1 Mov. Parabólico

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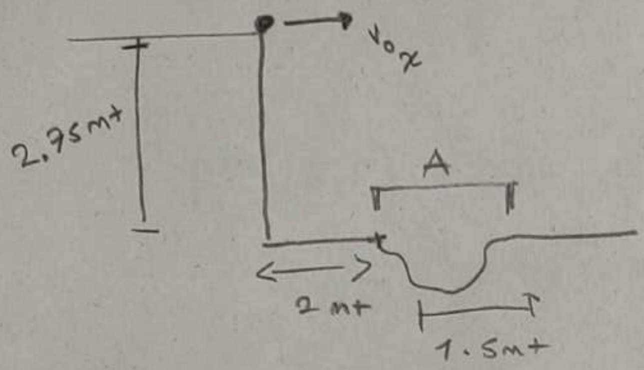
* No hay resistencia del aire



a) el intervalo de velocidades V_{0x} para caer en la region A depende del tiempo:

$$0 = 2.75\ mt - \frac{1}{2} g t^2$$

$$2.75\ mt = \frac{1}{2} g t^2$$

$$\sqrt{\frac{2(2.75\ mt)}{g}} = t_{caida}$$

$$\boxed{t_{caida} = 0,748\ s}$$

Ahora la región A está a 2 mt del punto inicial y acaba a los 3.5 mt del punto inicial

así:

Minima	Maxima
$2\ mt = V_{0x} \cdot t_{caida}$	$3.5\ mt = V_{0x} \cdot t_{caida}$
$\frac{2\ mt}{t_{caida}} = V_{0x}$	$\frac{3.5\ mt}{t_{caida}} = V_{0x}$
$V_{0x} = 2,67\ \frac{mt}{s^2}$	$V_{0x} = 4,67$

$$V_{0x} \in \left(2,67 \frac{mt}{s},\ 4,67 \frac{mt}{s}\right)$$

b) ya sabemos los valores de velocidad$_x$ en los intervalos, para hayar V_{final} solo nos falta V_{final_y}:

$$V_{final_y} = t_{caida} \cdot g = (0{,}748\ s)\left(9{,}81\ \frac{mt}{s^2}\right)$$
$$= 7{,}337\ \frac{mt}{s}$$

$$V_{final} = \sqrt{V_{final_x}^2 + V_{final_y}^2}$$

V_{final} minima | V_{final} máxima

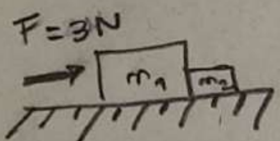
$$V_{final} = \sqrt{\left(2{,}67\ \frac{mt}{s}\right)^2 + \left(7{,}337\ \frac{mt}{s}\right)^2}$$
$$\underbrace{= 7{,}807\ \frac{mt}{s}}_{\text{borde izquierdo}}$$

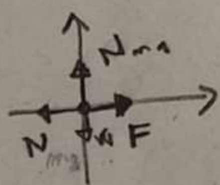
$$V_{final} = \sqrt{\left(4{,}67\ \frac{mt}{s}\right)^2 + \left(7{,}337\ \frac{mt}{s}\right)^2}$$
$$\underbrace{= 8{,}6971\ \frac{mt}{s}}_{\text{borde derecho}}$$

② Aplicación leyes de newton

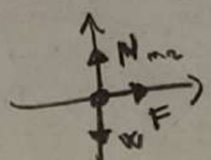
$m_1 = 2\,kg$
$m_2 = 1\,kg$

⊛ No hay fricción

a) 

m_1: 

$$⊛\ \Sigma F_{x_{m_1}} = F - N_{m_2} = 0$$
$$\boxed{= F = N = 3N}$$
$$\Sigma F_{y\,m_1} = N_{m_1} - W_{m_1} = 0$$
$$\boxed{= N_{m_1} = W_{m_1} = 19{,}62N}$$

m_2: 

$$⊛\ \Sigma F_{x_{m_2}} = F = m \cdot a$$
$$\Sigma F_{y\,m_2} = N_{m_2} - W_{m_2} = 0$$
$$\boxed{= N_{m_2} = W_{m_2} = 9{,}81N}$$

b) dado que son un mismo sistema es como si tuviesemos una gran masa $m_1 + m_2$:

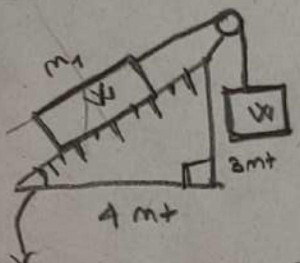
$$(m_1 + m_2)a = F$$

$$(3\,kg)a = 3N$$

$$\boxed{a = 1\,\frac{mt}{s^2}}$$

Aceleración del sistema

Problema 3

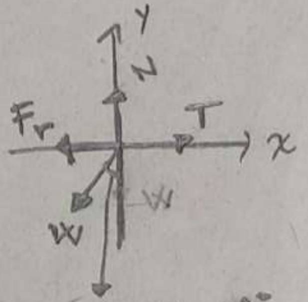


$$\tan(\theta) = \frac{OP}{AD}$$

$$\theta = \tan^{-1}\left(\frac{OP}{AD}\right)$$

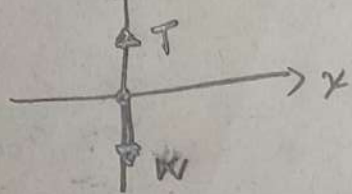
$$\theta_o = 36{,}86^\circ$$

a) m_1:



$$\theta_{m_1} = 53{,}14^\circ$$

m_2:



b)
$$\sum F_{x_{m_1}} = T - F_r - \overbrace{sen(\theta_{m_1})\,w}^{w_x} = 0$$

$$= T - N\mu_s - sen(\theta_{m_1})\,20N = 0 \quad (1)$$

$$= T - N\mu_s = 16N$$

$$\sum F_{y_{m_1}} = N - \cos(\theta_{m_1})\,w = N - \cos(\theta_{m_1})\,20N = 0 \quad (2)$$

$$= N = 12N$$

$$\Sigma F_{x_{m_2}} = 0 \qquad (3)$$

$$\Sigma F_{y_{m_2}} = T - W = 0 \quad (4)$$

$$= T = W = 20N$$

Con (4) y (2) evaluamos en (1):

$$T - N\mu_s = 16N$$

$$= 20N - 12N\mu_s = 16N$$

$$= \boxed{\mu_s = \frac{1}{3}}$$

$$\boxed{F_r = \mu_s \cdot N = \left(\frac{1}{3}\right)(12N) = 4N}$$