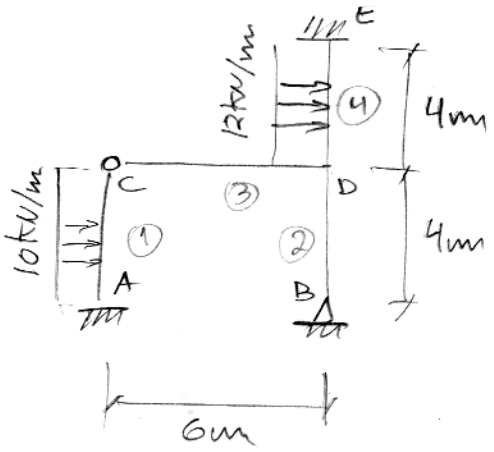
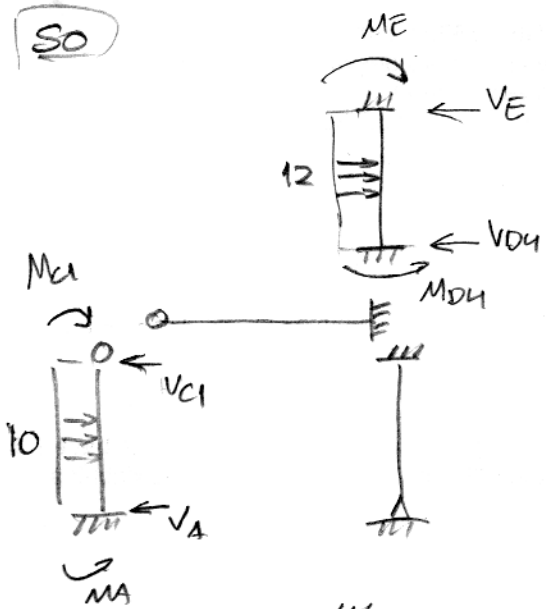
TE2-7.2



→ TRAÇAR O DIAGRAMA DE MOMENTOS FLETORES

- TODAS AS BARRAS POSSUEM O MESMO EI
- CONSIDERAR QUE AS BARRAS SÃO INEXTENSÍVEIS

S0



$M_{D4} = M_E = qL^2/12 = 12 \cdot 4^2/12 = 16\ kNm$

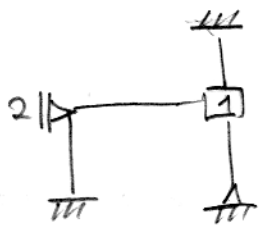
$V_{D4} = V_E = q4/2 = 12 \times 4/2 = 24\ kN$

$M_{C1} = 0$

$M_A = q4^2/8 = 10 \times 4^2/8 = 20\ kNm$

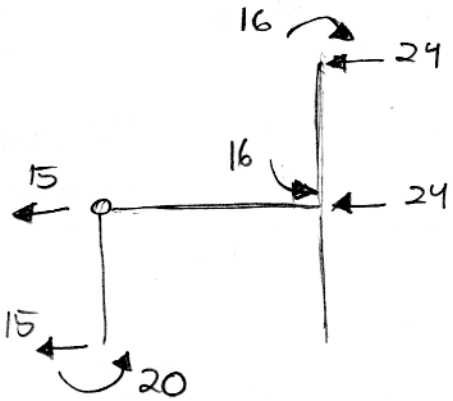
$V_{C1} = 3q4/8 = 3 \times 10 \times 4/8 = 15\ kN$

$V_A = 5q4/8 = 5 \times 10 \times 4/8 = 25\ kN$

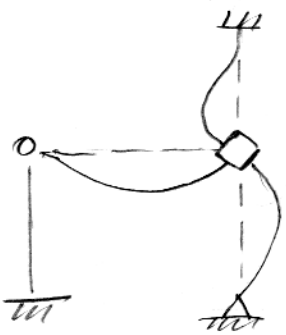


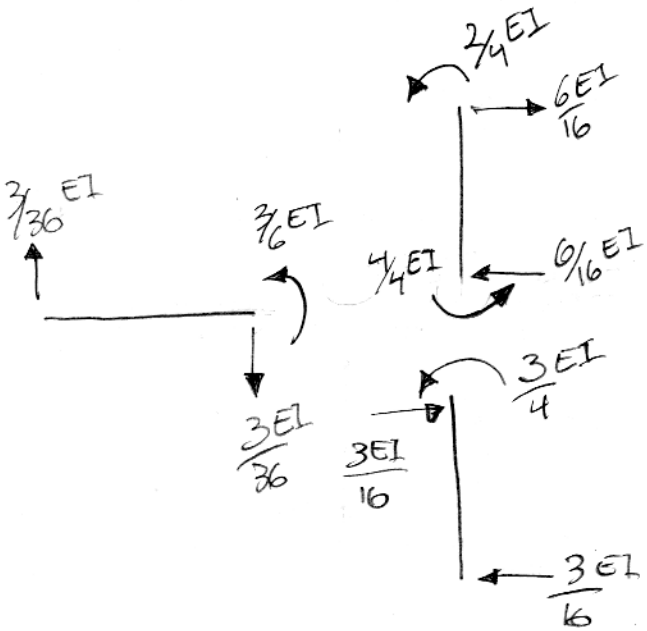
$F_1 = 16\ kNm$

$F_2 = -39\ kN$



S1

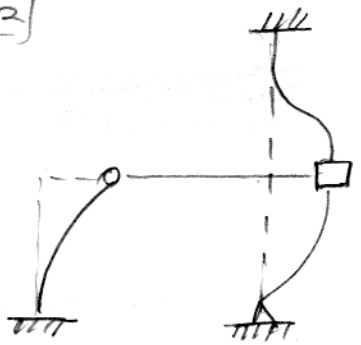




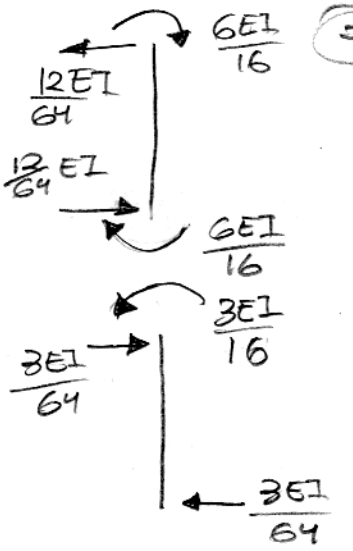
$k_{11} = \left(\frac{3}{6} + 1 + \frac{3}{4}\right) EI = \frac{9}{4} EI$

$k_{21} = \left(+\frac{3}{16} - \frac{9}{16}\right) EI = -\frac{3}{16} EI$

S2







$$K_{12} = \frac{3EI}{16} - \frac{6EI}{16} = -\frac{3}{16}EI$$

$$K_{22} = \frac{3EI}{64} + \frac{3EI}{64} + \frac{12}{64}EI = \frac{18EI}{64}$$

SISTEMA:

$$EI\begin{bmatrix} 9/4 & -3/16 \\ -3/16 & 18/64 \end{bmatrix}\begin{Bmatrix} D_1 \\ D_2 \end{Bmatrix} = \begin{Bmatrix} -16 \\ 39 \end{Bmatrix}$$

$$\begin{Bmatrix} D_1 \\ D_2 \end{Bmatrix} = \frac{1}{EI}\begin{bmatrix} 8/17 & 16/51 \\ 16/51 & 64/17 \end{bmatrix}\begin{Bmatrix} -16 \\ 39 \end{Bmatrix} = \begin{Bmatrix} 80/17\,EI \\ \dfrac{7232}{51\,EI} \end{Bmatrix}$$

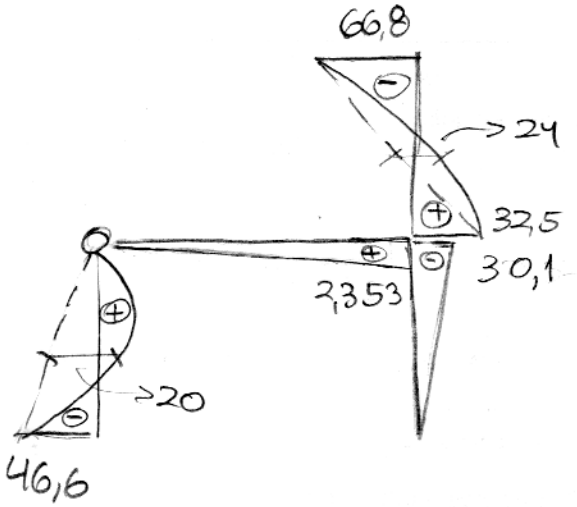
$$M_A = 20 + 0 \times 80/17 + 3/16 \times \frac{7232}{51} = 46{,}59\ kNm$$

$$M_{D\,(2)} = 0 + 3/4 \times 80/17 + 3/16 \times \frac{7232}{51} = 30{,}12\ kNm$$

$$M_{D\,(3)} = 0 + 3/6 \times 80/17 + 0 \times \frac{7232}{51} = 2{,}353\ kNm$$

$$M_{D\,(4)} = 16 + 1 \times 80/17 - 6/16 \times \frac{7232}{51} = -32{,}47\ kNm$$

$$M_E = -16 + 2/4 \times 80/17 - 6/16 \times \frac{7232}{51} = -60{,}82\ kNm$$



$10 \times 4^2/8 = 20$

$12 \times 4^2/8 = 24$