DINÁMICA

ESTUDIA EL MOVIMIENTO DE LOS CUERPOS, CONSIDERANDO LA CAUSA QUE LO GENERA.

SEGUNDA LEY DE NEWTON

(LEY DE LA ACELERACIÓN O FUERZA)

LA ACELERACIÓN ES DIRECTAMENTE PROPORCIONAL A LA FUERZA RESULTANTE E INVERSO CON LA MASA.

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

$$\rightarrow \vec{F}_R = m\vec{a}$$

$\vec{F}_R$: FUERZA RESULTANTE (N)

m: MASA (kg)

$\vec{a}$: ACELERACIÓN (m/s^2)

ÉLITE CLASS VIRTUAL

Dinámica lineal

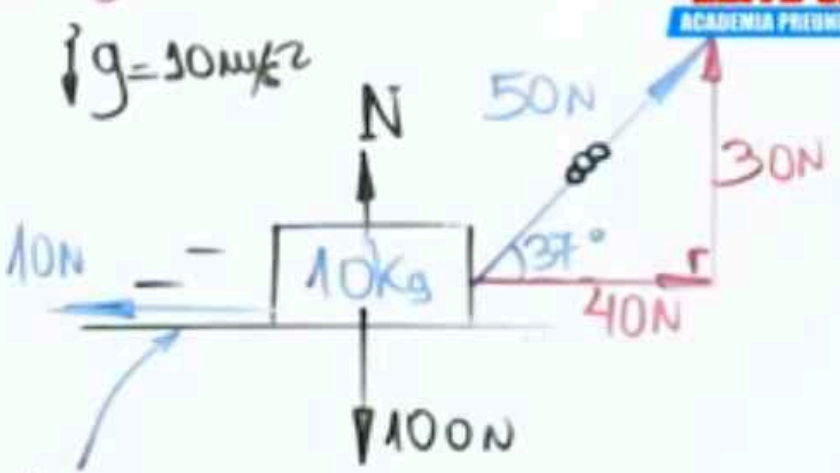
Estudia la segunda ley de Newton en trayectorias rectilíneas.

$$\vec{F}_R = m\vec{a}$$

Forma Práctica

$$\vec{F}_R = \sum F_{\text{A favor del mov.}} - \sum F_{\text{contra el mov.}}$$

Ejemplo: $a = ?$



$$\vec{F}_R = m\vec{a}$$

$$40 - 10 = 10 \cdot a$$

$$a = 3\ m/s^2$$

Dinámica Circular

Estudia la segunda ley de Newton en trayectorias circulares.

$$\vec{F}_{cp} = m\vec{a}_{cp}$$

Forma Practica

$$F_{cp} = \sum F_{\text{Al centro}} - \sum F_{\text{Salen del centro}}$$

Nota:

$$a_c = \frac{V_{Tan}^2}{R} \; ; \; a_{cp} = \omega^2 \cdot R$$

S.I

V_{Tan} (m/s) ; ω (rad/s)

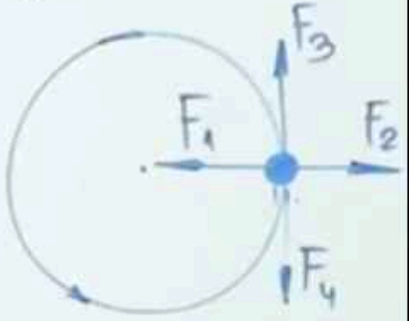
R (m)

$$\vec{F}_{Tan} = m\vec{a}_T$$

Forma Practica

$$F_{Tan} = \sum F_{\text{A favor del mov. tang.}} - \sum F_{\text{Contra el mov. tang.}}$$

Ejemplo:



$$F_{cp} = F_1 - F_2$$

$$F_{Tan} = F_3 - F_4$$

ÉLITE CLASS VIRTUAL

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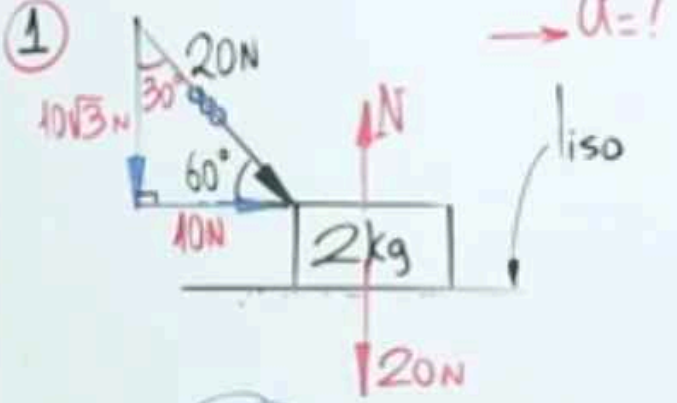
1

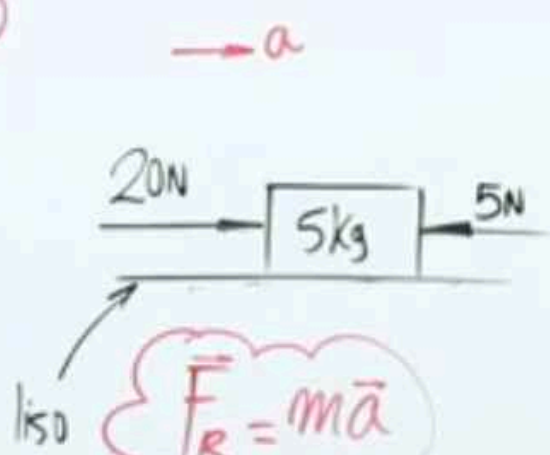


$F_R = ma$

$10 = 2.a$

$(a = 5\,m/s^2)$

2

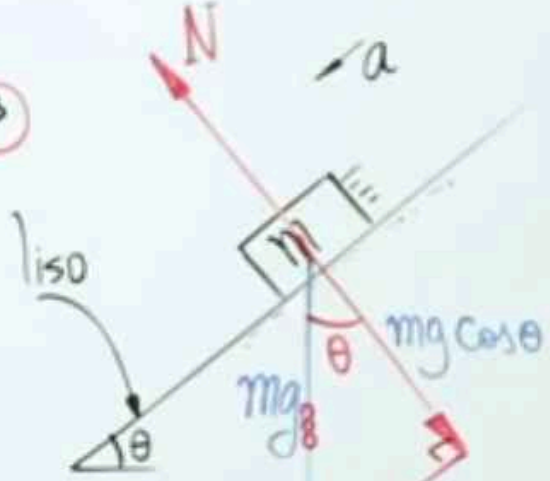


$\vec{F}_R = m\vec{a}$

$20 - 5 = 5.a$

$a = 3\,m/s^2$

3



$\vec{F}_R = m\vec{a}$

$mg\,Sen\theta = ma \rightarrow (a = g\,Sen\theta)$

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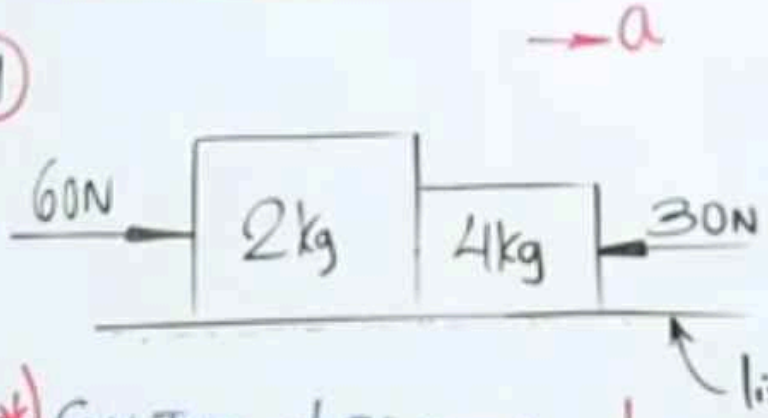
ÉLITE CLASS ACADEMIA PREUNIVERSITARIA

④



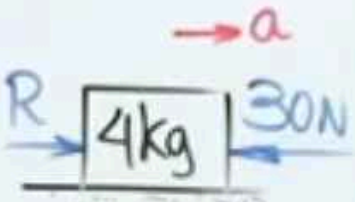
*) CON TODO EL SISTEMA

$\vec{F}_{TOTAL} = m_{TOTAL} \cdot \vec{a}$

$60 - 30 = (2+4).a$

$a = 5 m/s^2$

*)



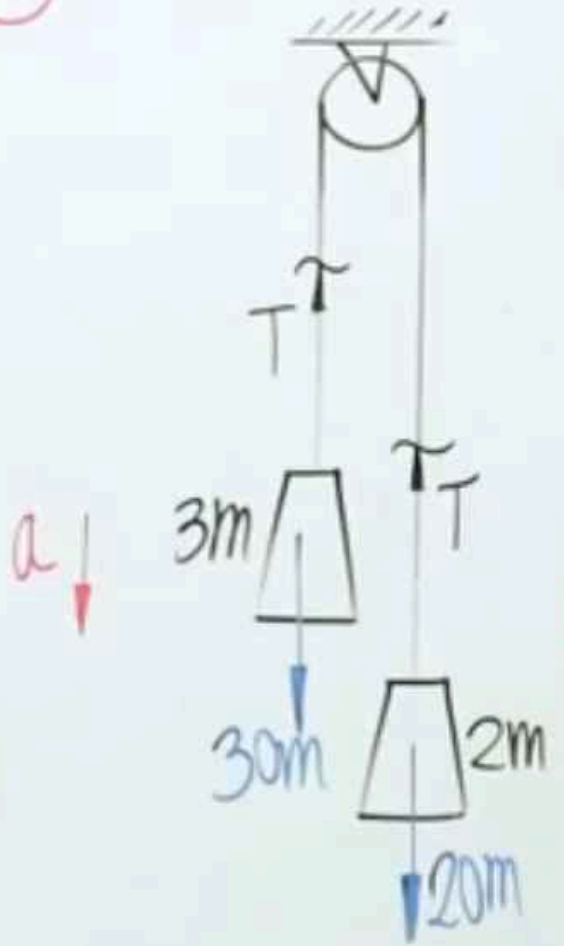
$F_R = ma$

$R - 30 = 4(5)$

$R = 50N$

⑤

$g = 10 m/s^2$



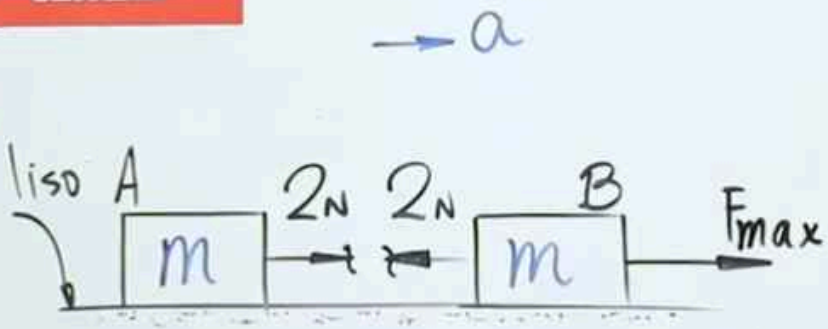
$F_R = ma$

$+\begin{cases} 30m - T = 3ma \\ T - 20m = 2ma \end{cases}$

$10m = 5ma$

$a = 2 m/s^2$

⑥



BLOQUE "A":

$(F_R = ma)$

$2 = ma$ —— (1)

BLOQUE "B"

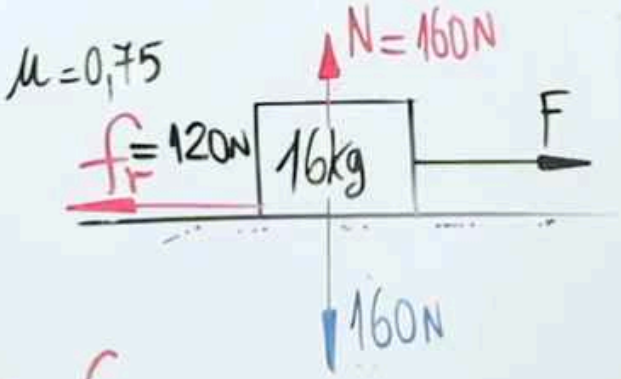
$(F_R = ma)$

$F_{max} - 2 = ma$

$F_{max} - 2 = 2$

$(F_{max} = 4N)$

⑧



*) $f_r = \mu N = 0{,}75(160) = 120N$

*) $(F_R = ma)$

$F - 120 = 16(5)$ → $(F = 200N)$

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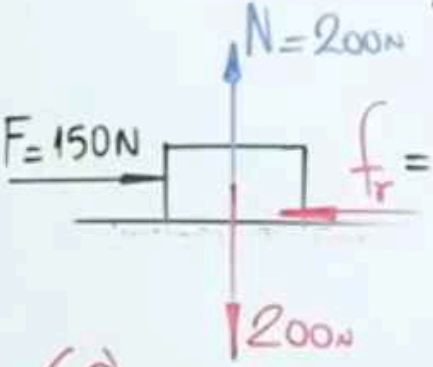
$\mu \begin{cases} 0,8 = \mu_e \\ 0,5 = \mu_c \end{cases}$



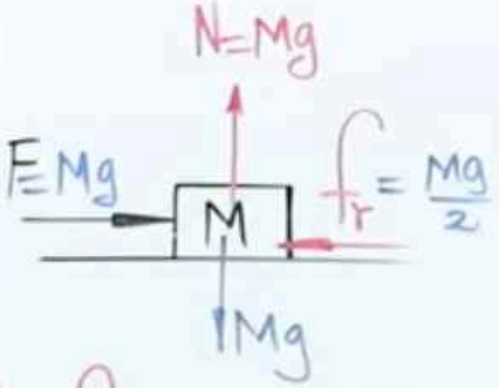
$(f_r)_{max} = f_e = \mu_e N = 0,8(200)$

$= 160N$

$\rightarrow F < f_e$ (Reposo) Equilibrio

$\therefore 0 \leq f_r \leq f_e$

11



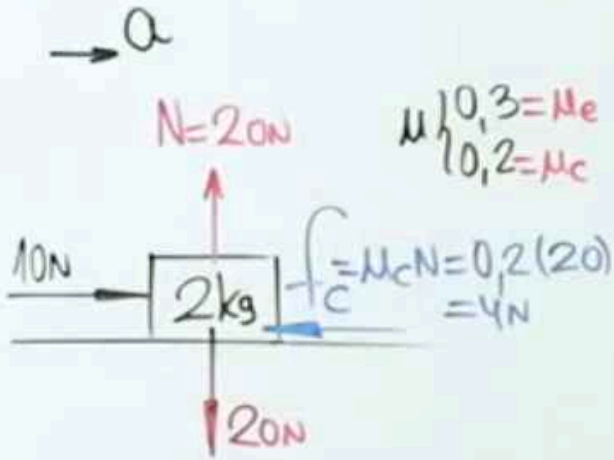
*) $f_r = \mu N = \frac{1}{2}(Mg) = \frac{Mg}{2}$

*) $F_R = ma$

$Mg - \frac{Mg}{2} = M.a$

$a = \frac{g}{2}$ //

12



$\mu \begin{cases} 0,3 = \mu_e \\ 0,2 = \mu_c \end{cases}$

✓ $f_e = \mu_e N = 0,3(20) = 6N < 10N$

✓ $F_R = ma$

$10 - 4 = 2a$

$a = 3m/s^2$

✓ $V_F = V_o + at$

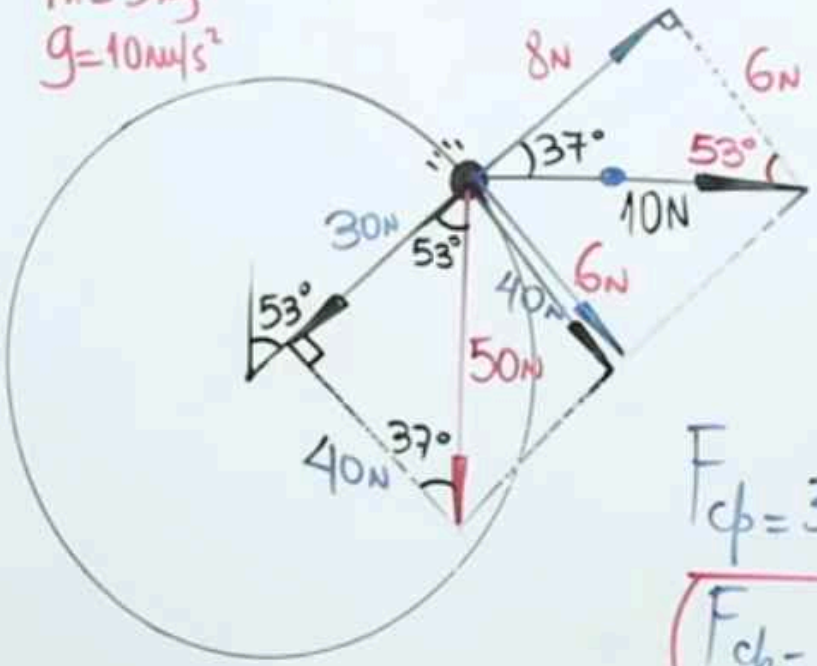
$V_F = 0 + 3(5)$

$V_F = 15m/s$

13

$m = 5kg$

$g = 10 m/s^2$



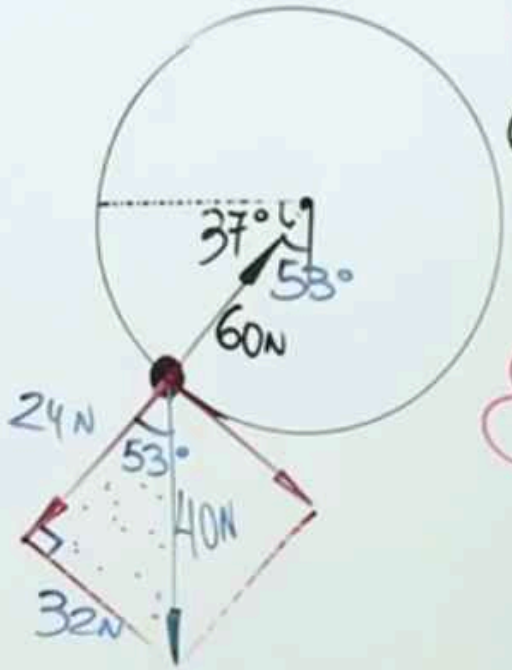
$F_{cp} = 30 - 8$

$F_{cp} = 22N$

14

$m = 4kg$; $V = ?$

$R = 4m$



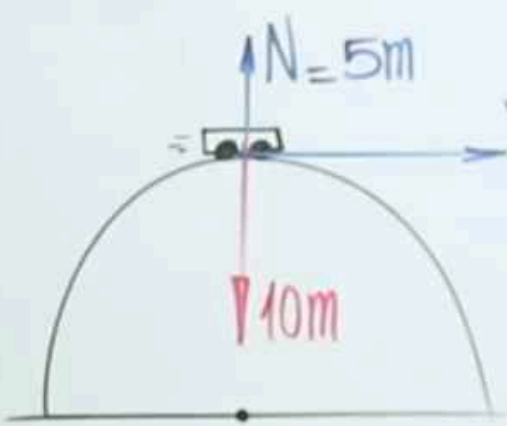
$F_{cp} = m a_{cp}$

$60 - 24 = 4 \cdot \frac{V^2}{R}$

$36 = \frac{4 \cdot V^2}{4}$

$V = 6 m/s$

15



$$F_{cp} = m a_{cp}$$

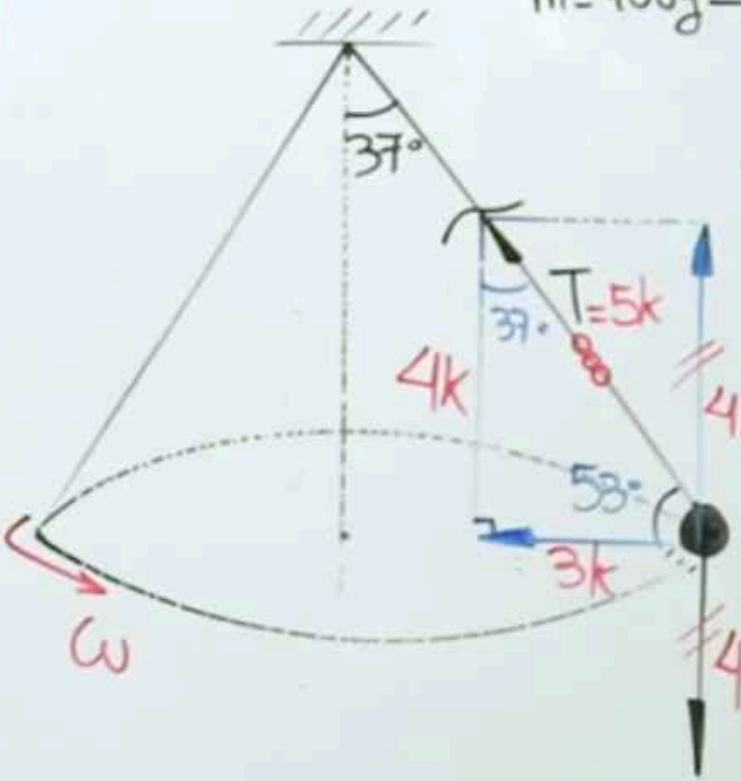
$$10m - 5m = m \cdot \frac{V^2}{R}$$

$$5 = \frac{V^2}{180}$$

$$\boxed{V = 30\,m/s}$$

16

$$m = 400g = 0{,}4kg$$



$$\Sigma F_y = 0$$

$$4k = 4$$

$$\boxed{k = 1}$$

$$\therefore$$

$$T = 5k$$

$$T = 5(1)$$

$$T = 5N$$

ÉLITE CLASS VIRTUAL

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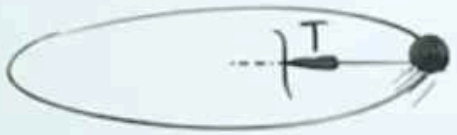
18 $m = 0{,}5kg$; $R = 0{,}8m$; $P = 0{,}4s$



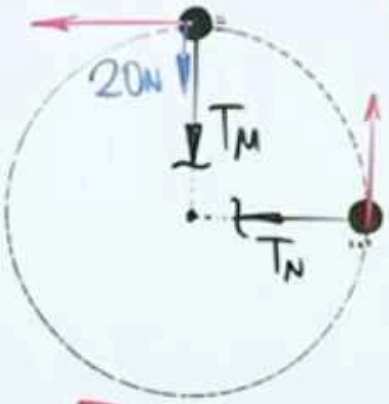
*) $\omega = \frac{2\pi}{P} = \frac{2\pi}{0{,}4} = 5\pi \text{ rad/s}$

*) $F_{cp} = m a_{cp}$

$T = m.(\omega^2 R)$

$T = \frac{1}{2}.(25\pi^2)(0{,}8) = 10\pi^2 N$

19 $V_M = 6m/s$; $m = 2kg$; $R = 3m$



N: $F_{cp} = m a_{cp}$

$T_N = 2.\frac{V_N^2}{R}$

$T_N = \frac{2(3)^2}{3} = 6N$

M: $F_{cp} = m a_{cp}$

$T_M + 20 = 2.\frac{V_M^2}{R}$

$T_M + 20 = \frac{2.(6)^2}{3} \rightarrow \boxed{T_M = 4N}$

21 ✓ $m = 1kg$

$+ \begin{cases} \vec{F}_1 = (7\hat{i} - 5\hat{j} + 9\hat{k})N \\ \vec{F}_2 = (-3\hat{i} + 3\hat{j} - 5\hat{k})N \end{cases}$,

✓ $\vec{F}_R = \vec{F}_1 + \vec{F}_2$

$\vec{F}_R = (4\hat{i} - 2\hat{j} + 4\hat{k})N$

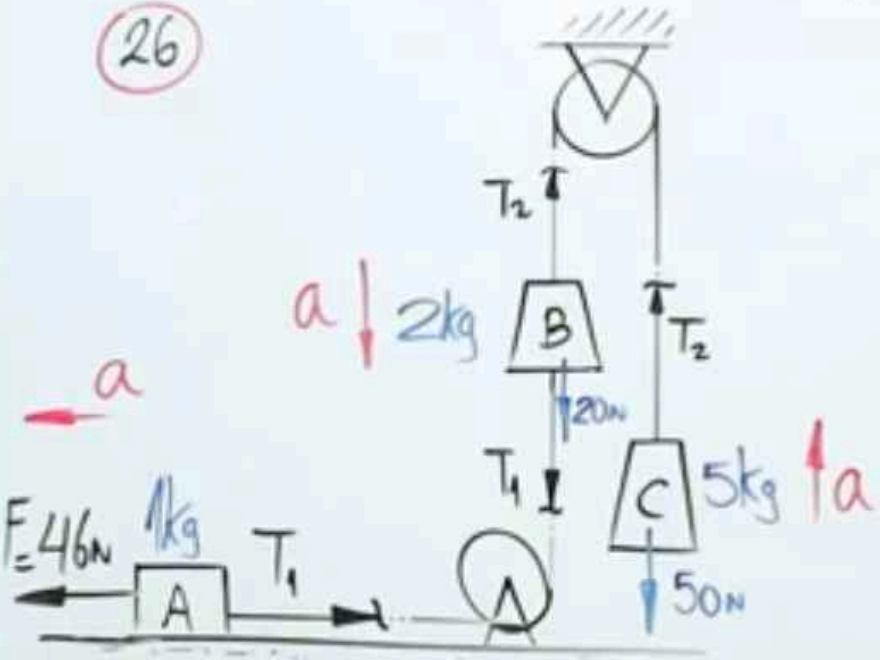
✓ $|\vec{F}_R| = \sqrt{(4)^2 + (-2)^2 + (4)^2}$

$F_R = \sqrt{16 + 4 + 16} = 6N$

✓ $F_R = ma \rightarrow 6 = 1.a \rightarrow \boxed{a = 6\frac{m}{s^2}}$

$m_C = 2{,}5 m_B = 5 m_A = 5kg$

26



$F_R = ma$

$46 - T_1 = 1a$ — A

$+ \quad T_1 + 20 - T_2 = 2a$ — B

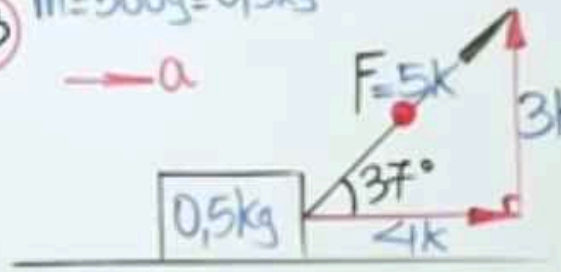
$T_2 - 50 = 5a$ — C

$16 = 8a$

$a = 2 m/s^2$

23

$m = 500g = 0{,}5kg$



$V_0 = 0$

$d = 9m$

$t = 3s$

$d = V_0 t + \frac{1}{2} a t^2$

$9 = \frac{1}{2} a (9)$

$a = 2 m/s^2$

$F_R = ma$

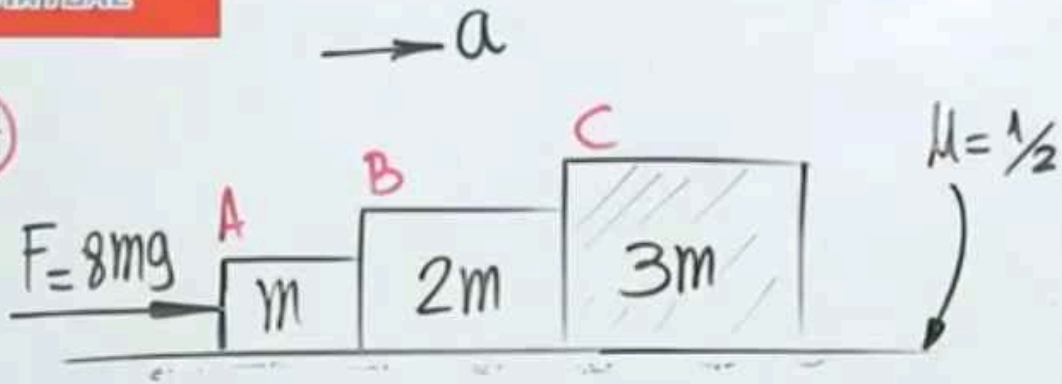
$4k = 0{,}5(2)$

$k = 1/4$

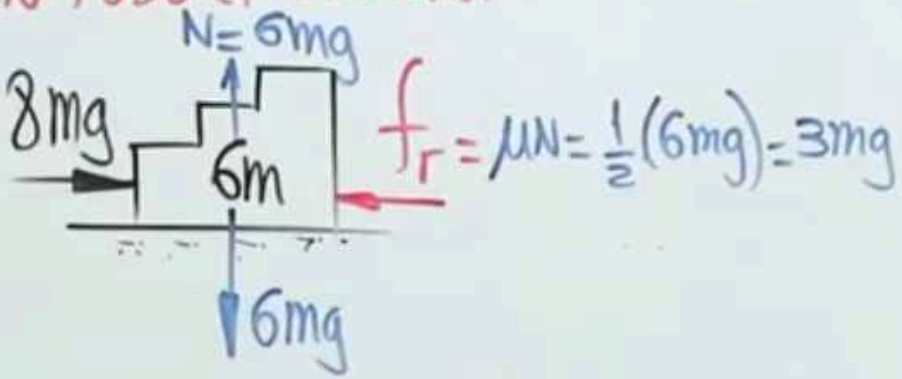
$\therefore F = 5k = \frac{5}{4} N$

$F = 1{,}25N$

(27)



CON TODO EL SISTEMA

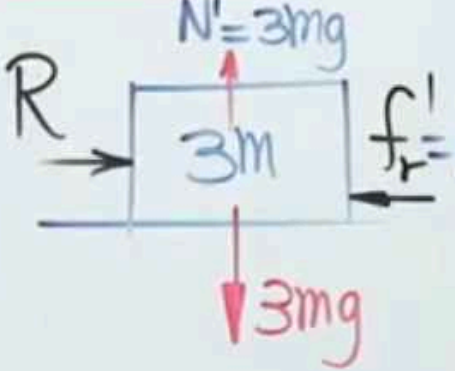


$F_R = ma$

$8mg - 3mg = 6m \cdot a$

$a = \frac{5g}{6}$

BLOQUE "C"



$F_R = ma$

$R - \frac{3mg}{2} = 3m\left(\frac{5g}{6}\right)$

$R = \frac{5mg}{2} + \frac{3mg}{2}$

$\boxed{R = 4mg}$