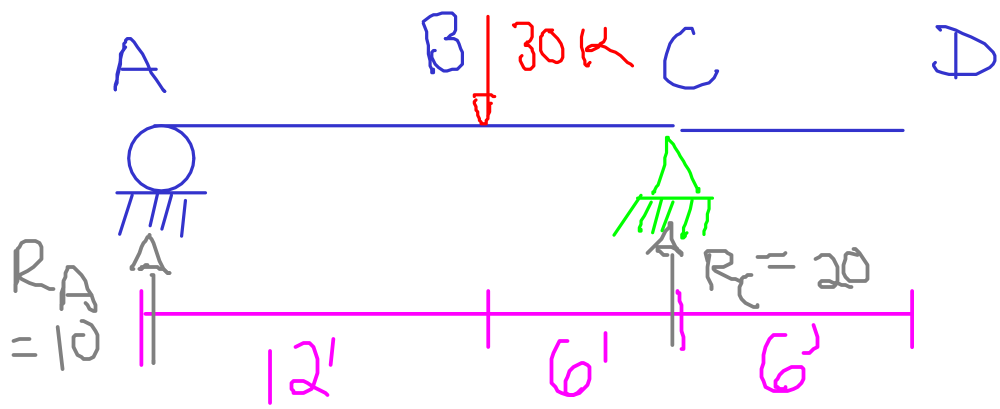
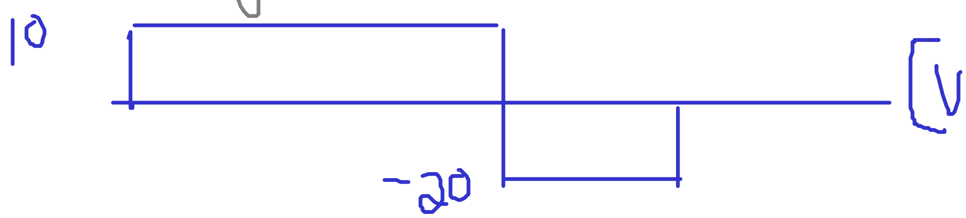
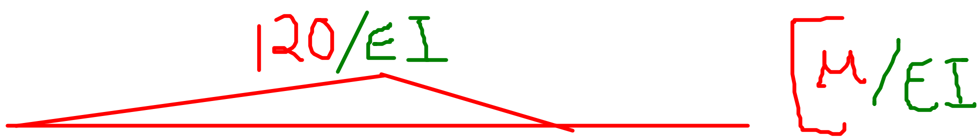
Obtener la deflexión máxima de A a C, y la deflexión en D.



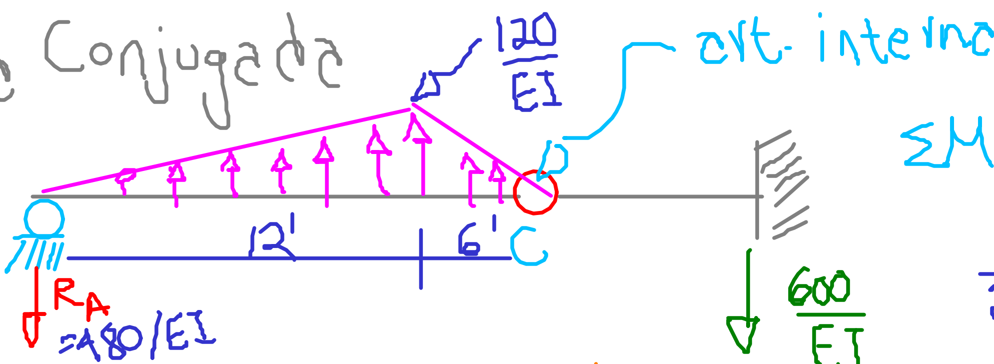
$$\Sigma M_C = R_A(18) - 30(6) = 0 \rightarrow R_A = 10\,K \uparrow$$

$$\Sigma F_y = 10 - 30 + R_C = 0 \rightarrow R_C = 20\,K \uparrow$$





Viga Conjugada

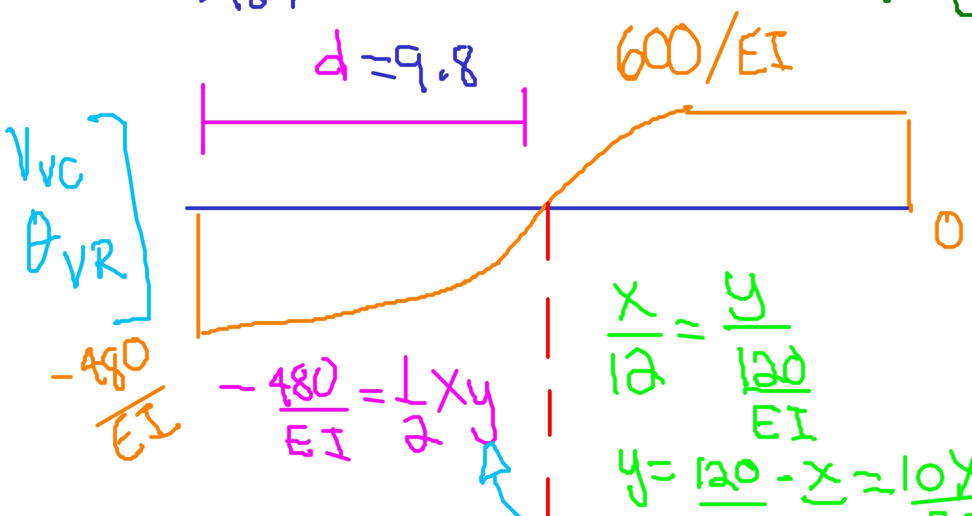


(Lado Izquierdo)

$$\Sigma M_C = R_A(18) - \frac{1}{2}(12)\left(\frac{120}{EI}\right)\left(6 + \frac{1}{3}\cdot 12\right) - \frac{1}{2}(6)\left(\frac{120}{EI}\right)\left(\frac{2}{3}\cdot 6\right) = 0 \rightarrow R_A = 480/EI$$

$$\Sigma F_y = -\frac{480}{EI} + \frac{1}{2}(12)\left(\frac{120}{EI}\right) + \frac{1}{2}(6)\left(\frac{120}{EI}\right) + R_D = 0$$

$$R_D = -600/EI$$



$$\frac{x}{12} = \frac{y}{\frac{120}{EI}}$$

$$y = \frac{120}{EI} \cdot \frac{x}{12} = \frac{10x}{EI}$$

$$-\frac{480}{EI} = \frac{1}{2}xy$$

$$\frac{480}{EI} = \frac{1}{2} x \left(\frac{10x}{EI}\right)$$

$$480 = 5x^2$$

$$96 = x^2$$

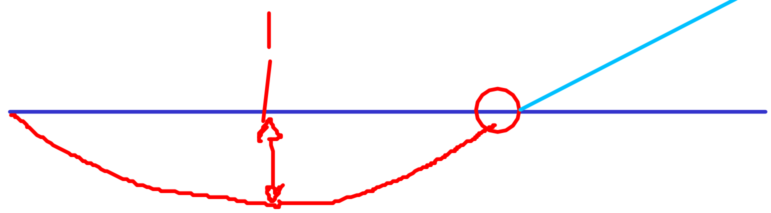
$$\sqrt{96} = x$$

$$x = 9.8$$

$$M_D = \frac{3600}{EI} = \delta_D \qquad \frac{600}{EI}(6') = \frac{3600}{EI}$$

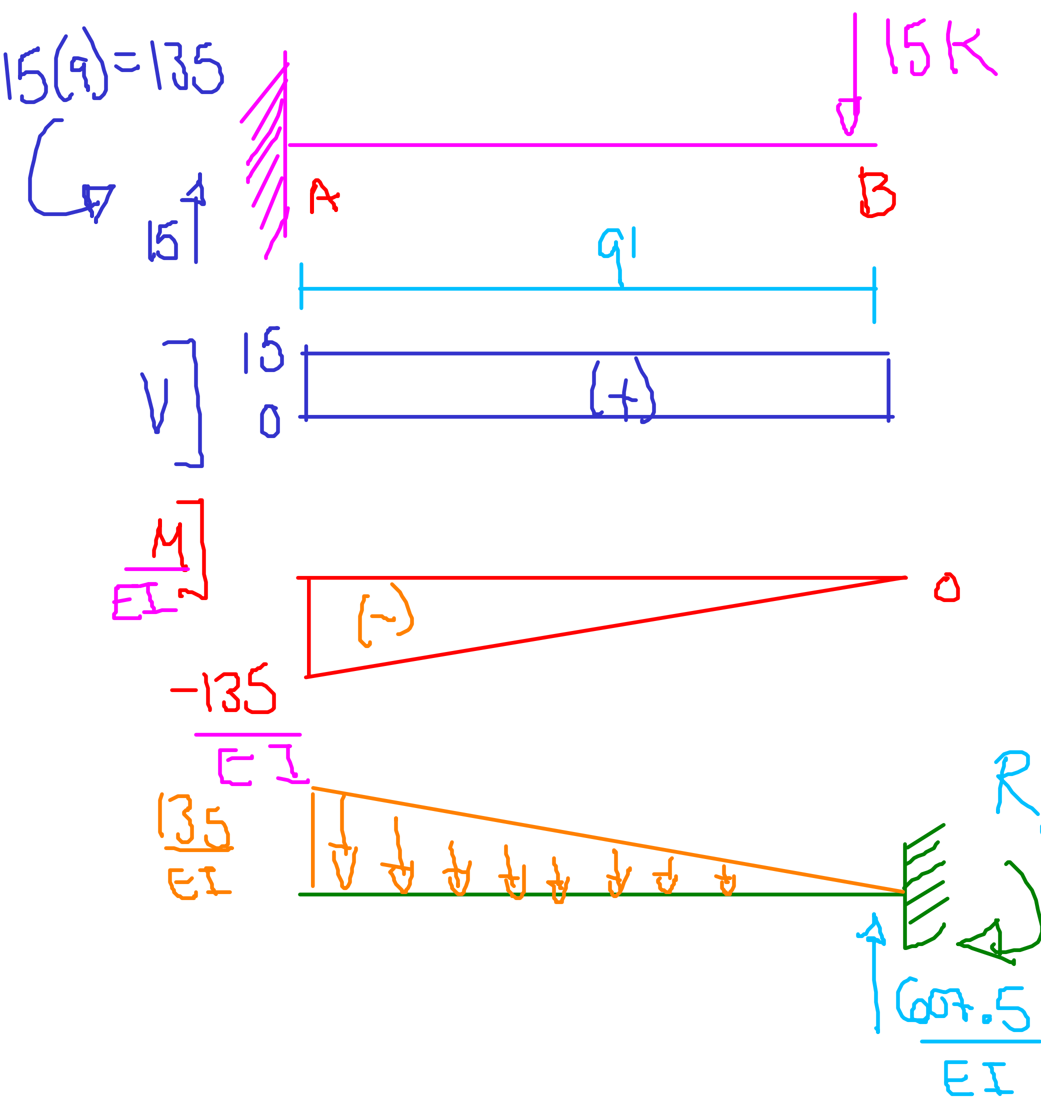
$$\frac{2}{3}(9.8)\left(\frac{480}{EI}\right) = \frac{3136}{EI}$$

$$\left.\begin{matrix} M_{VC} \\ \delta_{VR} \end{matrix}\right]$$



$$\delta_{AC} = M_{9.8m} = \frac{-3136}{EI}$$

$$15(9) = 135$$



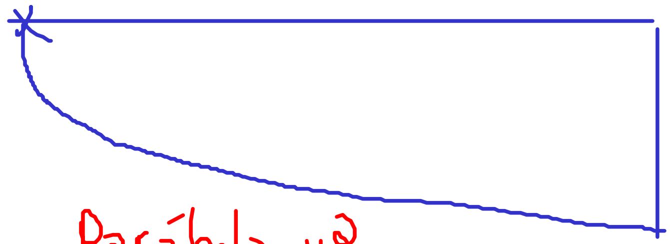
$$\delta_B = ¿?$$

$$\theta_B = ¿?$$

$$R_B = \frac{1}{2}(9)\left(\frac{135}{EI}\right) = \frac{607.5}{EI}$$

$$M_B = \frac{1}{2}(9)\left(\frac{135}{EI}\right)\left(\frac{2}{3}\cdot 9\right) = \frac{3645}{EI}$$

V_{VC} / θ_{VR}



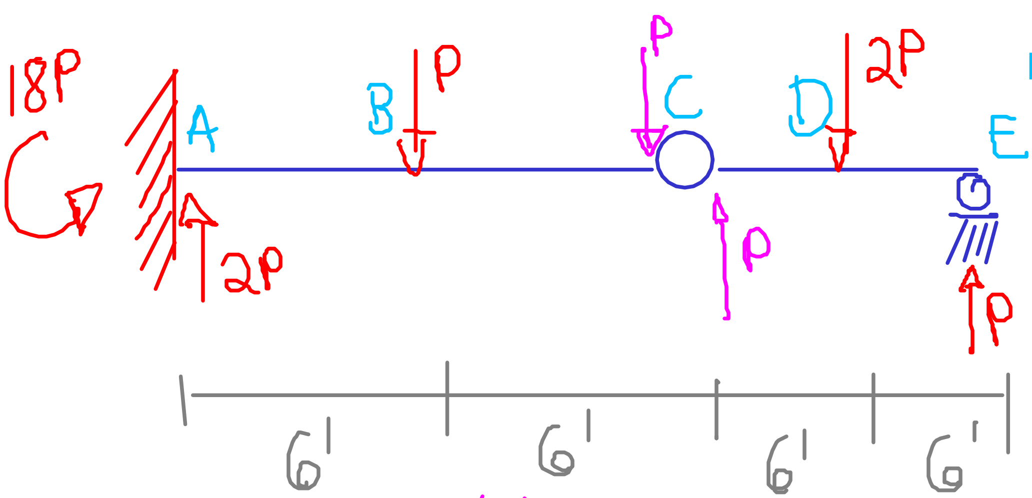
$$-\frac{607.5}{EI} = \theta_B$$

M_{VC} / δ_{VR}

$$\frac{2}{3}bh = \frac{2}{3}(9)\left(\frac{607.5}{EI}\right)$$

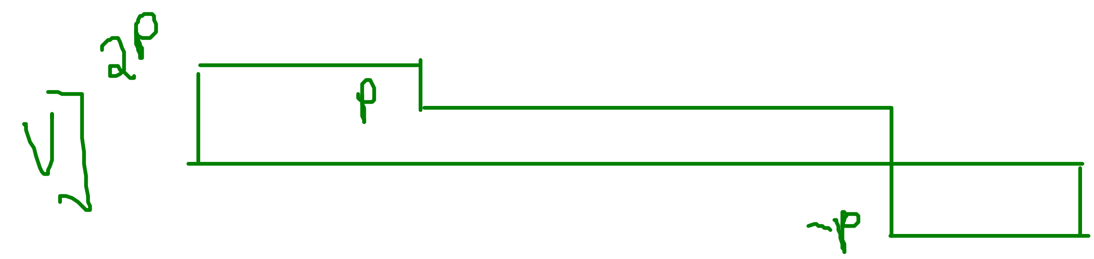
$$-\frac{3645}{EI} = \delta_B$$

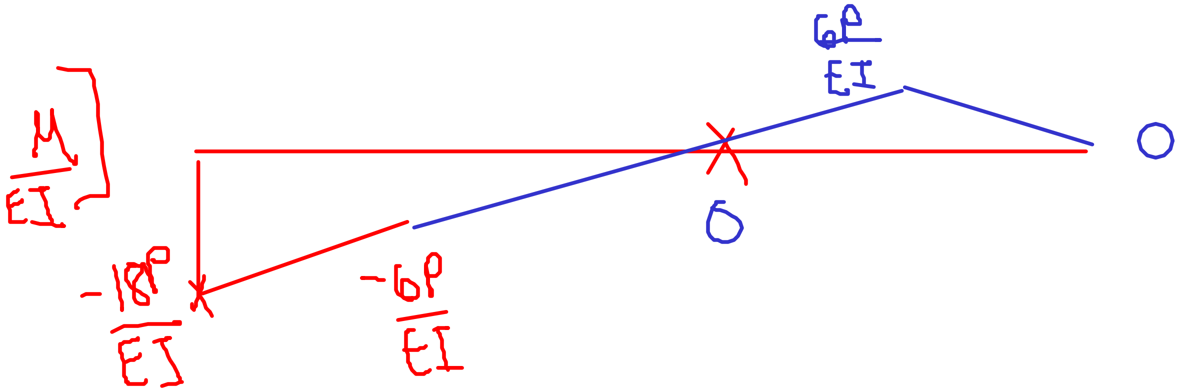
Deflexión Máxima de la Viga



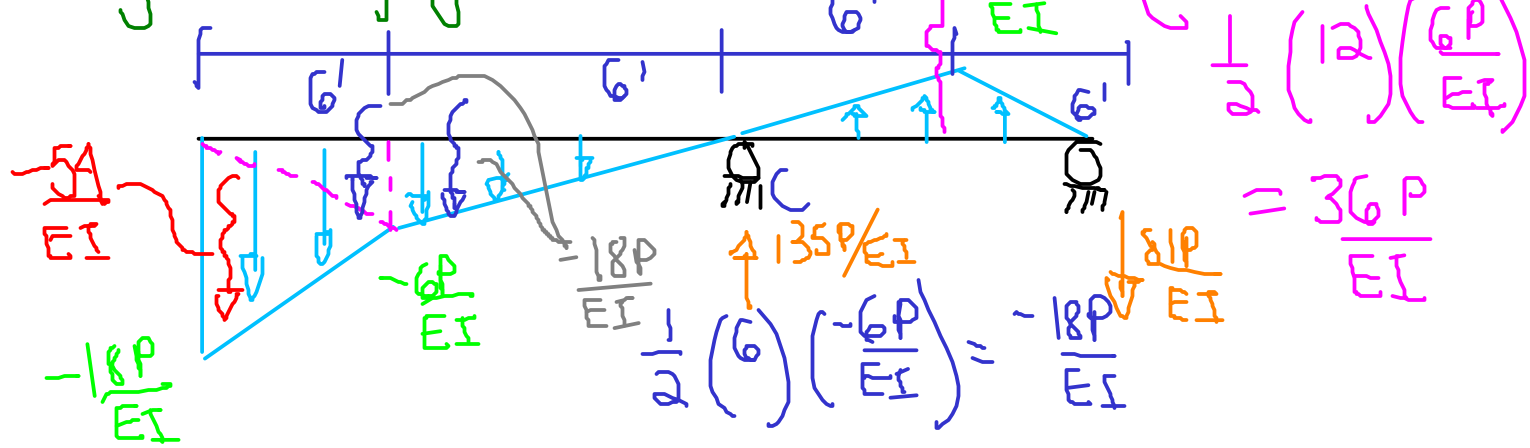
$$M_A = P(6) + P(12) = 0$$

$$M_A = 18P$$





Viga Conjugada



$$\frac{1}{2}(6)\left(\frac{-18P}{EI}\right) = \frac{-54}{EI}$$

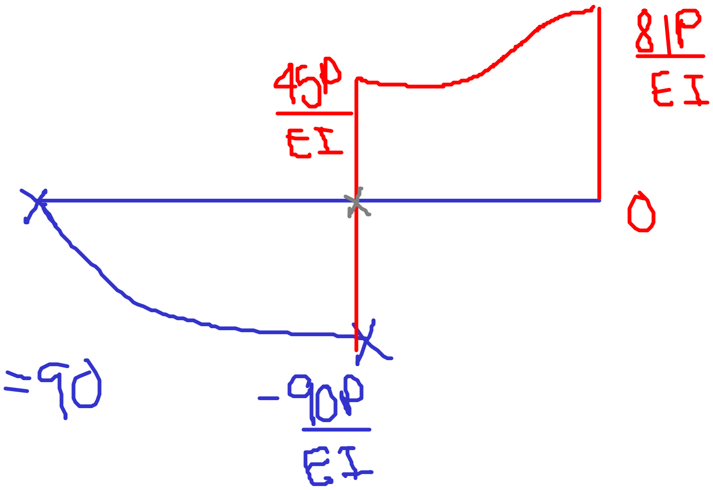
$$\circlearrowleft \Sigma M_C = 0 = \frac{36P}{EI}(6) + \frac{18P}{EI}\left(\frac{2}{3}\cdot 6\right) + \frac{18P}{EI}\left(6 + \frac{1}{3}\cdot 6\right)$$

$$+ \frac{54}{EI}\left(6 + \frac{2}{3}\cdot 6\right) - R_E(12) = 0 \rightarrow R_E = \frac{81P}{EI} \downarrow$$

$$\Sigma F_y = 0 = \frac{P}{EI}(-54 - 18 - 18 + 36 - 81 + R_C) = 0$$

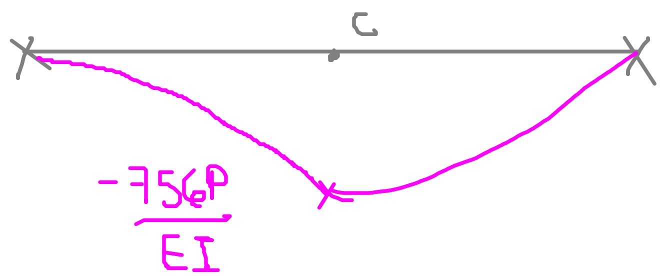
$$R_C = \frac{135P}{EI}$$

$V_{VC} = \theta_{VR}$



18+18+54=90

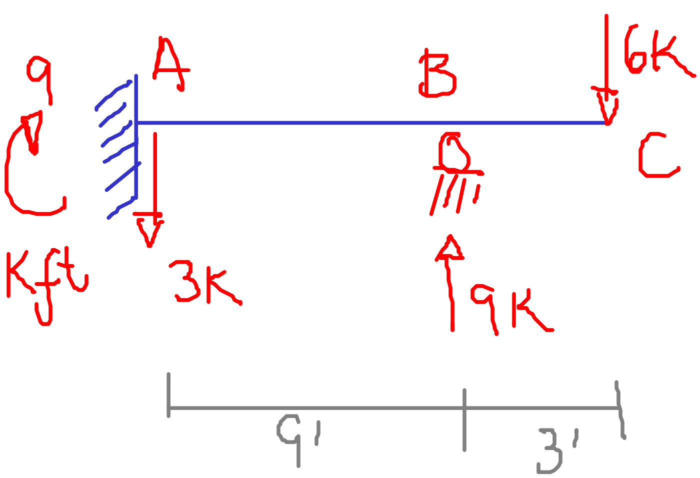
$M_{VC} = \delta_{VR}$

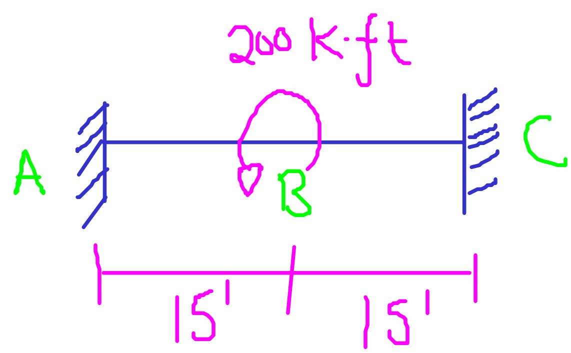


$$\Sigma M_C = \frac{P}{EI}\left[54\left(6+\frac{2}{3}\cdot 6\right)+18\left(6+\frac{1}{3}\cdot 6\right)+18\left(\frac{2}{3}\cdot 6\right)\right]=\frac{756P}{EI}$$

JZQ

$$\delta_{MAX} = -\frac{756P}{EI}$$

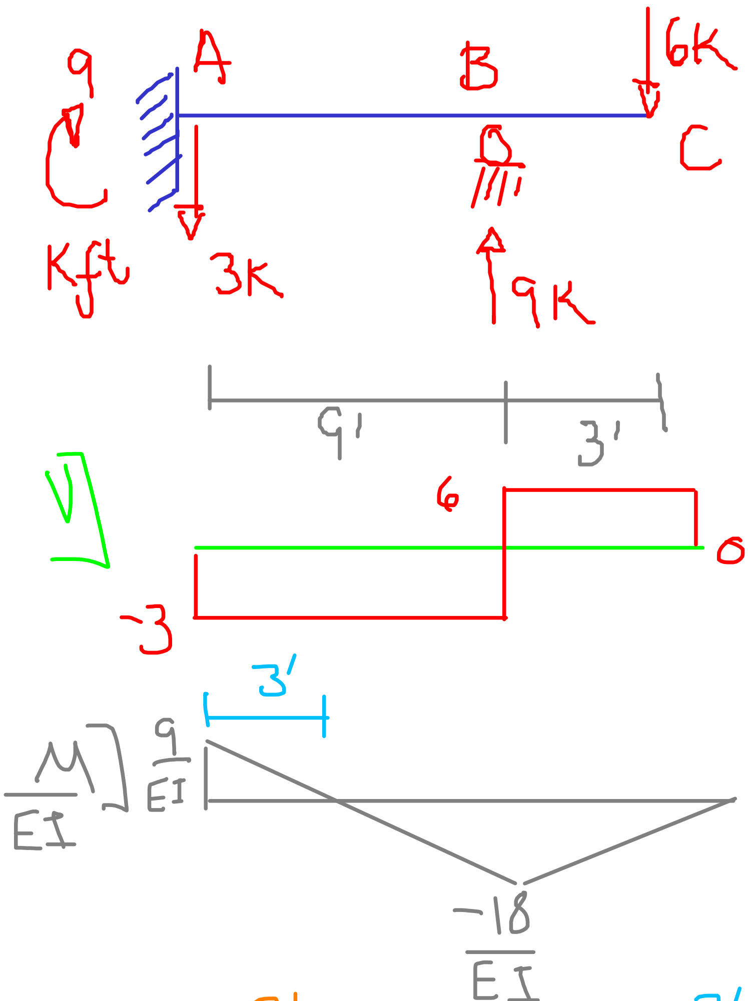




$\delta_C = ¿?$

$\delta_{máx}$ entre A y B.

EI = cte.

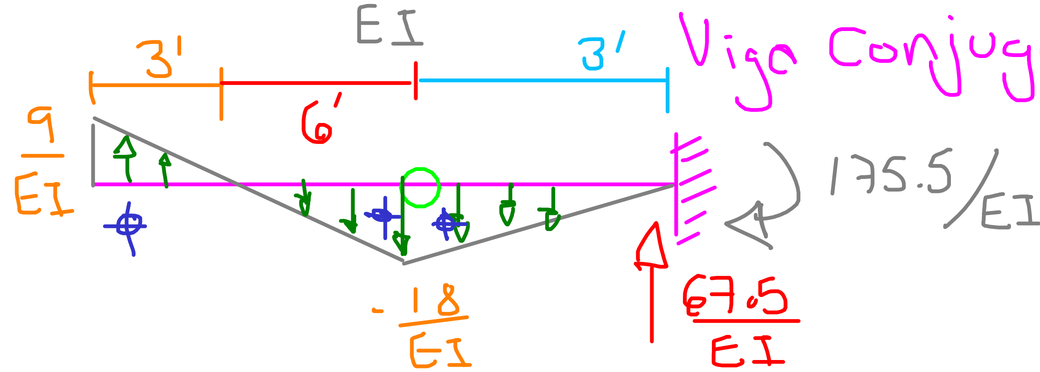


$9-(3\times 9) = -18$

$-18+6(3) = 0$

$9-3x=0 \rightarrow x=3$

Viga Conjugada

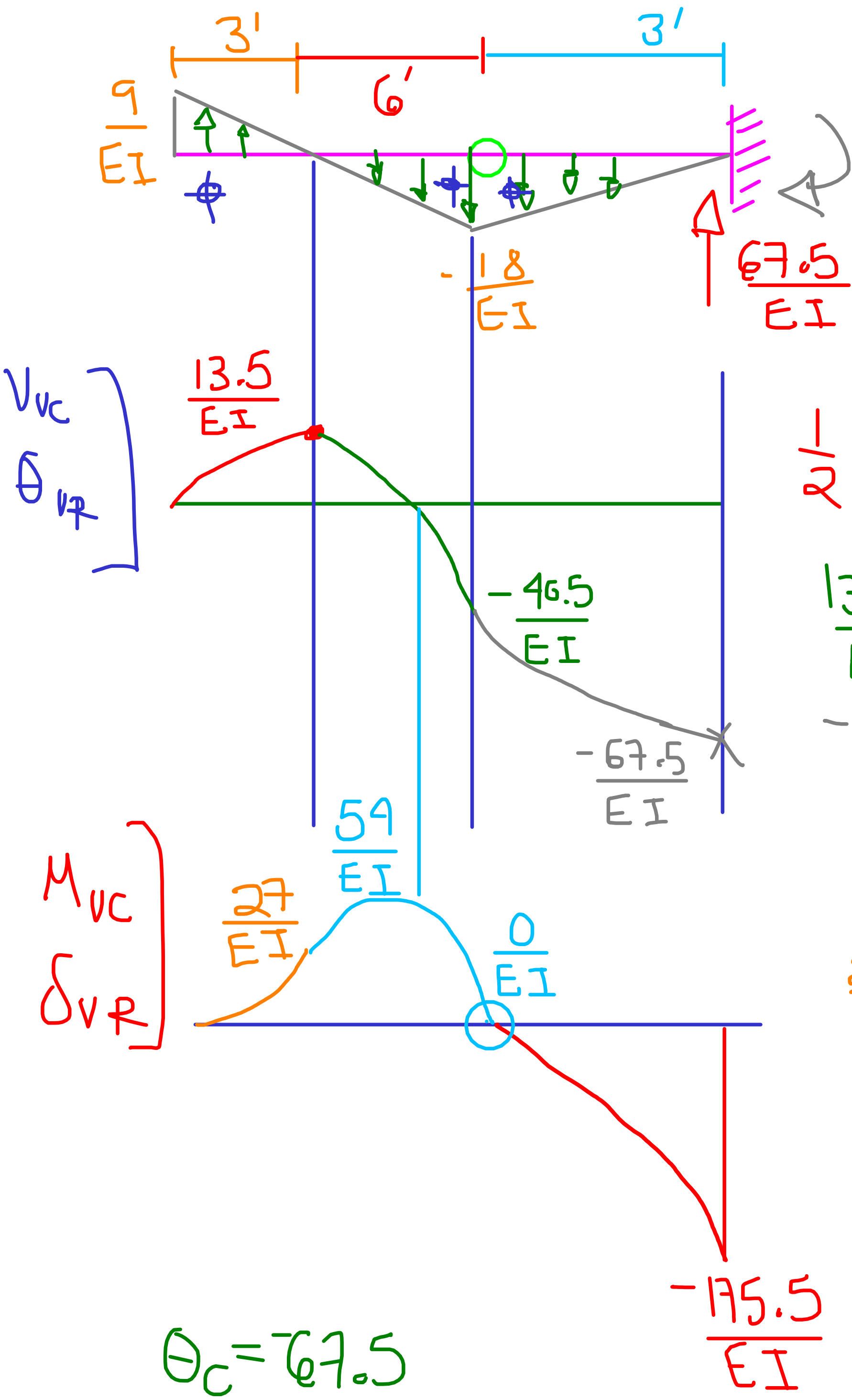


$$\Sigma F_y = \left(\frac{1}{2}\right)(3')\left(\frac{9}{EI}\right) + \frac{1}{2}(6')\left(\frac{-18}{EI}\right) + \frac{1}{2}(3')\left(\frac{-18}{EI}\right) + R_C = 0$$

$$R_C = 67.5/EI \uparrow$$

$$\Sigma M_C = 0 = \left(\frac{1}{2}\right)(3)\left(\frac{9}{EI}\right)\left(9+\frac{2}{3}\cdot 3\right) + \frac{1}{2}(6')\left(\frac{-18}{EI}\right)\left(3+\frac{1}{3}\cdot 6\right)$$

$$+\frac{1}{2}(3)\left(\frac{-18}{EI}\right)\left(\frac{2}{3}\cdot 3\right) + M_C = 0 \rightarrow M_C = \frac{175.5}{EI} \circlearrowleft$$



$$\frac{1}{2}(3)\left(\frac{9}{EI}\right) = \frac{13.5}{EI}$$

$$\frac{13.5}{EI} - \frac{1}{2}(6)\left(\frac{18}{EI}\right) = \frac{-40.5}{EI}$$

$$\frac{-40.5}{EI} - \frac{1}{2}(3)\left(\frac{18}{EI}\right) = \frac{-67.5}{EI}$$

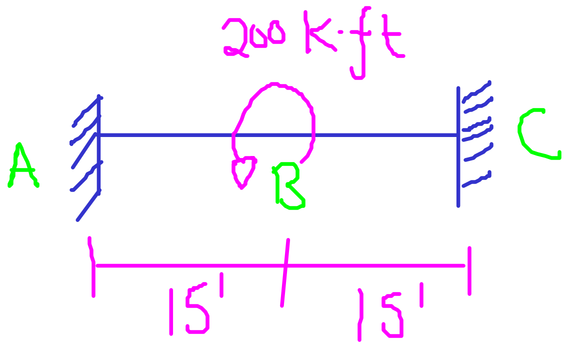
$$\frac{2}{3}(3)\left(\frac{13.5}{EI}\right) = \frac{27}{EI}$$

$$\frac{27}{EI} + \frac{2}{3}(3)\left(\frac{13.5}{EI}\right) = \frac{54}{EI}$$

$$\theta_C = \frac{-67.5}{EI}$$

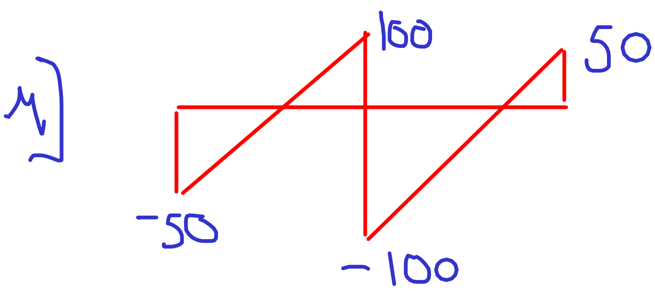
$$\delta_C = \frac{-175.5}{EI}$$

$$\delta_{MAX_{A-B}} = \frac{54}{EI}$$

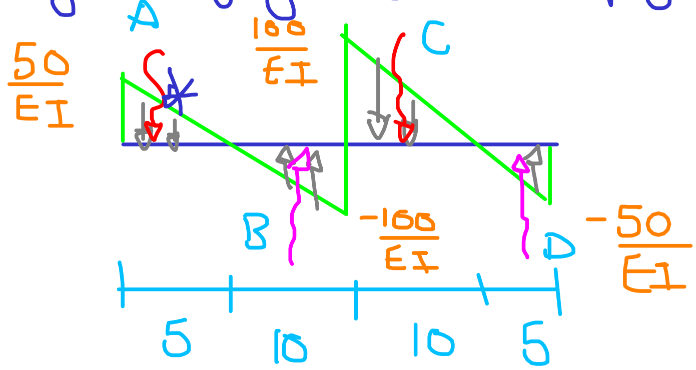


¿$\delta_{vert \cdot máx}$?

¿$\theta_{máx}$? & ubicación



Viga Conjugada (sin apoyos) → Equilibrio por las cargas



$$A = \frac{1}{2}(5')\left(\frac{50}{EI}\right) = \frac{150}{EI}$$

$$B = \frac{1}{2}(10')\left(\frac{100}{EI}\right) = \frac{500}{EI}$$

$$C = \frac{1}{2}(10')\left(\frac{100}{EI}\right) = \frac{500}{EI}$$

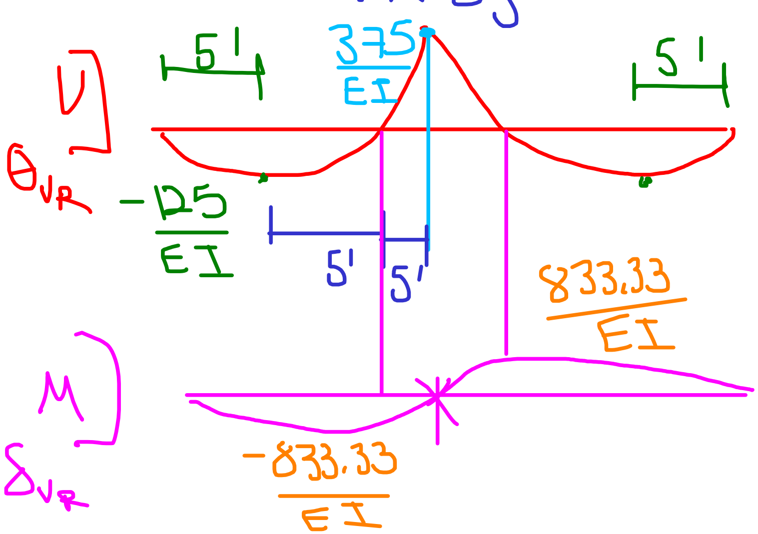
$$D = \frac{1}{2}(5')\left(\frac{50}{EI}\right) = \frac{150}{EI}$$

$*E_c = y = mx + b$

$$y = \frac{-100-50}{15}x + 50 = -10x + 50$$

$$-10x + 50 = 0$$

$\rightarrow x = 5$ ft.



$$\frac{1}{2}\left(\frac{50}{EI}\right)(5) = \frac{125}{EI}$$

$$\frac{1}{2}\left(\frac{100}{EI}\right)(10) = \frac{500}{EI}$$

$$\frac{500}{EI} - \frac{125}{EI} = \frac{375}{EI}$$

$$\frac{2}{3}(10')\left(\frac{125}{EI}\right) = \frac{833.33}{EI}$$

$\theta_{MÁX} = \frac{375}{EI}$ @ ℄

$\delta_{MÁX} = \frac{833.33}{EI}$

a 10 ft de cada apoyo.