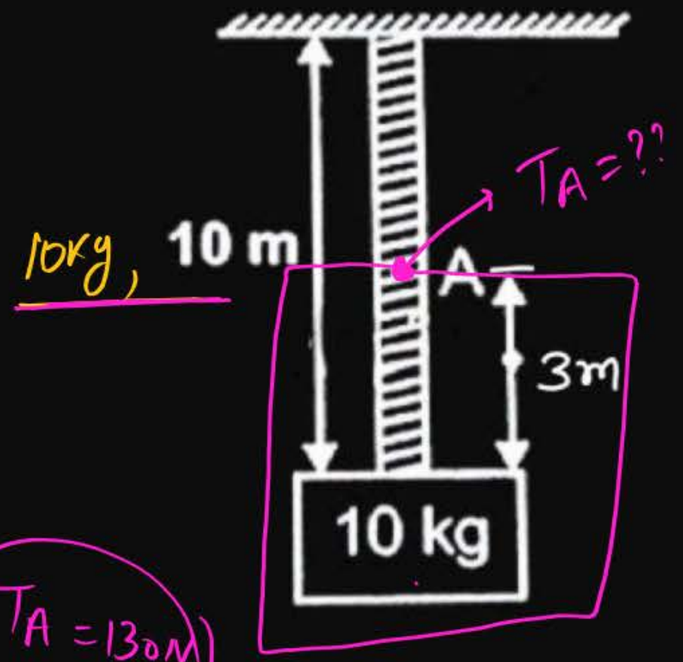
4m ⟶ $\frac{10}{10} \times 4$ kg (4kg)

Question 15

B

The adjoining figure shows a block of mass 10 kg connected to free end of a rope of mass 10 kg and length 10 m. The tension of the rope at point A is: (g = 10 m/s^2)

1. 170 N
2. 30 N
3. 130 N
4. 70 N



Question

16 A vertical force F is applied at one end of a uniform rope of mass M and length L. Find out tension in the rope as a function of x.

1. $F + Mg$
2. $F + \frac{MgL}{x}$
3. $\frac{FL + Mgx}{L}$
4. $\frac{Fx + MgL}{L}$

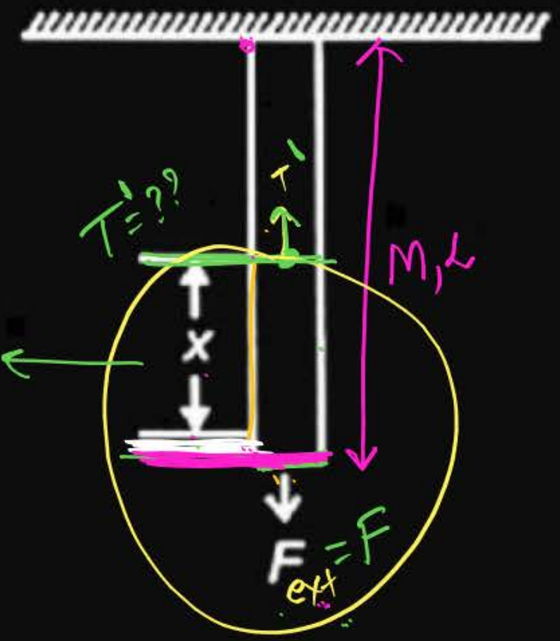
$m R^{x}$ g f $x = L$

$T_{Top} = mg + F$

$m R^{x}$

g f $x = 0$ (Bottom)

$T = F$



$m' = \frac{m}{L} x$

$$T' = \frac{m}{L} xg + F$$

$$T' = \frac{mgx + FL}{L}$$

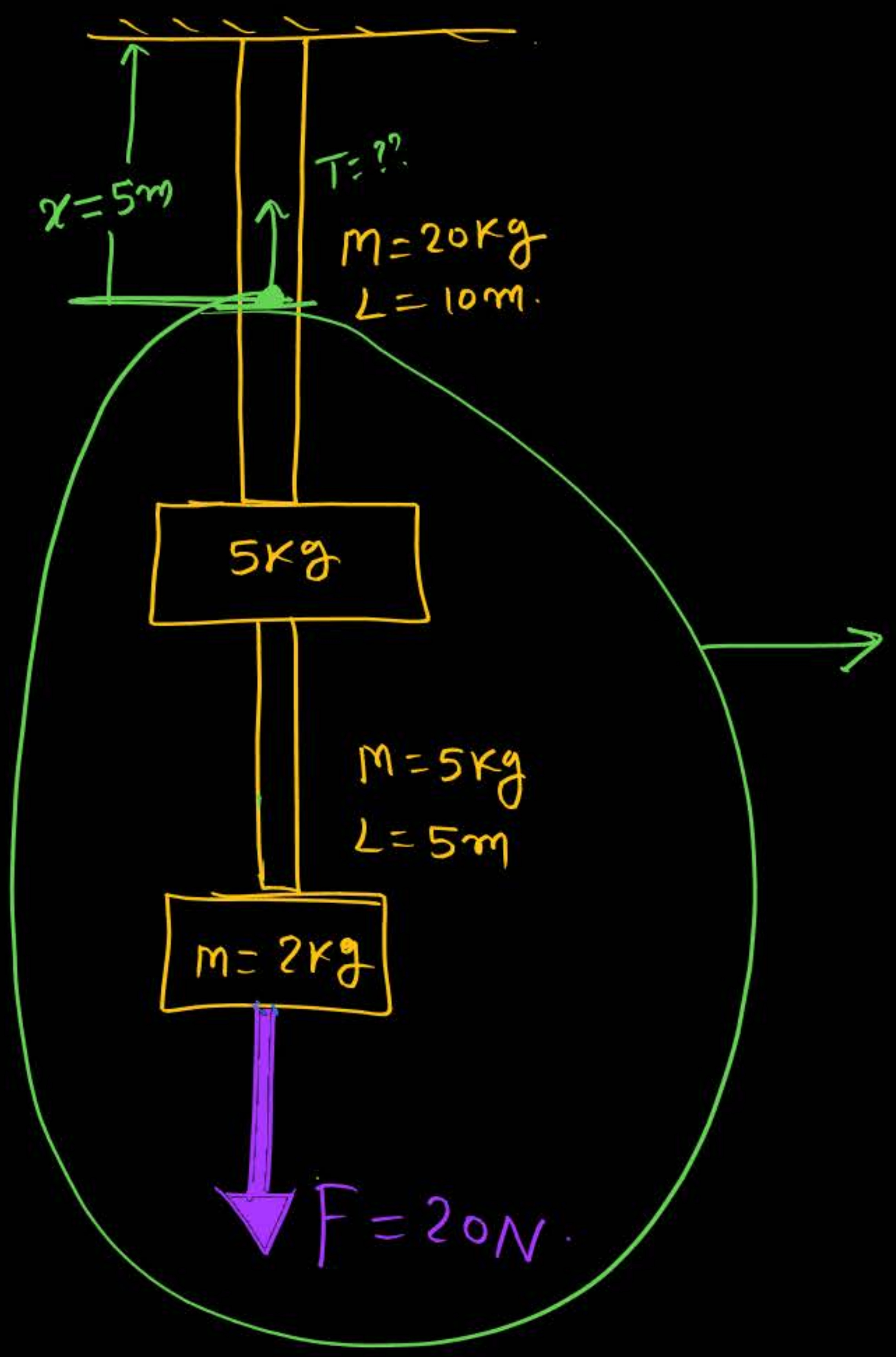
$L \longrightarrow M$

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

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

**MI

(17)



T = नीचे wali take from

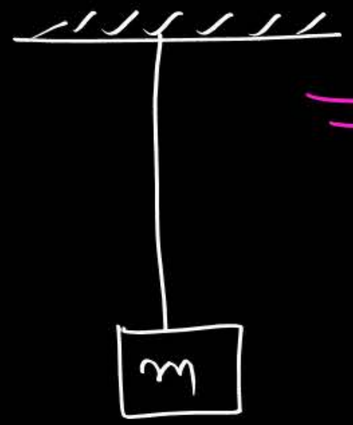
$m_{total} = (10 + 5 + 5 + 2) = 22\,kg$

$T' = mg + F$

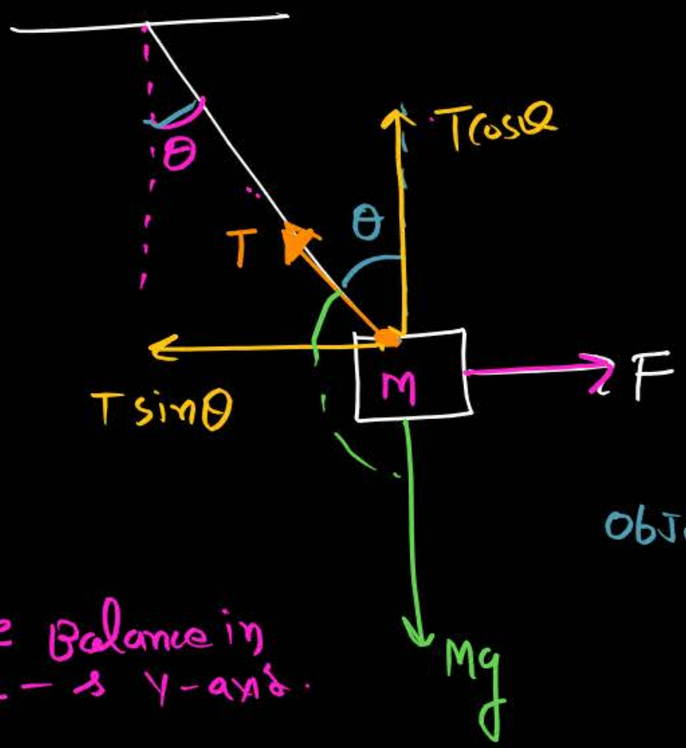
$= 22 \times 10 + 20$

$T' = 240\,N$

(18)



find $\theta = ?$



Sol^n

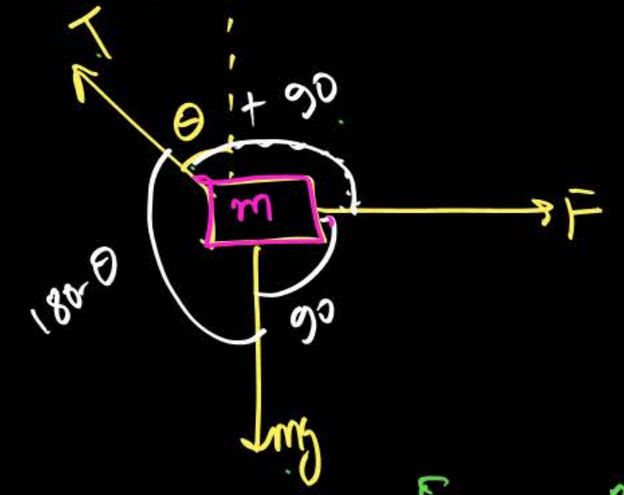
force Balance in $x-$ & $y-$ axis.

$$T\sin\theta = F$$

$$T\cos\theta = mg$$

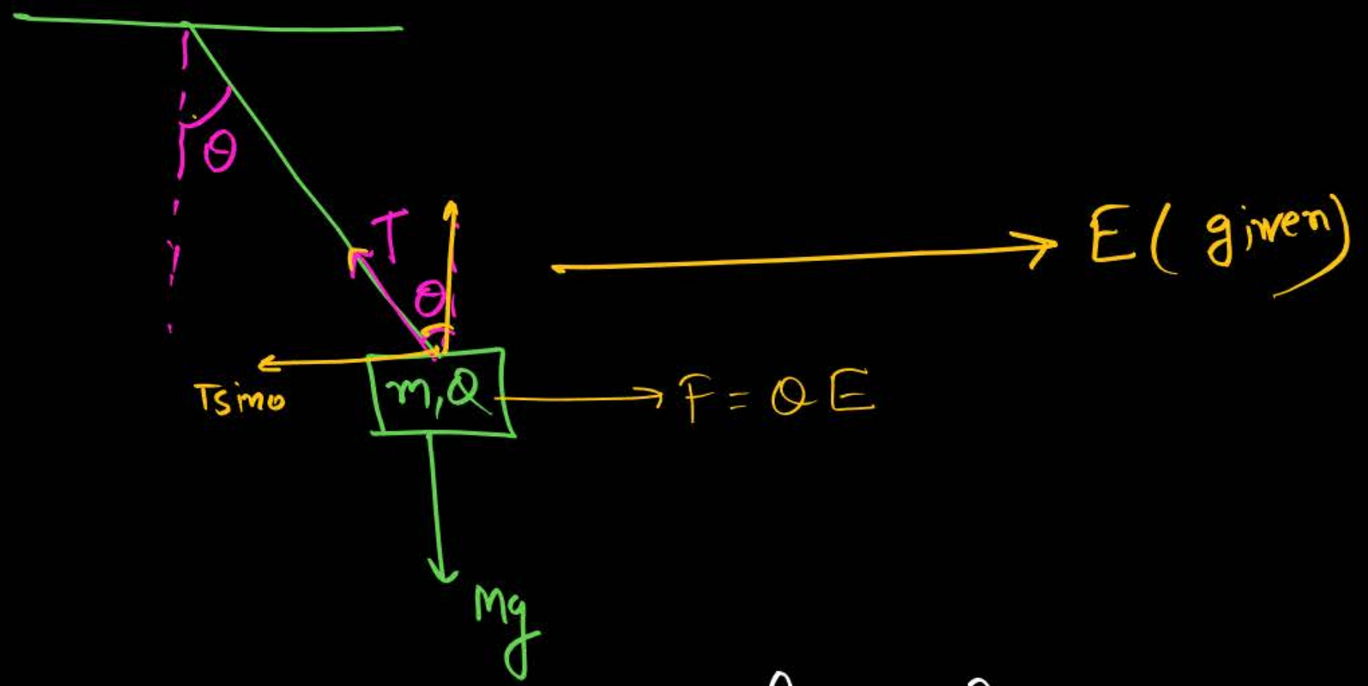
$$\# \boxed{\tan\theta = \frac{F}{mg}}$$

object is in equilibrium (rest)



$$\frac{F}{\sin(180-\theta)} = \frac{mg}{\sin(\theta+90)} = \frac{T}{\sin 90}$$

(19)



equilibrium में है

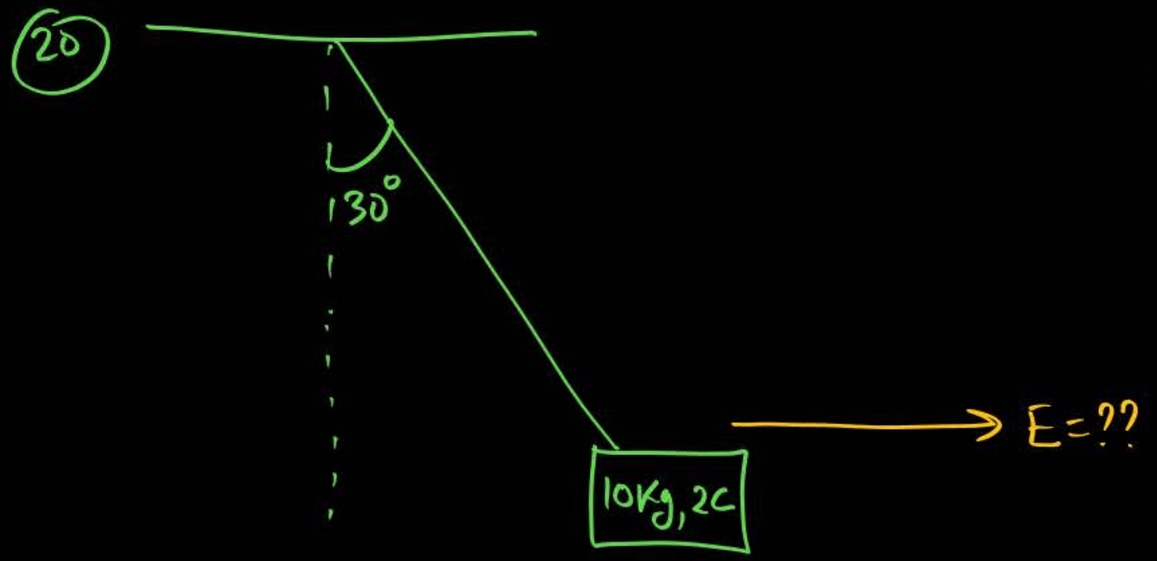
$$T\sin\theta = QE$$

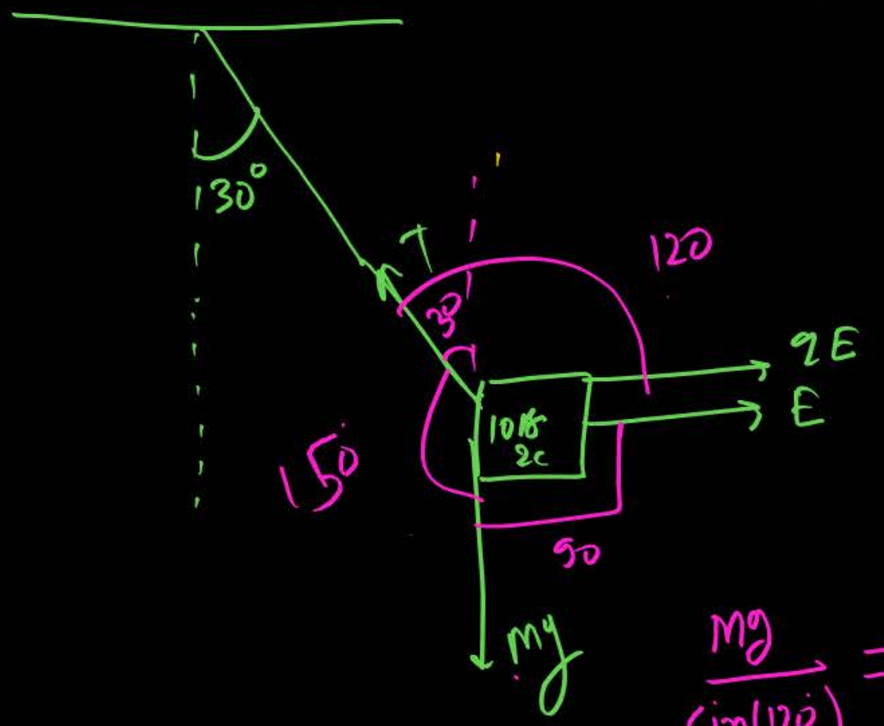
$$T\cos\theta = mg$$

$$\tan\theta = \frac{QE}{mg}$$

Ans

Find electric field if object is in equilibrium ??

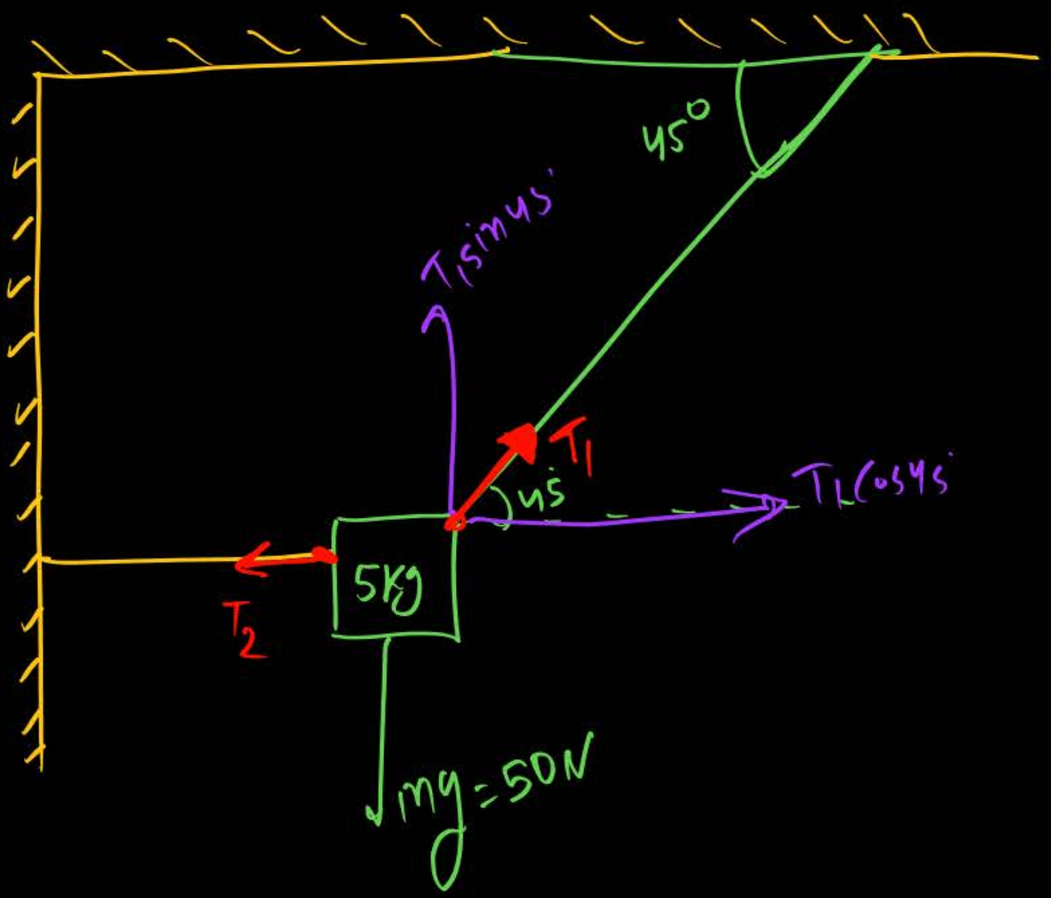




$$\frac{mg}{\sin(120)} = \frac{qE}{\sin(150)}$$

$$E = \frac{50}{\sqrt{3}}\ N/C$$

(21)



find T_1 & T_2

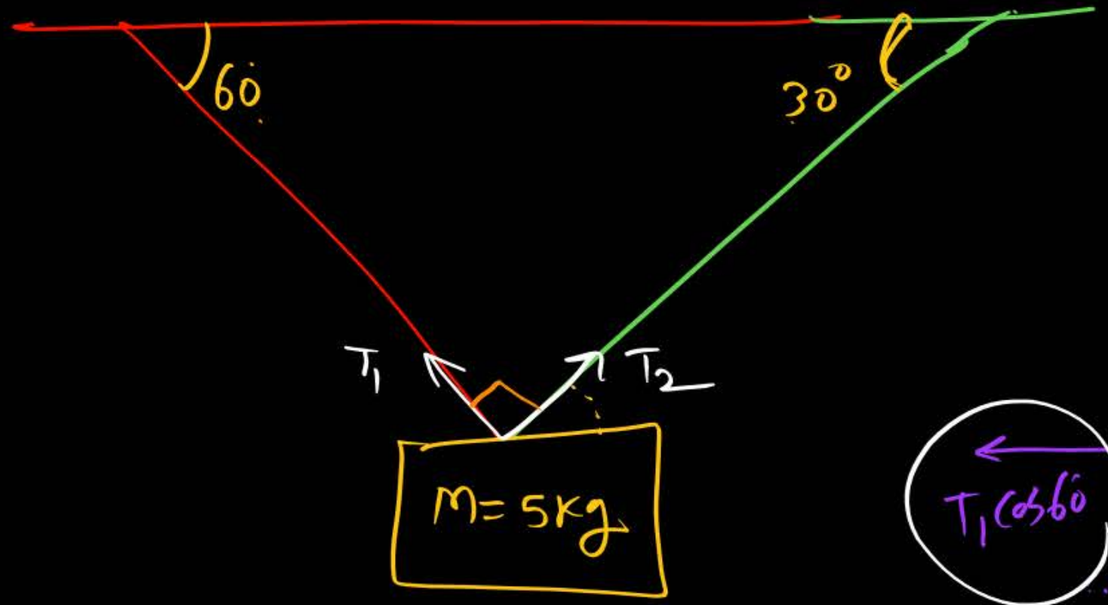
$T_1 \times \sin 45° = 50$

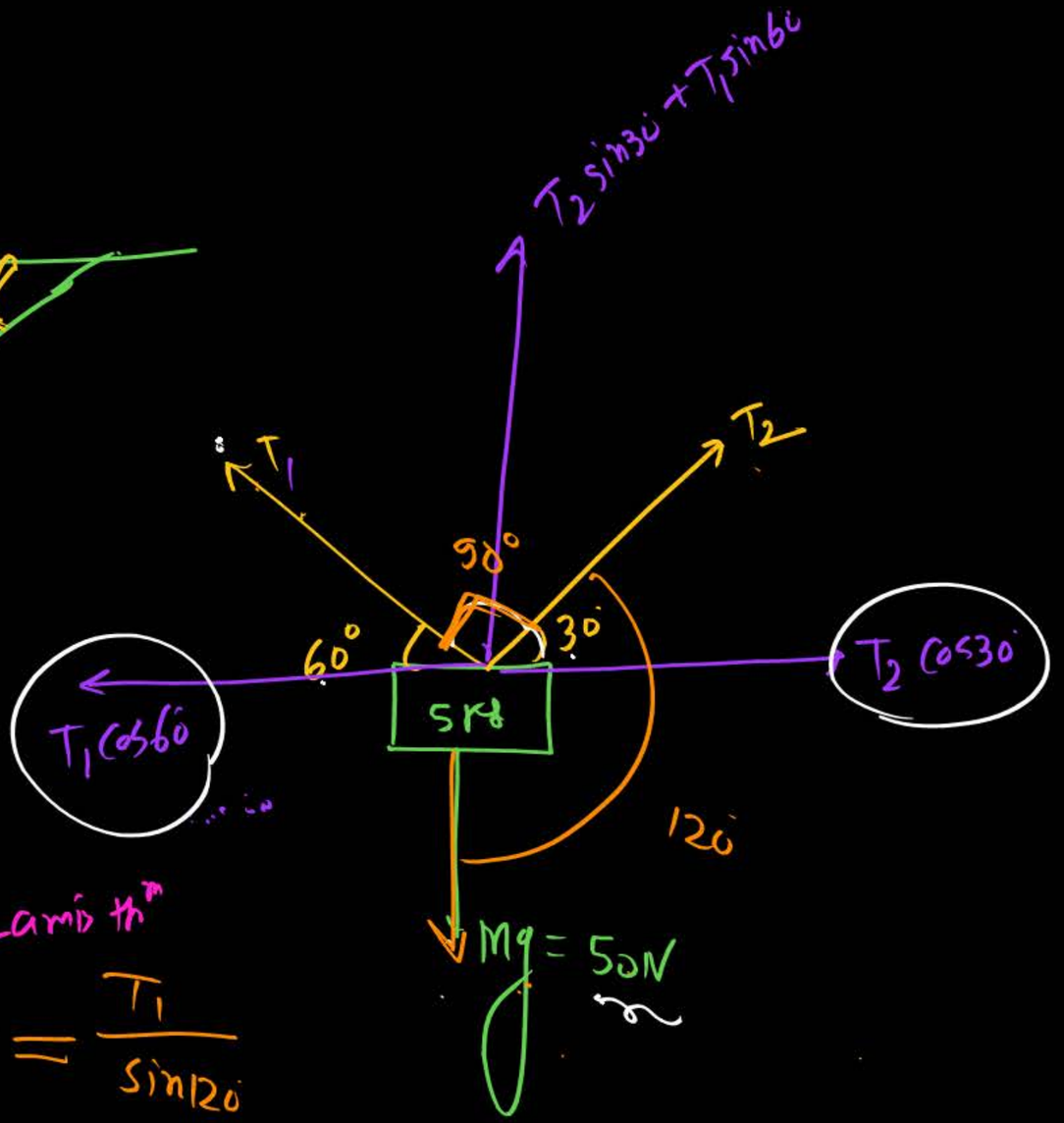
$T_1 = 50\sqrt{2}\ N$

$T_2 = T_1 \cos 45° = 50\sqrt{2} \times \frac{1}{\sqrt{2}}$

$= 50N$

(22)





Lami's th^m

$$\frac{50}{\sin 90^\circ} = \frac{T_1}{\sin 120^\circ}$$

$$\frac{50}{1} = \frac{T_1}{\frac{\sqrt{3}}{2}}$$

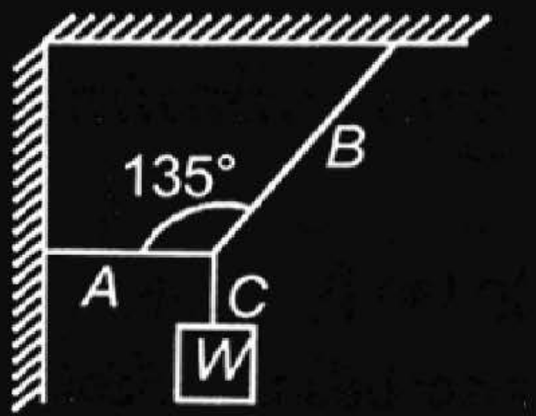
$$T_1 = 50 \times \frac{\sqrt{3}}{2}$$

$$\boxed{T_1 = 25\sqrt{3}}$$

Question 23

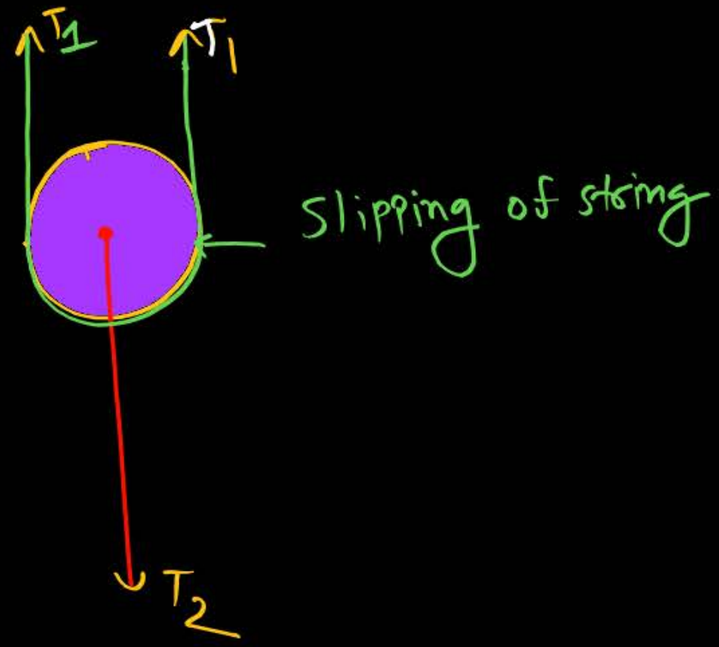
A block of weight W is supported by three strings as shown in figure. Which of the following relations is true for tension in the strings? (Here T_1, T_2 and T_3 are the tension in the strings A, B and C respectively)

1. $T_1 = T_2$
2. $T_1 = T_3$
3. $T_2 = T_3$
4. $T_1 = T_2 = T_3$



Pulley

→ Ideal Pully → massless & friction less in N.L.M.

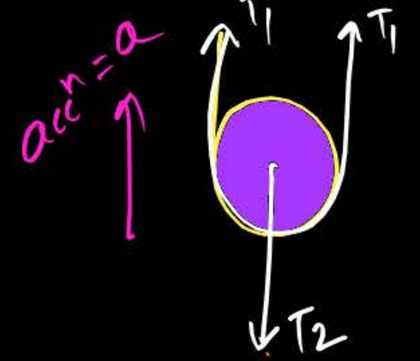


(1) Pulley at rest or moving with const velocity

$F_{net} = 0$

$2T_1 = T_2$

(1) If Pulley is accelerating

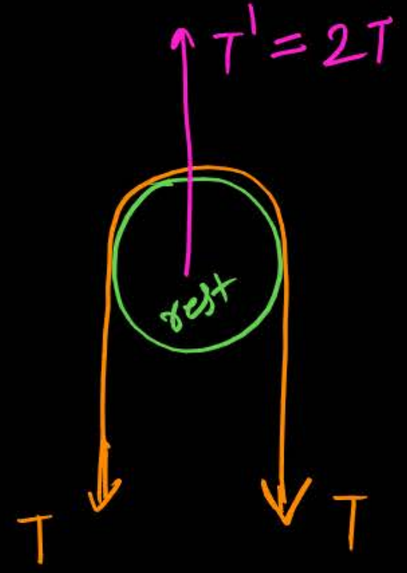


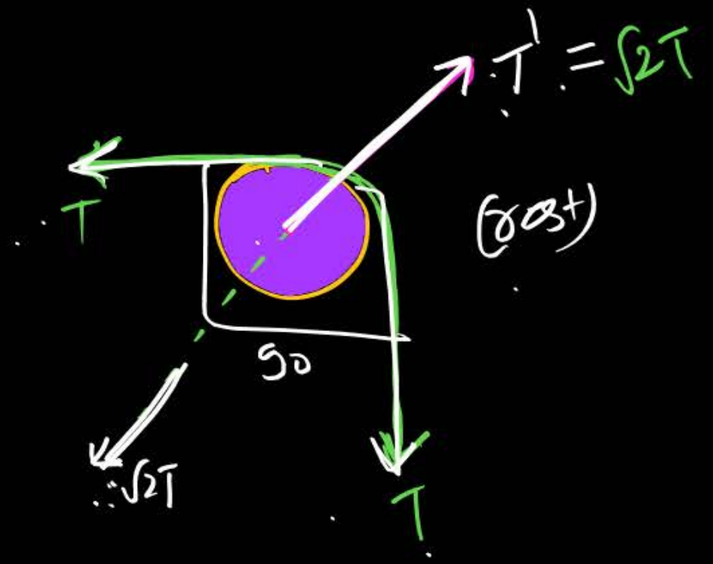
$F_{net} = m_{pulley} \cdot a$

$F_{net} = 0$

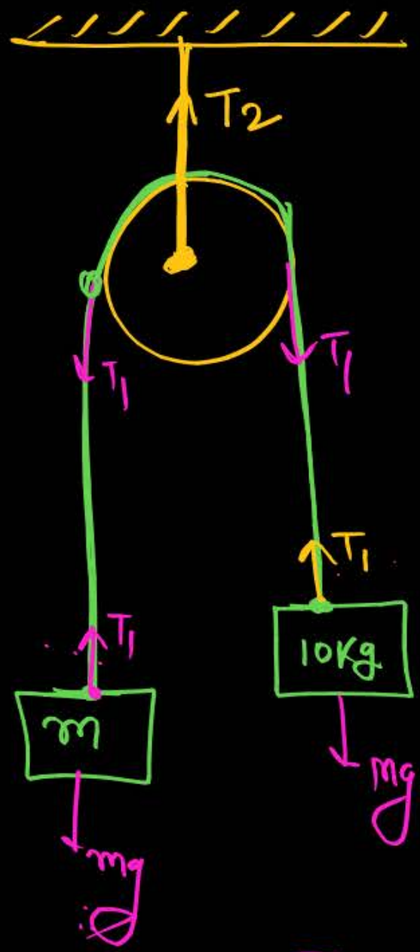
$2T_1 = T_2$

$2T_1 > T_2$ ✗


$T' = 2T$
rest
T
T


$T' = \sqrt{2}T$
T
(acc)
90
$\sqrt{2}T$
T

(24)



If system is in equilibrium then find T_1, T_2 & m = ??

$T_2 = 2T_1$

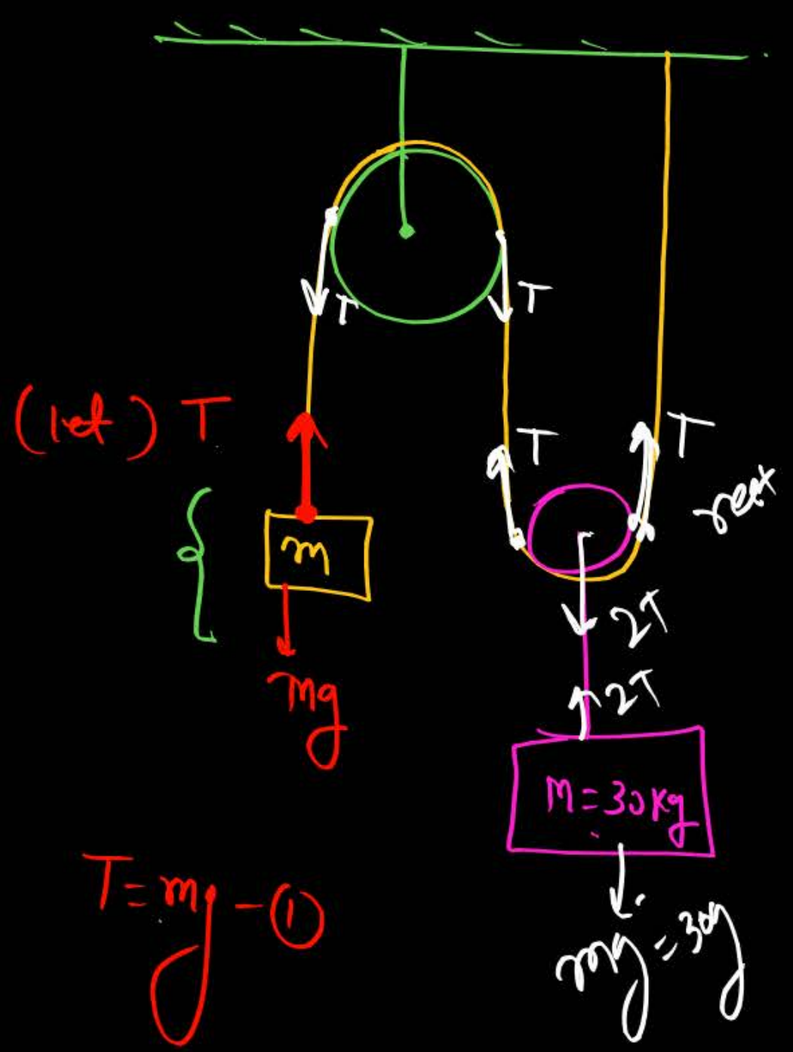
$= 2 \times 100 = 200N$

$T_1 = 10g = 100N$

$T_1 = 10g = mg$

$m = 10kg$

(25)



$T = mg$ — ①

$T = 15 \times 10 = 150N$

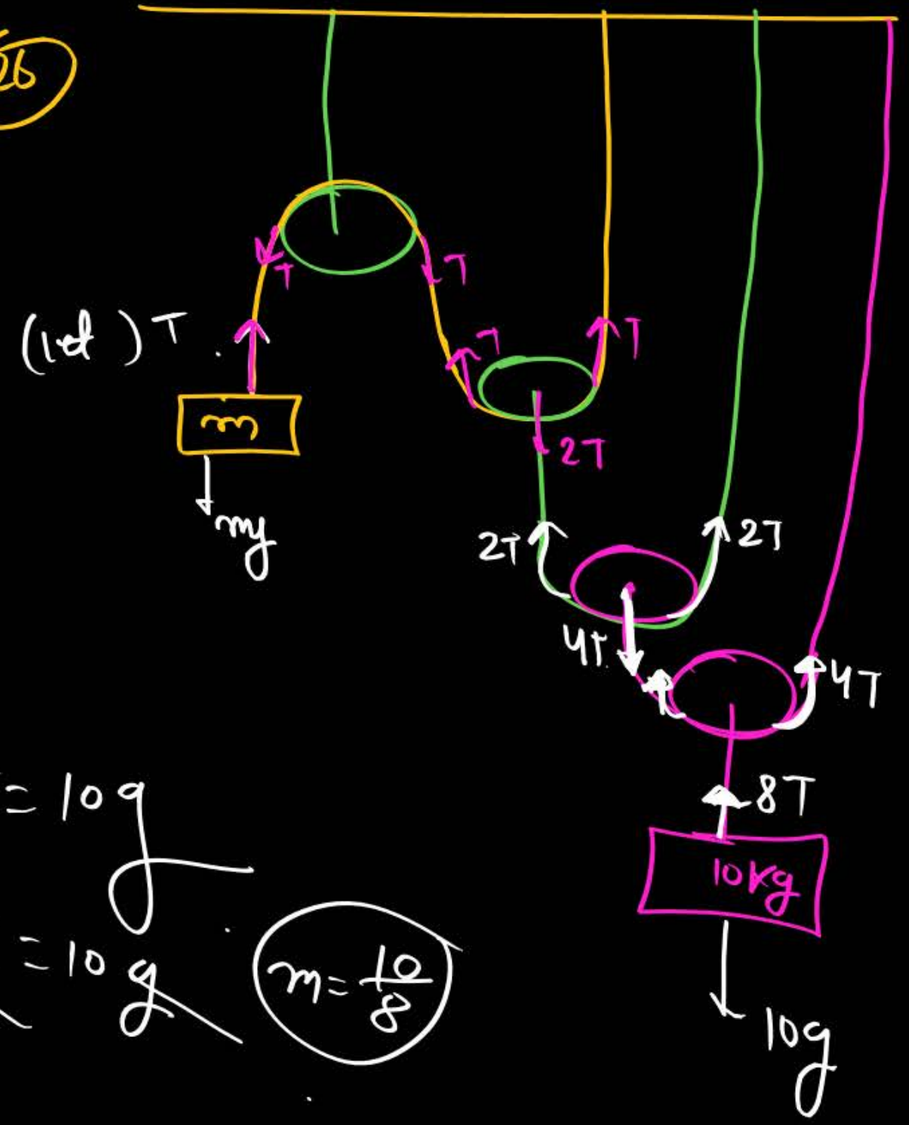
If system is in equilibrium then find m & Tension is each string.

$2T = 30g$

$2(mg) = 30g$

$m = 15kg$

(26)

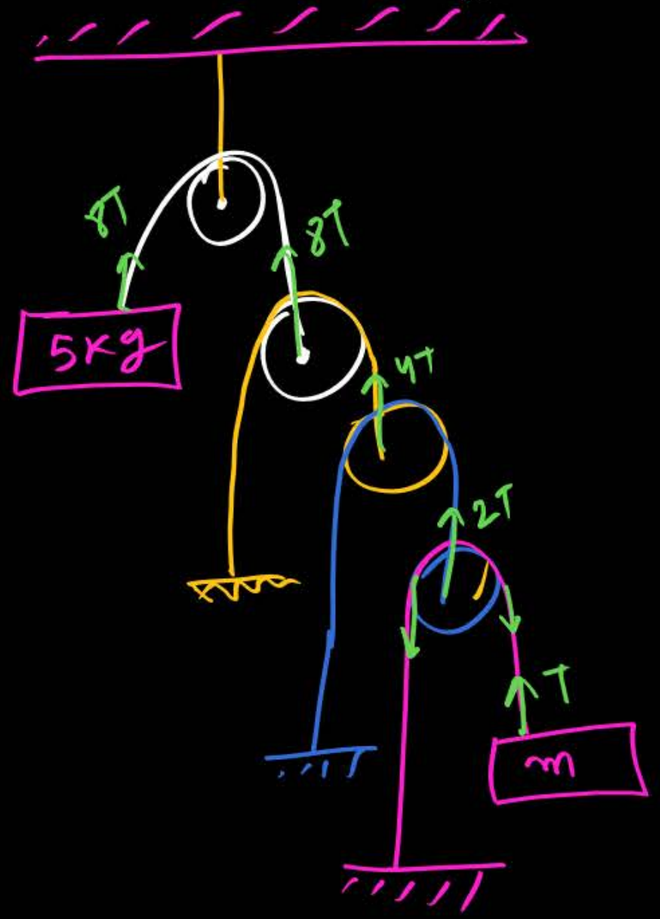


$8T = 10g$

$8mg = 10g$

$m = \frac{10}{8}$

(27) find (m) so that system is in equilibrium



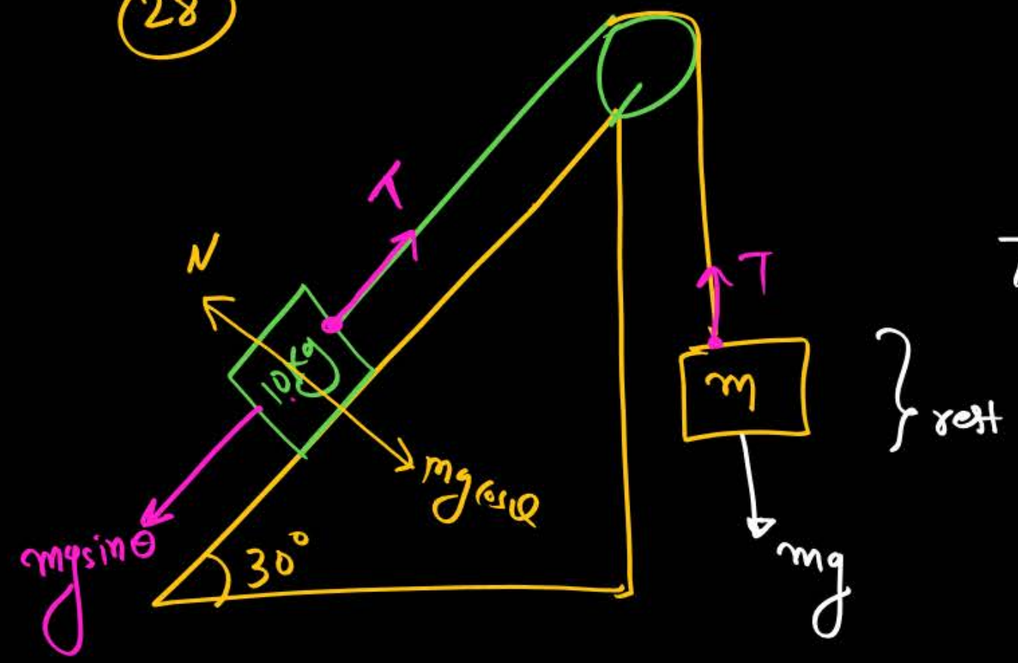
$8T = 5g$

$8mg = 5g$

$m = \frac{5}{8}$ kg

find m so that system is at rest ??

(28)



} rest

$T = mg \quad -①$

$mg = 5g$

$m = 5kg$

along Inclined plane.

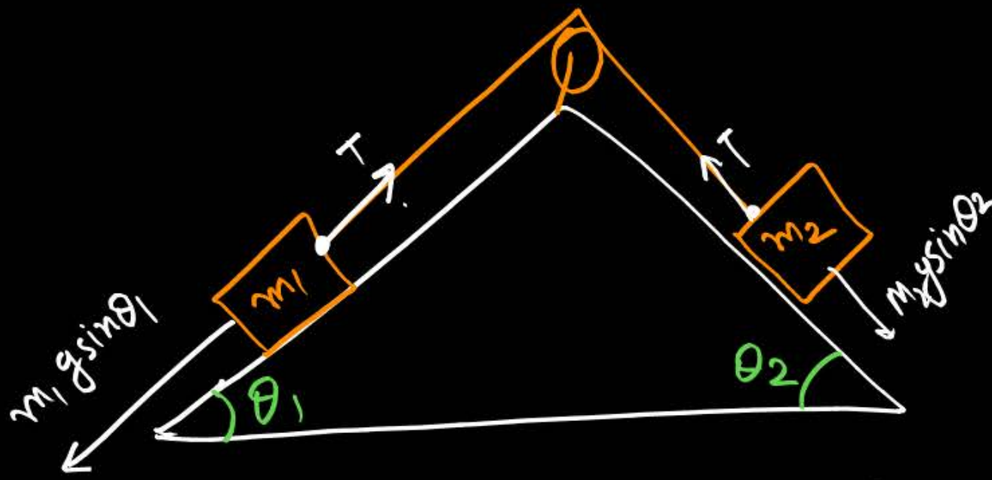
$T = mg\sin\theta$

$= 10 \times g \sin 30$

$= 5g \quad -②$

M/W

(29)

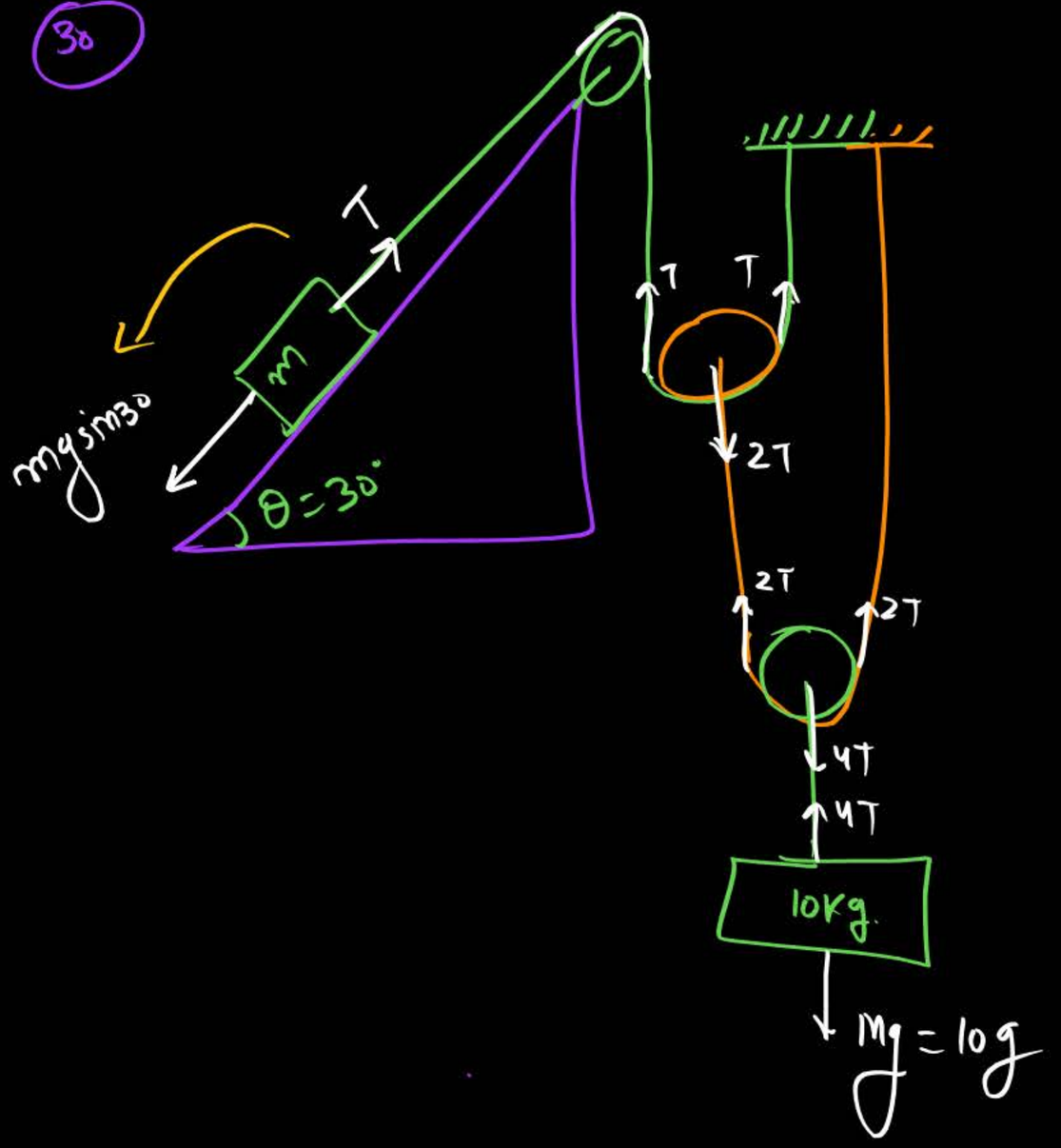


$T = m_1 g\sin\theta_1 = m_2 g \sin\theta_2$

$m_1 \sin\theta_1 = m_2 \sin\theta_2$

find m so that object is in equilibrium.

30



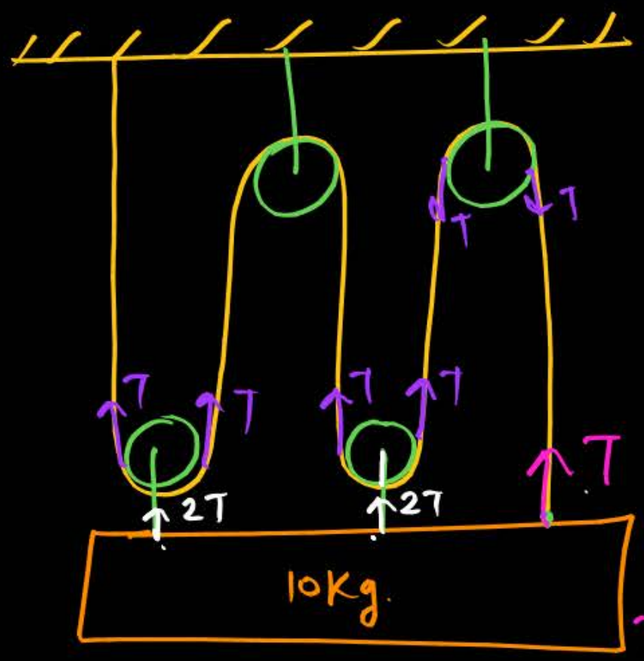
$4T = 10g$ — (1)

$4[mg\sin 30^\circ] = 10g$

$2mg = 10g$

$m = 5kg$

(31)

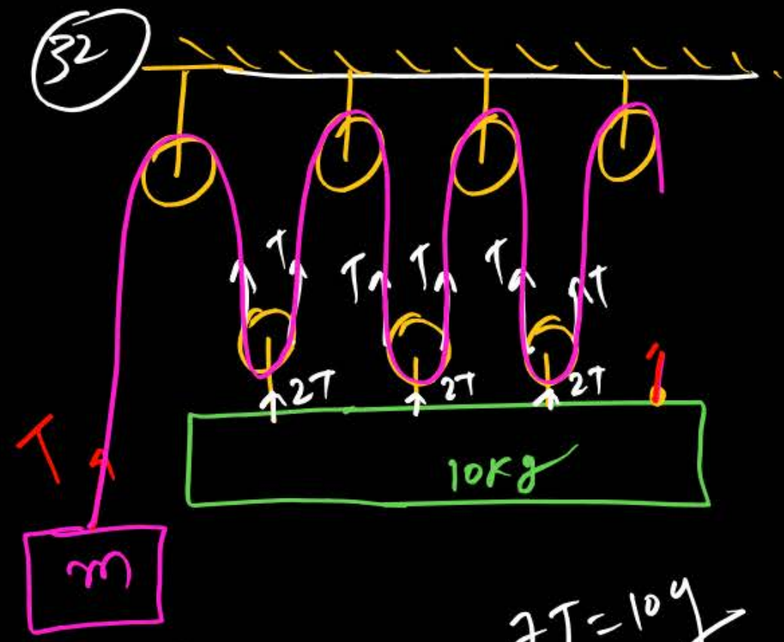


$5T = 10g$

$T = 2 \times 10$

$T = 20N$

(32)



$7T = 10g$

$7(mg) = 10g$

$m = \frac{10}{7}$ kg

Question

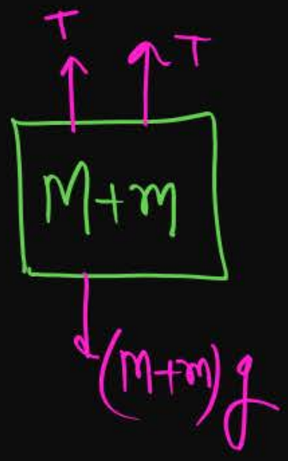
A man of mass m stands on a frame of mass M. He pulls a light rope, which passes over a pulley. The other end of the rope is attached to the frame. For the system to be rest, what force must the man exert on the rope?

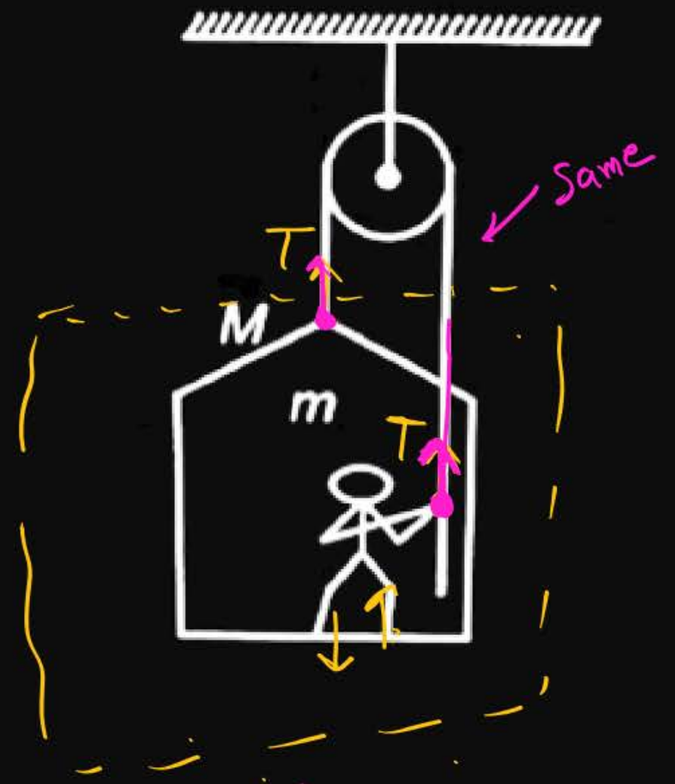
1. $\frac{(M + m)g}{2}$
2. $(M + m)\, g$
3. $(M - m)\, g$
4. $(M + 2m)\, g$

$2T = (m+M)g$

$T = \left(\frac{M+m}{2}\right)g$

Man + fram ka Combine FBD

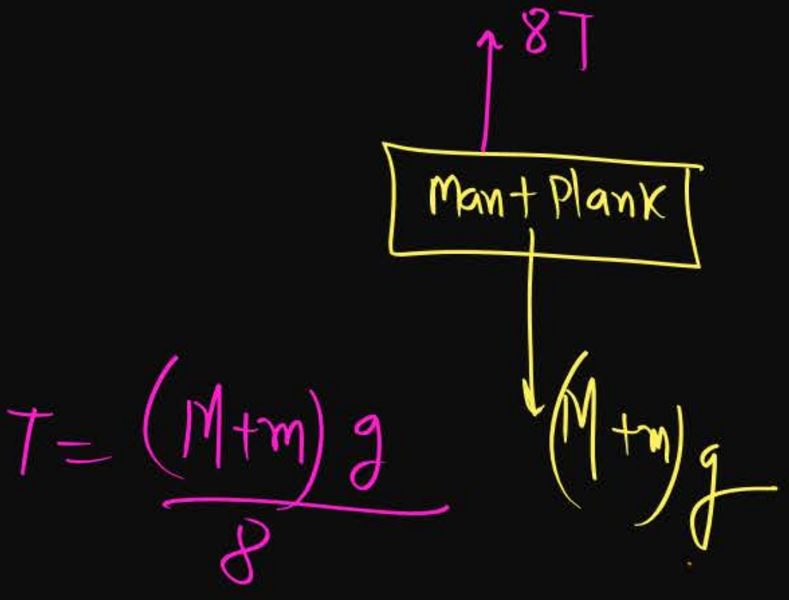




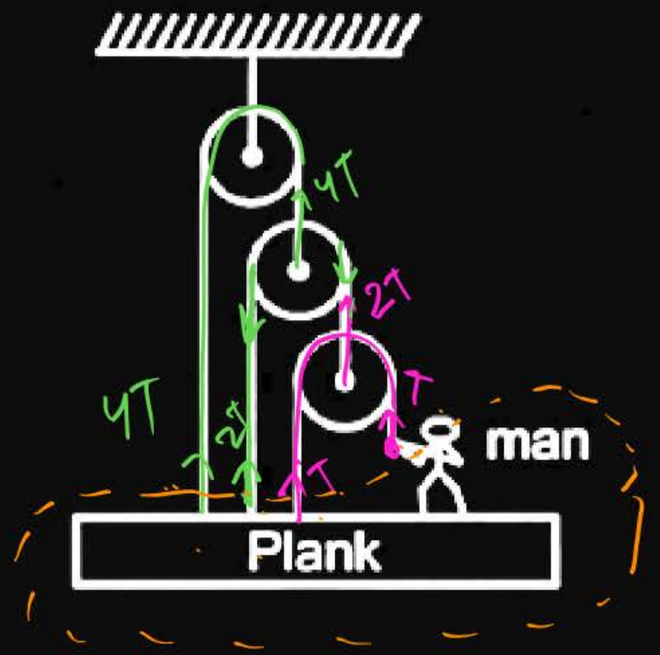
Question

A man (mass m) hold himself and plank (mass M) in equilibrium with the help of 3 pulley + string system. The force exerted by man upon rope is

1. $\frac{(M+m)g}{7}$
2. $\frac{(M+m)g}{8}$
3. $\frac{(M+m)g}{6}$
4. $\frac{(M+m)g}{5}$



$$T = \frac{(M+m)g}{8}$$



Question (HW) लिखना नहीं है

A uniform rope of mass M and length L is fixed at its upper end vertically from a rigid support. Then the tension in the rope at the distance I from the rigid support is

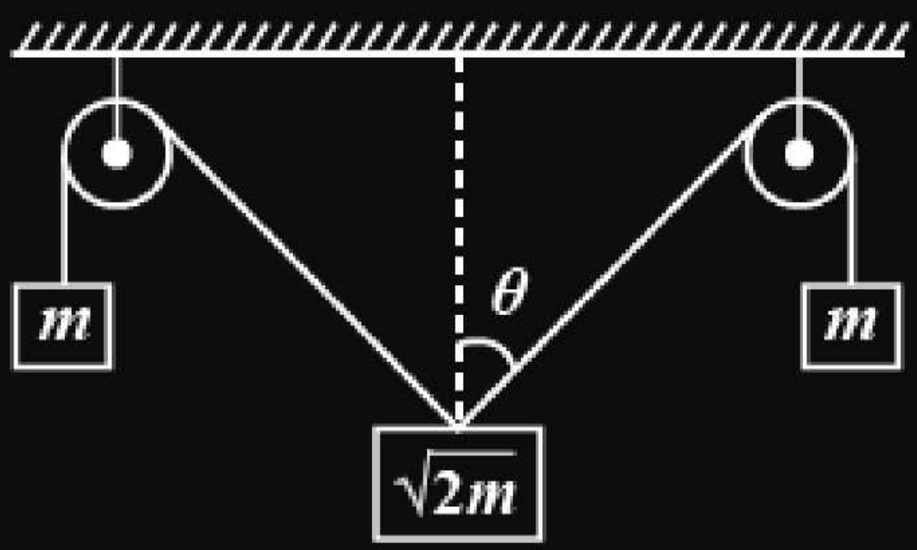
1. $\mathrm{Mg}\dfrac{L}{L+I}$
2. $\dfrac{\mathrm{M}g}{L}(\mathrm{L}-\mathrm{I})$
3. $\mathrm{M}g$
4. $\dfrac{L}{L}\mathrm{M}g$

Question

H/W लिखना नहीं है।

The pulleys and strings shown in the figure are smooth and of negligible mass. For the system to remain in equilibrium, the angle θ should be **(2001, 2M)**

1. 0°
2. 30°
3. 45°
4. 60°



Question H/W लिखना नहीं है

A mass of 10 kg is suspended vertically by a rope from the roof. When a horizontal force is applied on the mass, the rope deviated at an angle of 45° at the roof point. If the suspended mass is at equilibrium, the magnitude of the force applied is
(Take, $g = 10\ ms^{-2}$)

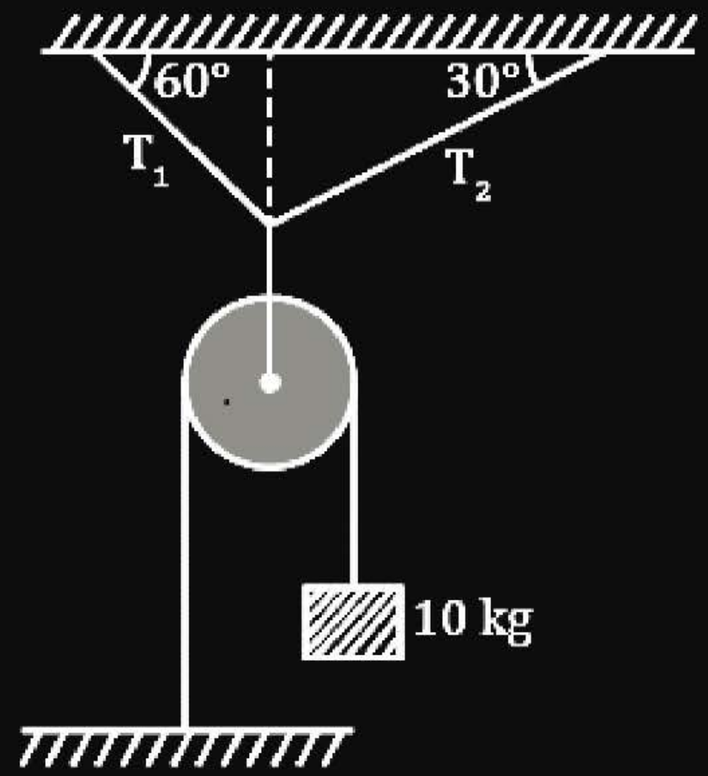
(2019 Main, 9 Jan II)

1. 70 N
2. 200 N
3. 100 N
4. 140 N

Question H/w लिखना नहीं है

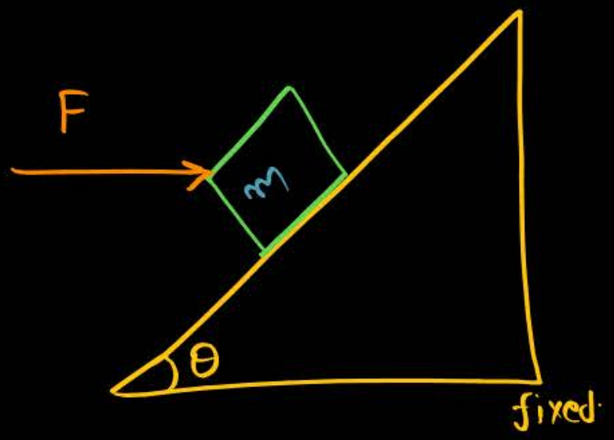
In the arrangement as shown, tension T_2 is ($g = 10\ \text{m/s}^2$)

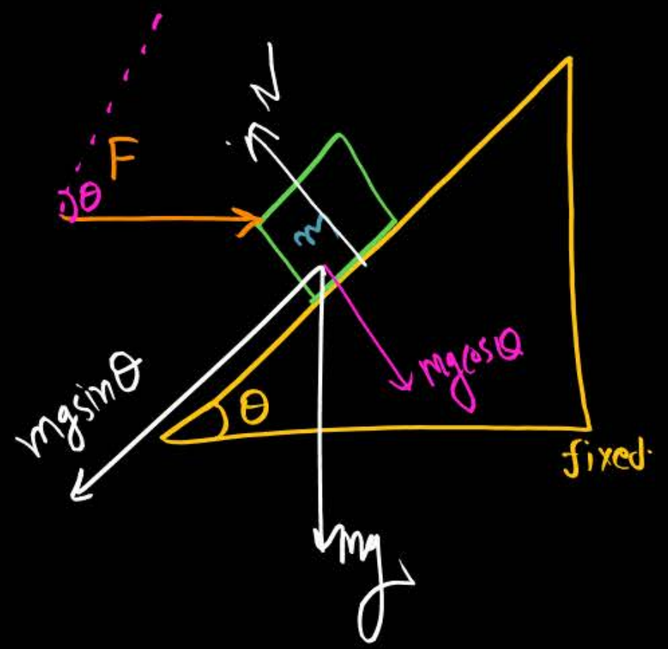
1. 50 N
2. 100 N
3. $50\sqrt{3}$ N
4. $100\sqrt{3}$ N



H/W लिखना है

find F so that block will be in equilibrium.





THANK YOU