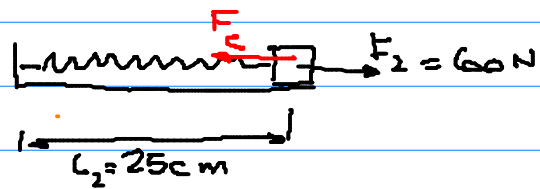
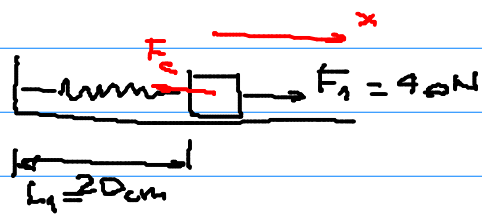


## Problema 24



$L_0 = ?$  longitud lliure

Seguint la llei de Hooke:

$$F_{e1} = -k(L_1 - L_0)$$

$$F_{e2} = -k(L_2 - L_0)$$

Per la 2a llei de Newton:

$$F_{e1} + F_1 = m \ddot{a}_1$$

$$F_{e2} + F_2 = m \ddot{a}_2$$

$$-k(L_1 - L_0) + F_1 = 0$$

$$-k(L_2 - L_0) + F_2 = 0$$

$$k(L_1 - L_0) = F_1$$

$$k(L_2 - L_0) = F_2$$

$$L_1 - L_0 = \frac{F_1}{k}$$

$$L_2 - L_0 = \frac{F_2}{k}$$

$$L_2 - L_0 = \frac{F_2}{k}$$

$$L_1 - L_0 - (L_2 - L_0) = \frac{F_1}{k} - \frac{F_2}{k}$$

$$L_1 - L_2 + L_0 = \frac{F_1 - F_2}{k}$$

$$k(L_1 - L_2) = \frac{F_1 - F_2}{L_1 - L_2}$$

$$k = \frac{F_1 - F_2}{L_1 - L_2} = \frac{40 - 60}{0,2 - 0,25} = \frac{-20}{-0,05} = \boxed{400 \frac{\text{N}}{\text{m}}}$$

$$L_1 - L_0 = \frac{F_1}{k}$$

$$\cancel{L_1} - L_0 - \cancel{L_1} = \frac{F_1}{k} - L_1$$

$$(-1) - L_0 = \left( \frac{F_1}{k} - L_1 \right) (-1)$$

$$L_0 = L_1 - \frac{F_1}{k} = 0,2 - \frac{40}{400} = 0,2 - 0,1 = 0,1 \text{ m}$$

10 cm

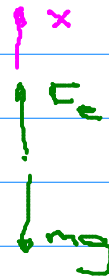
# Problema 25



$$m = 3 \text{ kg}$$

$$k = 50 \text{ N/m}$$

$$L_0 = -2 \text{ m}$$



Equació de Newton:

$$F_e - mg = ma$$

$$F_e = -k(L - L_0)$$

$$-k(L - L_0) - mg = ma$$

(a) Ascensor puja amb  $a = 2 \text{ m/s}^2$

$$\frac{-k(L - L_0)}{-k} = \frac{ma + mg}{-k}$$

$$L - L_0 = -\frac{m(a + g)}{k}$$

$$L = L_0 - \frac{m(a + g)}{k}$$

$$= -2 \text{ m} - \frac{3(2 + 9.8)}{50} = -2 - 0.71$$

$$= -2.71 \text{ m}$$

$L$  longitudinal serà:  $L = 2.71 \text{ m}$

(b)  $a = 0$

$$L = L_0 - \frac{m(a + g)}{k} = -2 - \frac{3 \cdot 9.81}{50} = -2 - 0.59$$

$$L = -2.59 \text{ m}$$