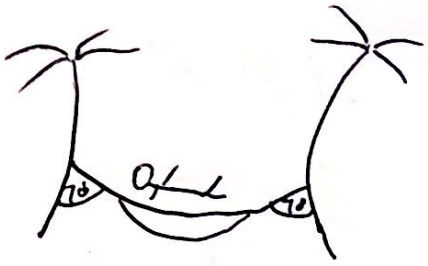
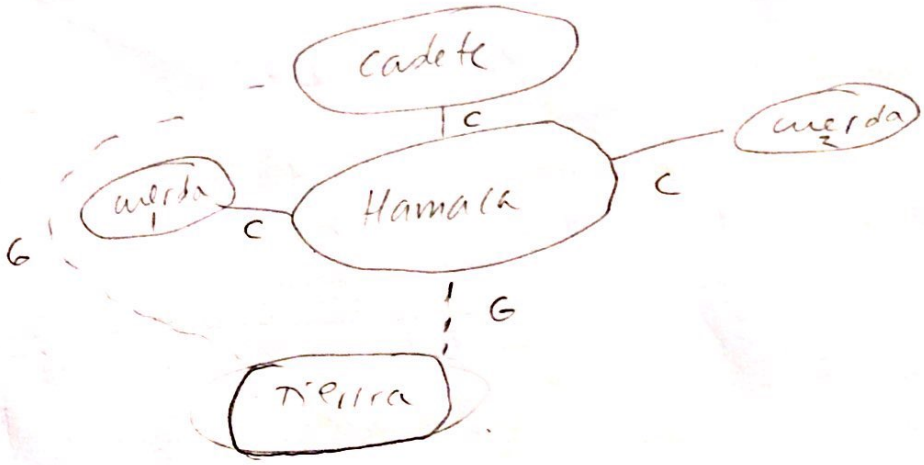
Agustín Keitel A. 2°1M Prueba Física.
Agustín K.

1) Un cadete de 60 kg de masa descansa en una hamaca cuya masa es de 10[kg], como muestra la figura a continuación.



a) Diagrama de interacciones para el sistema.



b) Inventario

Cadete

- $F^{\text{contacto}}_{\text{Hamaca} \to \text{cadete}} = \vec{F}_{H \to C}$
- $F^{\text{grav.}}_{\text{tierra} \to \text{Cadete}} = \vec{P}_C$

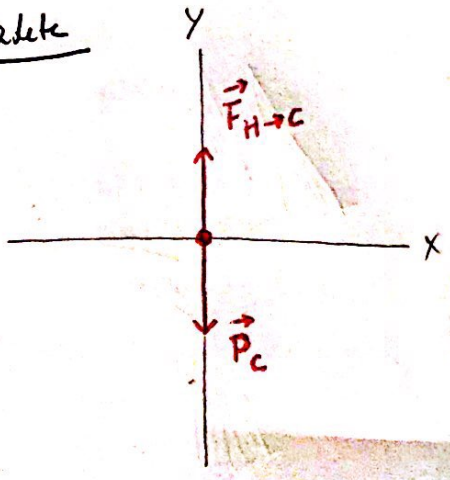
Hamaca

- $F^{\text{contacto}}_{\text{cuerda1} \to \text{Hamaca}} = \vec{T}_1$
- $F^{\text{contacto}}_{\text{cuerda 2} \to \text{Hamaca}} = \vec{T}_2$
- $F^{\text{contacto}}_{\text{cadete} \to \text{Hamaca}} = \vec{F}_{C \to H}$
- $F^{\text{grav.}}_{\text{tierra} \to \text{Hamaca}} = \vec{P}_H$.

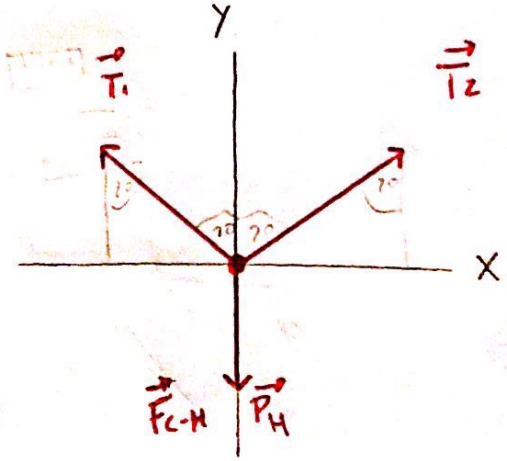
Para acción reacción = cadete - Hamaca
$\vec{F}_{H-C}$ y $\vec{F}_{C \to H}$.

c) D.C.L

Cadete



Hamaca



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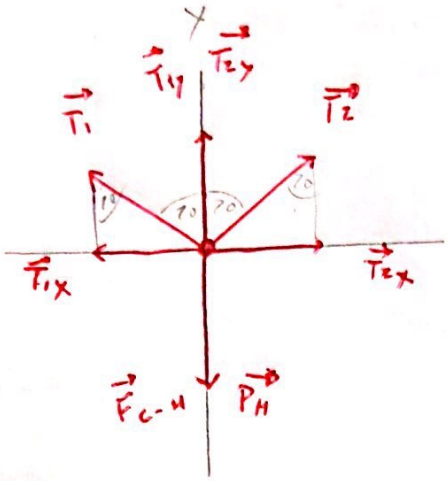
Hamaca



$\text{sen } 20° = \frac{T_{2x}}{T_2}$ $\quad \cos 20° = \frac{T_{2y}}{T_2}$

$T_2 \text{ sen } 20° = T_{2x}$ $\quad T_2 \cos 20° = T_{2y}$

$\text{sen } 20° = \frac{T_{1x}}{T_1}$ $\quad \cos 20° = \frac{T_{1y}}{T_1}$

$T_1 \text{ sen } 20° = T_{1x}$ $\quad T_1 \cos 20° = T_{1y}$

masa cadete = 60 kg
600N

masa hamaca = 10 kg
100 N

d) Calcule tensión.

Hamaca

$\sum F_y = 0$

$T_{2y} + T_{1y} = F_{C-H} + P_H$

$T_{2y} + T_{1y} = 600\,N + 100\,N$ $\quad \vec{F}_{C-H} = \vec{F}_{H-C}$

$F_{C-H} = 600\,N$

$T_{2y} + T_{1y} = 700N$

$T_2 \cdot \cos 20 + T_1 \cdot \cos 20 = 700N$

$0{,}94\,T_2 + 0{,}94\,T_1 = 700N$

$\sum F_x = 0$

$T_{2x} - T_{1x} = 0$

$T_2 \cdot \text{sen } 20 - T_1 \cdot \text{sen } 20 = 0$

$T_2 \cdot \text{sen } 20 = T_1 \cdot \text{sen } 20$

$0{,}34\,T_2 = 0{,}34\,T_1$

cadete

$\sum F_y = 0$

$F_{H-C} = P_c$

$F_{H-C} = 600N$

$0{,}34 \cdot x = 0{,}94$

$x = \frac{0{,}94}{0{,}34}$

$x = 2{,}76$

$0{,}94\,T_2 + 0{,}94\,T_1 = 700$

$0{,}34\,T_2 - 0{,}34\,T_1 = 0$ $\quad \cdot 2{,}76$

$0{,}94\,T_2 + 0{,}94\,T_1 = 700$

$0{,}94\,T_2 - 0{,}94\,T_1 = 0$

$1{,}88\,T_2 = 700$

$T_2 = \frac{700}{1{,}88}$

$\vec{T}_2 = 372\,[N]$

$0{,}94 \cdot 372 + 0{,}94 \cdot T_1 = 700$

$349{,}68 + 0{,}94\,T_1 = 700$

$0{,}94 \cdot T_1 = 700 - 349{,}68$

$0{,}94\,T_1 = 350{,}32$

$T_1 = \frac{350{,}32}{0{,}94}$

$\vec{T}_1 = 372\,[N]$

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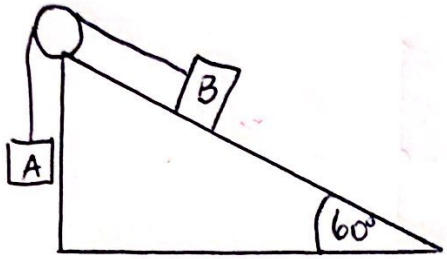
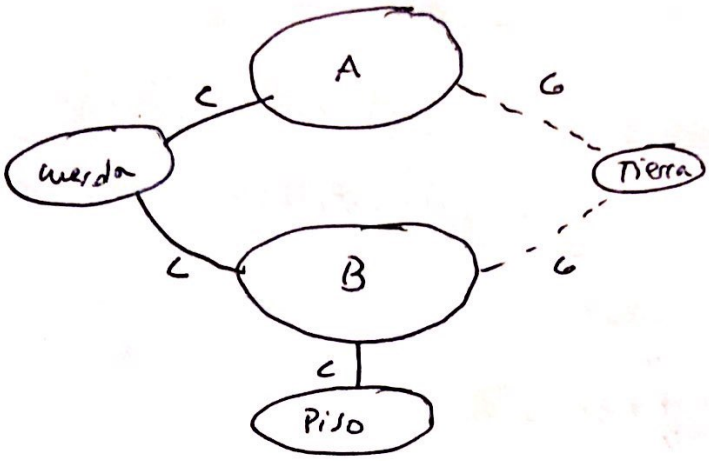
2)



a)



Inventario

A

- $F^{contacto}_{cuerda \to A} = \vec{T}_A$
- $F^{gravitacional}_{tierra \to A} = \vec{P}_A$

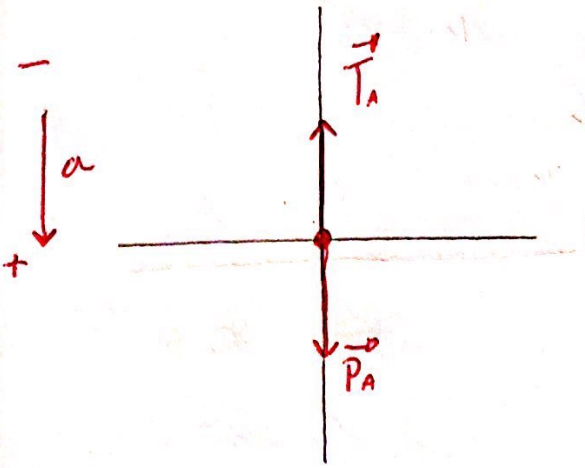
B

- $F^{contacto}_{cuerda} = \vec{T}_B$
- $F^{contacto}_{piso \to B} = \vec{N}_B$ y $\vec{R}_B$
- $F^{grav.}_{tierra \to B} = \vec{P}_B$

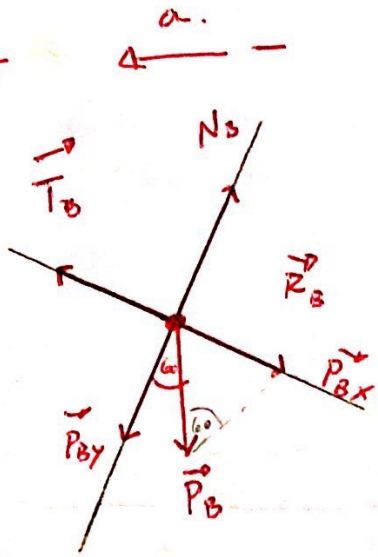
$M = 15\ kg$
$150\ [N]$
$\mu = 0,2$

b) D.C.L

A



B



$\text{Sen } 60 = \frac{P_{Bx}}{P_B}$

$P_B \text{ Sen } 60° = P_{Bx}$

$\cos 60 = \frac{P_{By}}{P_B}$

$P_B \cos 60 = P_{By}$

C) Determinar aceleración del sistema.

$m = 15\ kg$ $\mu = 0,2$

150 N

A

$\sum F_y = m \cdot a$

$\vec{P}_A - \vec{T} = m \cdot a$

$150 - \vec{T} = 15 \cdot a$

B

$\sum F_x = m \cdot a$

$\vec{T} - \vec{F}_B - \vec{P}_{Bx} = m \cdot a$

$\vec{T} - 15 - (150 \cdot \sin 60) = 15 \cdot a$

$\vec{T} - 15 - 129,9 = 15a$

$\vec{T} - 144,9 = 15a$

$\sum F_y = 0$

$\vec{N}_B = \vec{P}_{By}$

$\vec{N}_B = m \cdot g \cdot \cos 60$

$\vec{N}_B = 15 \cdot 10 \cdot \cos 60$

$\vec{N}_B = 75\ [N]$

$\vec{F} = N \cdot \mu$

$\vec{F} = 75 \cdot 0,2$

$\vec{F} = 15\ N$

$-\vec{T} + 150 = 15a$

$\vec{T} - 144,9 = 15a$

$5,1 = 30a$

$\frac{5,1}{30} = a$

$0,17 \frac{m}{s^2} = a$

$\vec{T} - 144,9 = 15 \cdot 0,17$

$\vec{T} - 144,9 = 2,55$

$\vec{T} = 144,9 + 2,55$

$\vec{T} = 147,45\ [N]$

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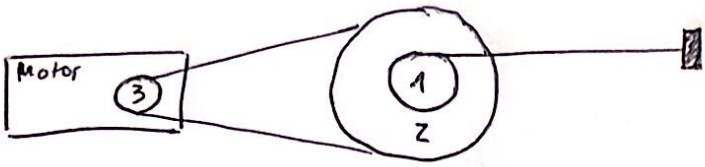
3)



$R_1 = 0,1[m]$ (radio)

$R_2 = 0,2[m]$

$R_3 = 0,05[m]$

$3 = 800$ RPM.

a) Vel. angular del motor en [RAD/s]

$$800 \frac{Rev}{min} \cdot \frac{1\,min}{60\,seg} \cdot \frac{2\pi\ RAD}{1\ Rev.}$$

$$\boxed{\omega = 83,8 \left[\frac{RAD}{s}\right]}$$

b) Vel. angular rueda 2.

$V_3 = V_2$

$V_3 = \omega_3 \cdot r_3$

$V_3 = 83,8 \cdot 0,05$

$V_3 = 4,19 \left[\frac{m}{s}\right]$

$V_2 = \omega_2 \cdot r_2$

$4,19 = \omega_2 \cdot 0,2$

$\frac{4,19}{0,2} = \omega_2$

$$\boxed{21 \left[\frac{RAD}{s}\right] = \omega_2}$$

c) $\omega_1 = \omega_2 \left(21 \left[\frac{RAD}{s}\right]\right)$

$V_1 = \omega \cdot r$

$V_1 = 21 \cdot 0,1$

$$\boxed{V_1 = 2,1 \left[\frac{m}{s}\right]}$$

d) N° vueltas que da la rueda 1, cuando el cable está enrollado 80[cm]

$S = \theta \cdot r$

$0,8 = \theta \cdot 0,1$

$\frac{0,8}{0,1} = \theta$

$8 [RAD] = \theta$

$2\pi = 6,28[RAD]$

$6,28[RAD] \rightarrow 1$ Rev

$8[RAD] \rightarrow x$

$1,27$ Rev.

$$\boxed{\text{Rueda 1 da 1,27 vueltas}}$$