Pauta Ejercicio 6.

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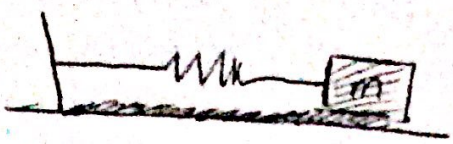
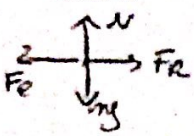


a) Escribir condiciones iniciales y ecuación de movimiento.

$$\boxed{x(0) = 2x_0 \quad \dot{x}(0) = 0} \qquad x(t_f) = x_f \quad \dot{x}(t_f) = 0$$

0.5

DCL



$$\Rightarrow N = mg \Rightarrow F_R = \mu mg \Rightarrow \boxed{m\ddot{x} = \mu mg - k(x - x_0)}$$ 1.0

b) $E_{MT}(0) = E_i = \frac{1}{2}kx_0^2$ 0.5

$E_{MT}(t_f) = E_f = \frac{1}{2}k(x_0 - x_F)^2$ 0.5

c) $E_F - E_i = W_{NC} = -\mu mg(2x_0 - x_F)$ 0.5

$$\Rightarrow W_{NC} = \frac{1}{2}k(x_0 - x_F)^2 - \frac{1}{2}kx_0^2$$

d) Sabemos que $W_{NC} = -\mu mg(2x_0 - x_F)$

$$\Rightarrow \frac{1}{2}k(x_0 - x_F)^2 - \frac{1}{2}kx_0^2 = -\mu mg(2x_0 - x_F)$$ 1.0

$$\frac{1}{2}kx_0^2 - kx_0x_F + \frac{k}{2}x_F^2 - \frac{1}{2}kx_0^2 + \mu mg \cdot 2x_0 - \mu mg x_F = 0.$$

$$\Rightarrow \frac{k}{2}x_F^2 - (kx_0 + \mu mg)x_F + 2\mu mg x_0 = 0$$

$$x_F = \frac{(kx_0 + \mu mg) \pm \sqrt{k^2x_0^2 + 2\mu mg kx_0 + (\mu mg)^2 - 4\mu mg x_0 k}}{2 \cdot \frac{k}{2}}$$ 1.0

$$\Rightarrow x_F = x_0 + \frac{\mu mg}{k} \pm \sqrt{(kx_0 - \mu mg)^2} \cdot \frac{1}{k} = \left(x_0 + \frac{\mu mg}{k}\right) \pm \frac{1}{k}|kx_0 - \mu mg|$$

$$\Rightarrow x_F = \begin{cases} \boxed{\frac{2\mu mg}{k}} & 0.8 \\ 2x_0 \longrightarrow \text{No sirve puesto a que corresponde a la posición inicial!} & 0.2 \end{cases}$$