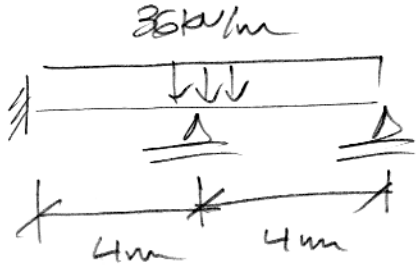
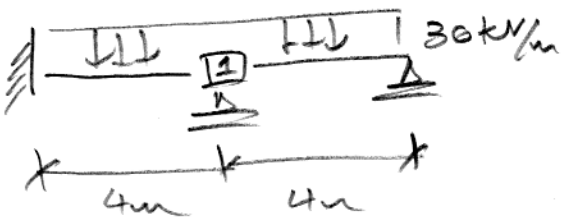
TE2-6.2

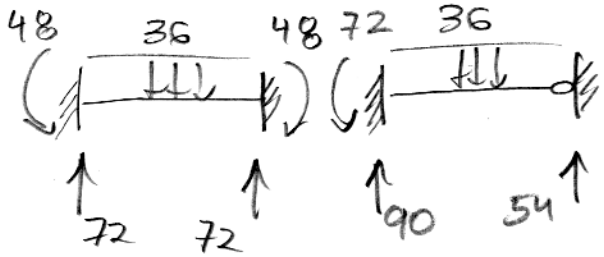


$$EI = 25\times10^{6}\,kN/m^2 \times 0{,}15m \times (0{,}4m)^3/12$$

$$EI = 20000\ kN\,m^2$$

CASO 0





$$qL^2/12 = 36\times4^2/12 = 48\ kNm$$

$$qL/2 = 36\times4/2 = 72\ kN$$

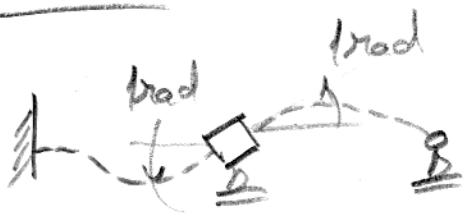
$$qL^2/8 = 36\times4^2/8 = 72\ kNm$$

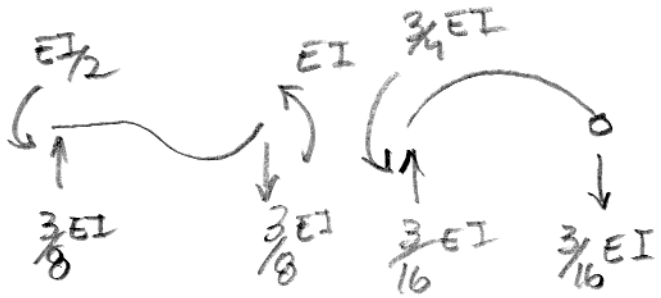
$$3qL/8 = 3\times36\times4/8 = 54\ kN$$

$$5qL/8 = 5\times36\times4/8 = 90\ kN$$

$$F_1 = -48\ kNm + 72\ kNm = +24\ kNm$$

CASO 1





$$4EI/L = EI$$

$$6EI/L^2 = 6/16\,EI = 3/8\,EI$$

$$2EI/L = 2/4\,EI = EI/2$$

$$3EI/L = 3/4\,EI$$

$$3EI/L^2 = 3/16\,EI$$

$K_{11} = EI + \frac{3}{4}EI = \frac{4+3}{4}EI = \frac{7}{4}EI$

→ Sistema de equações:

$k_{11} \cdot D_1 = -F_1 \qquad D_1 = -F_1/k_{11}$

$D_1 = -24 kNm / \frac{7}{4}EI = \frac{-24}{\frac{7}{4} \times 20000} = -6{,}8571 \times 10^{-4}$ rad

→ Sobreposição de efeitos:

$M_A = M_{A0} + M_{B1} \times D_1 = 48 + 20000/2 \times (-6{,}8571 \times 10^{-4}) = 41{,}14$ kNm ↶

$M_D = M^{esq}_{D} = M^{e}_{B0} + M^{e}_{B1} \times D_1 = -48 + 20000 \times (-6{,}8571 \times 10^{-4}) = -61{,}71$ kNm ↷

$M_{D_{dir}} = M^{d}_{B0} + M^{d}_{B1} \times D_1 = 72 + \frac{3}{4} \times 20000 \times (-6{,}8571 \times 10^{-4}) = 61{,}71$ kNm ↶

$M_C = 0$

$V_A = V_{A0} + V_{A1} \times D_1 = 72 + \frac{3}{8} \times 20000 \times (-6{,}8571 \times 10^{-4}) = 66{,}86$ kN ↑

$V_B = V_{B0} + V_{B1} \times D_1 =$

$(72+90) + \left(-\frac{3}{8} + \frac{3}{16}\right) \times 20000 \times (-6{,}8571 \times 10^{-4}) = 164{,}6$ kN ↑

$V_C = V_{C0} + V_{C1} \times D_1 = 54 - \frac{3}{16} 20000 \times (-6{,}8571 \times 10^{-4}) = 56{,}57$ kN ↑