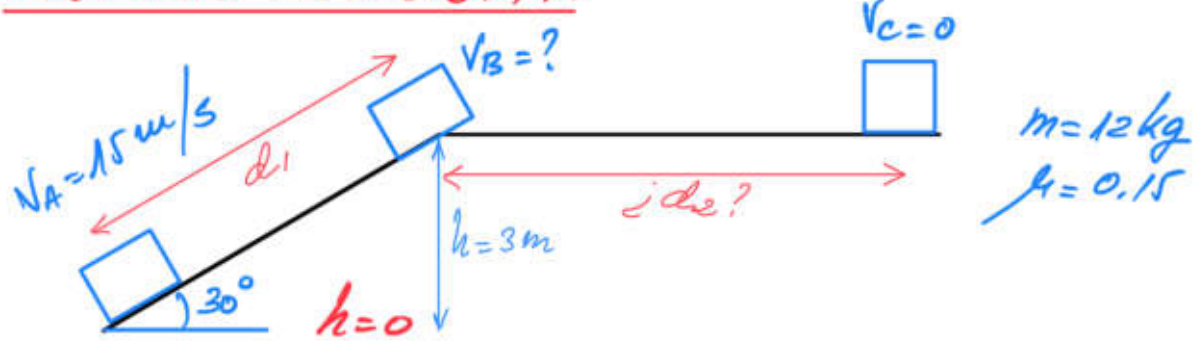
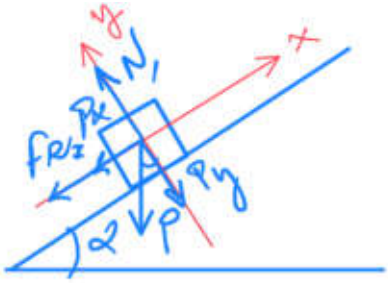
EJERCICIO FQ1BE2797:



a) Espacio d_2?

Pendiente hasta resolver cuestiones necesarias previas.

b) Aceleración en el plano inclinado:



$P_x = m g \operatorname{sen}\alpha$

$P_y = m g \cos\alpha$

$\Sigma F_y = 0$

$N_1 - P_y = 0 \Rightarrow N_1 = P_y$

$\Sigma F_x = m \cdot a_I$

$-F_{R_I} - P_x = m \cdot a_I$

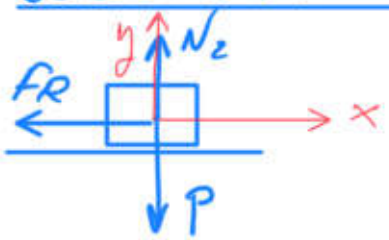
$-\mu \cdot N_1 - m g \operatorname{sen}\alpha = m \cdot a_I$

$-\mu \cdot m g \cos\alpha - m g \operatorname{sen}\alpha = m \cdot a_I$

$a_I = -0,15 \cdot 9,8 \cdot \cos 30 - 9,8 \cdot \operatorname{sen} 30$

$a_I = -1,27 - 4,9 \Rightarrow \boxed{a_I = -6,17\ m/s^2}$

c) Aceleración en el plano horizontal:



$\Sigma F_y = 0$

$N_2 - P = 0$

$N_2 = P = m \cdot g$

$\Sigma F_x = m \cdot a_H$

$-f_R = m \cdot a_H$

$-\mu \cdot N_2 = m \cdot a_H$

$-\mu \cdot mg = m \cdot a_H$

$a_H = -\mu \cdot g =$

$= -0,15 \cdot 9,8 =$

$$\boxed{a_H = -1,47 \ m/s^2}$$

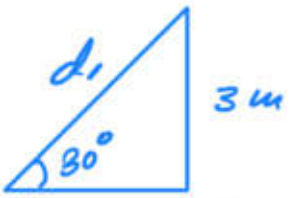
d) Velocidad final en el plano inclinado: $¿V_3?$

POR CINEMÁTICA

$V_0 = 15 \ m/s$

$a = -6,17 \ m/s^2$

$S = d_1 = 6m$



$\text{sen}30 = \frac{3}{d_1}$

$d_1 = \frac{3}{\text{sen}30} = 6m.$

MRUA:

$S = S_0^{\,0} + V_0 t + \frac{1}{2} a t^2$

$6 = 15t - \frac{1}{2} 6.17 \cdot t^2$

$3,09t^2 - 15t + 6 = 0$

$$t = \frac{15 \pm \sqrt{15^2 - 4.3,09.6}}{2.3,09} = \frac{15 \pm \sqrt{150,84}}{6,18} = \frac{15 \pm 12,28}{6,18}$$

$t_1 = 4,41 \ s \Rightarrow$ Valor excluido

$t_2 = 0,44 \ s \Rightarrow$ Valor adoptado

$V = V_0 + at$

$V = 15 - 6,17 \cdot 0,44 = 12,29 \ m/s \Rightarrow$ Se confirma por energías

Por Energías: $W_{NC} = \Delta E$

$F_R \cdot d_1 \cdot \cos 180 = (E_C + E_p)_B - (E_C + E_p)_A$ ($E_{p_A}^{\nearrow 0}$)

$-\mu \cdot N_1 \cdot d_1 = \frac{1}{2} m v_B^2 + mgh - \frac{1}{2} m v_A^2$

$-\mu \cdot mg \cos 30 \cdot 6 = \frac{1}{2} m v_B^2 + m \cdot g \cdot 3 - \frac{1}{2} m v_A^2$

$-0{,}15 \cdot 9{,}8 \cdot \cos 30 \cdot 6 = \frac{1}{2} v_B^2 + 9{,}8 \cdot 3 - \frac{1}{2} \cdot 15^2$

$-7{,}64 = \frac{1}{2} v_B^2 + 29{,}4 - 112{,}5$

$112{,}5 - 29{,}4 - 7{,}64 = \frac{1}{2} v_B^2$

$2 \cdot 75{,}46 = v_B^2 \Rightarrow v_B = \sqrt{150{,}92} = 12{,}28 \text{ m/s}$

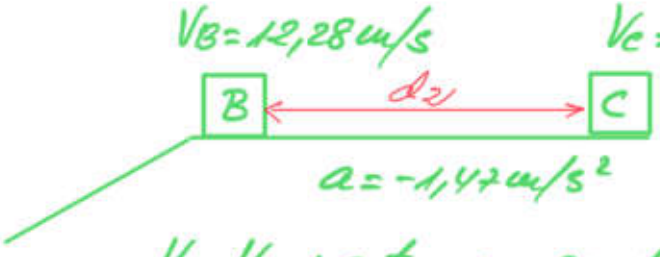
e) W_{TOTAL} de la Fricción:

$W_{FR_1} = F_{R_1} \cdot d_1 \cdot \cos 180 = \mu \cdot m \cdot g \cdot \cos 30 \cdot d_1 \cdot (-1) =$

$= -0{,}15 \cdot 12 \cdot 9{,}8 \cdot \cos 30 \cdot 6 = -91{,}66 \text{ J}$

$W_{FR_2} = F_{R_2} \cdot d_2 \cdot \cos 180 = \mu \cdot m \cdot g \cdot d_2 (-1) = \ldots$

¿Cuánto vale d_2?



$V = V_0 + at \Rightarrow 0 = 12{,}28 - 1{,}47 \cdot t$

$1{,}47t = 12{,}28$

$t = \frac{12{,}28}{1{,}47} = 8{,}35 \text{ s}$

$S = S_0^{\nearrow 0} + V_0 t + \frac{1}{2} a t^2$

$S = 12{,}28 \cdot 8{,}35 - \frac{1}{2} 1{,}47 \cdot 8{,}35^2 = \boxed{51{,}29 \text{ m} = d_2}$

$\ldots = 0{,}15 \cdot 12 \cdot 9{,}8 \cdot 51{,}29\,(-1)$

$$\boxed{W_{FR_2} = -904{,}76\ J}$$

$$W_{TOTAL} = W_{FR_1} + W_{FR_2} =$$

$$= -91{,}66 - 904{,}76$$

$$\boxed{W_{TOTAL} = -996{,}42\ J}$$

a) Espacio en el plano horizontal:

$$\boxed{d_2 = 51{,}29\ m}$$