YAKEEN NEET 2.0

2026

Laws of Motion

Physics | Lecture - 9

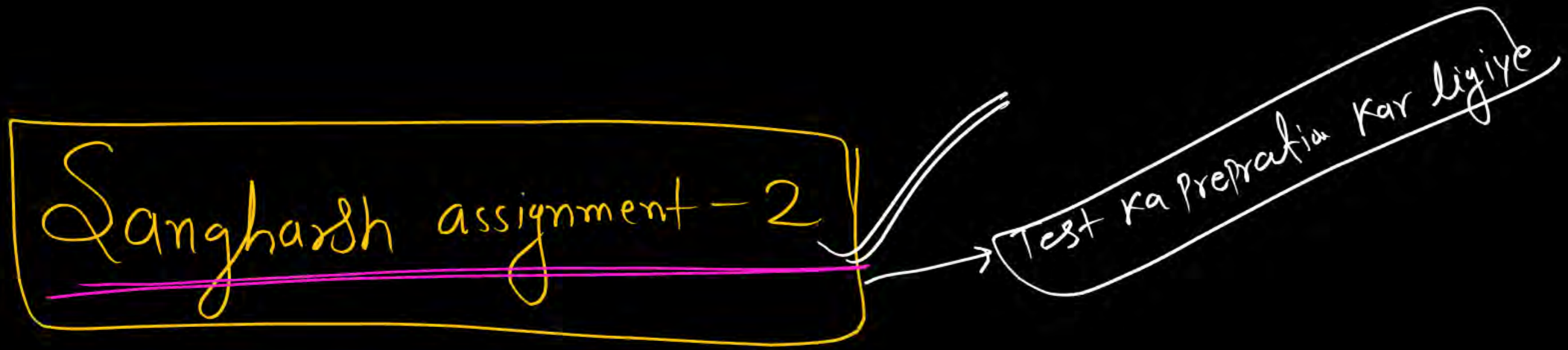
By- Manish Raj (MR Sir)

Topics to be covered

1. #
2.
3.
4.

H/W

P.h.D on Pseudo force


Sanghasth assignment - 2
Test ka Preparation kar lijiye

Question H/W (Try)

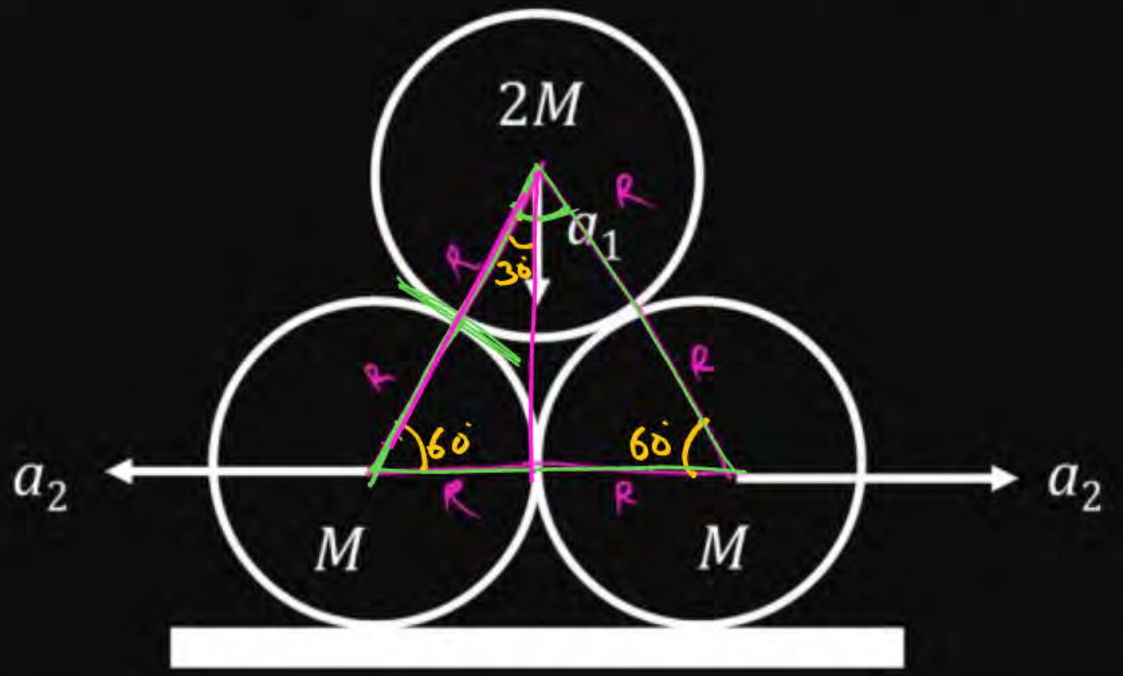
The relation between acceleration a_1 and a_2, if the radius of each sphere is equal to R.

1. $a_2 = a_1\sqrt{3}$
2. $a_1 = a_2\sqrt{3}$
3. $a_1 = 2a_2$
4. $a_2 = 2a_1$

$a_1 \cos 30° = a_2 \cos 60$

$a_1 \times \frac{\sqrt{3}}{2} = a_2 \times \frac{1}{2}$

$\sqrt{3}a_1 = a_2$



Question Challenge Question

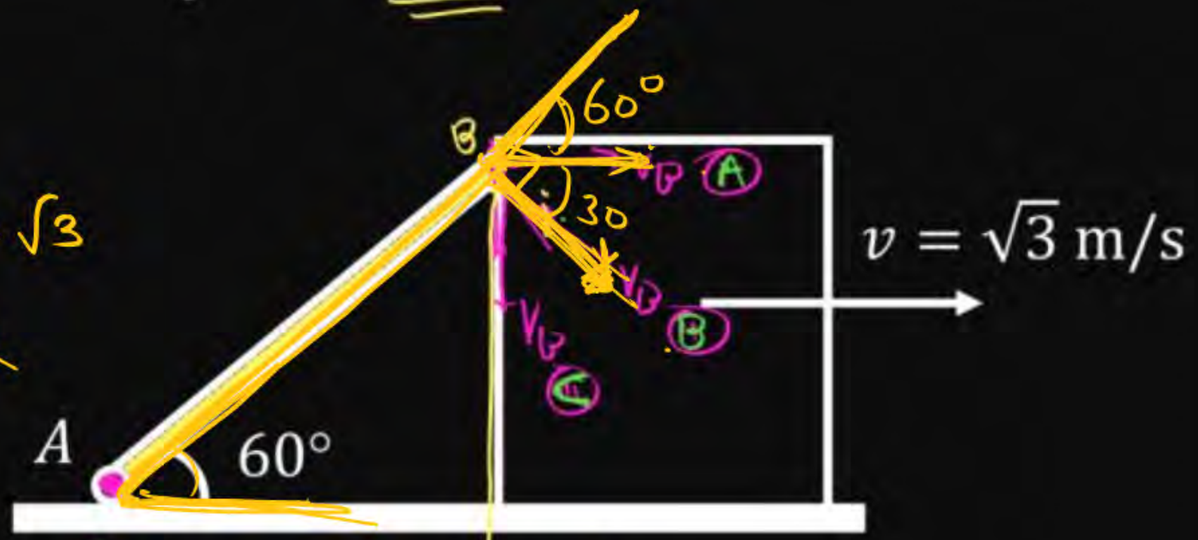
A rod AB is shown in figure. End A of the rod is fixed on the ground. Block is moving with velocity $\sqrt{3}$ m/s towards right. The velocity of end B of rod when rod makes an angle of 60° with the ground is;

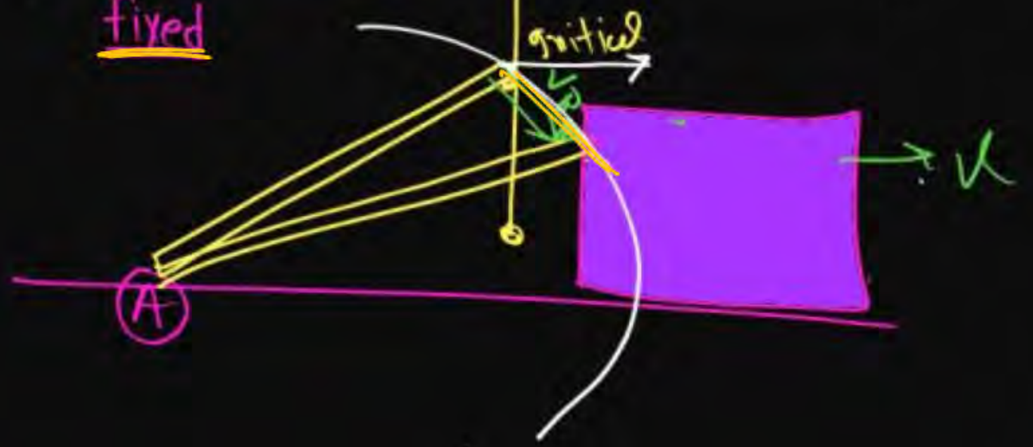
1. $\sqrt{3}$ m/s
2. 2 m/s
3. $2\sqrt{3}$ m/s
4. 3 m/s

$V_B \cos 30° = \sqrt{3}$

$V_B \frac{\sqrt{3}}{2} = \sqrt{3}$

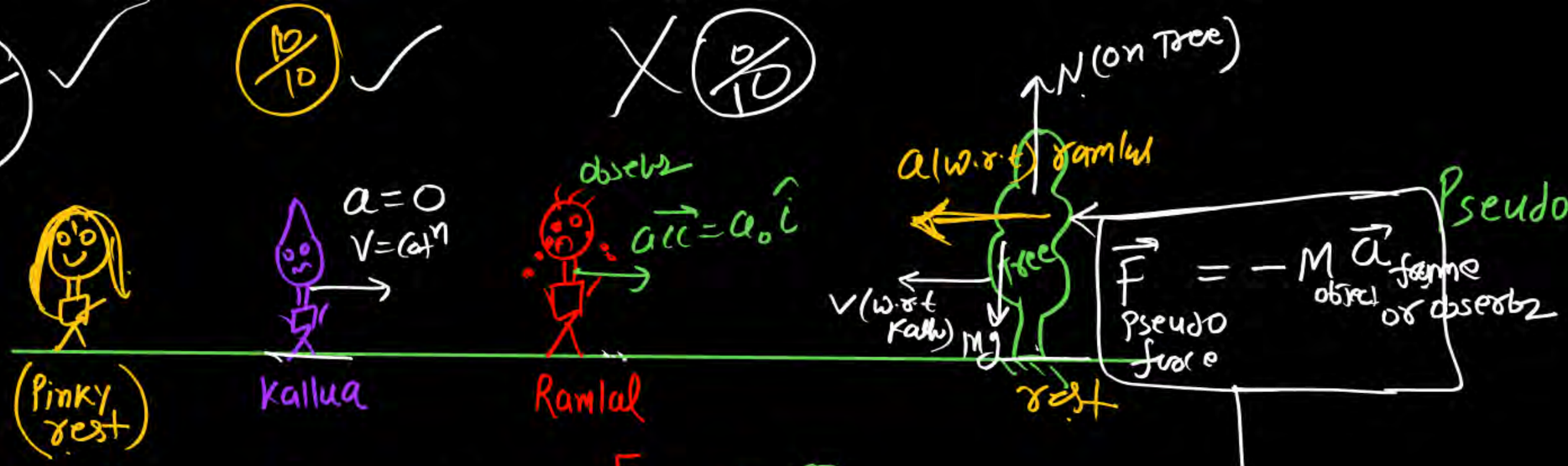
$V_B = 2$ m/s





Component of velocity along normal must be same.

10/10 ✓ 10/10 ✓ ✗ 0/10



Pseudo force → Non-real force

→ always applied w.r.t accelerated frame only

→ This force is a technique to validate Laws of motion from non-Inertial frame ✓

$F_{net(x)} = 0$

$a_x = 0$

$F_{net(x)} = 0$

$a_x = 0$ ($V = const^n$)

$F_{net(x)} = 0$

$(a_x)_{Tree\ w.r.t\ Ramlal} = -a_0 \hat{i}$

$F_{net(y)} = N - mg = 0$

$a_y = 0$

$F_{net(y)} = N - mg = 0$

$a_y = 0$

$F_{net(y)} = N - mg = 0$

$a_y = 0$

only Ramlal can Apply this force Jab wo accelerated hoga

rest or $\vec{v} = const^n$

⇓

Inertial frame (Newtons law of motion valid)

accelerated frame

↓

Non-Inertial frame

↳ Newtons law of motion are Not valid *

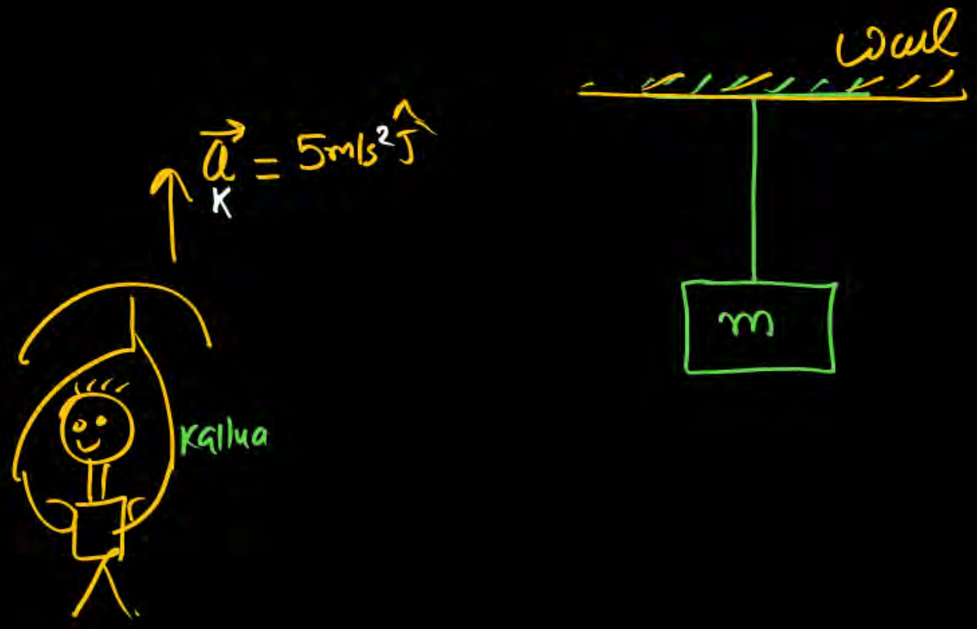
MR^x Box :—

Rest & const^n velocity wala observer or frame Pseudo force Nahi laga sakta.

MR^x

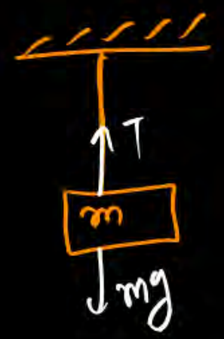
Pseudo force sirf accelerated frame & observer object par lagayegi

$$\vec{F}_{Pseu} = -m_{object}\,\vec{a}_{fram}$$



→ Soln

FBD of object w.r.t. Pinky

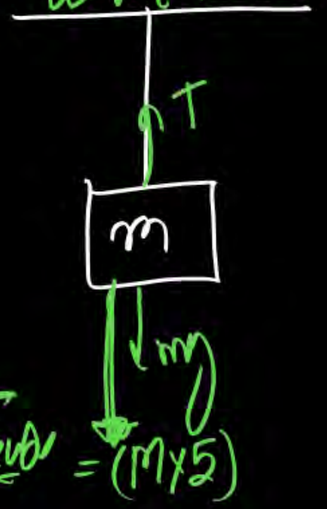


No Pseudo force

FBD of object w.r.t. (Ramlal)

$F_{pseu} = m \times 4$ Backward

w.r.t Kallu



Question

नहीं लिखना

Select the correct statement regarding pseudo force

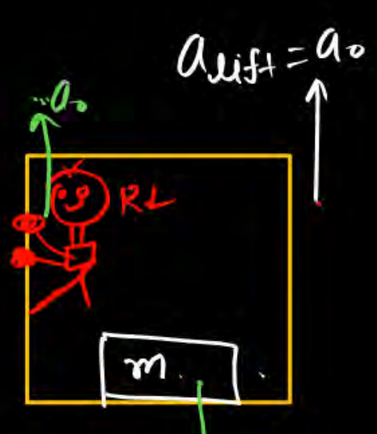
1. It is electromagnetic in origin ✗
2. Newton's 3rd law is applicable for it ✗
3. It is a fundamental force ✗
4. ✓ It is used to make Newton's law applicable in non-inertial frame

direction of Pseudo force w.r.t given accelerating lift :

(first Pseudo force dekhna hai No comp+ F.B.D)

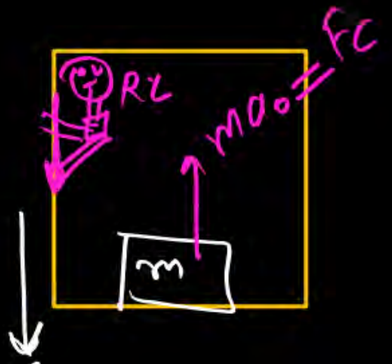
(A)

$F_c = 0$

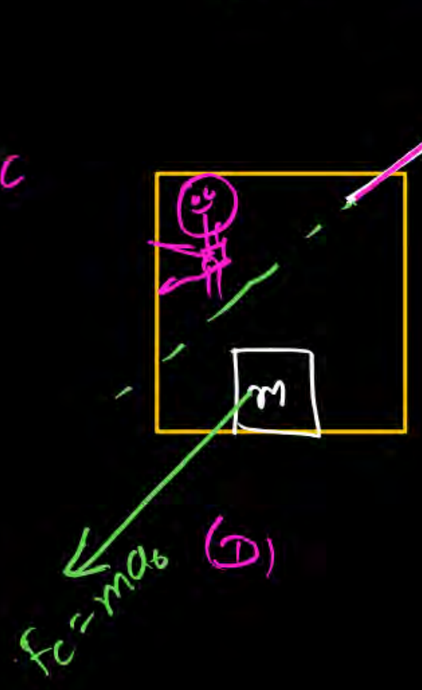


(B)

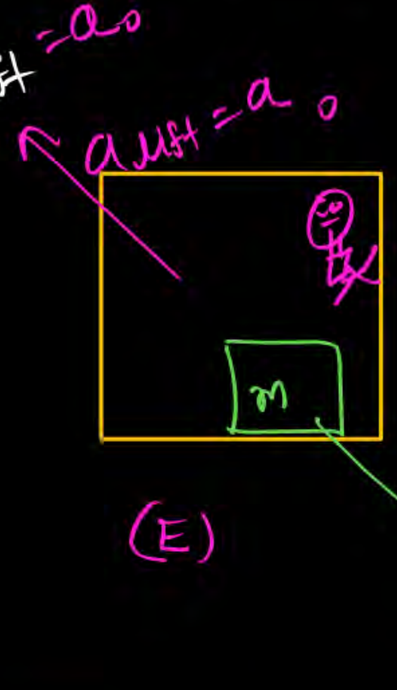
$F_c = ma_0$



(C)



(D)



(E)

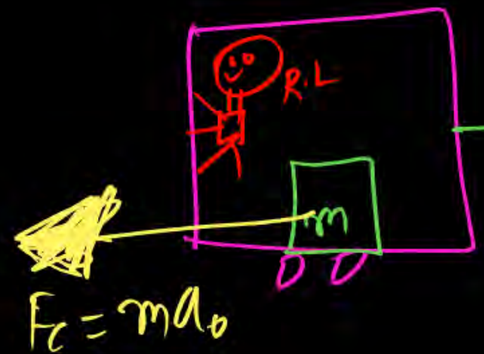
Pseudo force w.r.t Ground

(a) down

(b) UP

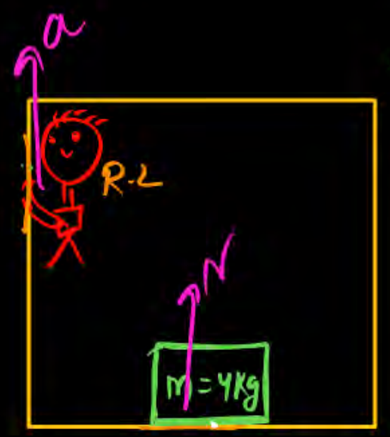
(c) zero

(MR Scam)



Likna hai

Find Normal reaction on 4kg w.r.t Ramlal & Pinkey.



$a_{lift} = 5 m/s^2$ (upward)

(TNR Scam)

(Q) Normal Ramlal & Pinky ke respect me ??

✓(a) Same

(b) diff^n (56%)

Block is accelerating up with $5 m/s^2$

F.B.D of Block w.r.t Pinky

$F_{net} = m\vec{a}$

$N - mg = ma$

$N = mg + ma = 4\times10 + 4\times5$

$= 40 + 20 = 60N$

Ramlal → Object is at rest w.r.t Ramlal

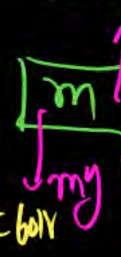
F.B.D w.r.t Ramlal

$F_{net} = 0$

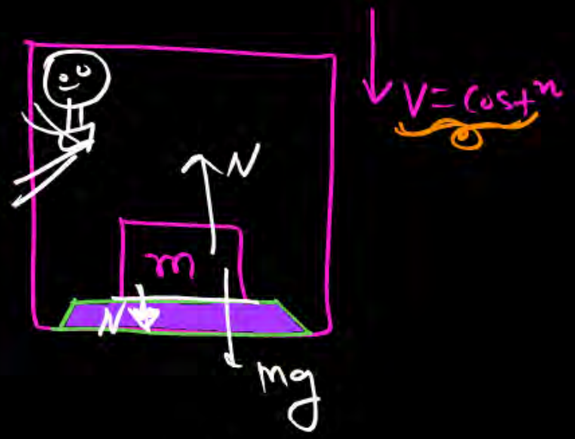
$N = mg + ma$

$= m(g+a)$

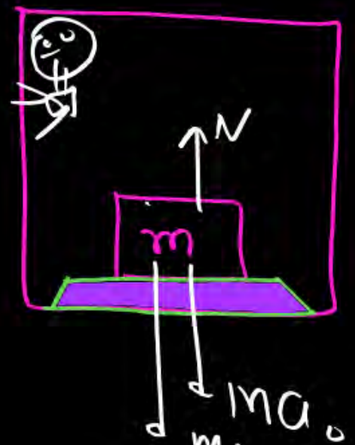
$= 4(15) = 60N$



Elevator Problem (lift) → [weighing machine] → measure normal force



$V = \text{const}^n$

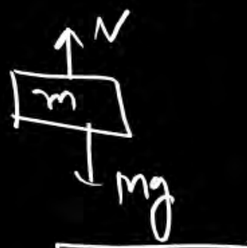


$a_{lift} = a_0$

$N + ma_0 = mg$

$N = m(g - a_0)$

Ready



$N = mg$

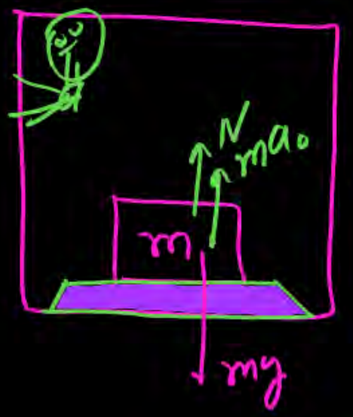
Ready of weighing

$N = mg$

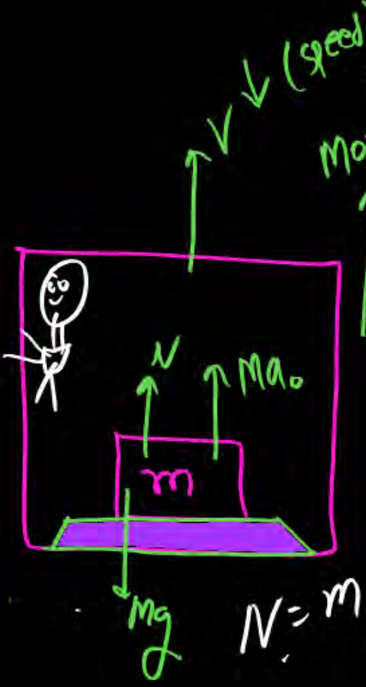
$N = m(g + a_0)$

$N = m g_{eef}$

Ready



$a_{lift} = a_0$



$N = m(g - a_0)$ A3

MR* Box

Pseudo force frame ke accn ke opposite & frame ke retardation ke dirn me lagta hai

Question likna Nahi hai

Q. A man weighs 80 kg. He stands on a weighing scale in a lift which is moving upwards with a uniform acceleration of 5 m/s^2. What would be the reading on the scale? (g = 10 m/s^2)

1. Zero
2. 400 N
3. 800 N
4. 1200 N

$N = m(g+a)$
$= 80(10+5)$

$N = mg$
$= 80[15]$
$= 1200$ N

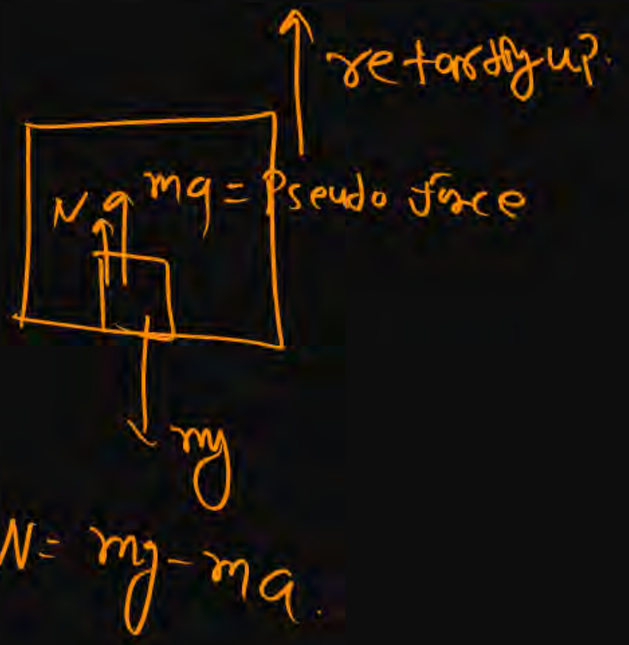
Question

A block of mass m kg is kept on a weighing machine in an elevator. If the elevator is retarding upward by a ms^{-2}, the reading of weighing machine is (in kg)

1. mg
2. $m(g-a)$ (correct in Reading in newton)
3. $m\left(1-\frac{a}{g}\right)$
4. $m(g+a)$

MRF GOY

weighing ki reading newton me Normal se equal & kg me $\left(\frac{N}{g}\right)$ hoga



$N = mg - ma$

$N = mg - ma$

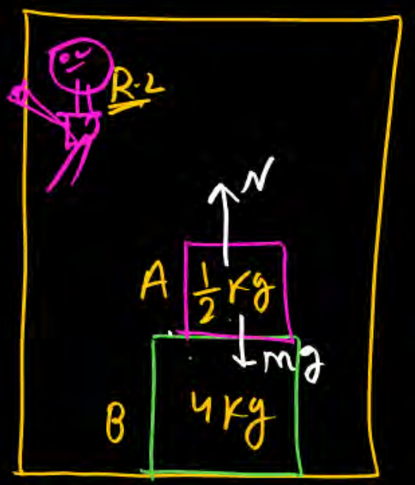
$$\text{Reading in mass} = \frac{N}{g} = \frac{mg - ma}{g}$$

$$= m - \frac{ma}{g}$$

$$= m\left(1-\frac{a}{g}\right)$$

HCV find force on A due to B

likho



$a = 2\ m/s^2$ lift

Soln w.r.t ground

$a = 2\ m/s^2$

$mg - N = ma$

$N = mg - ma$

$= m(g-a) = \frac{1}{2}(10-2) = \frac{8}{2} = 4$ Newt.

Soln w.r.t (Ramlal)

$ma + N = mg$

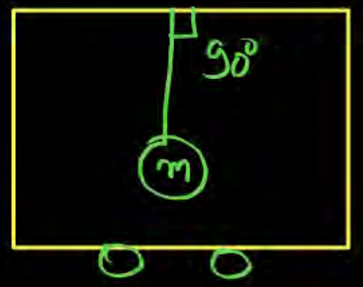
$N = mg - ma$

$= m(g-a)$

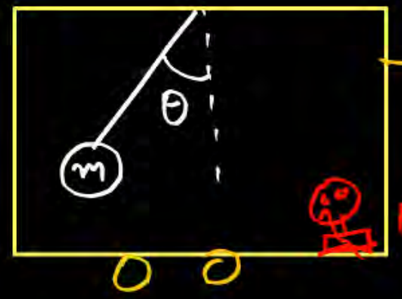
$= \frac{1}{2}(10-2)$

$= \frac{8}{2} = 4$ N

CAR is at rest. As shown in figure; if it starts accelerating a then find Angle made by string with vertical.

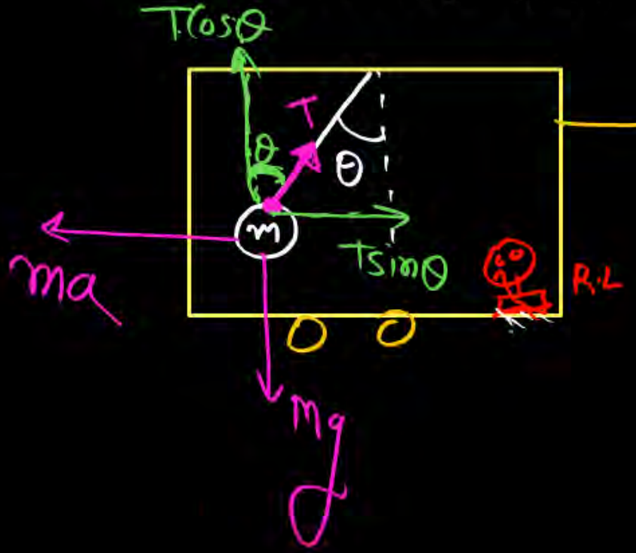


rest



$acc^n = a$

(#) F.B.D of block w.r.t. Ramlal



a

$T\sin\theta = ma$ — (i)

$T\cos\theta = mg$ — (ii)

$\frac{(i)}{(ii)}$

$\frac{T\sin\theta}{T\cos\theta} = \frac{ma}{mg}$

$\boxed{\tan\theta = \frac{a}{g}}$

$\theta = \tan^{-1}\left(\frac{a}{g}\right)$

$\tan\theta = a/g = P/B$

$H = \sqrt{P^2+B^2} = \sqrt{a^2+g^2}$

$\sin\theta = \frac{P}{H} = \frac{a}{\sqrt{a^2+g^2}}$

$\theta = \sin^{-1}\left(\frac{a}{\sqrt{a^2+g^2}}\right)$

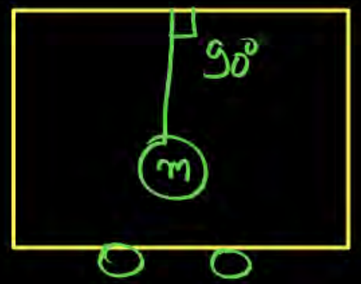
$(i)^2 + (ii)^2$

$T^2(\sin^2\theta+\cos^2\theta) = (ma)^2 + (mg)^2$

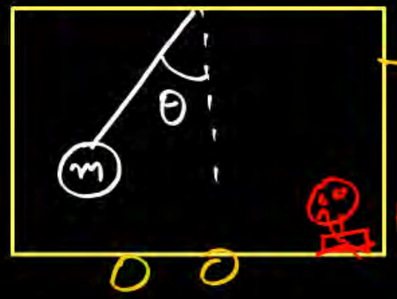
$T^2 = m^2(a^2+g^2)$

$T = m\sqrt{a^2+g^2}$

CART/ CAR is at rest. As shown in figure; if it starts accelerating a then find Angle made by string with vertical.



rest



$acc^n = a$

w.r.t ground

$acc^n = a$

in x-axis

$F_{net} = ma$

$T\sin\theta = ma \quad -(1)$ *

$\Sigma F_y = 0$

$T\cos\theta = mg \quad -(11)$ *

Same as Page

$\tan\theta = \frac{a}{g}$ *

Question

नहीं लौटना

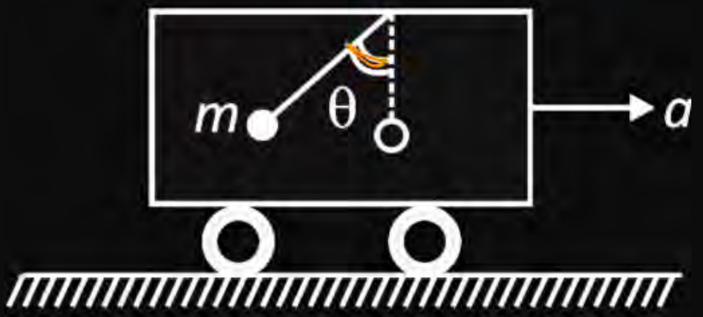
A small metallic sphere of mass m is suspended from the ceiling of a car accelerating on a horizontal road with constant acceleration a. The tension in the string attached with metallic sphere is

1. mg
2. $m(g + a)$
3. $m(g - a)$
4. $m\sqrt{g^2 + a^2}$

Ans

Question

If trolley accelerates horizontally with acceleration a then bob is displaced backward from its initial vertical position. The angular deflection of the bob in equilibrium is



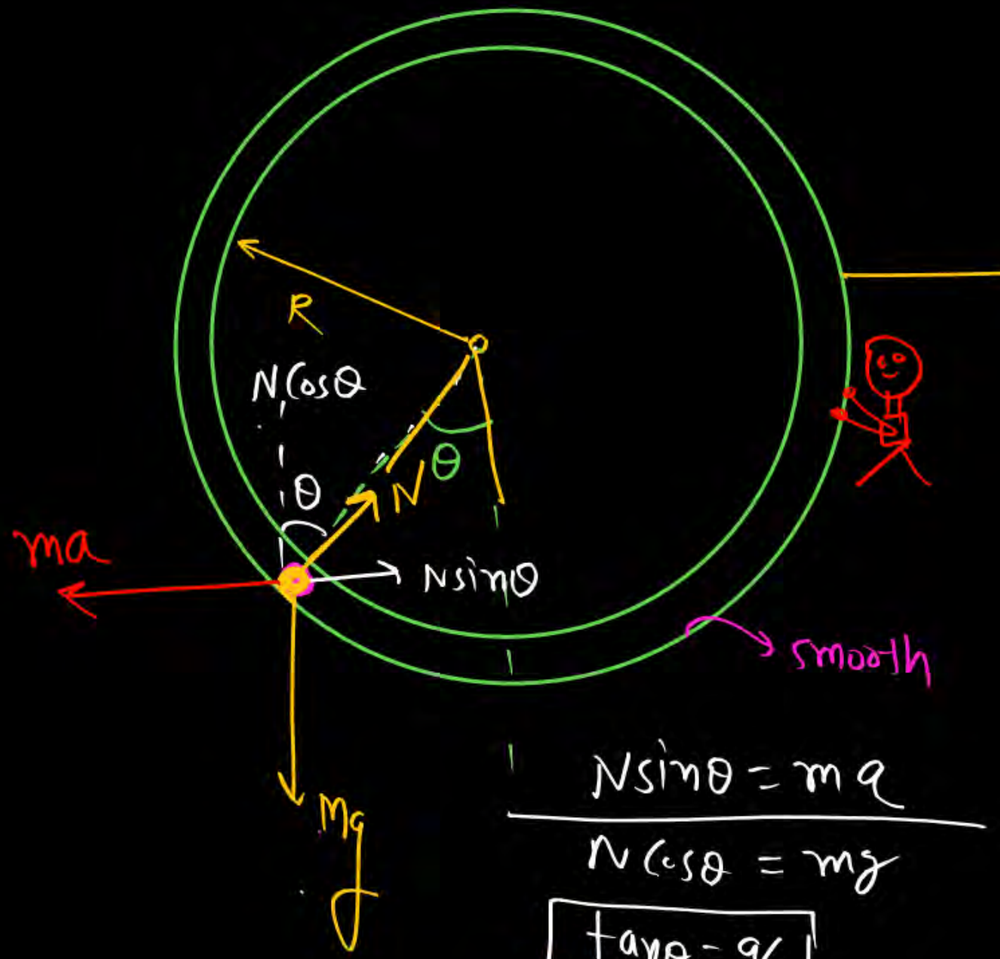
1. $\theta = \cos^{-1}\left(\frac{a}{g}\right)$
2. $\theta = \sin^{-1}\left(\frac{a}{g}\right)$
3. $\theta = \cot^{-1}\left(\frac{a}{g}\right)$
4. $\theta = \tan^{-1}\left(\frac{a}{g}\right)$

$\tan\theta = \frac{a}{g}$

$\sin\theta = \frac{a}{\sqrt{a^2+g^2}}$

(Q) A smooth vertical loop is accelerating then Find Angle made by Ball with vertical.

likha hai



(a) Back side

(b) wahi rega ✗

(c) front side Jayga

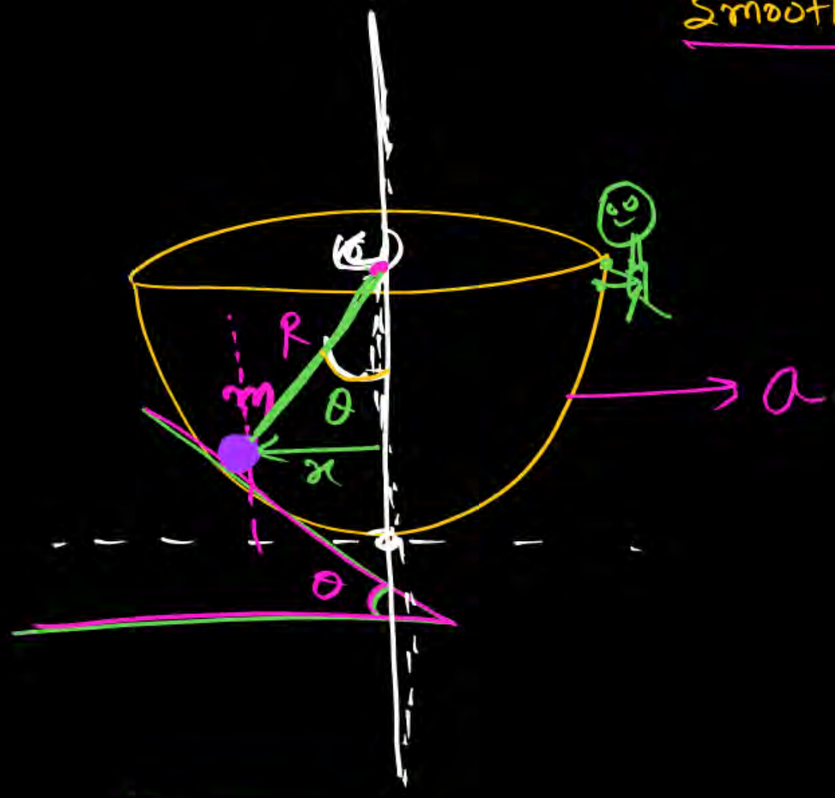
$$N\sin\theta = ma$$

$$N\cos\theta = mg$$

$$\# \quad \tan\theta = a/g$$

Smooth hemisphere is accelerating with a in x-axis.

Radius of sphere = R



$$\tan\theta = \frac{a}{g}$$

Same as last

Target-2

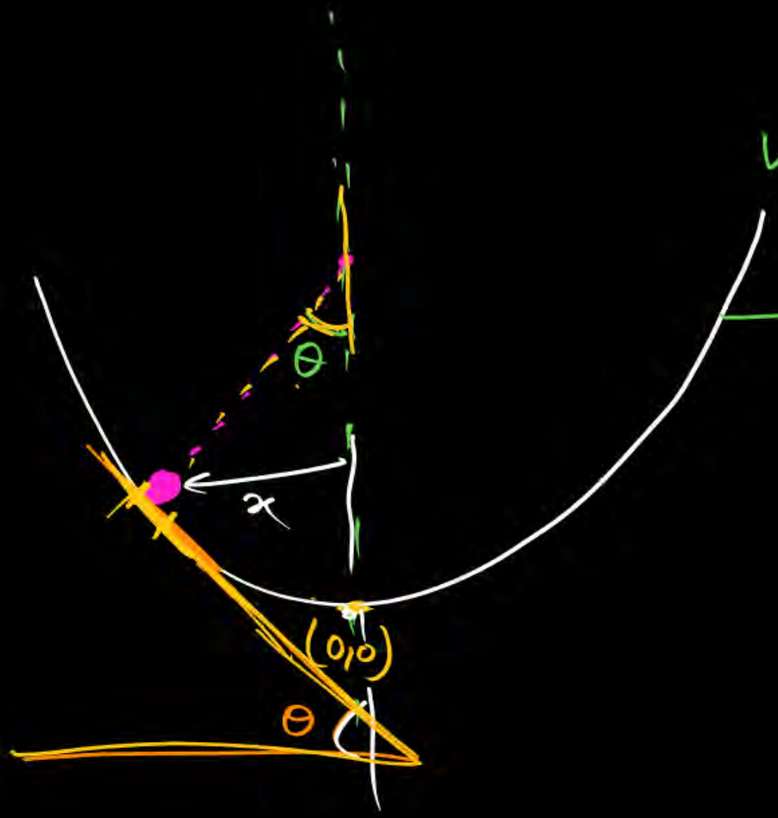
Position of Ball from Y-axis

$$\sin\theta = \frac{x}{R}$$

$$x = R\sin\theta$$

$$= R\left(\frac{a}{\sqrt{a^2+g^2}}\right)$$

AB



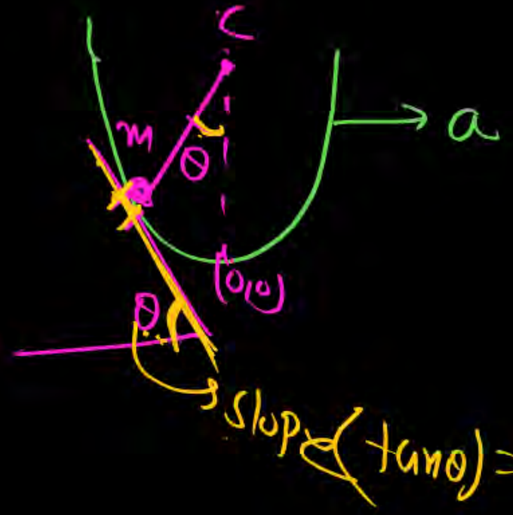
Wire of eqn $y = kx^2$ (Parabolic wire)

$\rightarrow$ acc^n = a

then find dist^n of ball from y-axis at equilibrium

$$\tan\theta = a/g \quad -(1)$$ done

Slope at a Point $\tan\theta = \frac{dy}{dx}$ ✓



IIT Advance

dist^n of Ball from Y axis $\rightarrow$ $x = \frac{a}{2kg}$

$$\tan\theta = \frac{d\,kx^2}{dx}$$

$$\frac{a}{g} = k\frac{dx^2}{da}$$

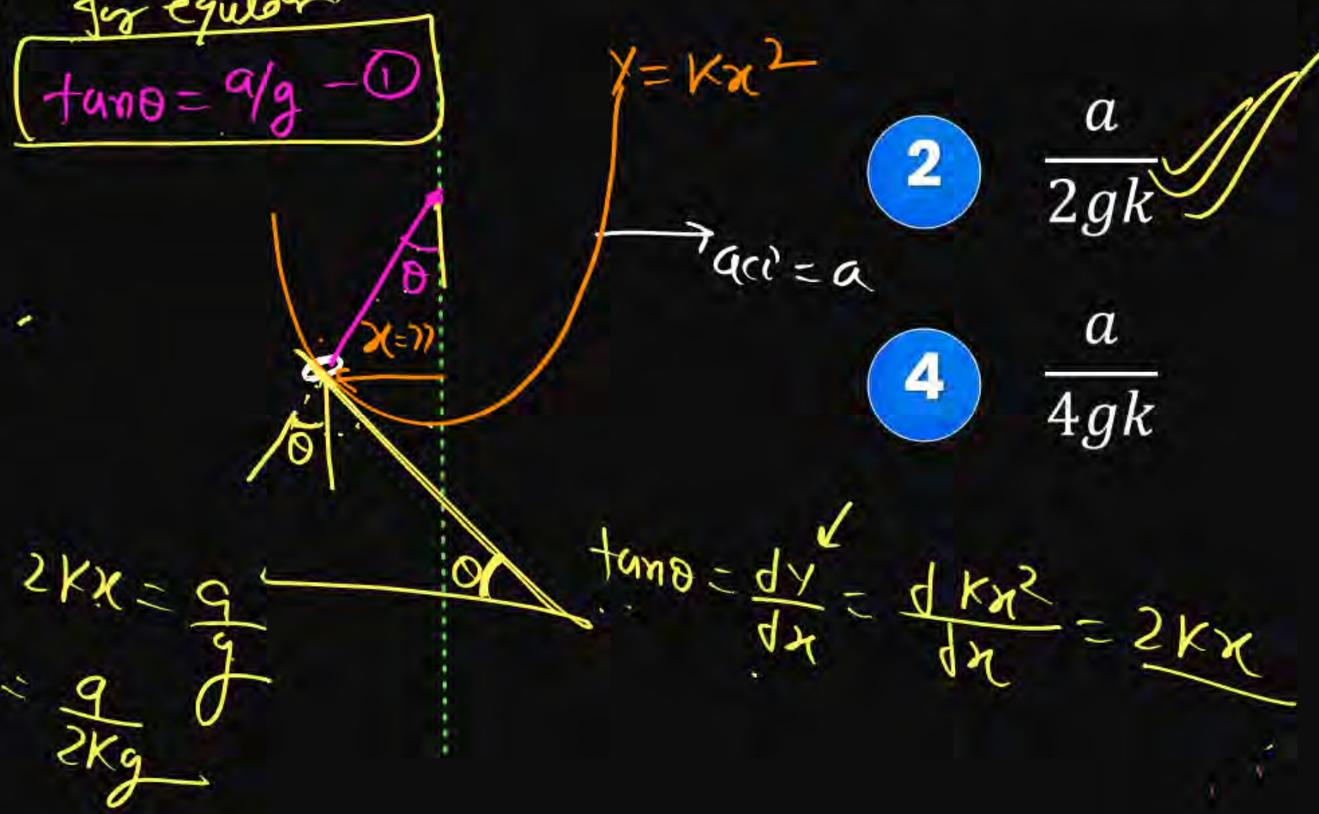
$$\frac{a}{g} = k2x$$

Question

A piece of wire is bent in the shape of a parabola $y = kx^2$ (y-axis vertical) with a bead of mass m on it. The bead can slide on the wire without friction. It stays at the lowest point of the parabola when the wire is at rest. The wire is now accelerated parallel to the x-axis with a constant acceleration a. The distance of the new equilibrium position of the bead, where the bead can stay at rest with respect to the wire, from the y-axis is:

[IIT-JEE Adv 2009]

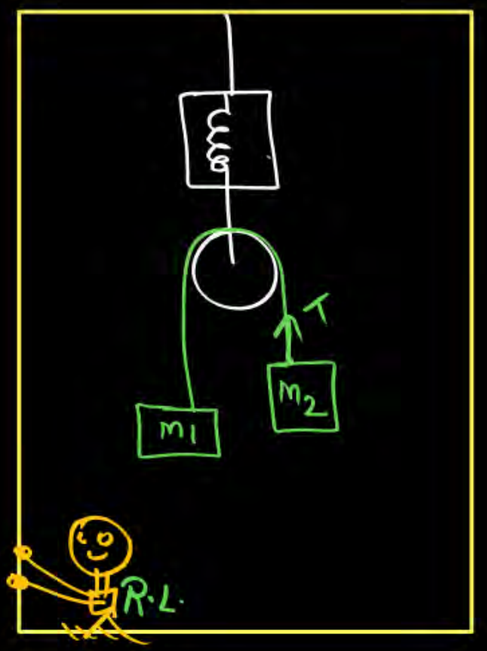
1. $\frac{a}{gk}$
2. $\frac{a}{2gk}$
3. $\frac{2a}{gk}$
4. $\frac{a}{4gk}$

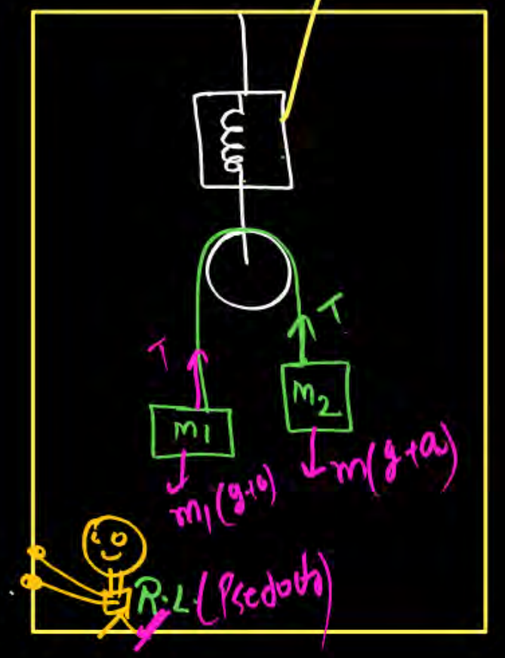


HCV

Pully Block – System in a lift

Find Tension in wire & Spring Reading.





$$T = \frac{2m_1m_2}{m_1+m_2}(g+a)$$

$$T = \frac{2m_1m_2}{m_1+m_2}(g+a_0)$$

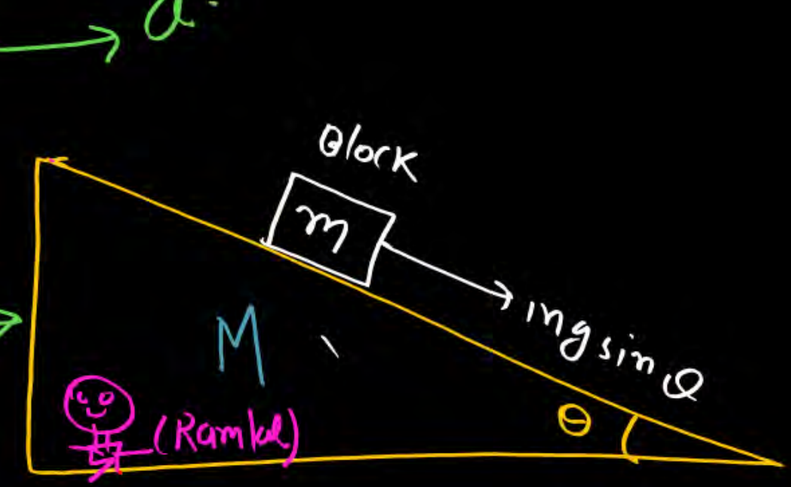
NEET

Smooth Inclined plane; then find acc^n of Inclined plane so that block of mass m does not slide of Inclined plane.

$ma\sin\theta + mg\cos\theta$

$$N = ma\sin\theta + mg\cos\theta = \frac{mg}{\cos\theta}$$

Put $a = g\tan\theta$ then solve



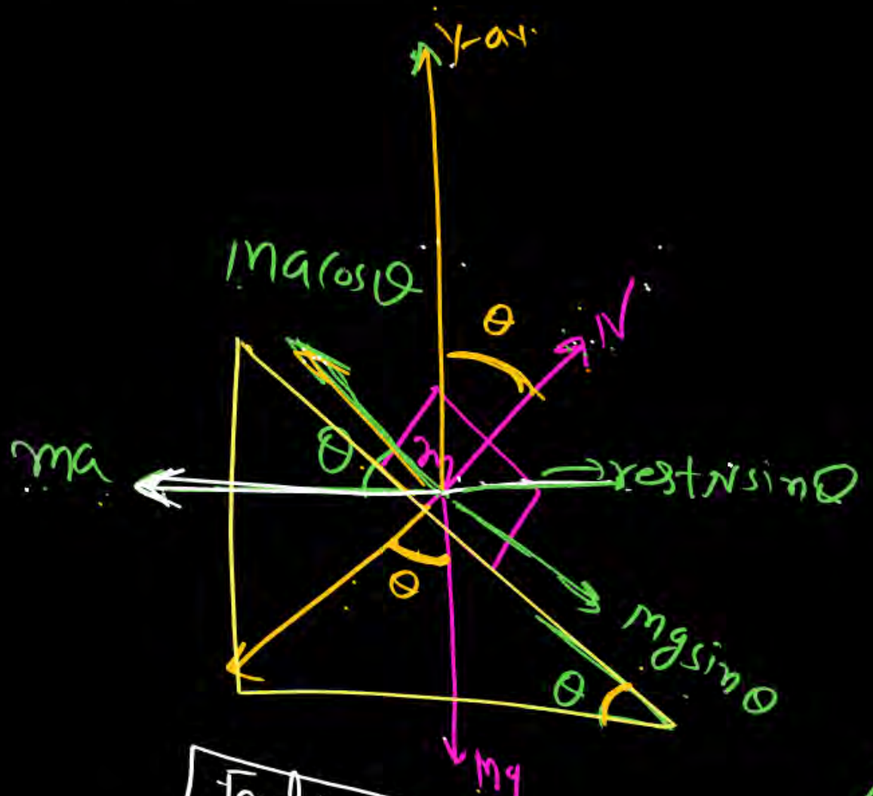
aloy Inclined) then

$F_{net} = 0$ (aloy Incled)

$mg\sin\theta = ma\cos\theta$

$$a = g\sin\theta/\cos\theta = g\tan\theta$$

for Normal



Fnet in y-axis = 0

$N\cos\theta = mg$

As $N = \frac{mg}{\cos\theta} = mg\sec\theta$

$\Sigma F_x = 0$ w.r.t Raml

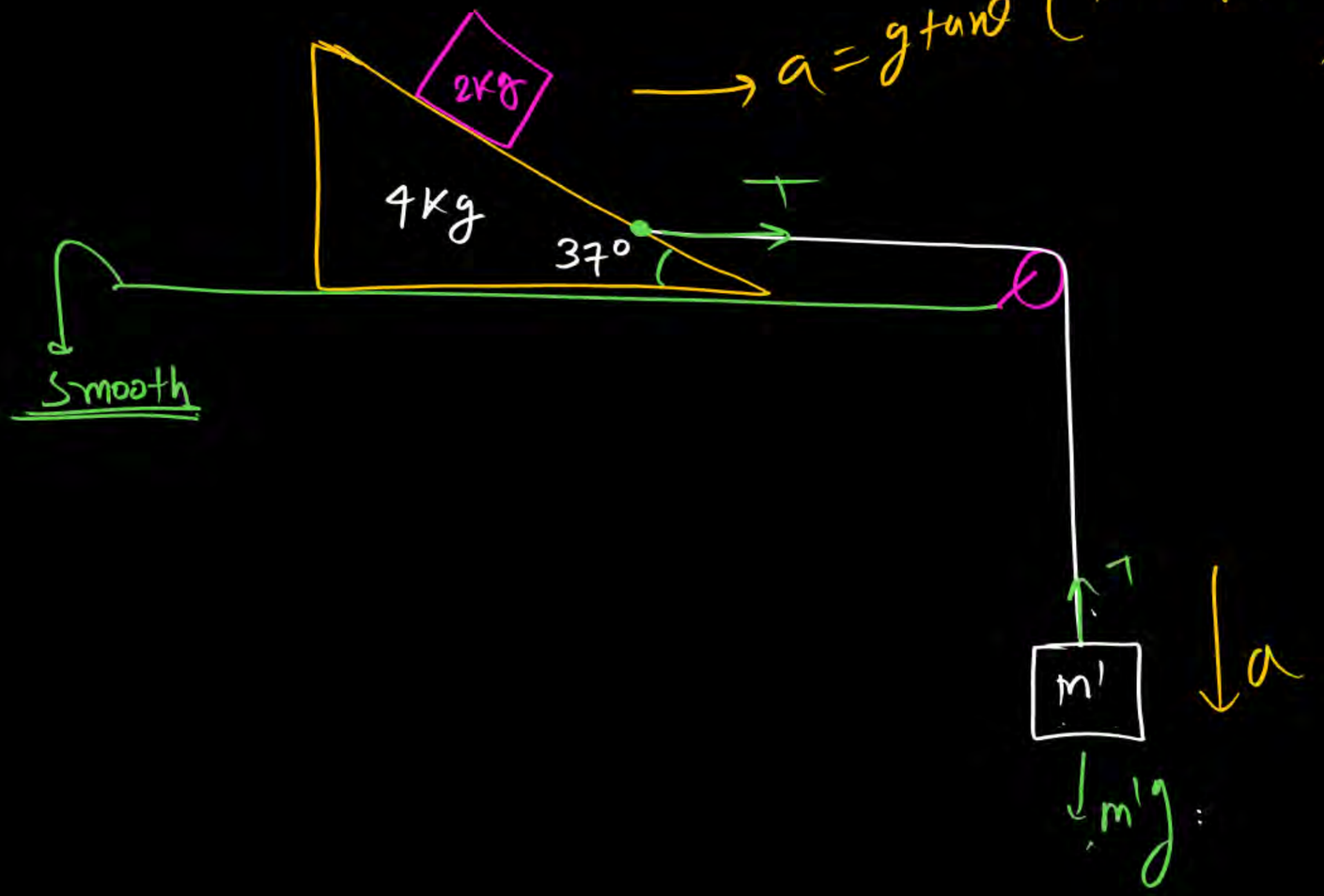
$N\sin\theta = ma$

$N = \frac{mg\tan\theta}{\sin\theta} = \frac{mg\sin\theta}{\cos\theta\sin\theta}$

$= \frac{mg}{\cos\theta}$

find value of m' so that Block of mass (2kg) does not slide on smooth Inclined Plane.

H.C. verma



$\longrightarrow a = g\tan\theta$ (Iss slide ki condn)

$$a = \frac{m'g}{(4+2+m')} = g\tan\theta$$

$$\frac{m'}{6+m'} = \tan 37^\circ = \frac{3}{4}$$

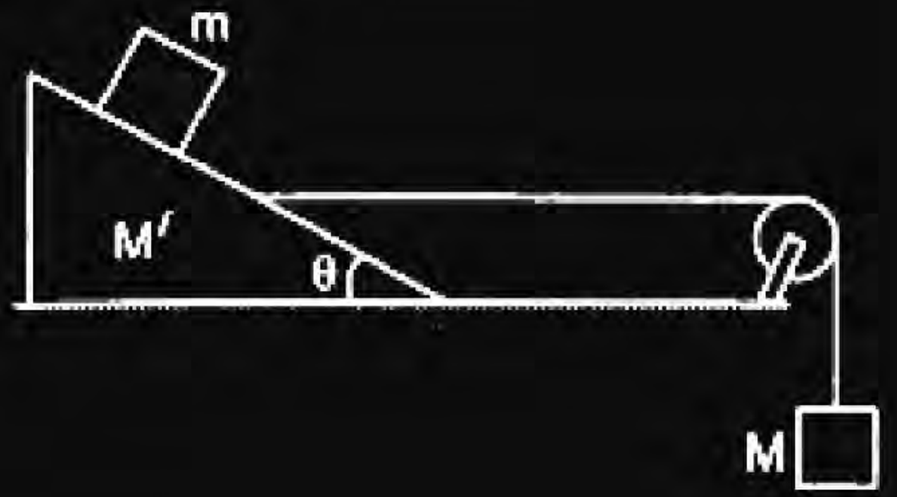
$$4m' = 18 + 3m'$$

$$4m' - 3m' = 18$$

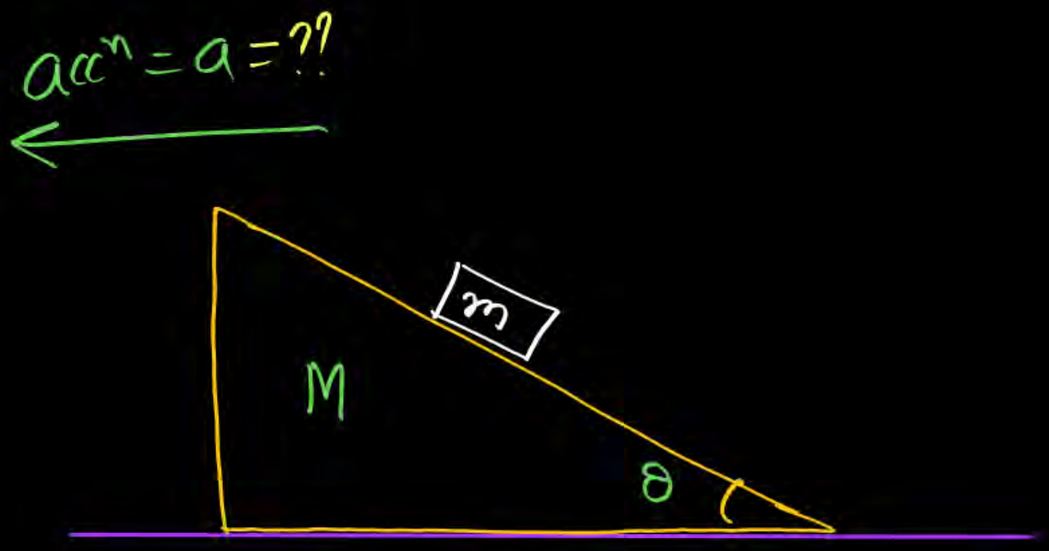
$$\boxed{m' = 18\,kg}$$

Question

Find the mass M of the hanging block in figure which will prevent the smaller block from slipping over the triangular block. All the surfaces are frictionless and the strings and the pulleys are light.



find acceleration of wedge so that block will free fall.



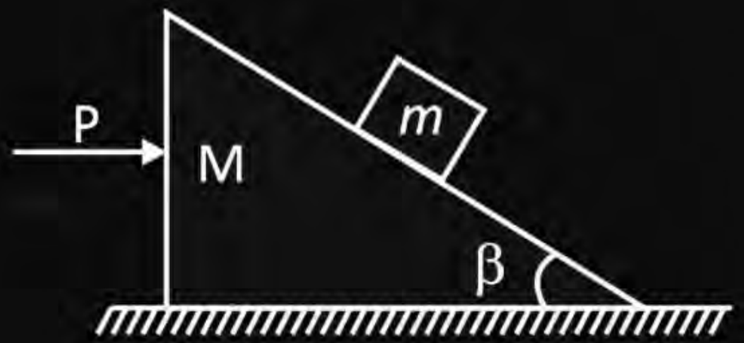
N = 0
Contact force

a = g(0) = 0

Question

H/W

A block of mass m, is kept on a wedge of mass M, as shown in figure such that mass m remains stationary w.r.t. wedge. The magnitude of force P is



1. $g \tan \beta$
2. $mg \tan \beta$
3. $(m + M)g \tan \beta$
4. $mg \cot \beta$

Question

A block of mass m is placed on a smooth wedge of inclination θ. The whole system is accelerated horizontally so that the block does not slip on the wedge. The force exerted by the wedge on the block (g is acceleration due to gravity) will be

1. $mg \cos \theta$
2. $mg \sin \theta$
3. mg
4. $mg/\cos \theta$

Question

H/W

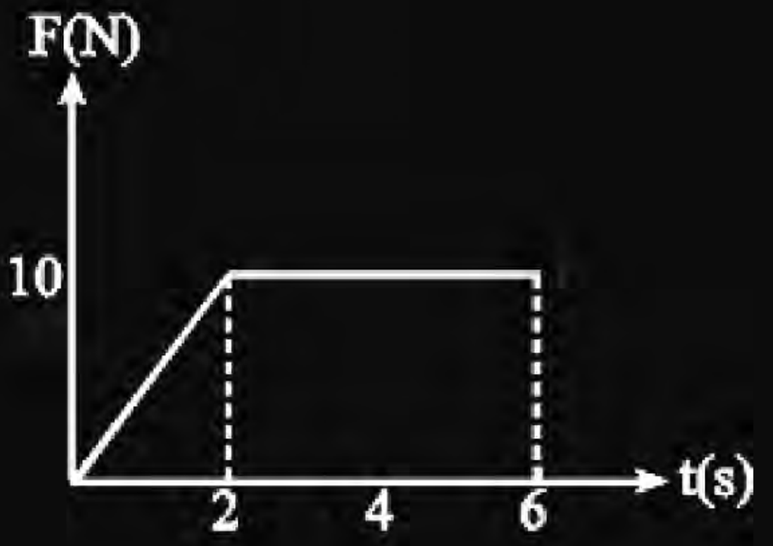
A cricketer catches a ball of mass 150 g in 0.1 s moving with speed 20 m/s, then the experiences force of

1. 300 N
2. 30 N
3. 3 N
4. 0.3 N

Question

H/W

A body of mass 3 kg is acted on by a force which varies as shown in the graph below. The momentum acquired is given by:



1. Zero
2. 5 N-S
3. 30 N-S
4. 50 N-S

Question

H/W

The momentum p (in kg/m) of a particle is varying with time t (in s) as $p = 2 + 3t^2$. The force acting on the particle at $t = 3$ s will be

1. 18 N
2. 54 N
3. 9 N
4. 15 N

Question

A force $\vec{F} = (2t\hat{\imath} + 3t^2\hat{\jmath})N$ acts on an object moving in xy plane. Find magnitude of change in momentum of the object in time interval $t = 0$ to $t = 2$s.

Rapid Test

Notes में H/W
marked hai
wo Karna hai

THANK YOU