

# YAKEEN NEET 2.0

**2026**

**Laws of Motion**

**Physics**

**Lecture –**

**8**

**By– Manish Raj (MR Sir)**





## Topics to be covered

1 # Rod constrain, wedge constrain.

2 Pseudo force

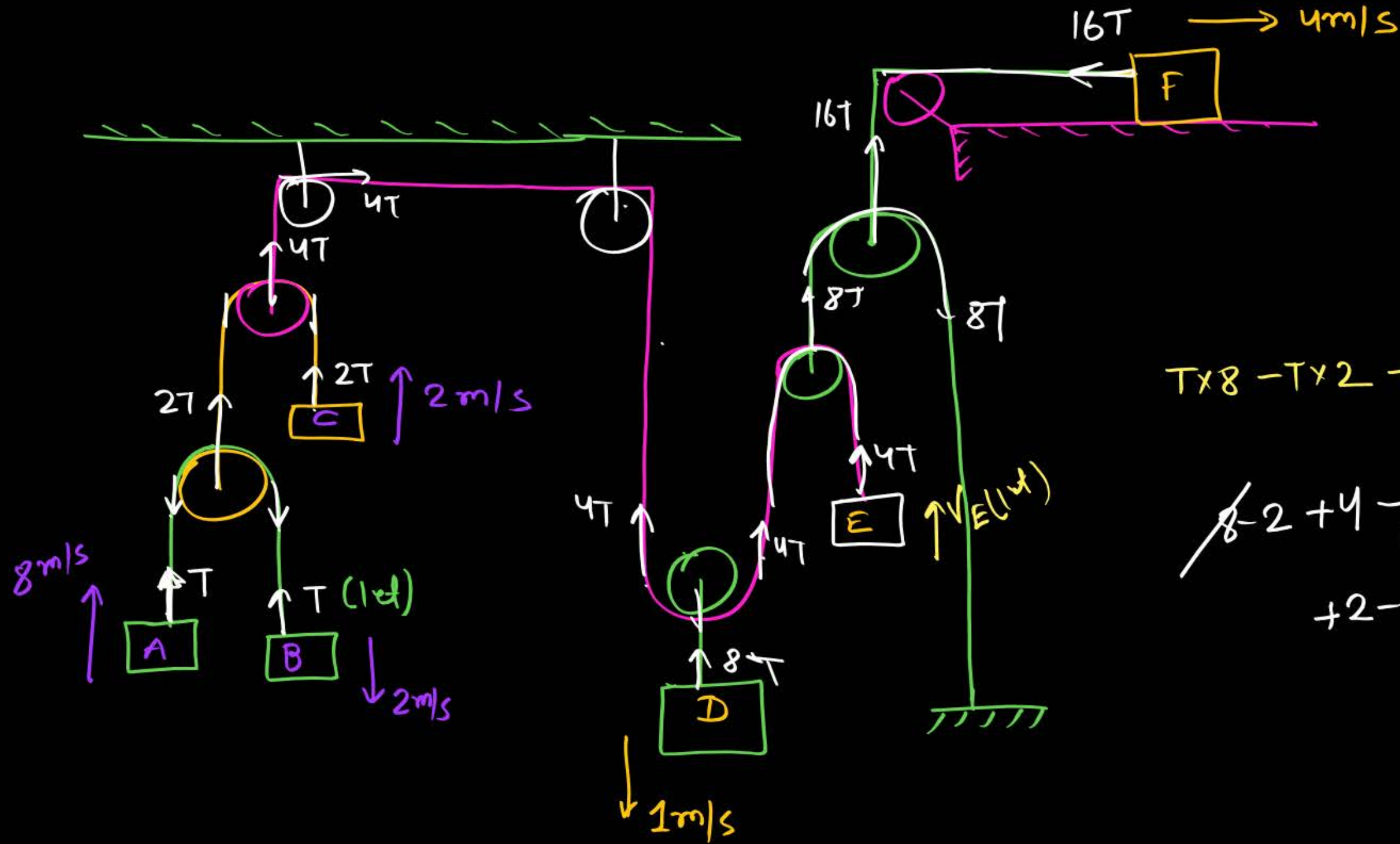
3

4



Q find velocity of 'E'

$V_E = ??$



$$T \times 8 - T \times 2 + 2T \times 2 - 8T \times 1 + 4TV_E - 16T \times 4 = 0$$

$$\cancel{8} - 2 + 4 - \cancel{8} + 4V_E - 64 = 0$$

$$+2 - 64 + 4V_E = 0$$

$$4V_E = +62$$

$$V_E = +\frac{62}{4} = +\frac{31}{2} \text{ m/s}$$

$\rightarrow$  (upward)

mr\* Boy

① yaha mans ki need  
isliye nahi kyki  
muje ~~acc<sup>n</sup>~~ <sup>velocity</sup> ka relation  
likh rahe hai



## Question

H/w challenge फै एी को प्रोब<sup>m</sup> next class \*\*



In the figure shown acceleration of monkey relative to the rope if the exerts a force of 80 N on string will be:

- 1  $2 \text{ m/s}^2$  downwards
- 2  $4 \text{ m/s}^2$  upwards
- 3  $4 \text{ m/s}^2$  downwards
- 4  $8 \text{ m/s}^2$  downwards

For monkey

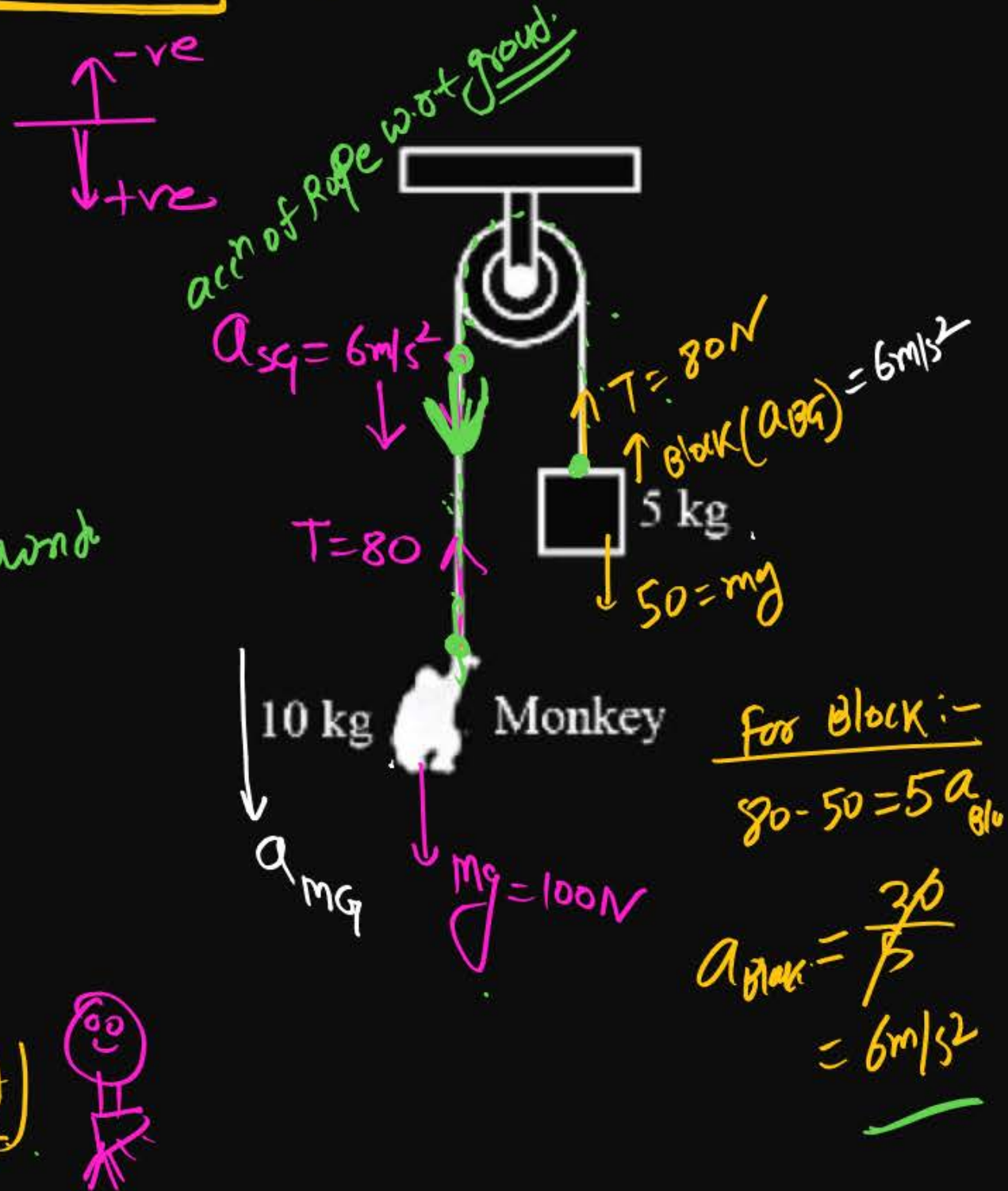
$$100 - 80 = 10 a_{mg}$$

$$20 = 10 a_{mg}$$

$$a_{mg} = 2 \text{ m/s}^2 \text{ } \checkmark \text{ Down}$$

Block  $\rightarrow$  string fixed hai

$$\begin{aligned} \vec{a}_{m \text{ string (Rope)}} &= \vec{a}_{mg} - \vec{a}_{sq} \\ &= 2 - 6 \\ &= -4 \text{ m/s}^2 \text{ (upward)} \end{aligned}$$

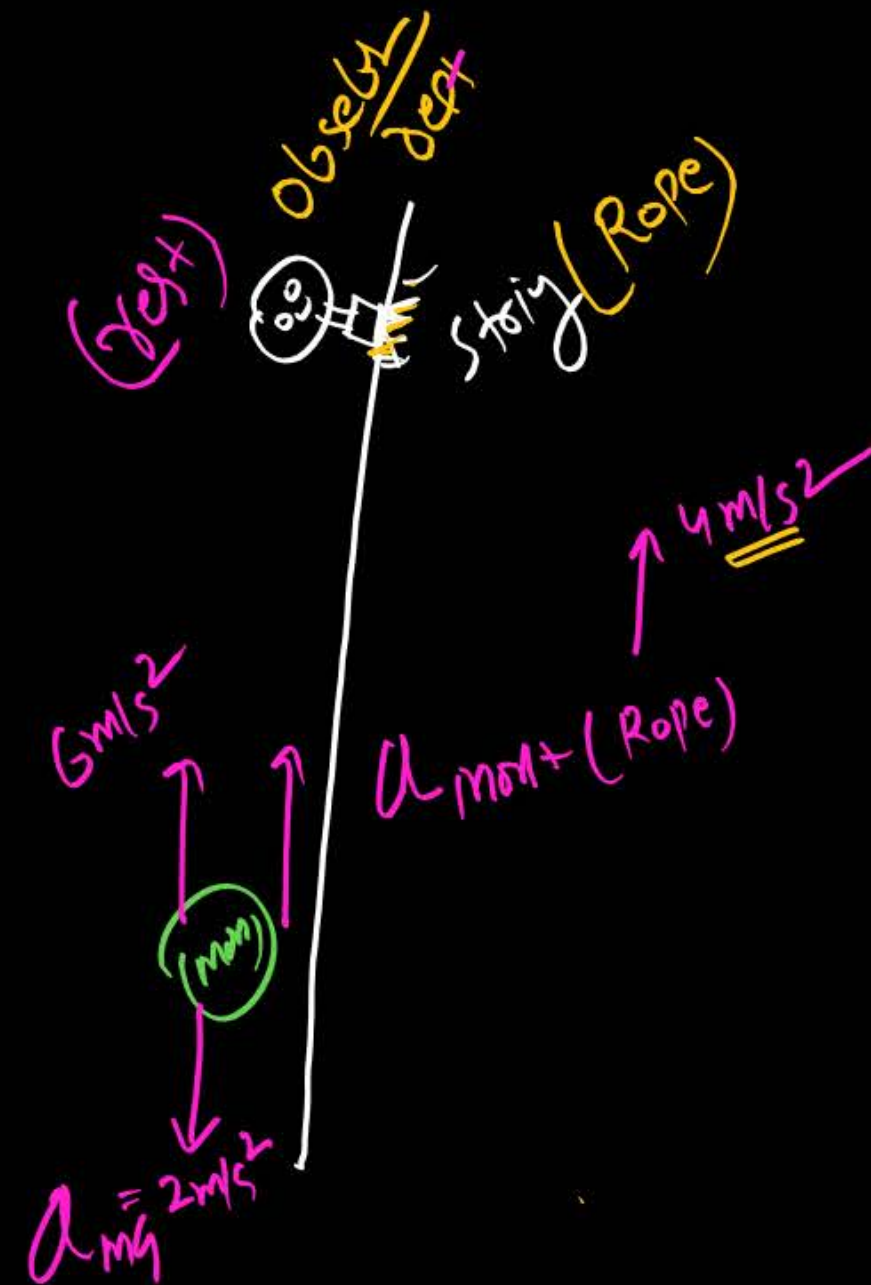
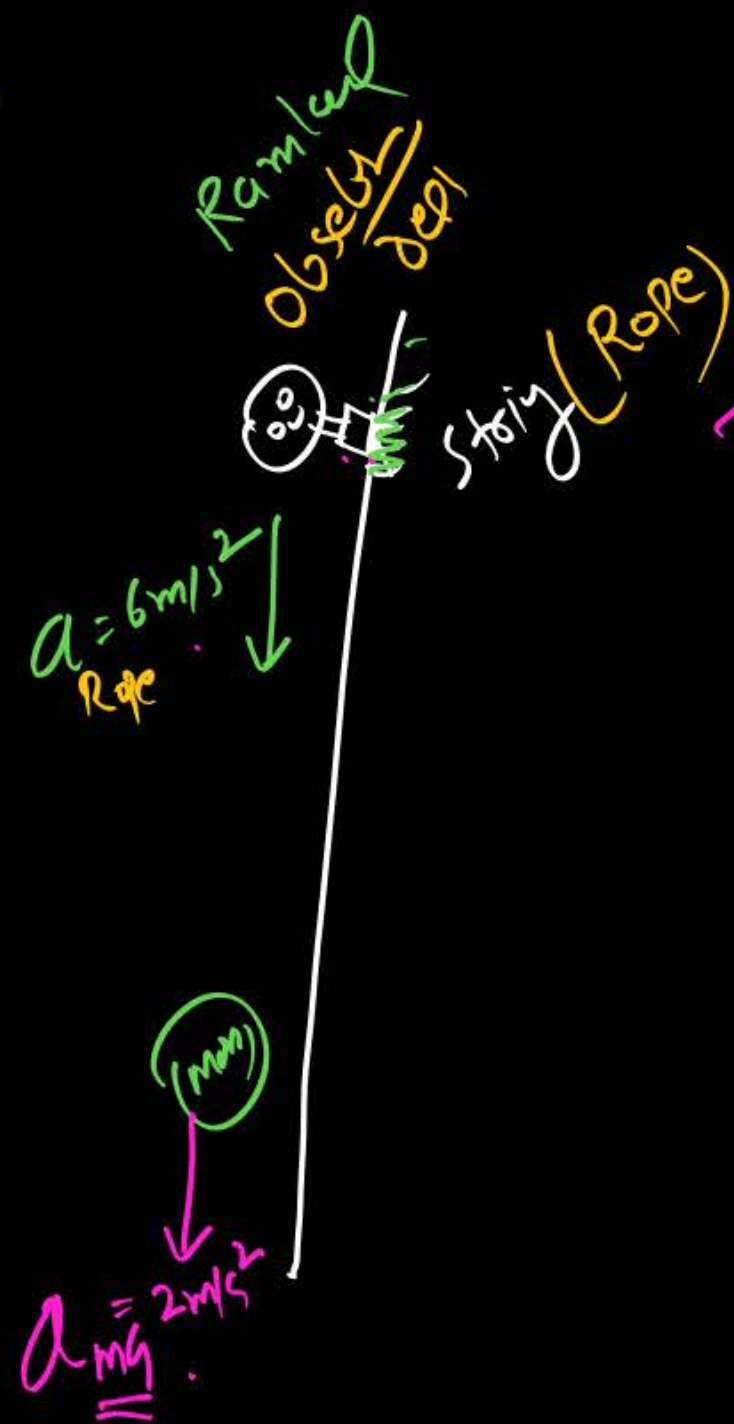


For Block:-

$$80 - 50 = 5 a_{bl}$$

$$a_{bl} = \frac{30}{5} = 6 \text{ m/s}^2$$

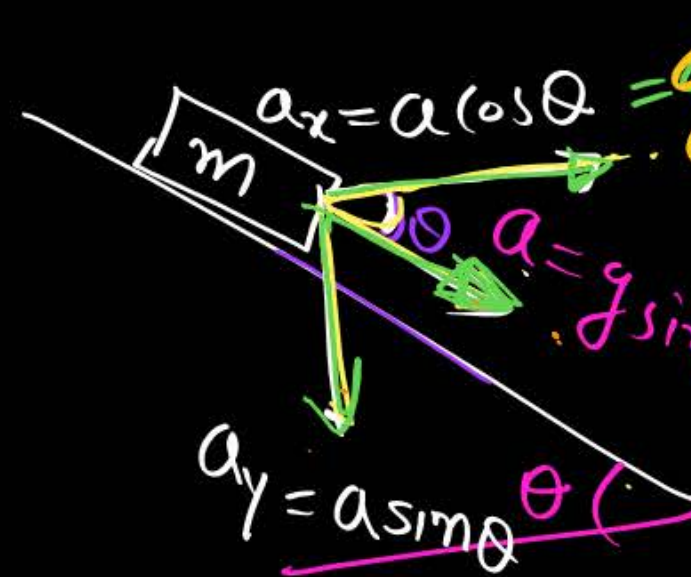
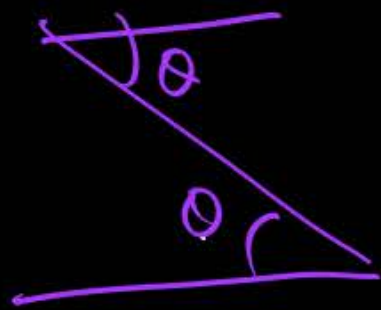
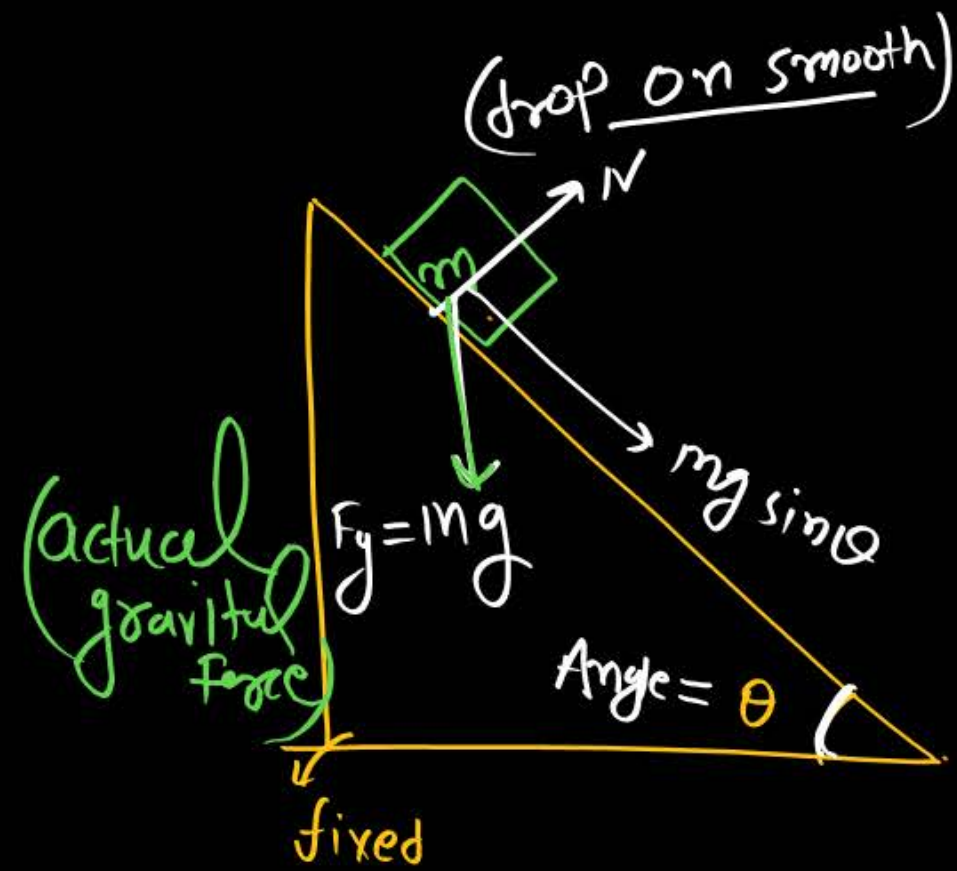
2nd method





JEE  
likho

Object is released then find its vertical acc<sup>n</sup> in (y-axis)



$$= g \sin \theta \times \sin \theta$$

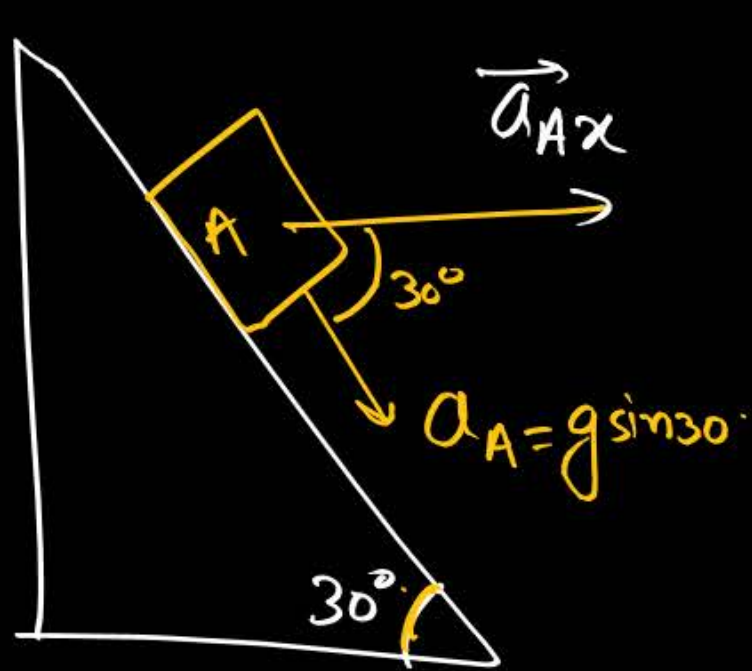
$$a_y = g \sin^2 \theta$$

(actual acceleration)  
(along Inclined plane) → Main acc<sup>n</sup>

- MR scam.
- (a)  $a_{\text{Block in vertical dir}} = 0$
- (b)  $a_{\text{Block in vertical dir}} = g$

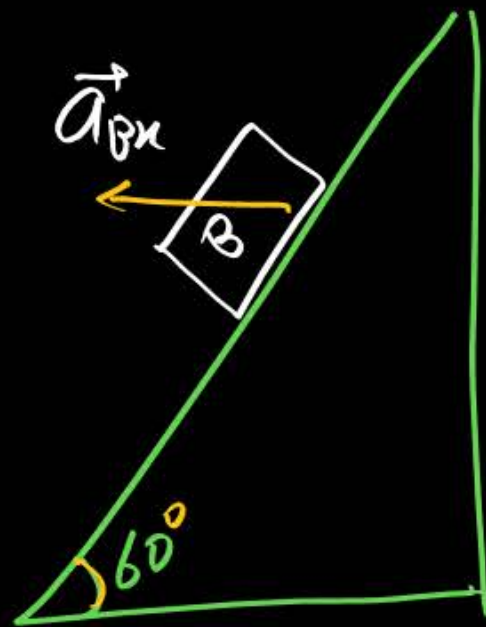
Ye Block free fall  
Nahi Kar raha  
to ac<sup>n</sup>  $g$  Nahi hogi  
vertical  $\uparrow$

Relative accn of A w.r.t B in Horizontal direction:- ✓



$$a_{Ax} = g \sin 30^\circ \cdot \cos 30^\circ$$

$$= +g \times \frac{1}{2} \times \frac{\sqrt{3}}{2}$$



$$\vec{a}_{Bx} = g \sin 60^\circ \times \cos 60^\circ$$

$$= -g \frac{\sqrt{3}}{2} \times \frac{1}{2}$$

~~(a)  $(\vec{a}_{AB})_{x\text{-axis}} = 0$~~

MR Scam (37/10)

(b)  $(\vec{a}_{AB})_{x\text{-axis}} \neq 0$

$$\vec{a}_{AB} = \vec{a}_A - \vec{a}_B$$

$$= \frac{g\sqrt{3}}{4} - \left(-\frac{\sqrt{3}g}{4}\right)$$

$$= \frac{2\sqrt{3}g}{4} = \frac{\sqrt{3}g}{2}$$



CH

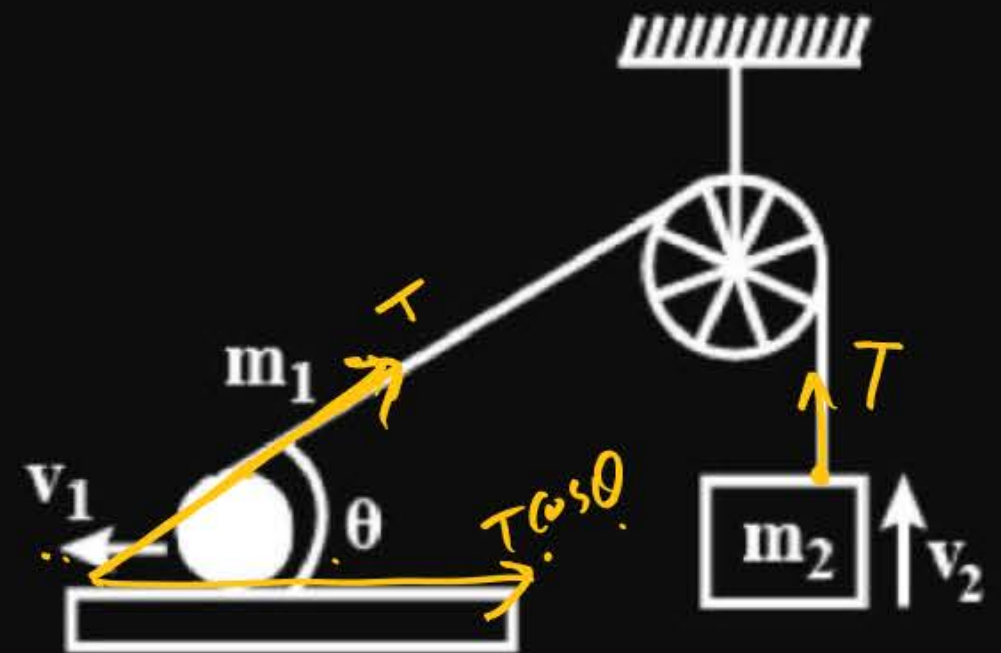
In figure, a ball of mass  $m_1$  and a block of mass  $m_2$  are joined together with an inextensible string. The ball can slide on a smooth horizontal surface. If  $v_1$  and  $v_2$  are the respective speeds of the ball and the block, Find  $\frac{v_1}{v_2}$ .

1  $\cos \theta$

2  $\sec \theta$  ✓

3  $\tan \theta$

4  $\sin \theta$



$$-v_1 T \cos \theta + T v_2 = 0$$

$$v_1 \cancel{T} \cos \theta = \cancel{T} v_2$$

$$\frac{v_1}{v_2} = \frac{1}{\cos \theta} = \sec \theta \quad \checkmark$$



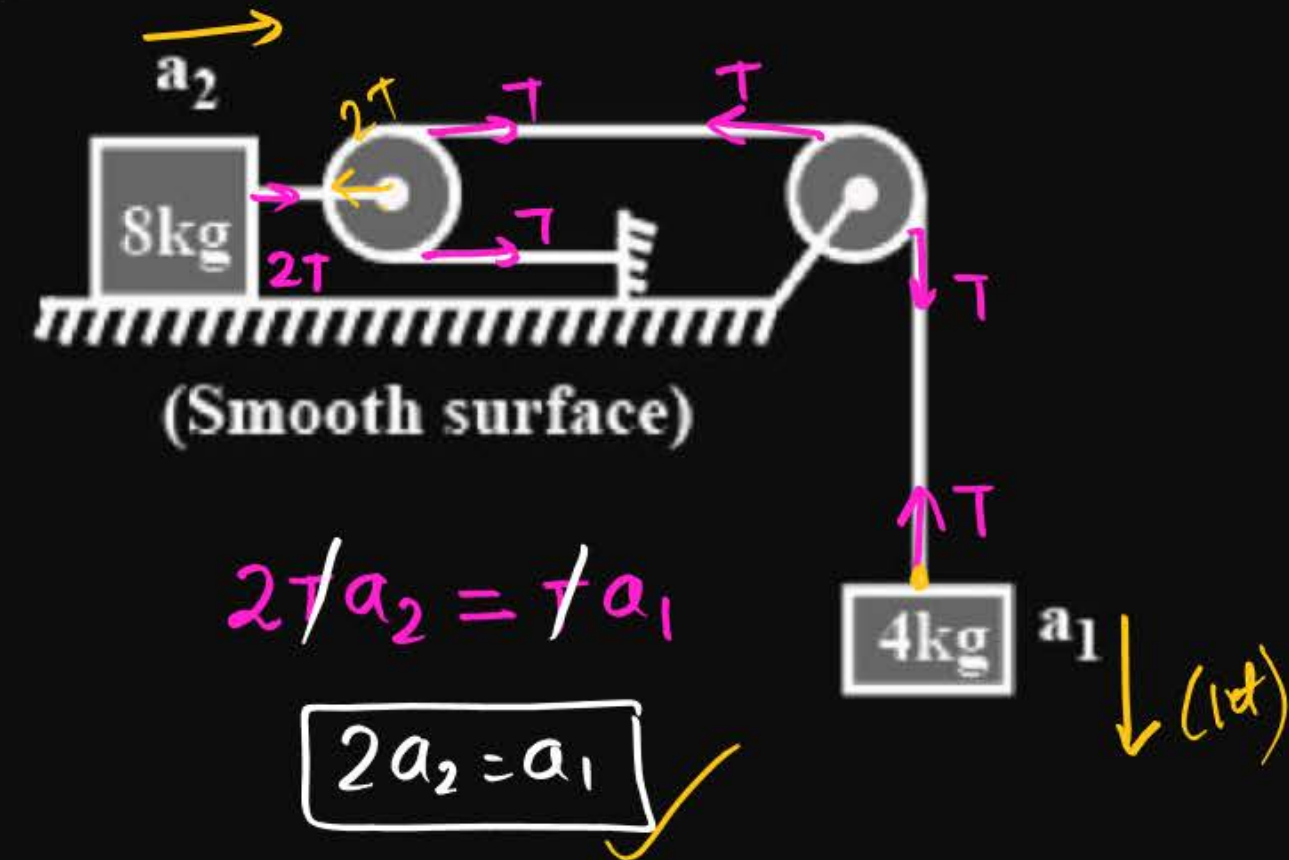
If pulleys shown in the diagram are smooth and massless and  $a_1$  and  $a_2$  are acceleration of blocks of mass 4 kg and 8 kg respectively, then

1  $a_1 = a_2$

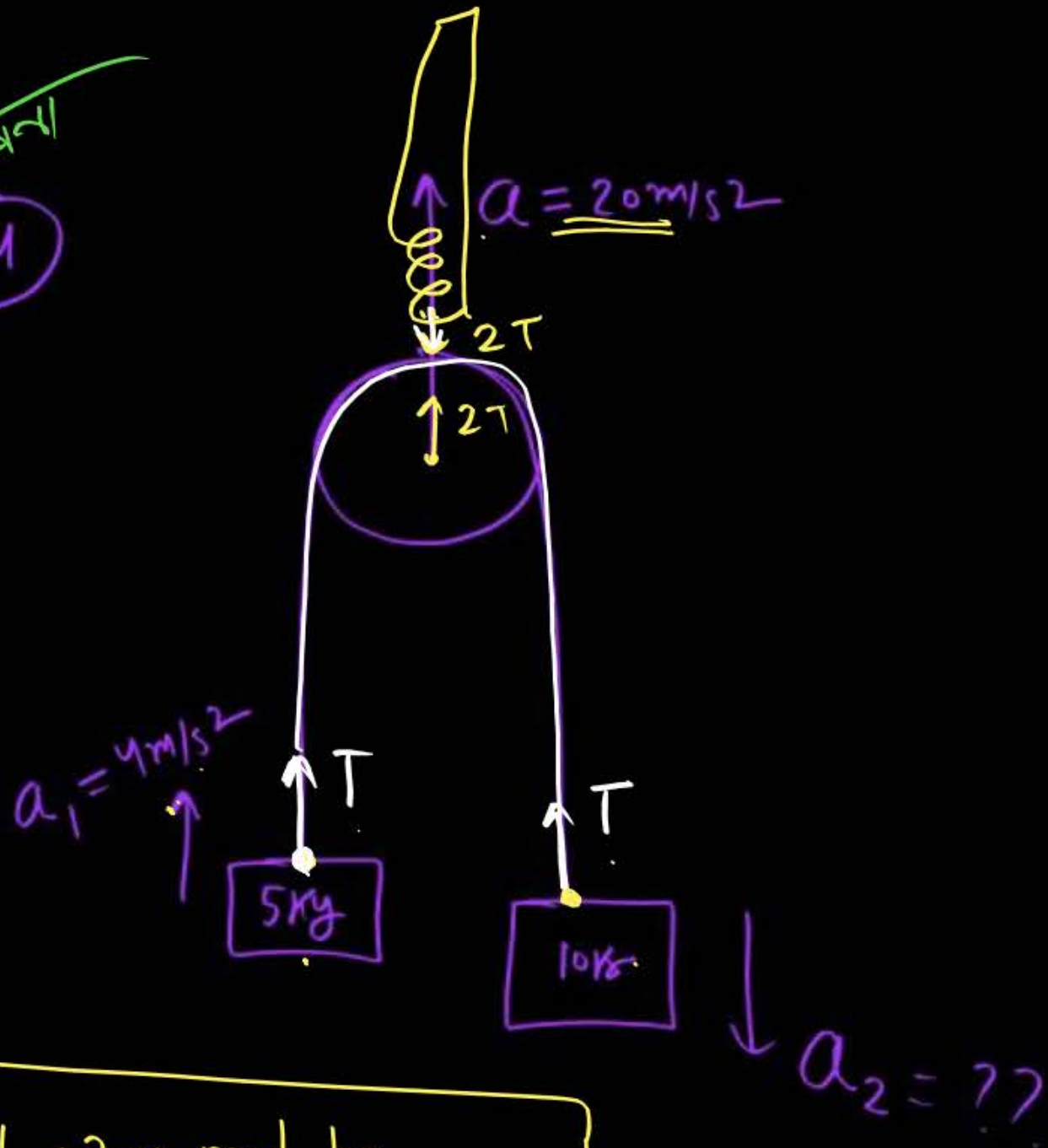
2  $a_1 = 2a_2$  ✓✓

3  $2a_1 = a_2$

4  $a_1 = 4a_2$



$\frac{H/w}{\sqrt{2} \cdot 42}$   $\frac{m/s^2}{1}$   
24



# Jab open end ho  
 to wha hand alymp  
 Kar lo

$$4T - T a_2 - 2T \times 20 = 0$$

$$4 - a_2 - 40 = 0$$

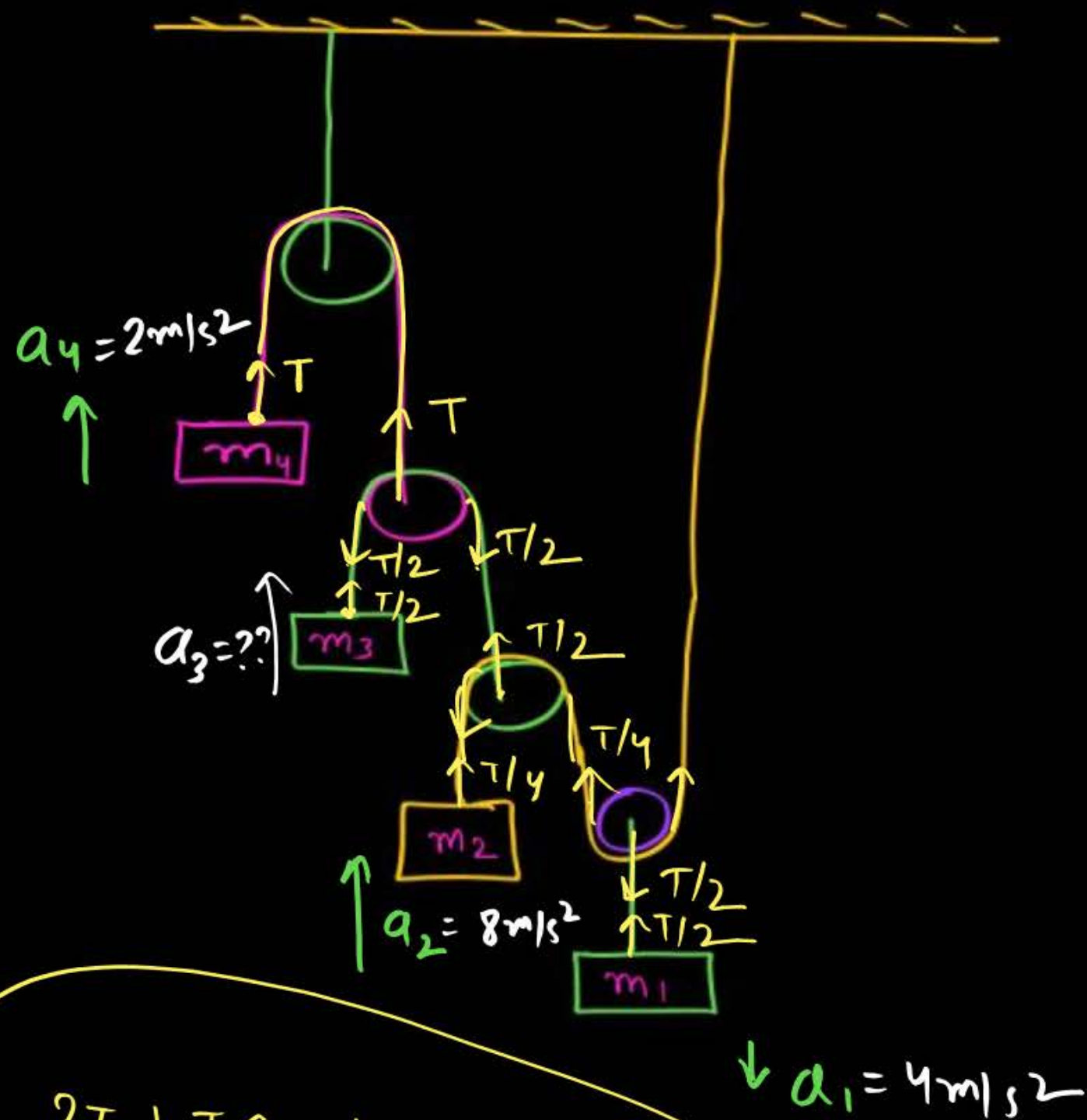
$$4 - 40 = a_2$$

$$a_2 = -36 \text{ m/s}^2$$

Ans



(25)

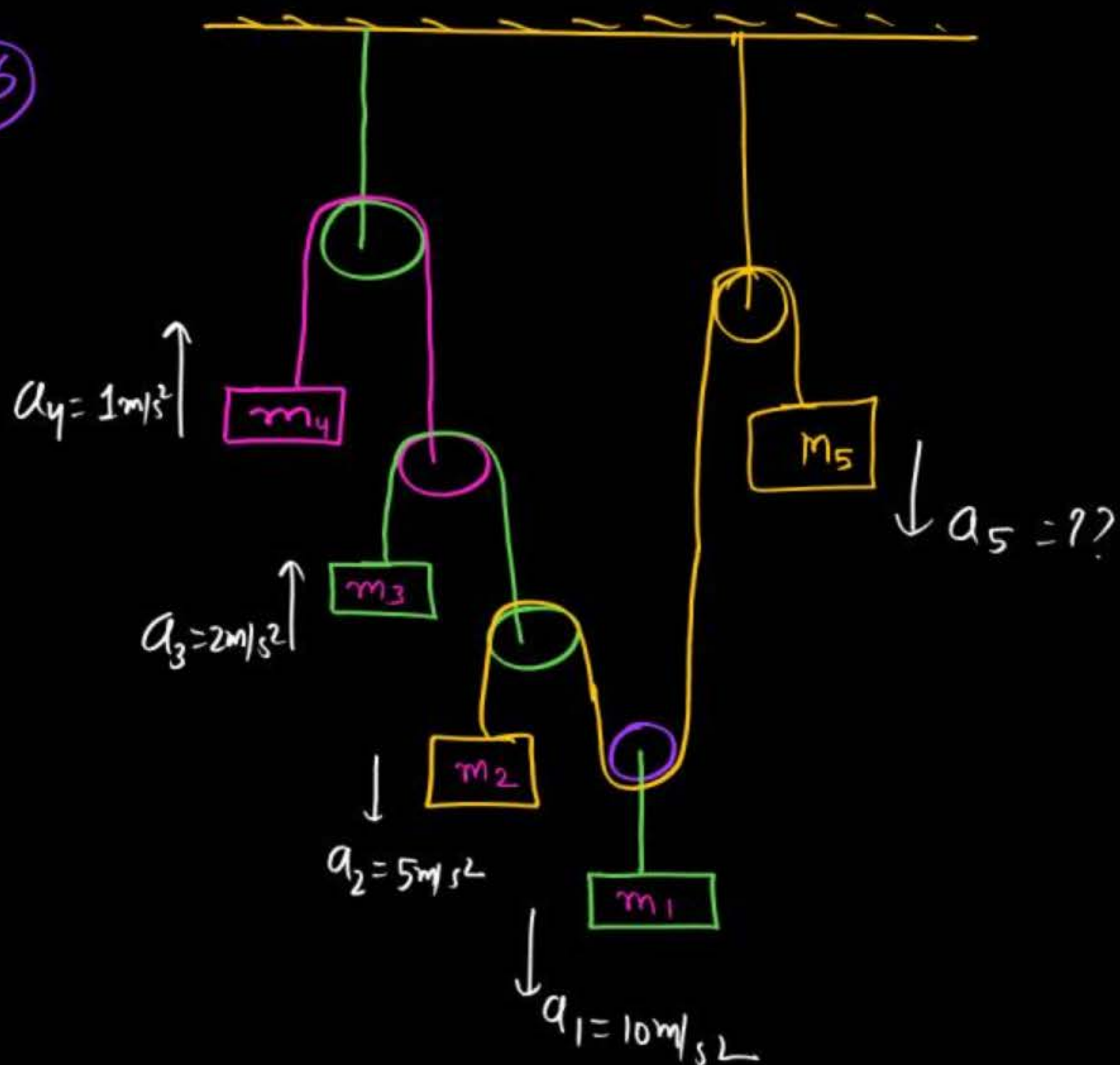


$$2T + \frac{T}{2}a_3 + \frac{T}{4}8 - \frac{T}{2}4 = 0$$

find  $a_3 = ??$

$$a_3 = 4 \text{ down}$$

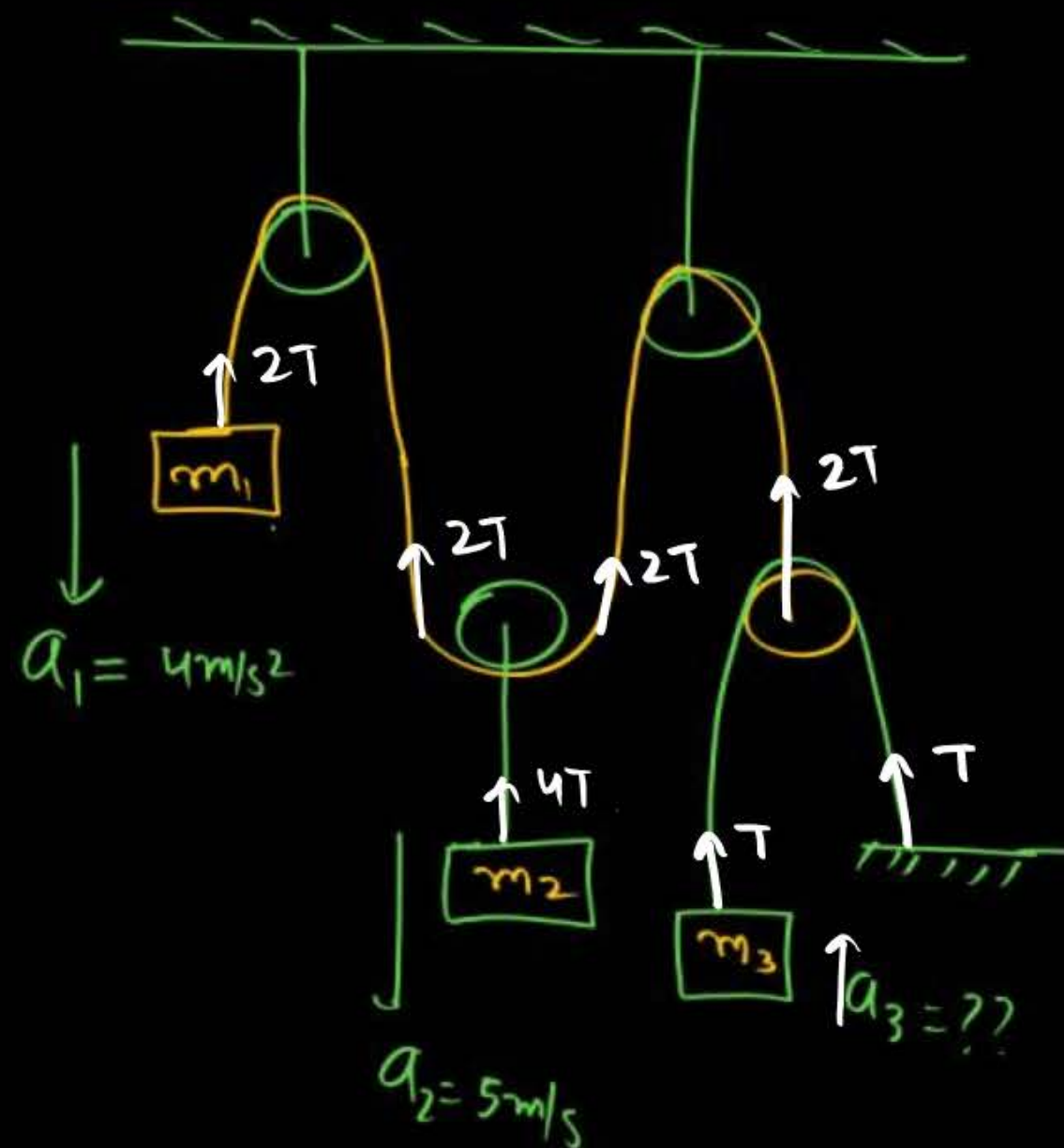
(26)



done → mas tar  
रही फिर



27



$$Ta_3 - 4T \times 5 - 4 \times 2T = 0$$
$$Ta_3 = 28T$$
$$a_3 = 28 \text{ m/s}^2$$

Ans ✓

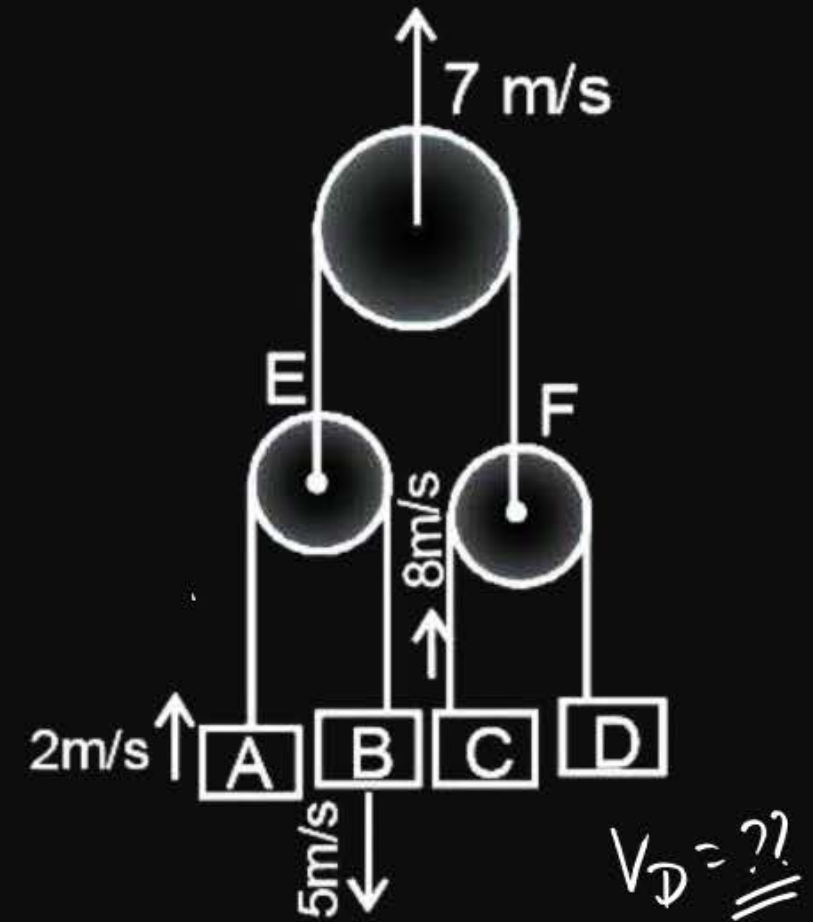
## Question

H/W

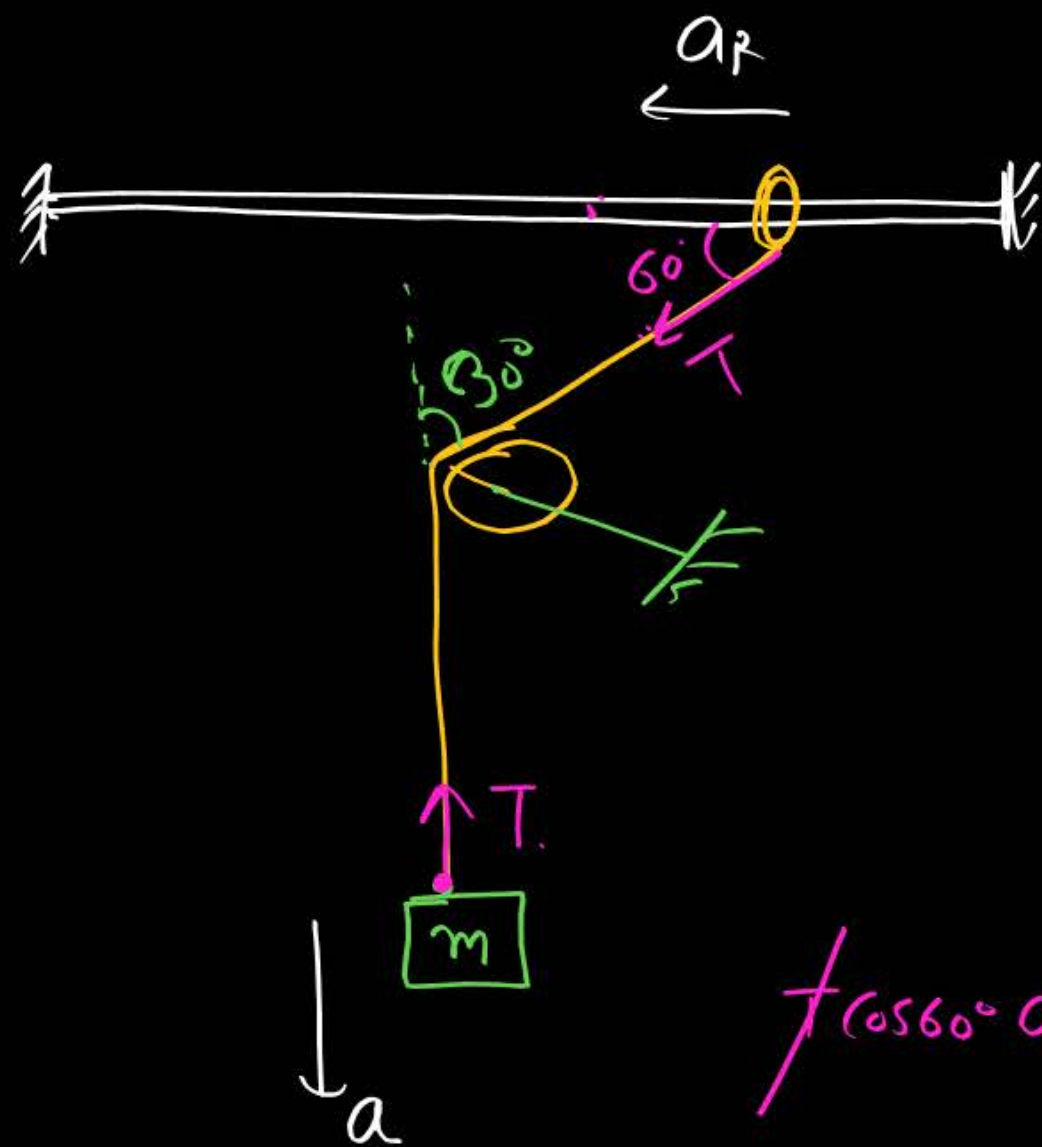


Find out the velocity of block  $D$ .

- 1  $V_D = 22 \text{ m/s}$  (upward direction)
- 2  $V_D = 22 \text{ m/s}$  (downward direction)
- 3  $V_D = 23 \text{ m/s}$  (upward direction)
- 4  $V_D = 23 \text{ m/s}$  (downward direction)







$$T \cos 60^\circ a_R = T a$$

$$a_R \frac{1}{2} = a$$

$$a_R = 2a$$

## Question

Find velocity of ring  $B(V_B)$  at the instant shown. The string is taut and inextensible.

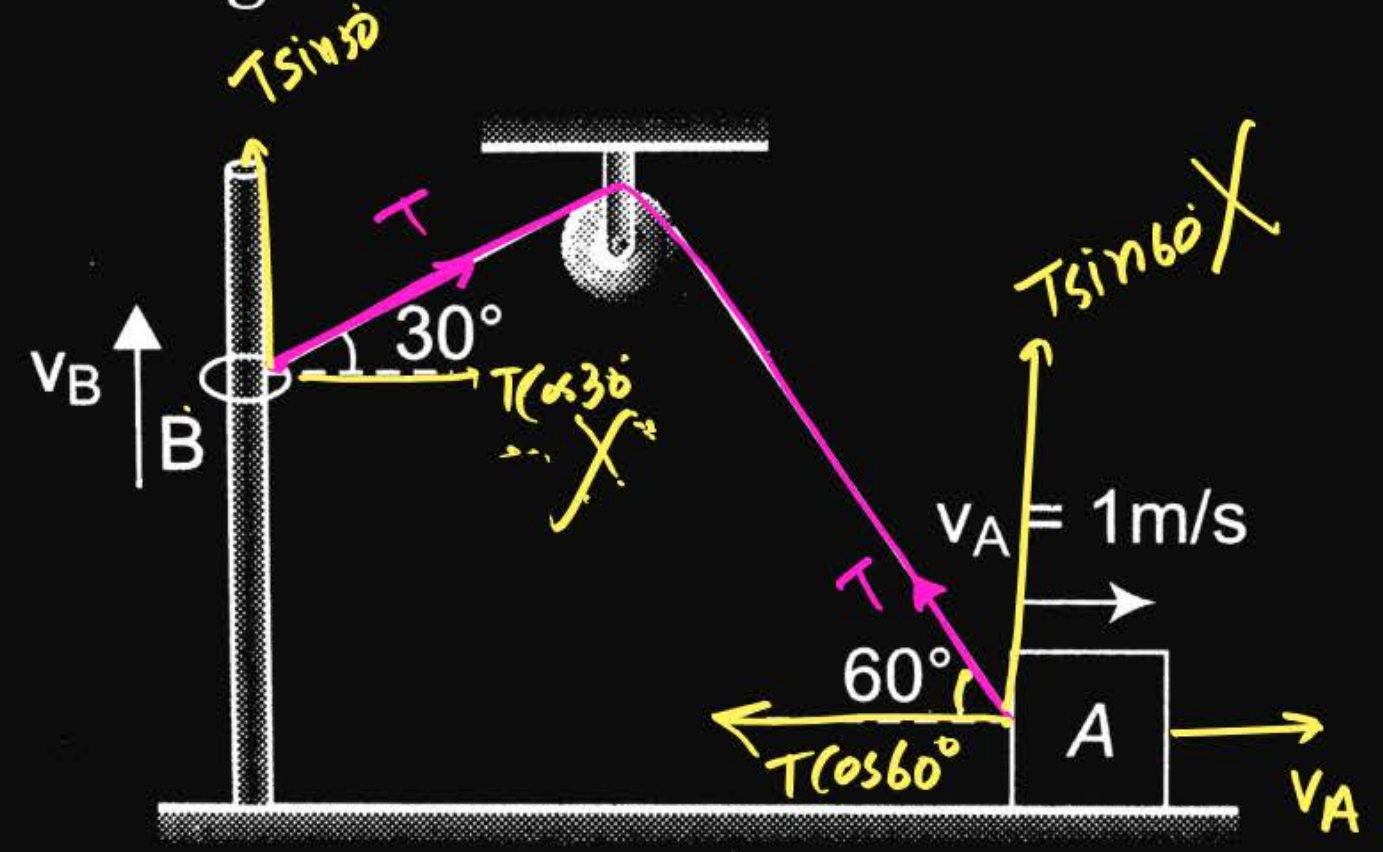
1  $\frac{1}{2} \text{ m/s}$

2  $\frac{\sqrt{3}}{4} \text{ m/s}$

3  $\frac{1}{4} \text{ m/s}$

4  $1 \text{ m/s}$

diagram  
bna ke  
likho



$$T \sin 30^\circ V_B - V_A T \cos 60^\circ = 0$$

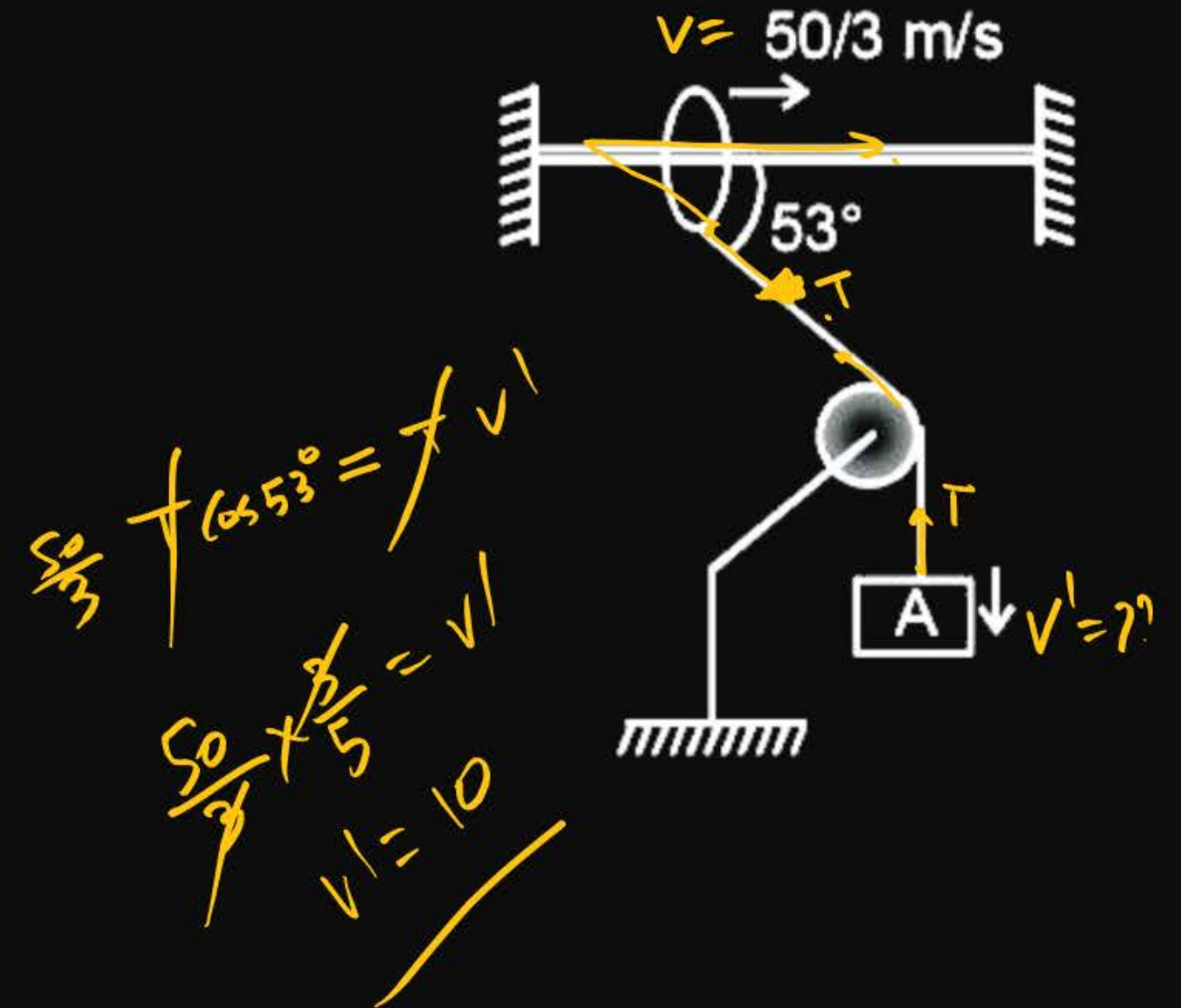
$$\cancel{T} \frac{1}{2} V_B = V_A \cancel{T} \frac{1}{2}$$

$$V_B = V_A = 1 \text{ m/s}$$

## Question

Find velocity of block A:

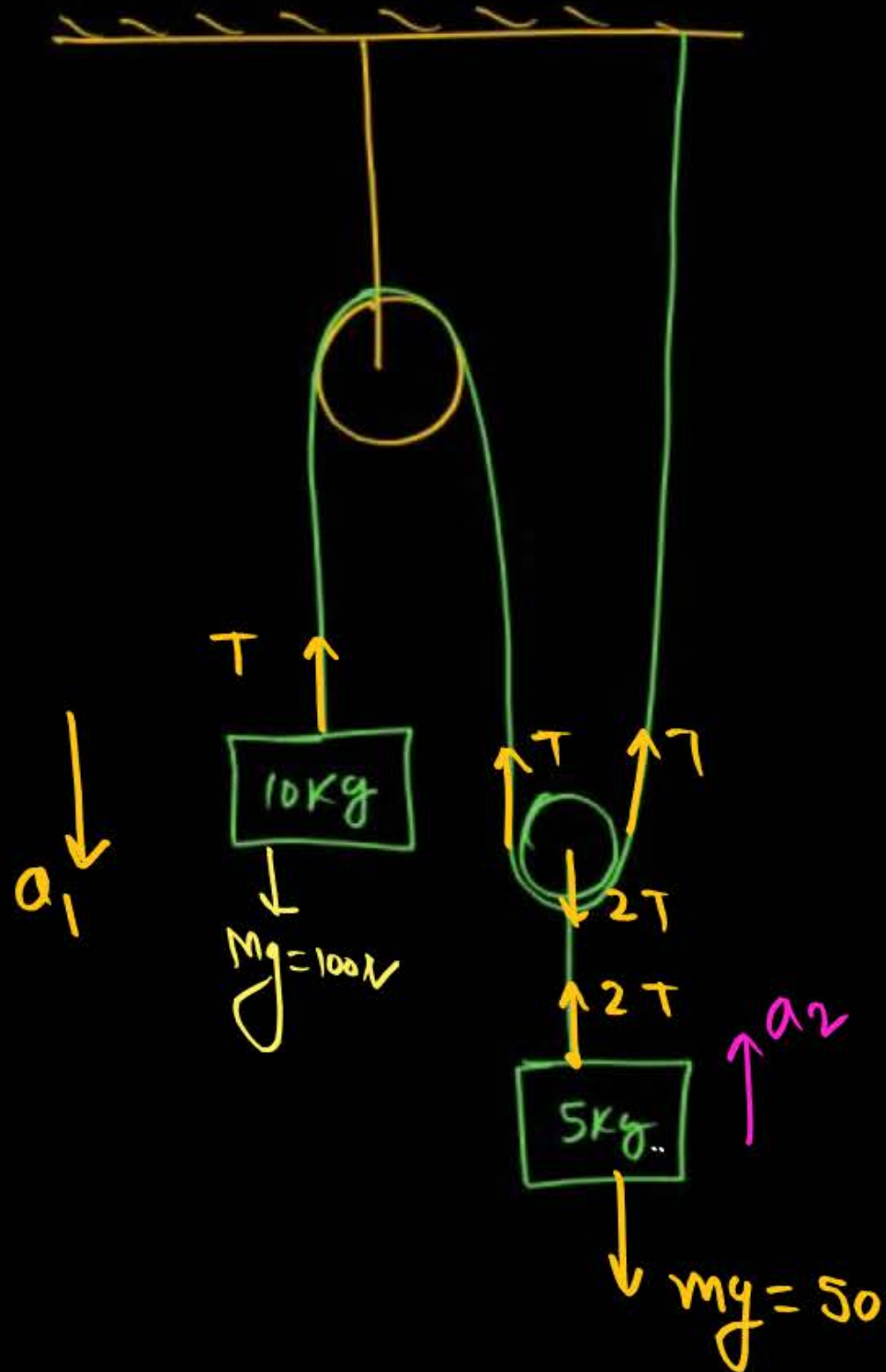
- 1 5 m/s
- 2 8 m/s
- 3 10 m/s ✓
- 4 15 m/s





Not 2 में लिखना है।

28



find value of  $a_1$  and  $a_2$   
of 10kg & 5kg ✓

$$-Ta_1 + 2Ta_2 = 0$$

$$2a_2 = a_1$$

$$a_1 = 2a_2 \quad \text{--- ① ✓}$$

$$\# 2T - 50 = 5a_2 \quad \text{--- ① ✓}$$

$$\# 100 - T = 10a_1 \quad \text{--- ② ✓}$$

Put value of  $a_1$

$$100 - T = 10 \times 2a_2 \quad \text{--- ③}$$

multiply by 2 both side

$$200 - 2T = 40a_2 \quad \text{--- ④}$$

$$\begin{array}{r} 2T - 50 = 5a_2 \\ 200 - 2T = 40a_2 \\ \hline \end{array}$$

$$150 = 45a_2$$

$$a_2 = \frac{150}{45} \text{ m/s}^2$$

$$a_1 = \frac{300}{45} \text{ m/s}^2 = \frac{20}{3} \text{ m/s}^2 \quad \text{✓}$$

## Question

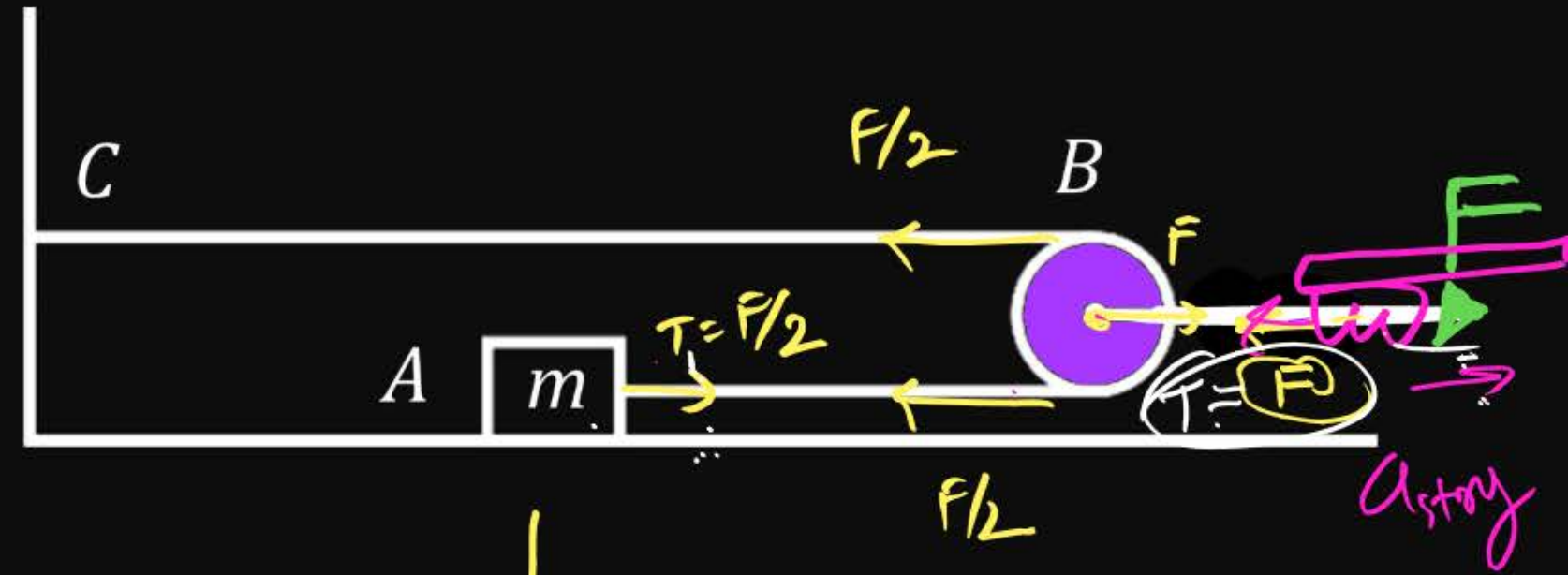
The acceleration of light pulley is

1  $F/m$

2  $F/2m$  <sup>75% (wrong)</sup>

3  $F/4m$  only (8%)

4  $F/8m$



Blok

$$T a_A = T_{\text{pulley}} a_p$$

$$\cancel{\frac{F}{2}} \times \cancel{\frac{F}{2m}} = \cancel{F} \times a_{\text{string pulley}}$$

$$\frac{F}{4m} = a_{\text{string/pulley}}$$

$$F_{\text{net}} = m a_A$$

$$\frac{F}{2} = m a_A$$

$$a_A = \frac{F}{2m} \checkmark$$

akor.

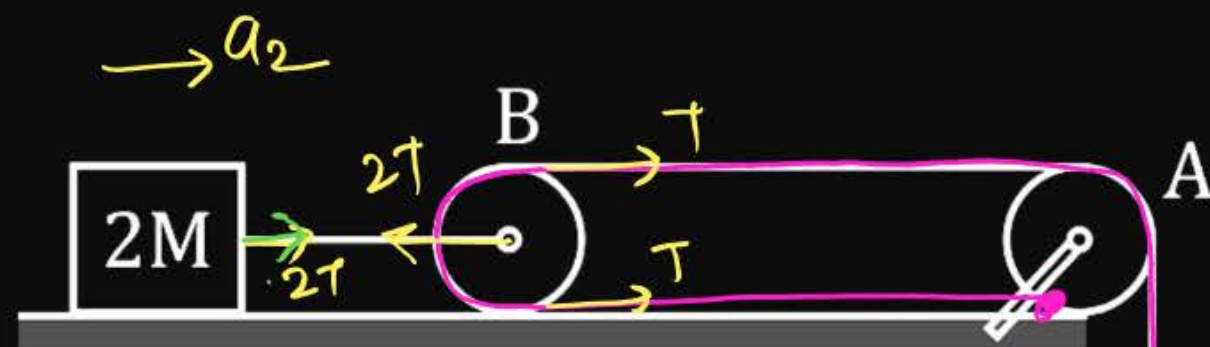


# Question

find  $a_1$  &  $a_2$

likho

$$a_1 = 2a_2 \quad (1)$$



$$\begin{cases} mg - T = ma_1 & (i) \\ 2T = 2ma_2 & (ii) \end{cases}$$

Putting value of  $a_1$

$$[mg - T = 2ma_2] \times 2$$

$$2mg - 2T = 4ma_2 \quad (i)$$

$$2T = 2ma_2 \quad (ii)$$

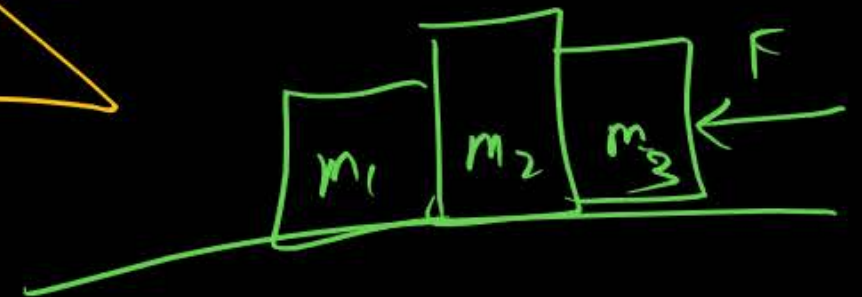
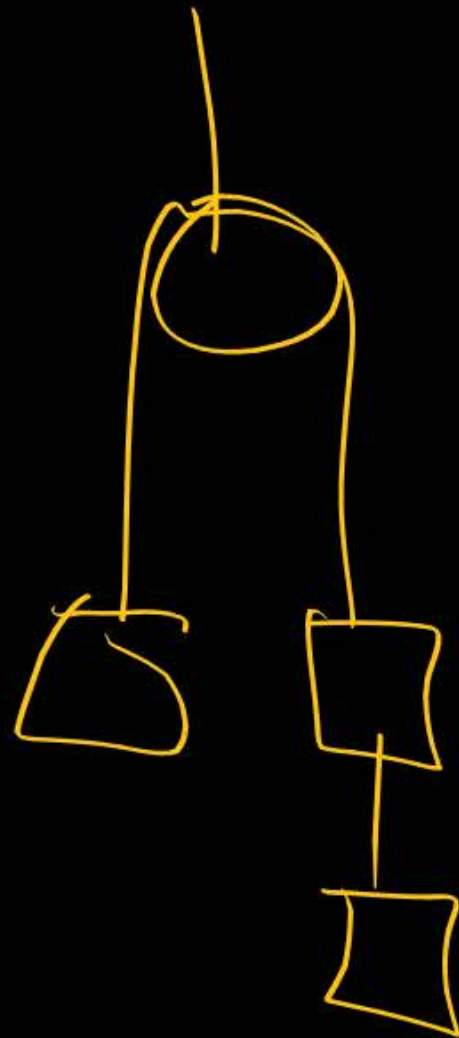
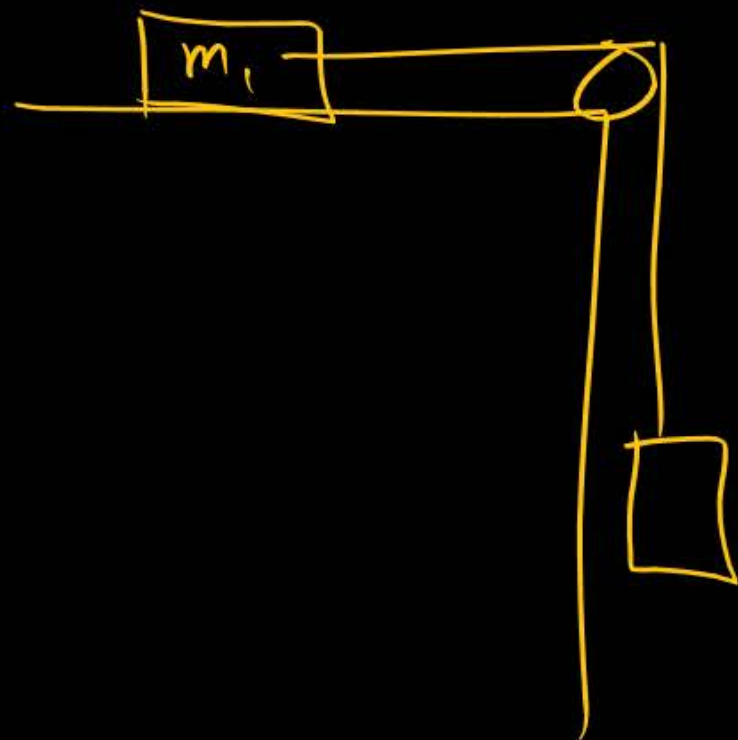
$$2mg = 6ma_2$$

$$a_2 = \frac{2g}{3} = \frac{g}{3}$$

$$a_1 = 2a_2 = \frac{2g}{3}$$



NEET important



# Rod constrain. (constraint)

Rigid Body



# MR\*Box  
Velocity along the length of  
Rod must be same.



$\perp$  to the length of  
Rod, velocity may  
or may not be  
same.



Possible ✓

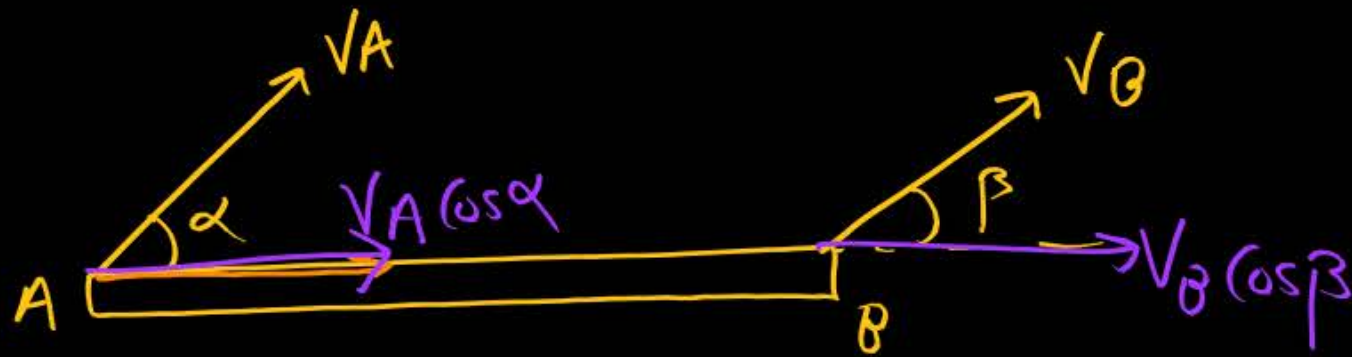


Wrong ✗



(Q) Rel<sup>n</sup>  $V_A$  &  $V_B$  for rigid rod:—

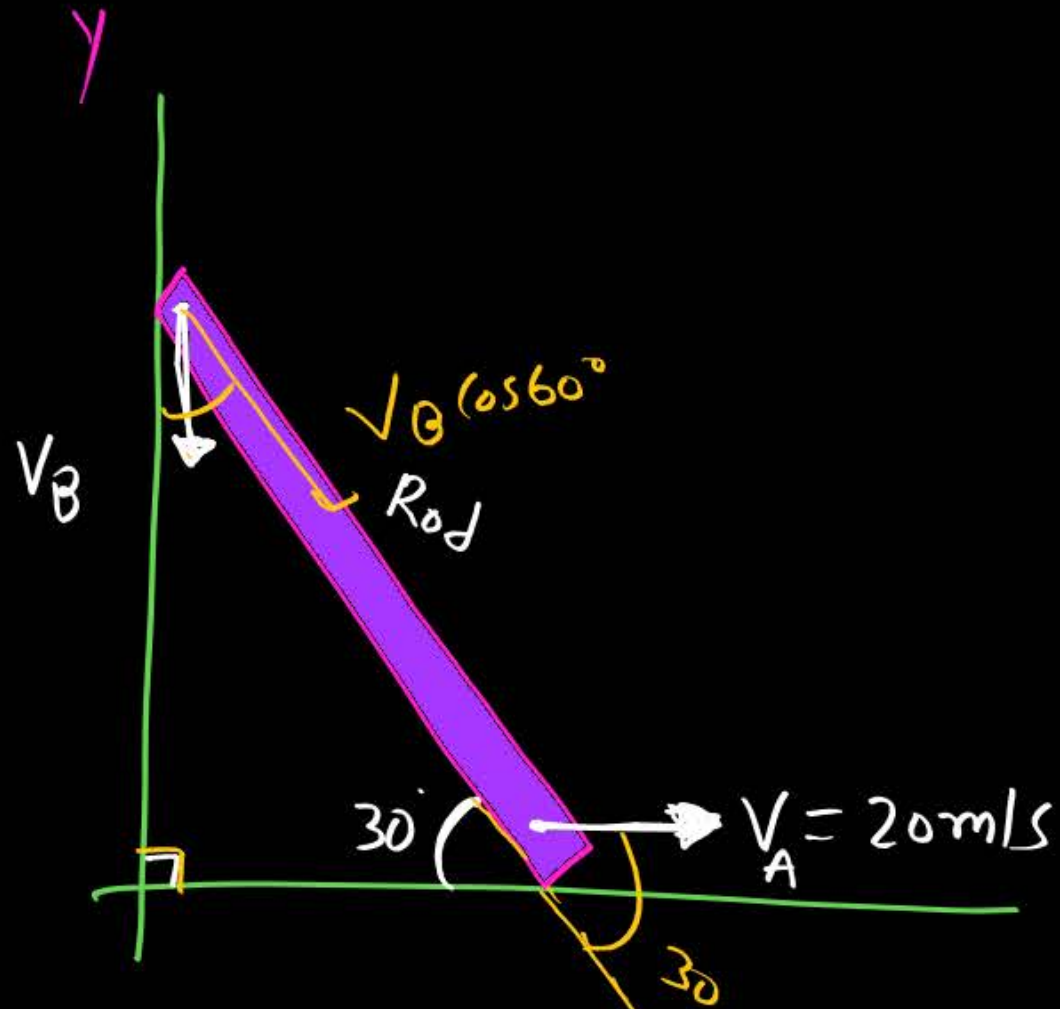
component of velocity along the length must be same.



$$V_A \cos \alpha = V_B \cos \beta$$



NEET

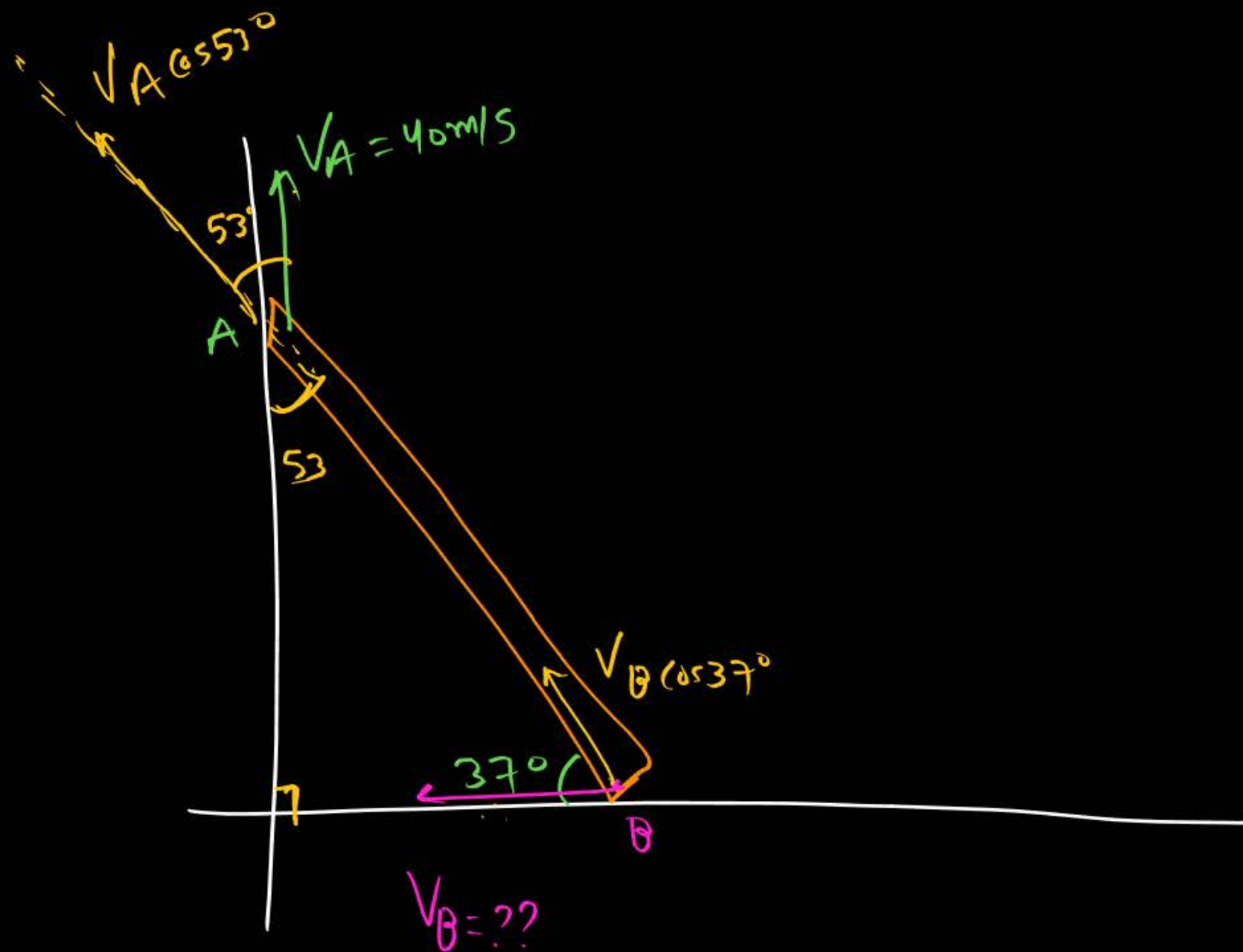


Component of  
velocity along  
the length  
must be same.

$$V_B \cos 60^\circ = 20 \cos 30^\circ$$

$$V_B \times \frac{1}{2} = 20 \times \frac{\sqrt{3}}{2}$$

$$V_B = 20\sqrt{3} \text{ m/s}$$



find velocity of  $V_B = ??$

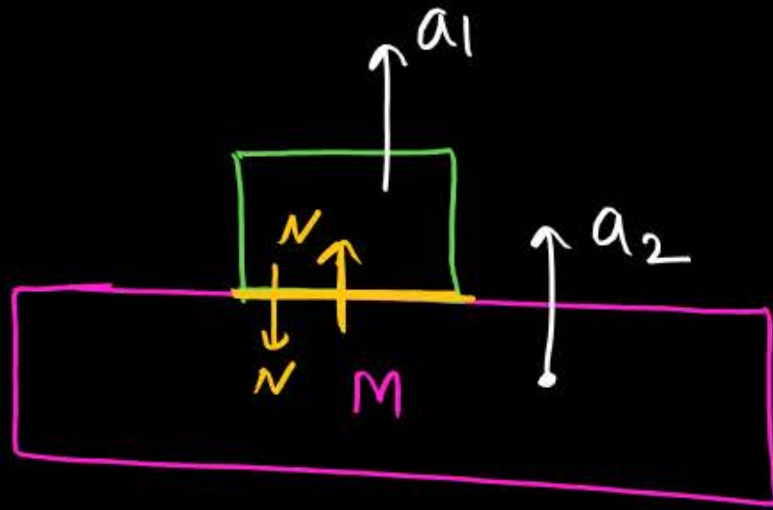
$$V_B \cos 37^\circ = V_A \cos 53^\circ$$

$$V_B \times \frac{4}{5} = 40 \times \frac{3}{5}$$

$$V_B = 30 \text{ m/s}$$

Ans

## Wedge constraint



$m_1$  Box

If Two object are chipka

huan then component  $a_{cm}$

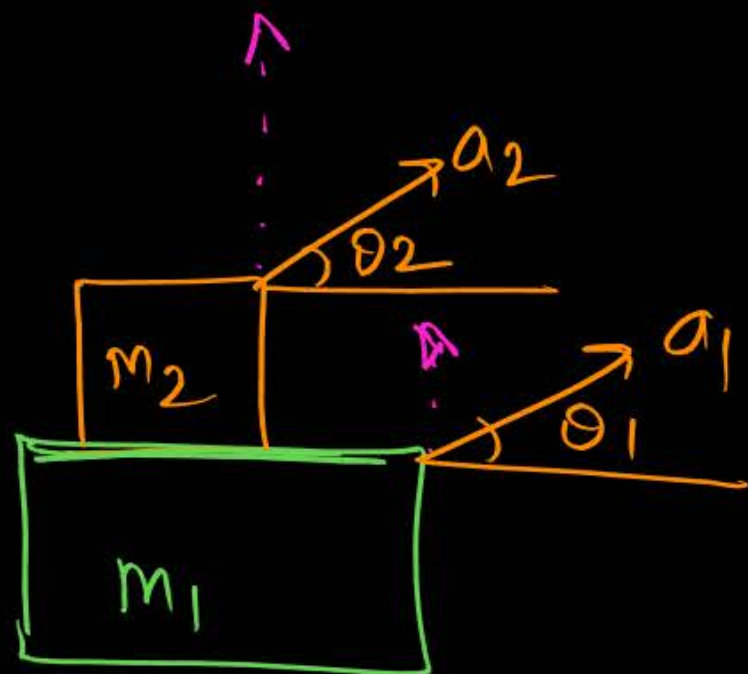
$\perp$  to contact surface must

be same, along surface may

or may not same.



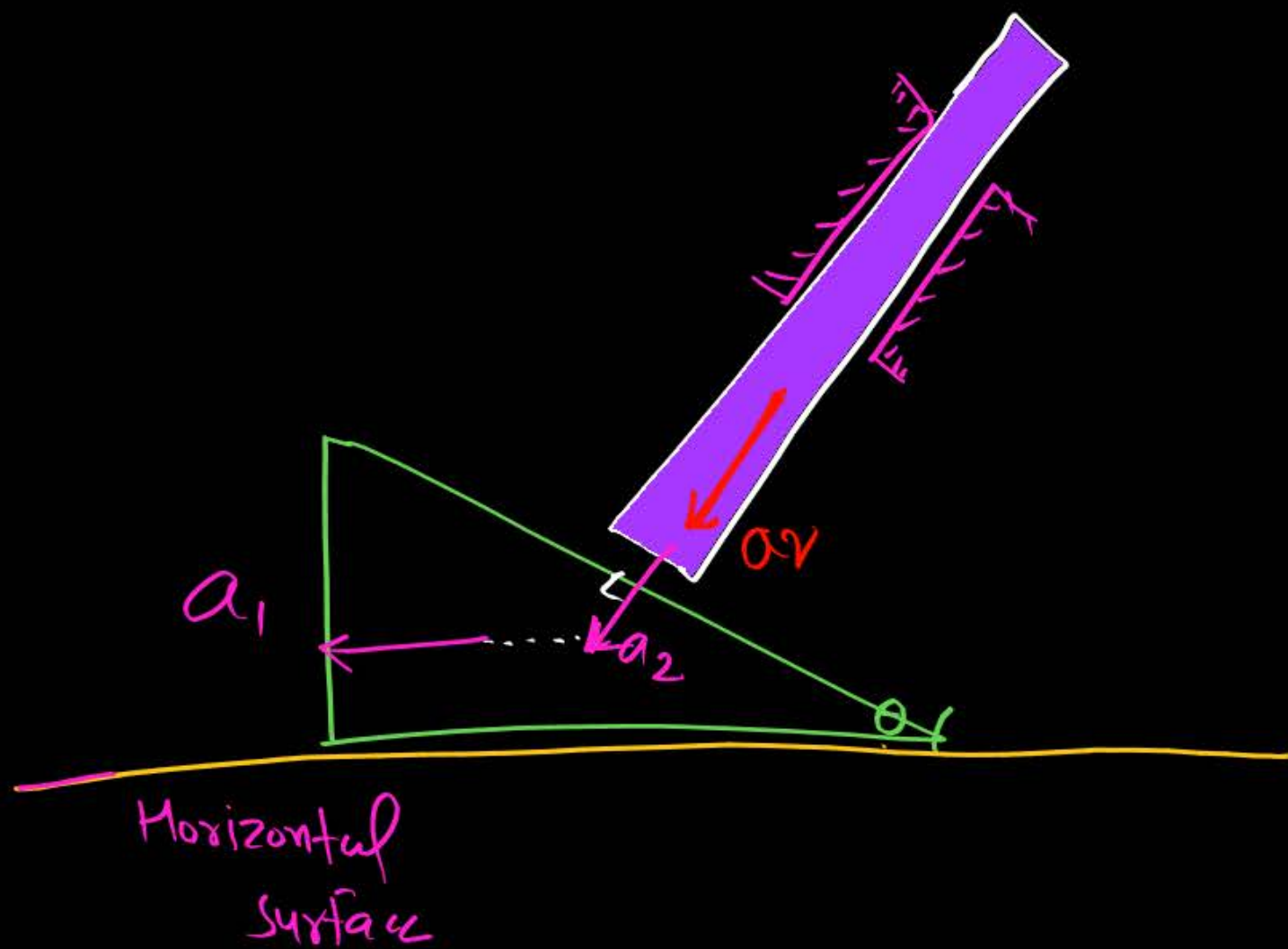
②



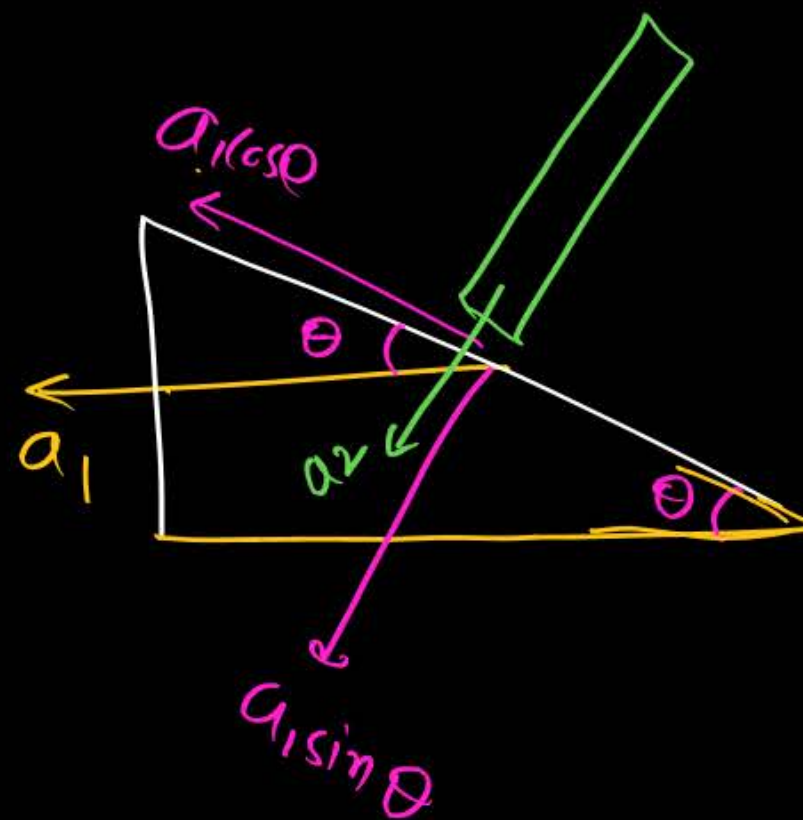
gf both are chipka  
huaa then Rel<sup>n</sup>  
B/w  $a_1$  &  $a_2$

$$a_2 \sin \theta_2 = a_1 \sin \theta_1$$

Ans



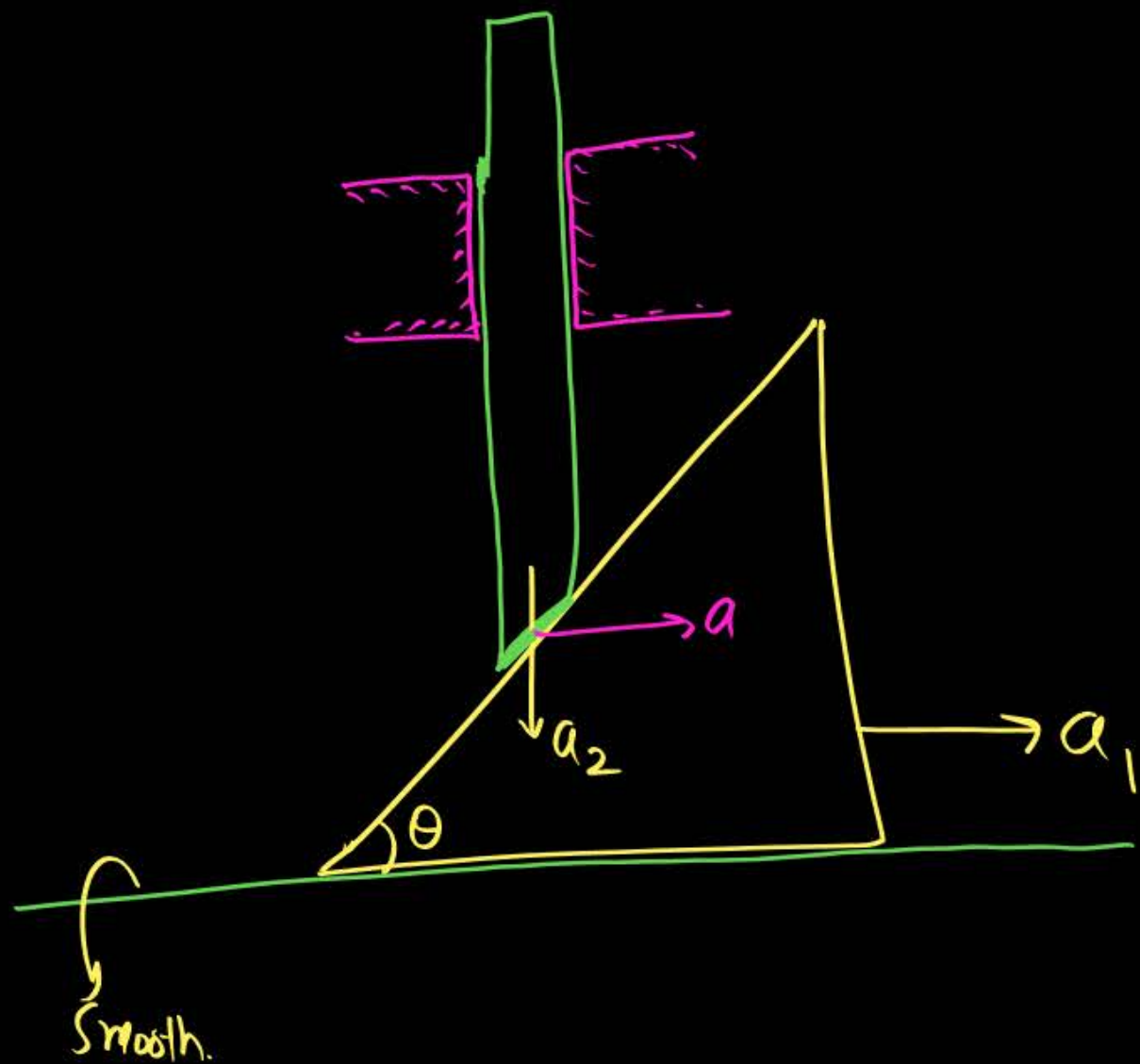
find rel<sup>n</sup> b/w  $a_1$  &  $a_2$



$$a_1 \sin \theta = a_2$$

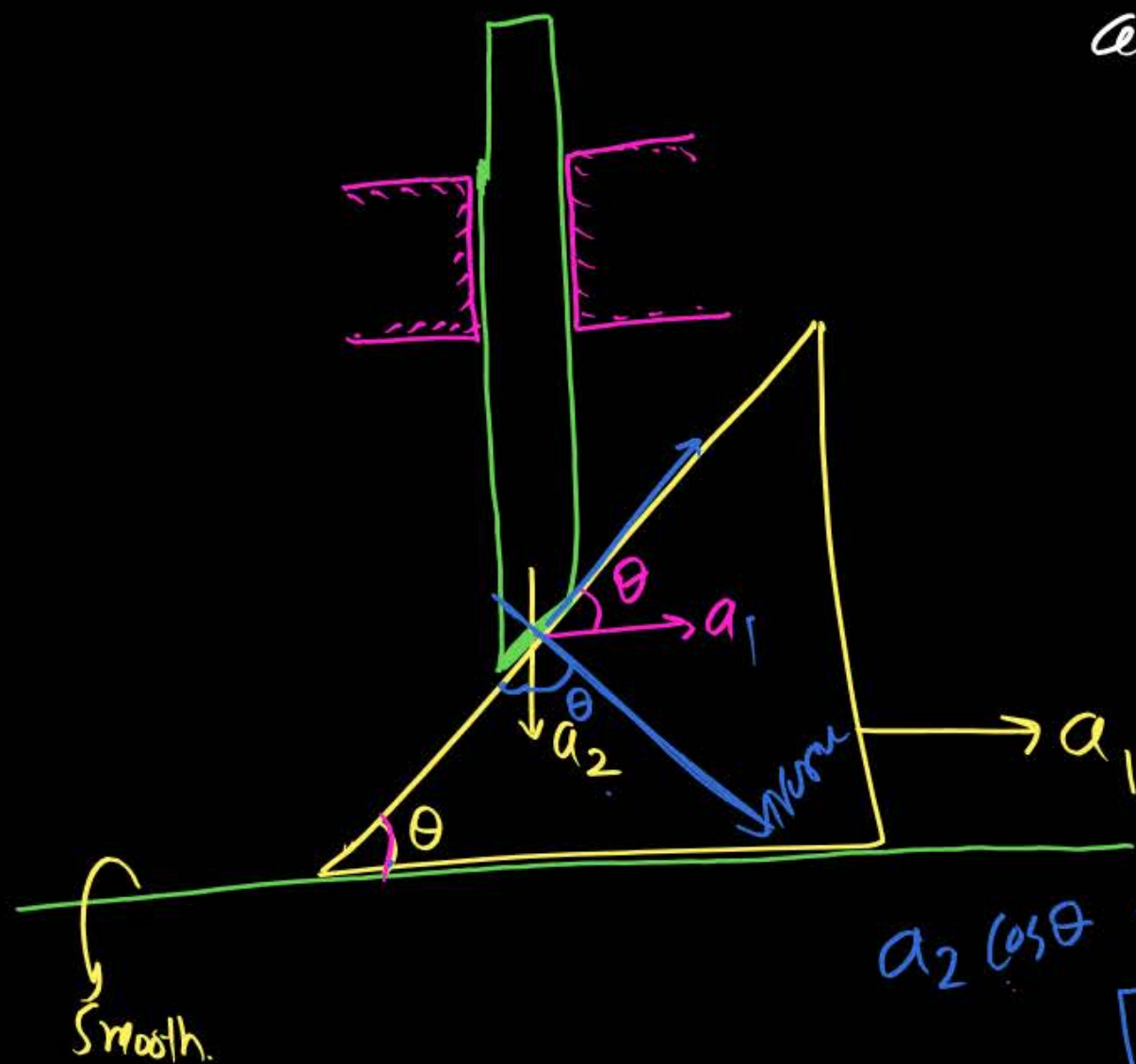
Ans





find Rel<sup>n</sup> Blw  
 $a_1$  &  $a_2$

↳ Surface comp<sup>n</sup> of  
acc<sup>n</sup> same.



$$a_2 \cos \theta = a_1 \sin \theta$$

$$a_2 = a_1 \tan \theta$$



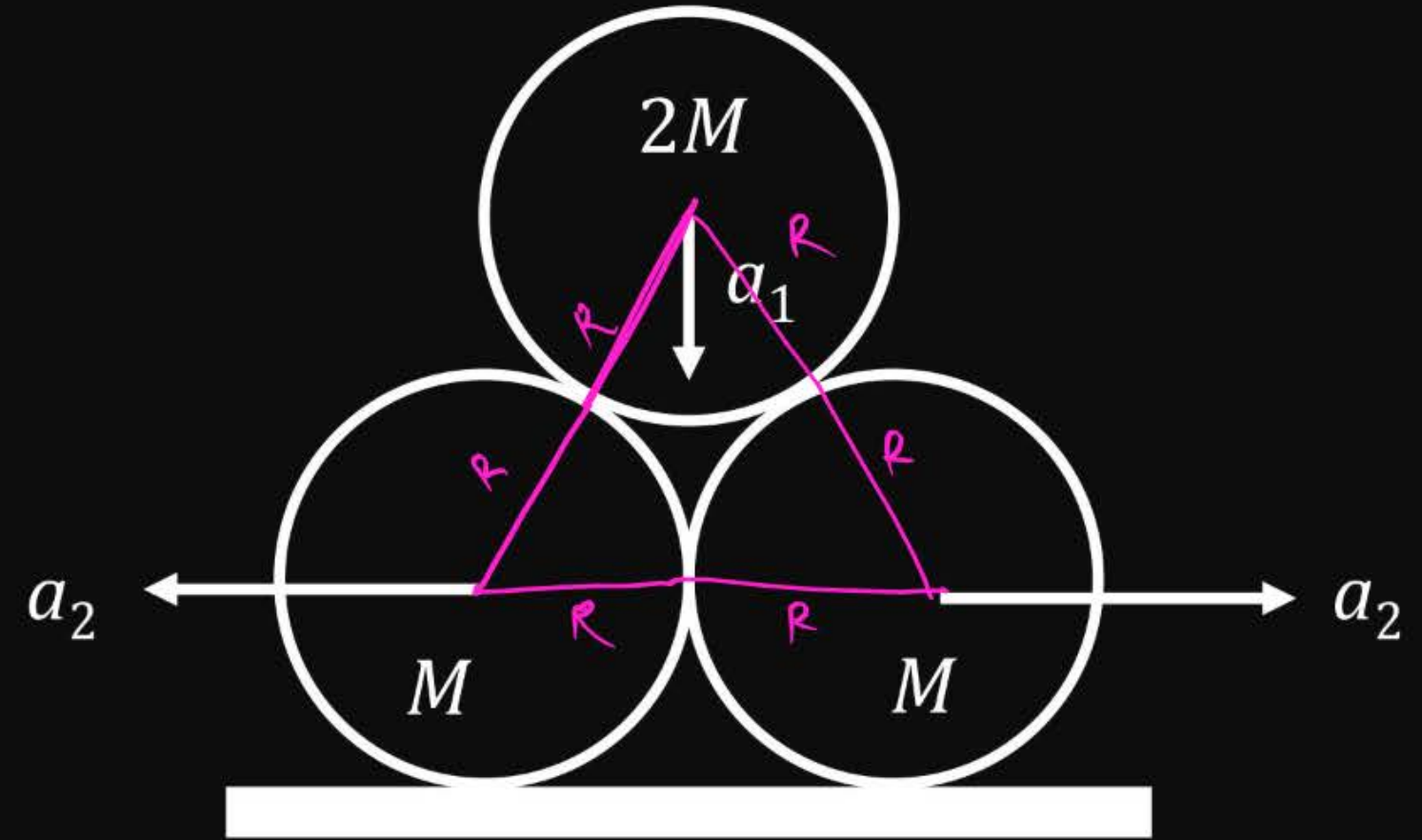
The relation between acceleration  $a_1$  and  $a_2$ , if the radius of each sphere is equal to  $R$ .

1  $a_2 = a_1\sqrt{3}$

2  $a_1 = a_2\sqrt{3}$

3  $a_1 = 2a_2$

4  $a_2 = 2a_1$



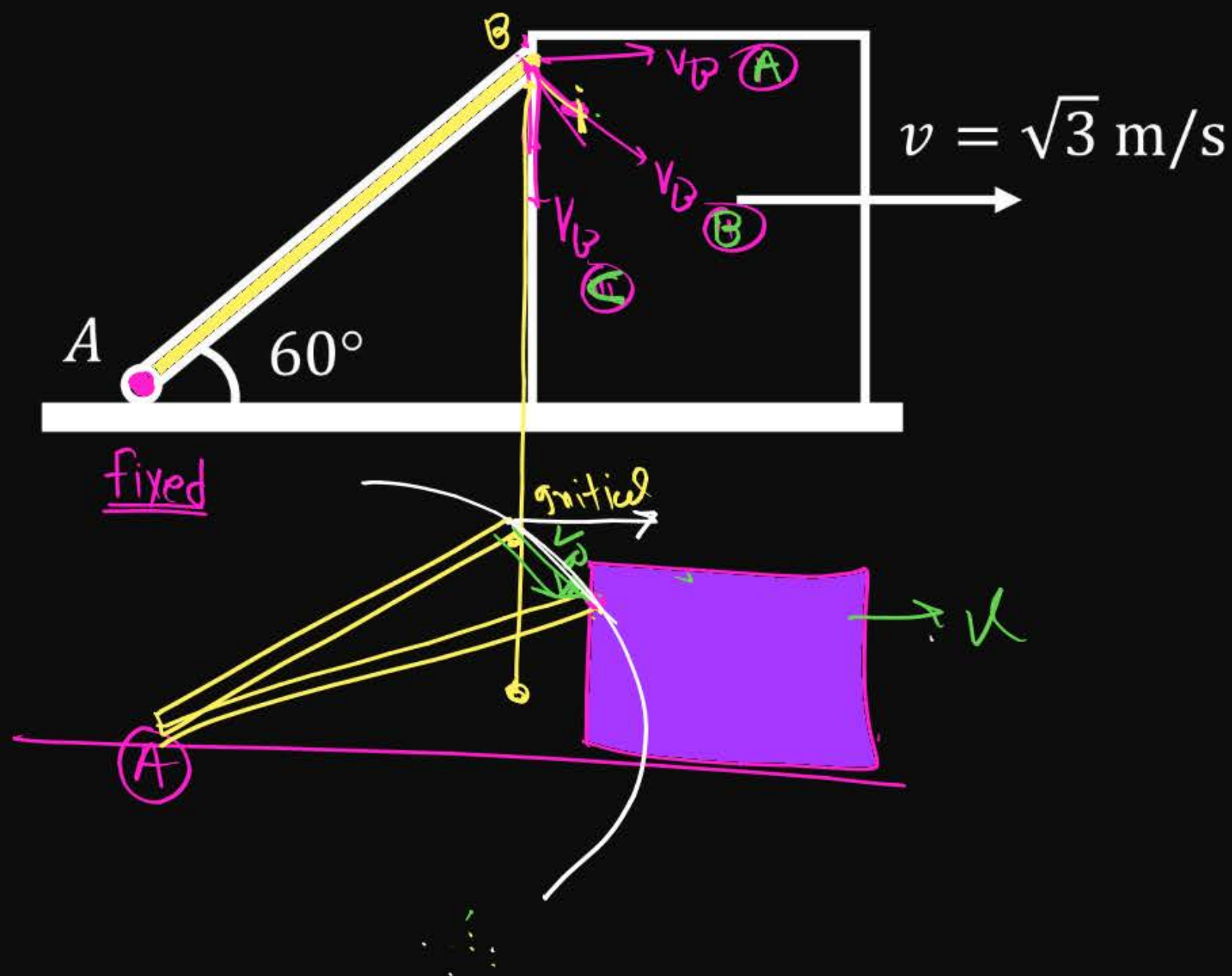
## Question

## Challenge Question



A rod  $AB$  is shown in figure. End  $A$  of the rod is fixed on the ground. Block is moving with velocity  $\sqrt{3}$  m/s towards right. The velocity of end  $B$  of rod when rod makes an angle of  $60^\circ$  with the ground is;

- 1  $\sqrt{3}$  m/s
- 2 2 m/s
- 3  $2\sqrt{3}$  m/s
- 4 3 m/s



H/W



$V_P = 0 \text{ (rest)}$

$\vec{F}_{x \text{ net}} =$

$a_{x \text{ net}} =$

$\begin{cases} F_{y \text{ net}} = \\ a_{y \text{ net}} = \end{cases}$



$\begin{cases} \vec{F}_{x \text{ net}} = \\ a_{x \text{ net}} = \end{cases}$

$\begin{cases} F_{y \text{ net}} = \\ a_{y \text{ net}} = \end{cases}$



Ramlu

$\begin{cases} \vec{F}_{x \text{ net}} = \\ a_{x \text{ net}} = \end{cases}$

$\begin{cases} F_{y \text{ net}} = \\ a_{y \text{ net}} = \end{cases}$







←  
Rapid Test

HOME WORK



Sangharsh assignment - 2

upload ho gya hai

do it

# NLM lect - 1 to

lect - 8 tak revision.

# DPP - bhi Karna hai (2-question off topic  
hai app me ignore)

**THANK**  
**YOU**