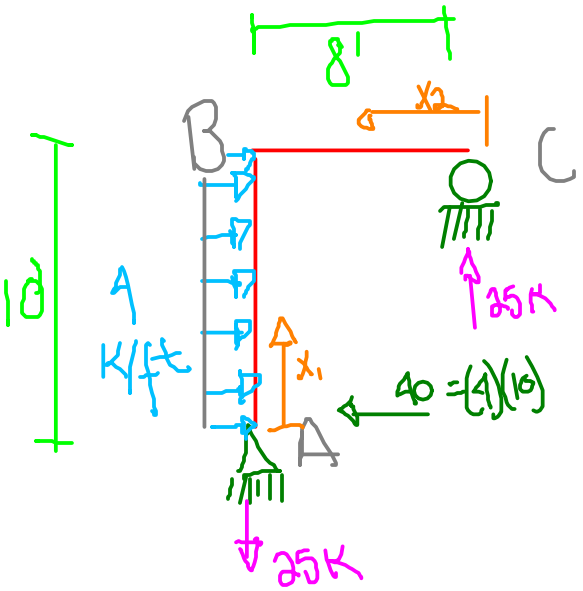


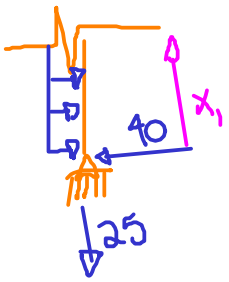
¿ δ_{x_C} ?

$\Sigma M_A = 0 = 4(10)(5) - R_C(8)$

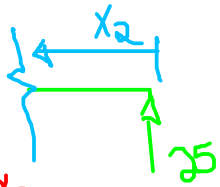
$R_C = 25K \uparrow$

P = Real

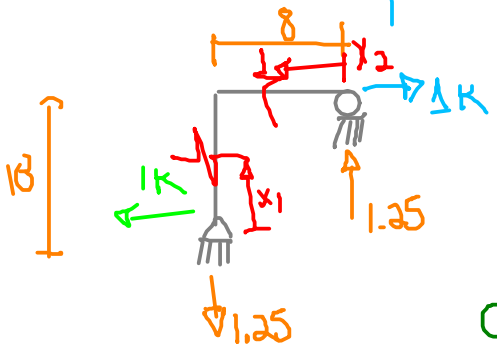
Q = Virtual



$M_P = 40x_1 - 4x_1\left(\frac{x_1}{2}\right) = 40x_1 - 2x_1^2$ Col.



$M_P = 25x_2$ Vig.



$M_Q = 1x_1$ Col.

$1(10) = R(8)$

$R = 1.25$

$M_Q = 1.25x_2$ Vig.

Col.

$$EI\,1\delta_P = \int_0^{10} (1x_1)(40x_1 - 2x_1^2)\,dx + \int_0^{8} (1.25x_2)(25x_2)\,dx$$

$\frac{kft^3}{kin^3}$ $(12)^3$

$$\delta = \frac{8333.33}{EI} + \frac{5333.33}{EI} = \frac{13{,}666.7\ kft^3}{EI}$$

M_P 25x8 = 200

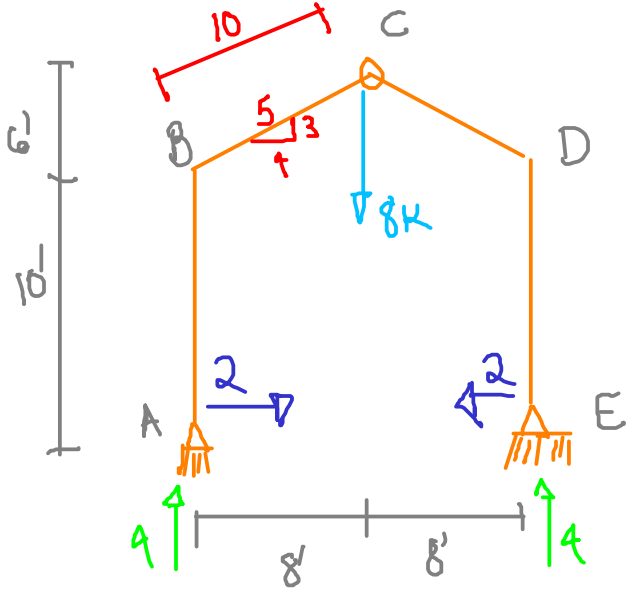
M_V 1.25(8) = 10

(10)(1)

$E = 29{,}000$ ksi

$I = 600\ in^4$

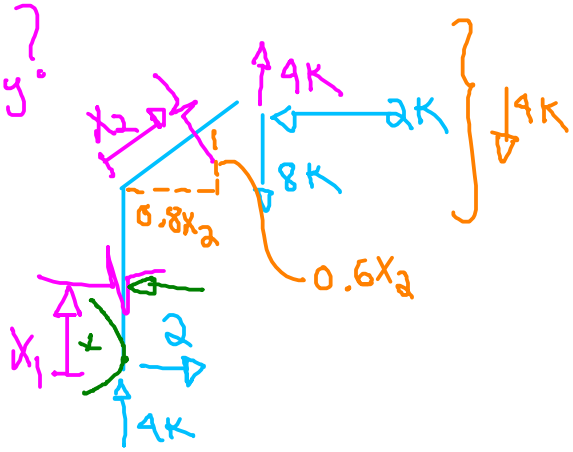
$\therefore \delta = 1.36$ in



$\Sigma M_C = 0 = 4(8) - R_{AX}(16)$

$R_{AX} = 2 \rightarrow$

¿δ_{Cy}?



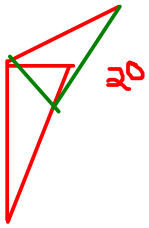
Col.

$M_p = +2X_1$

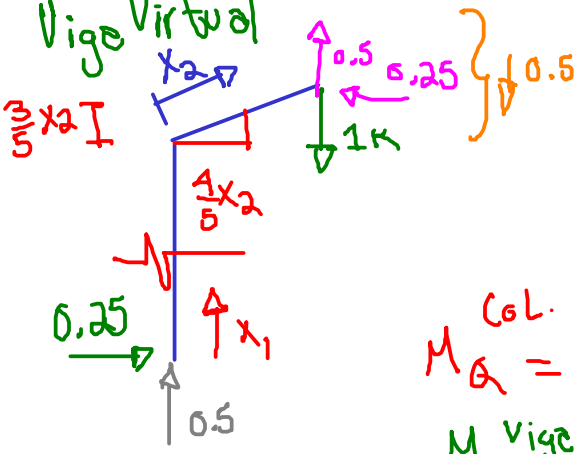
Viga =

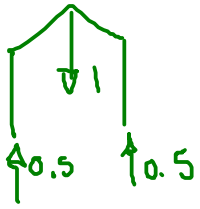
$M_p = +20 - 4(0.8X_2) + 2(0.6X_2)$

$M_p = +20 - 2X_2$



Viga Virtual





$\Sigma M_C = 0 = 0.5(8) - R_{AX}(16) = 0$

$R_{AX} = 0.25$

Col.

$M_Q = 0.25X_1$

$M_Q^{viga} = -0.5(0.8X_2) + 0.25(0.6X_2) + 2.5$

$M_Q = 2.5 - 0.25X_2$

$$\Sigma Q\delta_p = \Sigma \frac{M_Q M_p}{EI}$$

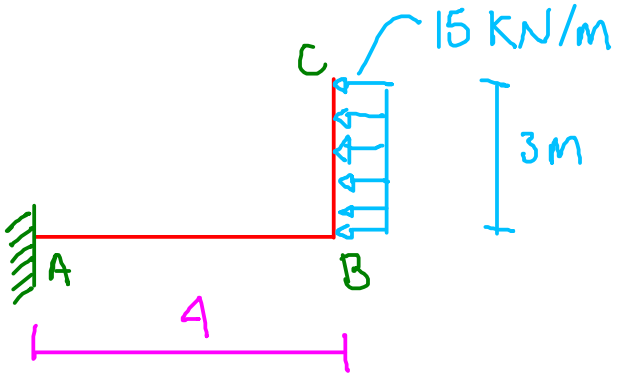
$$EI\ 1K\ \delta_p = \left(\int_0^{10} (0.25X_1)(2X_1)dx + \int_0^{10} (2.5 - 0.25X_2)(20 - 2X_2)dx \right)(2)$$

$$= (166.67 + 166.67)(2) = 666.67$$

$\delta_{VC} = 666.67^* / EI\ (\downarrow)$ * Kft^3

$$\int_0^{10} (0.25 \cdot x) \cdot (2 \cdot x)\, dx = 166.6667$$

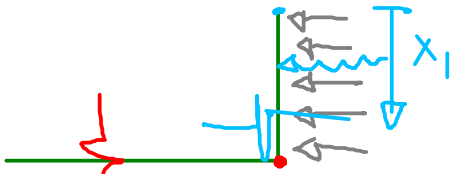
$$\int_0^{10} (2.5 - 0.25 \cdot x) \cdot (20 - 2 \cdot x)\, dx = 166.6667$$



$\delta_{x_C} = ¿?$

$EI = cte.$

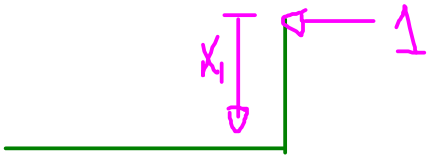
Sistema Real P



$M_p = (15)(x_1)\left(\frac{x_1}{2}\right) = 7.5x_1^2$

$M_p = (15)(3)(1.5) = 67.5$

Sistema Virtual Q



$M_Q = 1x_1$

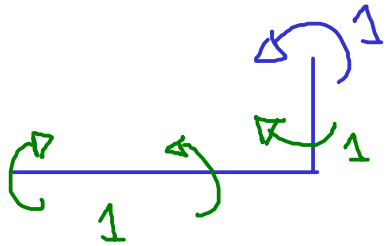
$M_Q = 3$

$$EI(1)\delta_p = \int_0^4 (67.5)(3)dx + \int_0^3 (7.5x^2)(x)dx$$

$$= 202.5x\Big|_0^4 + \frac{15x^4}{8}\Big|_0^3 = 810 + 151.875$$

$$\delta_{x_C} \approx \frac{962}{EI}\ KN\,m^3\ (\longleftrightarrow)$$

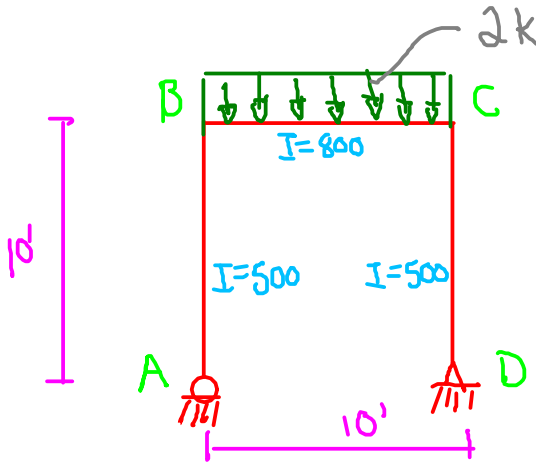
→ Rotación en "C"



$$EI\ 1KNm\ \theta_{p_C} = \int_0^4 (67.5)(1)dx$$

$$+ \int_0^3 (7.5x^2)(1)dx = 270 + 67.5 = 337.5$$

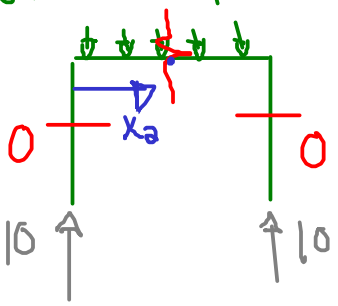
$$\theta_C = \frac{337.5\ KN\,m^2}{EI}\ \circlearrowleft$$



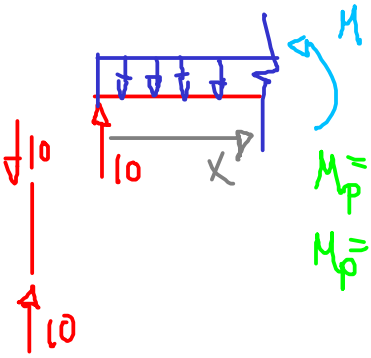
$E = 29{,}000\ ksi$

$\delta_{x_A} = ¿?$

Sistema Real



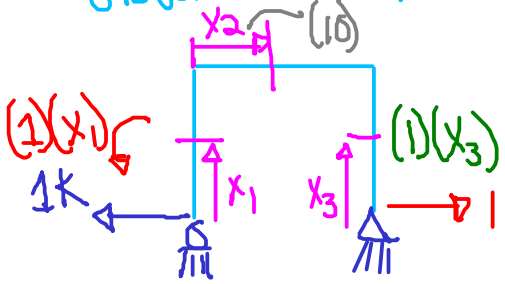
$$M_p = -(2)(x_2)\left(\frac{x_2}{2}\right) + 10x_2$$



$$M_p = 10x_2 - 2(x_2)\left(\frac{x_2}{2}\right)$$

$$M_p = 10x_2 - x_2^2$$

Sistema Virtual

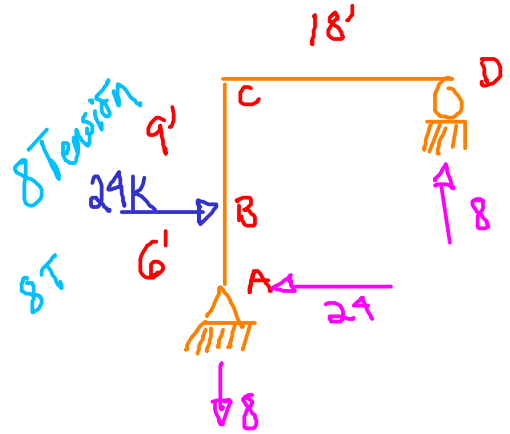


$$EI\ 1K\delta_p = \int_0^{10} (10x - x^2)(10)dx$$

$$50x^2 - \frac{10}{3}x^3 \Big|_0^{10} = 1666.67\ K^2ft^3$$

$$1K\delta_p = \frac{1666.67\ K^2ft^3\ (12x12x12)^2}{29000\ \frac{K}{in^2}\ (800\ in^4)}$$

$$\delta_p = 0.124\ in\ (\leftarrow)$$

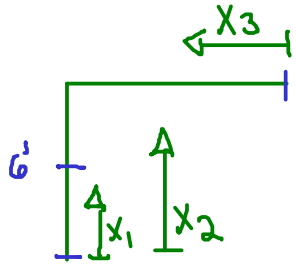


$\delta_{x_C} = ¿?$

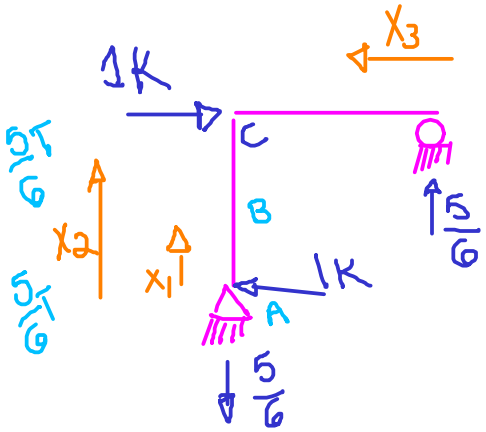
$I = 600\ in^4$ $A = 13\ in^2$ $E = 29{,}000\ ksi$

$(29)(6) = (18)(x)$

$x = 8$



Segmento	Origen	Límites	M_p	M_Q
AB	A	0-6	$24X_1$	X_1
BC	A	6-15	$24X_2 - 24(X_2-6)$ (Reac. − Acc.)	X_2
DC	D	0-18	$8X_3$	$\frac{5}{6}X_3$



$$(1)(15) = (18)(x)$$

$$x = \frac{5}{6}$$

$$W_Q = U_Q$$

$$\Sigma Q\,\delta_{x_C} = \Sigma \int \frac{M_Q M_P}{EI} + \Sigma \int \frac{F_Q F_P}{AE}$$

$$1K_{ip}\,\delta_{x_C} = \int_0^6 \frac{(24X)(X)}{EI}\,dx + \int_6^{15} \frac{(24X_2 - 24X_2 + 144)(X_2)}{EI}\,dx + \int_0^{18} \frac{(8X_3)\left(\frac{5}{6}X_3\right)}{EI}\,dx$$

$$+ \int_0^{15} \frac{\left(\frac{5}{6}\right)(8)}{AE}\,dx = \frac{8x^3}{EI}\Big|_0^6 + \frac{72x^2}{EI}\Big|_6^{15} + \frac{20X_3^3}{9EI}\Big|_0^{18} + \frac{40x}{GAE}\Big|_0^{15}$$

$$= \frac{1}{EI}(1728 + 16200 - 2592 + 12960) + \frac{100}{AE}$$

(por flex. / por f. axial)

$$= \frac{28296}{29000(600)}(12\times12\times12) + \frac{100(12)}{(13)(29000)} = 2.81 + 0.0032$$

$$= 2.8\ in\ (\rightarrow)$$