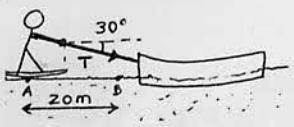
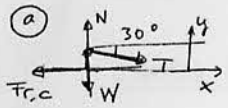
FISICA I - 9-VII-12 - SOLUCIONES

(1)



(a)



$\sum \vec{F} = m \cdot \vec{a} \Rightarrow \begin{cases} \sum Fx = m \cdot a \\ \sum Fy = 0 \end{cases} \Rightarrow$

$T_x - Fr,c = m \cdot a$

$N - T_y - W = 0$

$Fr,c = \mu c \cdot N = \mu c (T_y + W)$

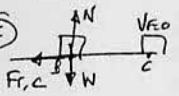
$Fr,c = 0,2 \times (400 \times \operatorname{sen} 30° + 80 \times 10) = 200 N$

(1) $a = \frac{T_x - Fr,c}{m} = \frac{400 \times \sqrt{3}/2 - 200}{80} = 1,83 m/s^2$

N.R.U.A. $V_B^2 = V_0^2 + 2as = 2 \times 1,83 \times 20 \Rightarrow V_B = 8,55 m/s$

(0,35) (b) $Em,dis = |W_{roz}| = \mu c \cdot N \cdot s = Fr,c \cdot s = 200 \times 20 = 4000 J$

(0,65) (c)



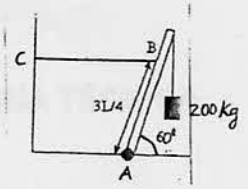
$\sum \vec{F} = m \cdot \vec{a} \Rightarrow -Fr,c = m \cdot a$

$Fr,c = \mu c \cdot N = \mu c \, m g$

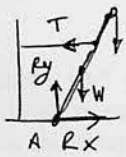
$\Rightarrow a = -\mu c \, g = -0,2 \times 10 = -2 m/s^2$

$V_F = V_0 + a \cdot t \Rightarrow 0 = 8,55 - 2 \times t \Rightarrow t = 4,27 s$

(2)



(a) (0,9)



$W = 120 \times 10 = 1200 N$

$W' = 200 \times 10 = 2000 N.$

$\sum \vec{M}_A = 0 \Rightarrow$

$W \cdot \frac{1}{2} \cdot \cos(60°) + W' \cdot \ell \cdot \cos(60°) - T \cdot \frac{3\ell}{4} \cdot \cos(60°) = 0$

$\Rightarrow T = 2001,5 N$

(b)

$\sum Fx = Rx - T = 0 \Rightarrow Rx = T = 2001,5 N.$

$\sum Fy = Ry - W - W' = 0 \Rightarrow Ry = W + W' = 3200 N$

(0,6) $\vec{R} = 2001,5 \, \vec{i} + 3200 \, \vec{j} \; N$

$R = 3774 N, \; \theta = 58°$

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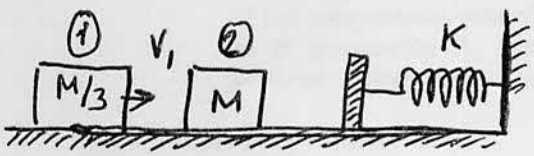
(3)



(a) (0,9)

$\frac{M}{3} V_1 + 0 = \frac{M}{3} V_1' + M V_2' \rightarrow V_1 = V_1' + 3 V_2'$

$e = 1 = \frac{V_2' - V_1'}{V_1} \rightarrow V_2' - V_1' = V_1 \rightarrow V_1 = -V_1' + V_2'$

$2 V_1 = / \; 4 V_2'$

$V_1' = V_2' - V_1 = 2 - 4 = -2 m/s$ $\quad V_2' = \frac{2 V_1}{4} = \frac{2 \cdot 4}{4} = 2 m/s$

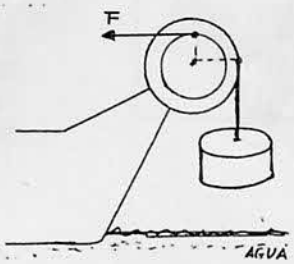
(b) (0,55)

$\frac{1}{2} M V_2'^2 = \frac{1}{2} K \Delta x^2 \rightarrow 1 \ldots^2 = 100 \Delta x^2$

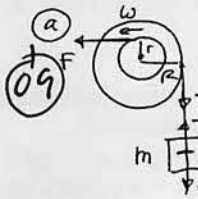
$\Delta x = \sqrt{4 \cdot 10^{-2}} = 2 \cdot 10^{-1} m = 20 cm$

(c) (0,35) $T = 2\pi \sqrt{\frac{M}{K}} = 2\pi \sqrt{\frac{1}{100}} = \frac{4\pi}{10} = \frac{\pi}{5} = 0,63 s$

(4)



(a) (0,9)



Bidón ($\sum \vec{F} = m \vec{a}$): $T - W = m \cdot a$

Polea ($M_{ext} = I \alpha$): $Fr \cdot r - T \cdot R = I \cdot \alpha$

$a = \alpha \cdot R$

$I = \frac{1}{2} M R^2 = \frac{1}{2} \times 20 \times 0,2^2 = 0,4 Kg \cdot m^2$

$T - W = m \cdot a$

$F \cdot \frac{r}{R} - T = \frac{1}{2} M R^2 \cdot \frac{a}{R^2}$

$F \cdot \frac{r}{R} - W = \left(m + \frac{1}{2} M\right) \cdot a$

$a = 4 m/s^2$

(b) (0,6) $E_c = \frac{1}{2} I \omega^2 = \frac{1}{2} I \left(\frac{V_F}{R}\right)^2 = \frac{1}{2} \times 0,4 \times \frac{16}{0,2^2} = 80 J$

$V_F^2 = V_0^2 + 2as = 2 \times 4 \times 2 = 16 \; (m/s)^2$

(c) $E = \rho_{AGUA} \cdot g \cdot V_{sum.} = 10^3 \times 10 \times 20 \times 10^{-3} = 200 N.$

$W = m \cdot g = 900 N$

(0,7)

$\sum \vec{F} = m \cdot \vec{a} \Rightarrow \frac{W - E}{m} = a = 7,7 m/s^2$