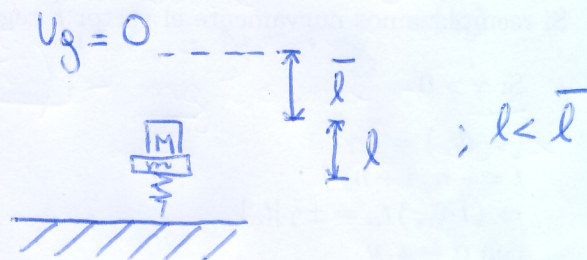
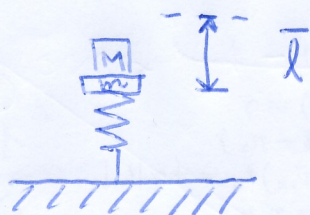
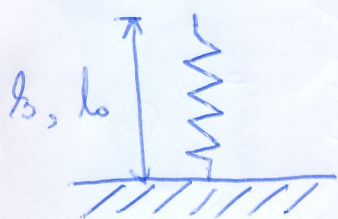


Parte Ejercicios 11

Parte a)



$$E_i = -(m+M)g(\bar{l}+l) + \frac{1}{2}k(\bar{l}+l)^2$$

$$E_f = -(m+M)g(\bar{l}-l) + \frac{1}{2}k(\bar{l}-l)^2$$

$$\Rightarrow E_i = E_f$$

$$\Rightarrow -(m+M)g(\bar{l}+l) + \frac{1}{2}k(\bar{l}+l)^2 = -(m+M)g(\bar{l}-l) + \frac{1}{2}k(\bar{l}-l)^2$$

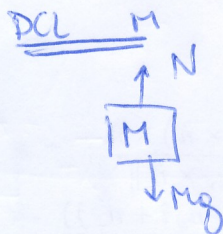
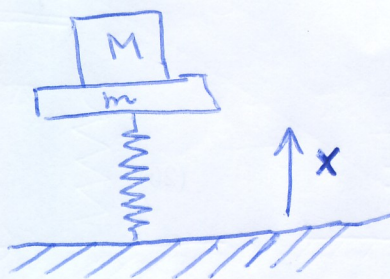
$$\begin{aligned}\Rightarrow -2(m+M)gl &= \frac{1}{2}k(\bar{l}-l)^2 - \frac{1}{2}k(\bar{l}+l)^2 \\ &= \frac{1}{2}k(-2\bar{l}l) - \frac{1}{2}k \cdot 2\bar{l}l\end{aligned}$$

$$\Rightarrow -2(m+M)gl = -\bar{l}lk - k\bar{l}l$$

$$\Rightarrow (m+M)gl = \bar{l}lk$$

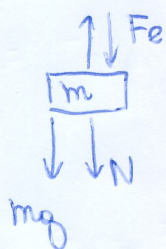
$$\Rightarrow \boxed{\bar{l} = \frac{(m+M)g}{k}}$$

b)



$$M\ddot{x}_M = N - Mg \quad (1)$$

DCL m



$$m\ddot{x}_m = -k(x_m - l_0) - mg - N \quad (2)$$

debido a la configuración del sistema

$$x_M = x_m = x$$

$$\ddot{x}_m = \ddot{x}_M = \ddot{x}$$

$$\Rightarrow (1) + (2) \Rightarrow (M+m)\ddot{x} = -k(x - l_0) - (M+m)g$$

$$\text{si } x = l_0$$

$$\Rightarrow (M+m)\ddot{x} = -(M+m)g \Rightarrow \boxed{\ddot{x} = -g}$$

Reemplazando en (1)

$$\Rightarrow -Mg = N - Mg \Rightarrow \boxed{N = 0}$$

\Rightarrow bloque masa M se despegó.

en ese momento (mejor dicho en el instante inmediatamente siguiente)

$$\ddot{x}_M = -g$$

$$\ddot{x}_m = -\frac{k}{m}(\underbrace{x_m - l_0}_{>0}) - g$$

ya que $x_m > l_0$.

$$\Rightarrow \ddot{x}_m = -\frac{k}{m} \cdot \text{algo} - g \Rightarrow |\ddot{x}_M| < |\ddot{x}_m|$$

\Rightarrow los bloques se mantienen separados.