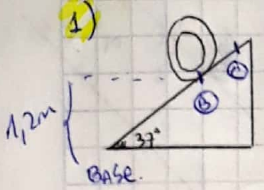
HOJA N° 1/2.

FECHA 2/12/2021

TOSCA. R2P. - 11021

Para hallar dist max Recorrida: desde la BASE.

1)



$M = 2,4\,kg$
$R = 0,06\,m$
Rs D.
$\theta = 37°$

Ⓑ E_M = ALTURA + CINETICA (W y V_{cm}). $V_{cm} = W \cdot R$.

Ⓒ E_m = ALTURA. (Sumar 2m de Inicio).

$I_{ARO} = M \cdot R^2 + \underset{\text{steiner}}{M \cdot R^2} = 2 M \cdot R^2$.

$\frac{2,80\,m/s}{0,06} = W \Rightarrow 46,6\ 1/s$.

Conserva Em_{B-C}. $W_{fnc} = 0$.

$m \cdot h_{Ⓑ} \cdot g + \frac{1}{2} I_{CIR} \cdot W^2 = m \cdot h_{Ⓒ} \cdot g$ (2,4; 1,2; 10; $2MR^2$; $46,6^2$; 2,4; 10)

$28,8\,J + 18,76\,J = 24\,J \cdot h_C \rightarrow 1,965\,m$.

$\frac{2}{h}$ S OH. $\sin 37° \cdot \frac{O}{h}$. 1,2m

$\sin 37° \cdot 2m$ = ALTURA.

$P_x = P \cdot \sin 37°$

$P_x = 24 \sin 37°$

$P_x = 14,44$

Inicio: 2m + 3,2m.

DIST MAX desde BASE ⇒ 5,2m ⇐ 2m + 3,2m.

S OH = $\sin 37° = \frac{O}{H?}$; $\frac{1,965}{\sin 37°}$

2) MOMENTO CINETICO.

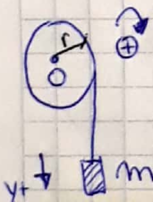
$\Sigma M_{EXT} \cdot \Delta t = \Delta L^{\circ}_{A-B\ \Delta t}$ (Impulso)

R. Tension / 4s.

L° { $m \cdot v \cdot d$ — Bloque. $I \cdot W$ — Polea.

Parte del Reposo.

a_{cm}). $\Sigma M_{EXT} = I \cdot \gamma$. $\Sigma F_y = m \cdot a_{cm}$.



(I) $T \cdot r = I \cdot \frac{a_{cm}}{R}$. (II) $-T + P_{Ⓐ} = m \cdot a_{cm}$

$m = 20\,kg$, 200N

$R = 0,6\,m$

$M = 30\,kg$

$I_{disco} = \frac{1}{2} \cdot M \cdot R^2$.

(I y II)

$T \cdot \not{r} = \frac{1}{2} M \cdot R^{\not{2}} \frac{a_{cm}}{\not{R}}$

$T = 1/2\,M \cdot a_{cm}$

$-T + P_{Ⓐ} = m \cdot a_{cm}$

$P_{Ⓐ} = a_{cm}\,(1/2\,M + m)$ (30, 20)

$\frac{200N}{35\,kg} = a_{cm} \Rightarrow 5,71\,m/s^2$

MOMENTO CINETICO (4s)

$L^{\circ} = I \cdot W + m \cdot v \cdot d$ (Polea, Bloque)

$L^{\circ}_{4s} = 5,4 \cdot W_{4s} + 20\,kg \cdot V_{4s} \cdot R_p$.

$L^{\circ}_{4s} = 5,4 \cdot 38 + 20 \cdot 22,8 \cdot 0,6$

$L^{\circ}_{4s} \Rightarrow 478,8$

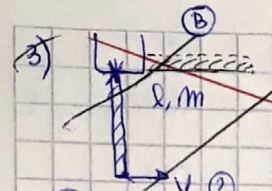
$V_{Bloque\ 4s} = \not{V_0} + a \cdot t = 5,71 \cdot 4 = 22,8\,m/s\ V_t$.

$V_t = W \cdot R. \Rightarrow W_p = 38\,1/s\ (4s)$

$I_{polea} = \frac{1}{2} \cdot M \cdot R^2 = \frac{1}{2}\,30 \cdot 0,6^2 = 5,4$.

NOTA

3) Pos horizontal. Conserva Energía



B) $W_{fr} = 0$.

$m \cdot g \cdot \frac{l}{2} = \frac{1}{2} \cdot \frac{1}{3} \cdot m \cdot l^2 \cdot w^2$

$\sqrt{\frac{g \cdot l \cdot 3}{l^2}} = w$

$w = \sqrt{\frac{3g}{l}}$

$V_{cm} = w \cdot \frac{l}{2} \Rightarrow$ (R) $\cdot \sqrt{0}$

$\frac{l}{2}$

B) Altura. $m \cdot g \cdot \frac{l}{2}$.

A) Velocidad w.

$\frac{1}{2} \cdot I \cdot w^2$ → $\frac{1}{2} \cdot \frac{1}{3} \cdot M \cdot l^2$

$W = \frac{V_{cm}}{R}$

$V_{CM} = R \cdot W$

$V_A = V_{cm} + w \cdot \frac{l}{2}$

$V_A = \frac{l}{2}\sqrt{0} + \sqrt{0}\ \frac{l}{2}$

$\sqrt{0} \left(\frac{2l}{2} \right)$

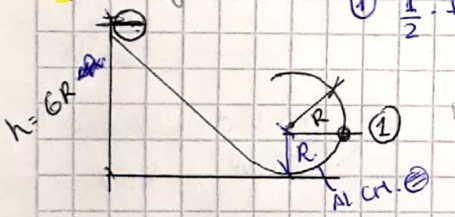
$V_A = V_{cm} + w \cdot r$

$V_{A\ NEC} = \sqrt{\frac{3g}{l}} \cdot l$.

A = Altura. $m \cdot g \cdot 5R$. 1. $\frac{1}{2} I_{cm} \cdot w^2$ $\frac{1}{2}\ \frac{7}{5}$.

$R = 1m$. $r_{Esfera} = 1cm = 0{,}01m$.

4) A) log. $r = 1cm$.



A) $m \cdot g \cdot (6R - r)$

1) $\frac{1}{2} \cdot I_{cm} \cdot w^2 = \frac{1}{2} \cdot \frac{7}{5} \cdot M \cdot R^2 \frac{V^2}{R^2}$ 1) $\frac{7}{10} \cdot M \cdot V_{cm}^2$.

$m \cdot g \cdot (6R - r) = \frac{7}{10} \cdot m \cdot V_{cm}^2 + m \cdot g \cdot R$.

$\frac{10}{7} \cdot g \cdot (6R - r) - g \cdot R = g(6R - r - R)$

$g(5R - r)$

6R − r. Al cm. (B)

$\sqrt{g(5R - r) \cdot \frac{10}{7}} = V_{cm}$

1) V_{cm}

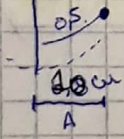
N y Fr → NO REALIZAN TRABAJO.

$P = m \cdot g = 0{,}01 \cdot 10 = 0{,}1\,N$

5) $t_0 = 0s$. +

-4 0

$\begin{cases} x = A \cos (wt + \varphi_0) = \\ V = -A\,w \operatorname{sen} (wt + \varphi_0) = \\ a = -A\,w^2 \cos (wt + \varphi_0) = \end{cases}$



$V(4s)$

$a(4s)$

Corrimiento.

$-4cm = 0{,}8cm \cdot \cos (w \cdot 0s) + \varphi_0$.

En IR y volver.

TAREA $2s = T$.

$A = 10cm$

$\frac{-4cm}{0{,}8cm} \quad \text{Arcos} = \varphi_0$ → 113° sen → + (A)

243. sen → − 1,62π

$w = \frac{2\pi}{T} = \pi\ \frac{1}{s}$

+x.

+) $V = -A \cdot w \cdot \operatorname{sen} (\pi \cdot t + \varphi_0)$

− − − −

$\begin{cases} x = 10cm \cdot \cos (\pi \cdot t + 1{,}62\pi) \\ V = -10cm \cdot \pi \cdot \operatorname{sen} (\pi \cdot t + 1{,}62\pi) \Rightarrow V(4s) \\ a = -10cm \cdot \pi^2 \cdot \cos (\pi t + 1{,}62\pi) \Rightarrow a(4s) \end{cases}$

$-10cm \cdot \pi \cdot \operatorname{sen} (\pi \cdot 4 + 1{,}62\pi) = 29{,}2$.

$-10 \cdot \pi^2 \cdot \cos (\pi 4 + 1{,}62\pi) = -36{,}33$

NOTA

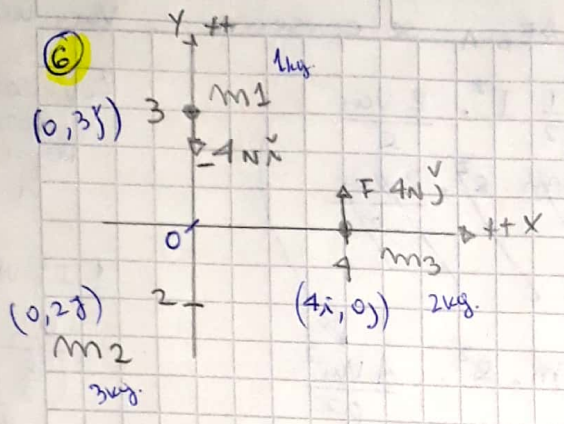
2/12/21

Supongo masas. $m_1 = 1kg$

$V_{iCM} = 3\hat{i}\ m/s$

$r_{cm} = \frac{\sum m_i \cdot r_i}{m_t}$

⑥



$m_1 \cdot r_1 + m_2 \cdot r_2 + m_3 \cdot r_3$

$1kg \cdot (0i, 3\hat{j}) + 3kg \cdot (0i, 2\hat{j}) + 2kg \cdot (4i, 0\hat{j})$

$3\hat{j}\ kg + 6\hat{j}\ kg + 8\hat{i}\ kg \Rightarrow \frac{8i + 9\hat{j}}{6kg}$

$r_{cm} = (1{,}33\hat{i} + 1{,}5\hat{j})$

$V_{cm\,i} = (3\hat{i}\ m/s, 0\hat{j})$

MRUV. $x = x_0 + V_i \cdot t + \frac{1}{2} a \cdot t^2$

$V = V_i + a \cdot t$

$a_{cm} \quad \frac{\sum F_{ext}}{m_t}$

$a_{cm} = \frac{-4N\hat{i} + 4N\hat{j}}{6kg} = (-0{,}66\hat{i} + 0{,}66\hat{j})\ m/s^2$

a_{cm}

$x_{4s} = r_{cm\,i} + V_{iCM} \cdot 4s + \frac{1}{2} a_{cm} \cdot 4^2$

$x_{4s} = (1{,}33\hat{i} + 1{,}5\hat{j})\ m + (3i\ m/s) \cdot 4s + \frac{1}{2}(-0{,}66\hat{i} + 0{,}66\hat{j})\ m/s^2 \cdot 16\ s^2$

$x_{4s} = (1{,}33\hat{i}\ m + 1{,}5\hat{j}\ m) + (12i\ m) + \frac{1}{2}(-10{,}56\hat{i} + 10{,}56\hat{j})\ m$

$x_{4s} = (1{,}33\hat{i}\ m + 1{,}5\hat{j}\ m) + (12i\ m) + (-5{,}28\hat{i}\ m + 5{,}28\hat{j}\ m)$

$x_{4s} = (8{,}05\hat{i}\ m + 6{,}78\hat{j}\ m)$

$(-0{,}66\hat{i} + 0{,}66\hat{j}) \cdot 9\ s^2$

$x_{3s} = (1{,}33\hat{i} + 1{,}5\hat{j}) + (9\hat{i}) + \frac{1}{2}(-5{,}94\hat{i} + 5{,}94\hat{j})$

$x_{3s} = (1{,}33\hat{i} + 1{,}5\hat{j}) + (9\hat{i}) + (-2{,}97\hat{i} + 2{,}97\hat{j})$

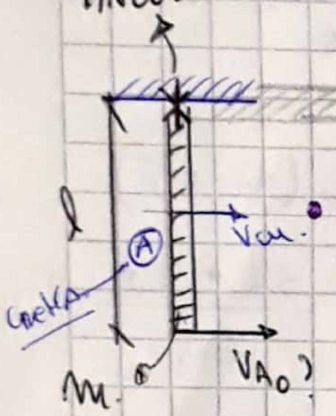
$x_{3s} = (7{,}36\hat{i}\ m + 4{,}47\hat{j}\ m)$

$V_{3s} = V_i + a_{cm} \cdot t = (3i\ m/s) + (-0{,}66\hat{i} + 0{,}66\hat{j})\ m/s^2 \cdot 3s$

$V_{3s} = (3i\ m/s) + (-1{,}98\hat{i}\ m/s + 1{,}98\hat{j}\ m/s)$

$V_{3s} = (1{,}02\hat{i}\ m/s + 1{,}98\hat{j}\ m/s)$

3) • VARILLA (FIJO EXTREMO) → TODO A este punto.



CM varilla = $l/2$

. SACAR V_{cm_0} para llegar A Pos horizontal

• TRANSLADO ES V_{cm} A $V_{A i}$

$W_{F_{NC}} = 0$. ΔE_{B-A} se conserva.

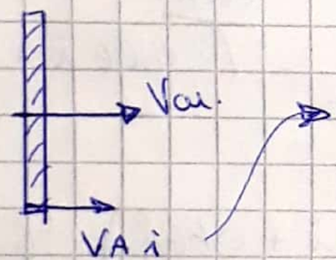
$$m \cdot h_{(B)} \cdot g = \frac{1}{2} I^{*} \cdot \frac{2 V_{cm}}{l}$$

$$m \cdot \frac{l}{2} \cdot g = \frac{1}{2} \cdot \frac{1}{3} \cdot m \cdot l^2 \cdot \frac{2 V_{cm}}{l}$$

$$g = \frac{1}{3} \cdot 2 V_{cm}$$

$$m \cdot \frac{l}{2} \cdot g = \frac{1}{2} \cdot \frac{1}{3} \cdot m \cdot l^2 \cdot \frac{4 V_{cm}^2}{l^2}$$

$$l \cdot g = \frac{1}{3} \cdot 4 V_{cm}^2 \Rightarrow V_{cm} = \sqrt{\frac{3}{4} \cdot l \cdot g}$$



$$V_A = V_{cm} + w \times r_{A,cm}$$

$r_{A,cm} = l/2$

$$V_A = \sqrt{O} + \frac{2\sqrt{O}}{l} \times \frac{l}{2}$$

$$V_A = 2\sqrt{O} \Rightarrow V_{A i}\ \text{nec.} = 2\sqrt{\frac{3}{4} \cdot l \cdot g}$$

Punto A fijo *

vinculo

$V_{cm} = w \cdot (R)$

E_{C_V} = solo ROTA Respecto A vinculo *

$\frac{1}{2} \cdot I^{*} \cdot w^{(2)}$

$$\frac{V_{cm}}{\left(\frac{l}{2}\right)_{\text{al fijo}}} = \frac{2V_{cm}}{l}$$

⇓

$$\frac{2V_{cm}^2}{l^2}$$

$$w = \frac{V_{cm}}{R}$$

$$w = \frac{V_{cm}}{\frac{l}{2}} = \frac{2 V_{cm}}{l} \quad \sqrt{O}$$

$$w = \frac{2\sqrt{O}}{l}$$

Scanned with CamScanner