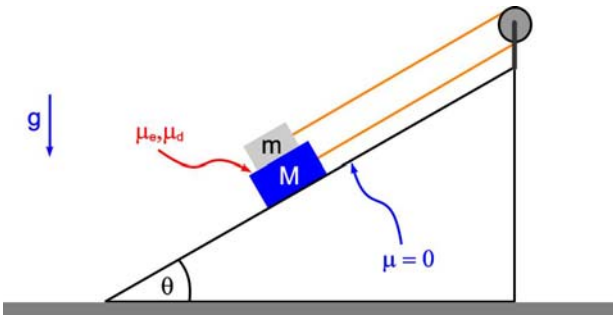
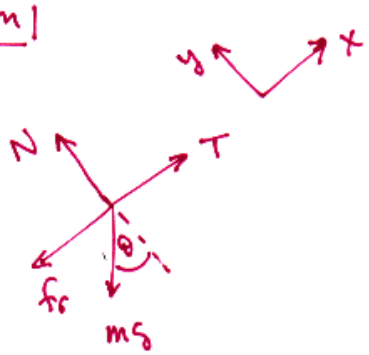
SOLUCIÓN EJERCICIO 6



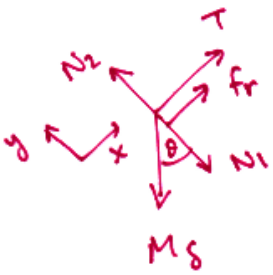
DcL m



$$x) \quad T - f_r - mg\,\mathrm{sen}\,\theta = m a_m \qquad (1)$$

$$y) \quad N - mg\cos\theta = 0$$

DcL M



$$x) \quad T + f_r - Mg\,\mathrm{sen}\,\theta = -Ma_M \qquad (2)$$

$$y) \quad N_2 - N_1 - Mg\cos\theta = 0$$

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i) SISTEMA EN REPOSO $\Rightarrow$ $a_m = a_M = 0$

ENTONCES (1) Y (2) QUEDAN

$$T - f_r - mg\,\text{sen}\theta = 0$$

$$T + f_r - Mg\,\text{sen}\theta = 0$$

RESTANDO ESTAS ECS.

$$T - f_r - mg\,\text{sen}\theta - T - f_r + Mg\,\text{sen}\theta = 0$$

$$\frac{1}{2}(M-m)g\,\text{sen}\theta = f_r$$

PERO $f_r \leq \mu_e N = \mu_e mg\cos\theta$

$\Rightarrow$ $$\frac{1}{2}(M-m)g\,\text{sen}\theta \leq \mu_e mg\cos\theta$$

$$\frac{M}{m} - 1 \leq \frac{2\mu_e}{\tan\theta}$$

$$\boxed{\frac{M}{m} \leq 1 + \frac{2\mu_e}{\tan\theta}}$$

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ii) DE (1) y (2) TENEMOS

$$T - \mu_d m g \cos\theta - m g \operatorname{sen}\theta = m a_m \quad (3)$$

$$T + \mu_d m g \cos\theta - M g \operatorname{sen}\theta = -M a_M \quad (4)$$

PERO $a_m = a_M \equiv a$, ENTONCES RESTANDO ESTAS ECS. SE OBTIENE

$$\cancel{T} - \mu_d m g \cos\theta - m g \operatorname{sen}\theta - \cancel{T} - \mu_d m g \cos\theta + M g \operatorname{sen}\theta = (m + M) a$$

$$\boxed{a = \frac{(M - m) g \operatorname{sen}\theta - 2\mu_d m g \cos\theta}{M + m}}$$

TOMEMOS $\frac{(3)}{m} + \frac{(4)}{M}$

$$\frac{T}{m} - \mu_d g \cos\theta - g \operatorname{sen}\theta + \frac{T}{M} + \mu_d \frac{m}{M} g \cos\theta - g \operatorname{sen}\theta = 0$$

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$$T\left(\frac{1}{m}+\frac{1}{M}\right) = \mu_d g\cos\theta\left(1-\frac{m}{M}\right)+2g\,\mathrm{sen}\,\theta$$

$$T = \frac{2mM}{m+M}\,g\,\mathrm{sen}\,\theta\left[\frac{\mu_d}{2\tan\theta}\left(1-\frac{m}{M}\right)+1\right]$$

Si $M=m \Rightarrow$ $a = -\mu_d g\cos\theta$

$$T = mg\,\mathrm{sen}\,\theta$$