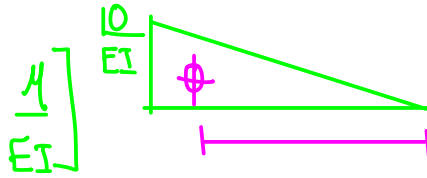
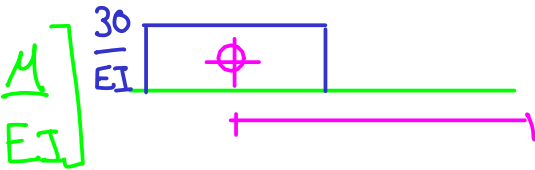
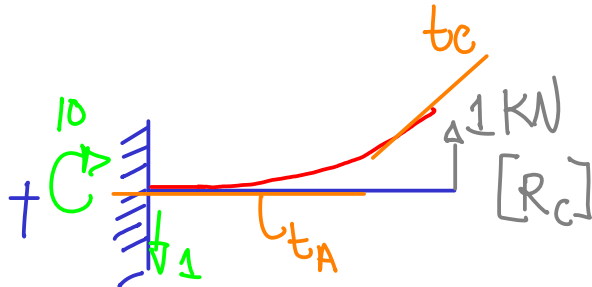
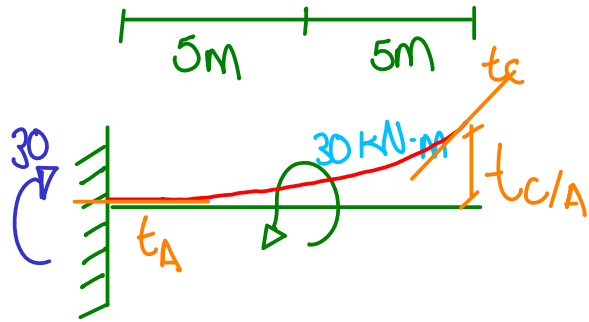


$\delta v \& \mu?$
 $EI = \text{cte.}$



$$t_{C/A} = \Delta_{C0} = \frac{30}{EI} (5) (2.5 + 5)$$

$$= \frac{1125}{EI} \uparrow$$

$$t_{C/A} = \delta_{CC} = \frac{1}{2} (10) \left(\frac{10}{EI}\right) \left(\frac{2}{3} \cdot 10\right)$$

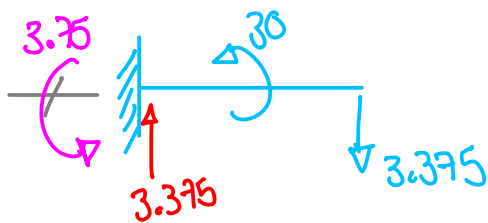
$$= \frac{1000}{3EI} \uparrow$$

Ecuación de compatibilidad

$$\Delta_{C0} + \delta_{CC} R_C = 0$$

$$\frac{1125}{EI} + \frac{1000}{3EI} R_C = 0$$

$$R_C = -3.375 = 3.375 \downarrow$$

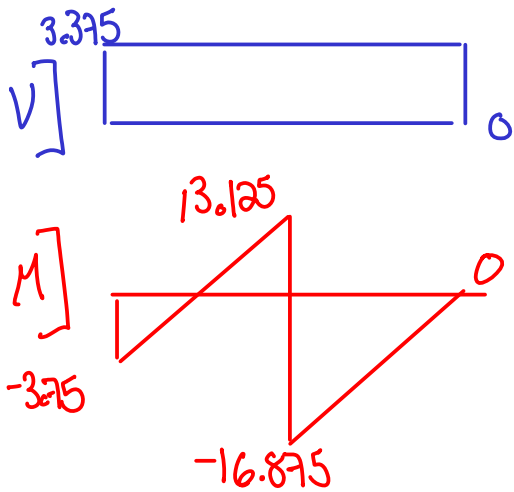


$$\sum F_y = R_{Ay} - 3.375 = 0$$

$$R_{Ay} = 3.375 \uparrow$$

$$\sum F_x = 0 = A_x$$

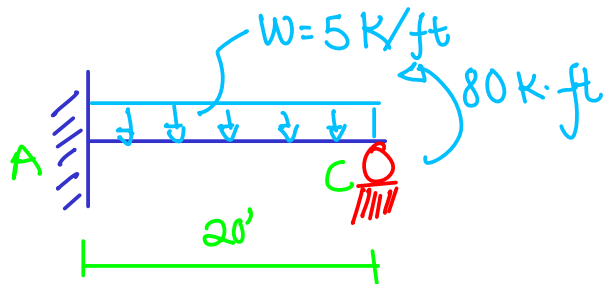
$$\sum M_A = M_A - 30 + 3.375 (10) = 0 \rightarrow M_A = -3.75 = 3.75 \curvearrowright$$



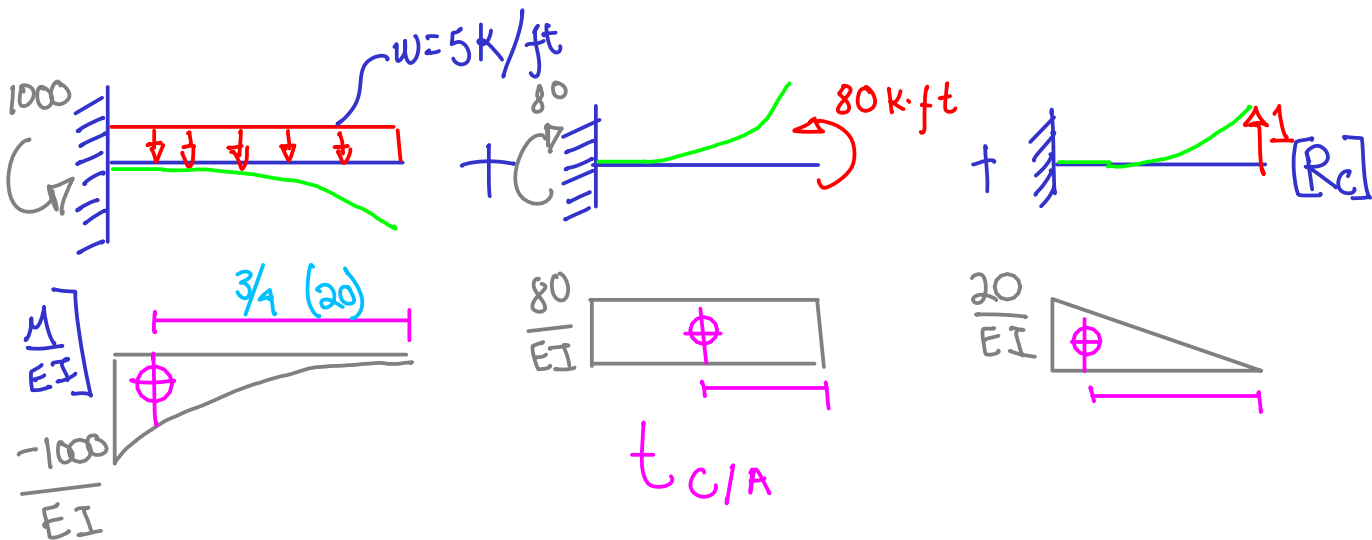
$$-3.75 + 3.375(5) = 13.125$$

$$13.125 - 30 = -16.875$$

$$-16.875 + 3.375(5) = 0$$



Reacciones
 V, M
 $EI = \text{cte.}$



$$\Delta_{C0_1} = \frac{1}{3}(20)\left(-\frac{1000}{EI}\right)$$

$$\left(\frac{3}{4} \cdot 20\right) = -\frac{100,000}{EI}$$

$$\Delta_{C0_2} = \frac{80}{EI}(20)$$

$$\left(\frac{20}{2}\right) = \frac{16,000}{EI}$$

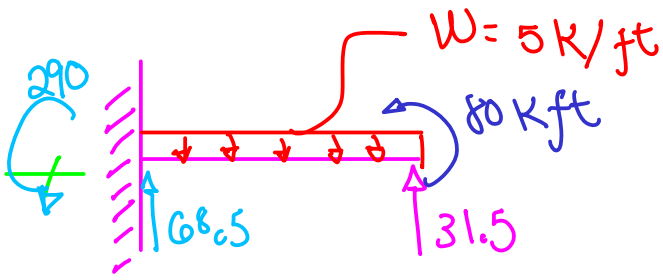
$$\Delta_{CC} = \frac{1}{2}(20)\left(\frac{20}{EI}\right)$$

$$\left(\frac{2}{3} \cdot 20\right) = \frac{8,000}{3EI}$$

Ecuación de Compatibilidad

$$\Delta_{C0_1} + \Delta_{C0_2} + \Delta_{CC} R_C = 0$$

$$\frac{-100,000}{EI} + \frac{16,000}{EI} + \frac{8000}{3EI} R_C = 0 \rightarrow R_C = 36.5 \text{ K}\uparrow$$



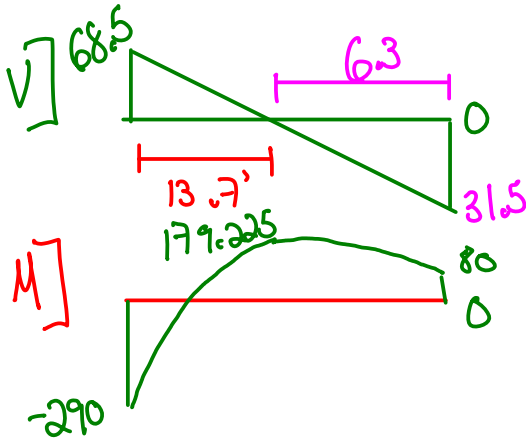
$$\sum F_y = A_y + 31.5 - 5(20) = 0$$

$$A_y = 68.5 \text{ K} \uparrow$$

$$\sum F_x = A_x = 0$$

$$\sum M_A = M_A + 5(20)(10) - 80 - 31.5(20) = 0$$

$$M_A = -290 = 290 \text{ ft}$$



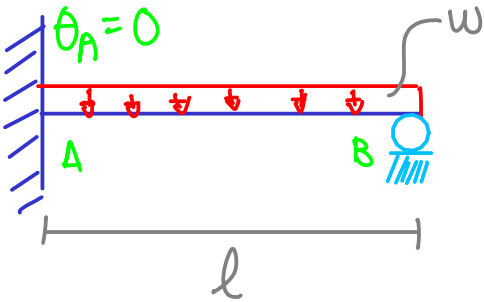
$$68.5 - 5(20) = -31.5$$

$$68.5 - 5x = 0$$

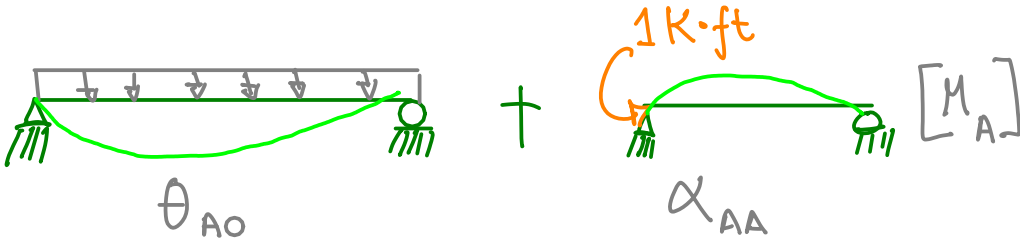
$$x = 13.7'$$

$$-290 + \frac{1}{2}(13.7)(68.5) = 179.225$$

$$179.225 - \frac{1}{2}(6.3)(31.5) = 80$$



Reacciones.



Ecuación de Compatibilidad

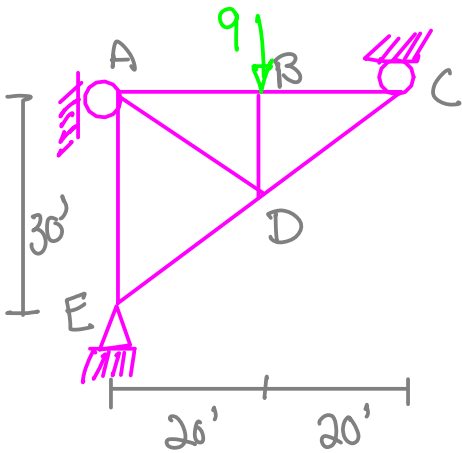
$$\theta_{A0} + \alpha_{AA} M_A = 0$$

$$\text{De la figura} \rightarrow \theta_{A0} = \frac{wl^3}{24EI} ; \alpha_{AA} = -\frac{1}{3EI}$$

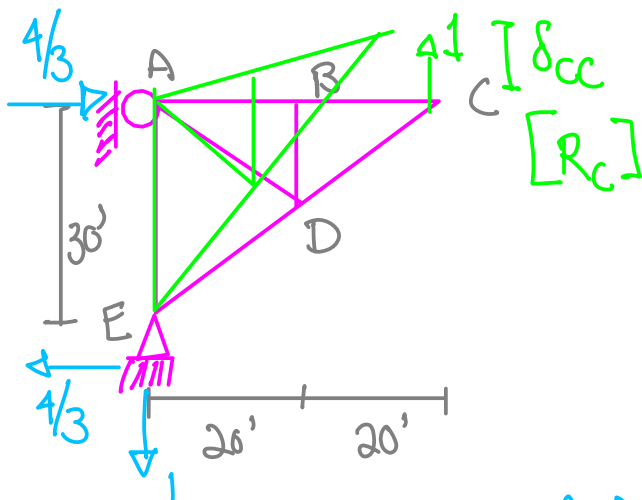
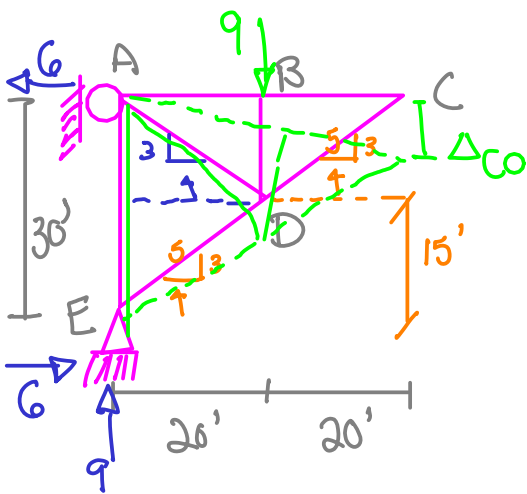
$$\frac{wl^3}{24EI} - \frac{M_A l}{3EI} = 0 \rightarrow M_A$$

$$\frac{M_A l}{3EI} = \frac{3wl^3}{24EI} \Rightarrow M_A = \frac{wl^2}{8}$$

$$M_A = \frac{wl^2}{8}$$



Fuerzas en las barras.
AE es constante

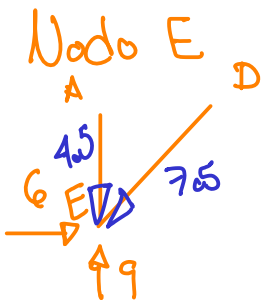


$$\sum M_E = 9(20) - A_x(30) = 0 \rightarrow A_x = 6$$

$$6(30) = 9(20) \text{ OK.}$$

$$\sum M_E = 1(40) - A_x(30) = 0$$

$$A_x = 4/3$$

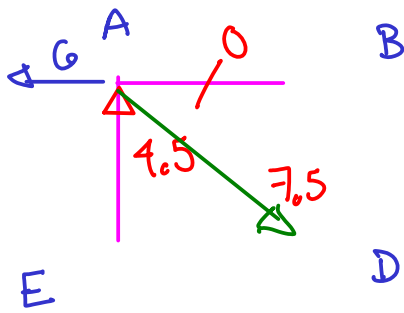


$$\sum F_x = 6 - F_{ED} \left(\frac{4}{5} \right) = 0 \rightarrow F_{ED} = 7.5 \text{ (c)}$$

$$\sum F_y = 9 + F_{AE} - 7.5 \left(\frac{3}{5} \right) = 0 \rightarrow F_{AE} = -4.5$$

$$F_{AE} = 4.5 \text{ (c)}$$

Nodo A



$$\sum F_y = 4.5 - F_{AD} \left(\frac{3}{5}\right) = 0$$

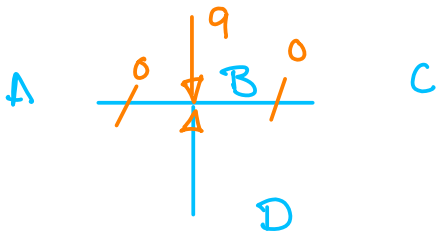
$$F_{AD} = 7.5 \text{ (T)}$$

$$\sum F_x = -6 + F_{AB} + 7.5 \left(\frac{4}{5}\right) = 0$$

$$F_{AB} = 0$$



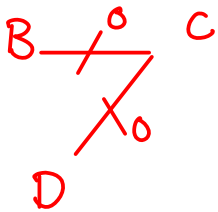
Nodo B



$$F_{BC} = 0$$

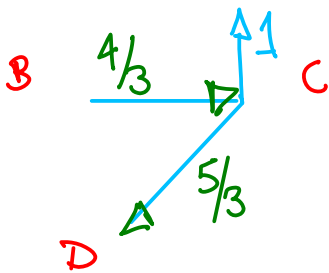
$$F_{BD} = 9 \text{ (C)}$$

Nodo C



$$F_{DC} = 0$$

Nodo C



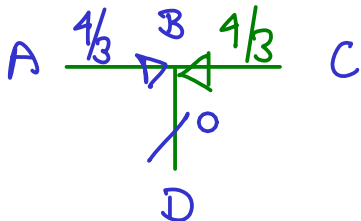
$$\sum F_y = 1 - F_{DC} \left(\frac{3}{5}\right) = 0$$

$$F_{DC} = \frac{5}{3} \text{ (T)}$$

$$\sum F_x = F_{BC} - \frac{5}{3} \left(\frac{4}{5}\right) = 0$$

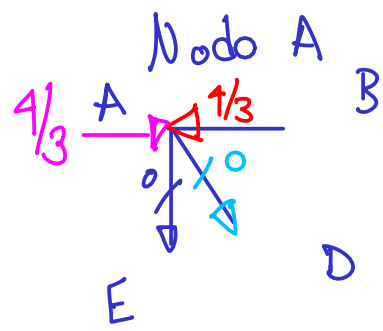
$$F_{BC} = \frac{4}{3} \text{ (C)}$$

Nodo B



$$\sum F_x \rightarrow F_{AB} = \frac{4}{3} \text{ (C)}$$

$$\sum F_y \rightarrow F_{BD} = 0$$

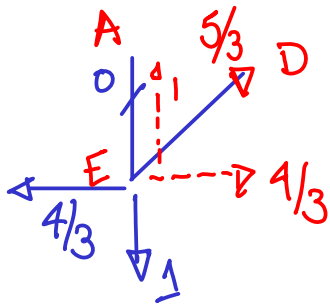


$$\sum F_x = 1/3 - 1/3 + F_{AD} \left(\frac{4}{5}\right) = 0$$

$$F_{AD} = 0$$

$$F_{AE} = 0$$

Node E



$$F_{ED} = \sqrt{\left(\frac{4}{3}\right)^2 + 1^2} = \frac{5}{3} (t)$$

Ecuación de Compatibilidad

$$\Delta_{c0} + \delta_{cc} R_c = 0$$

Barra	Fuerza P	Fuerza Q
AB	0	-4/3
BC	0	-4/3
AE	-4.5	0
AD	7.5	0
BD	-9	0
ED	-7.5	5/3
DC	0	5/3

$$(1) \Delta_{c0} = \sum \frac{F_p F_Q L}{AE}$$

$$\Delta_{c0} = \frac{-7.5 \left(\frac{5}{3}\right) \sqrt{15^2 + 20^2}}{AE} \quad (2)$$

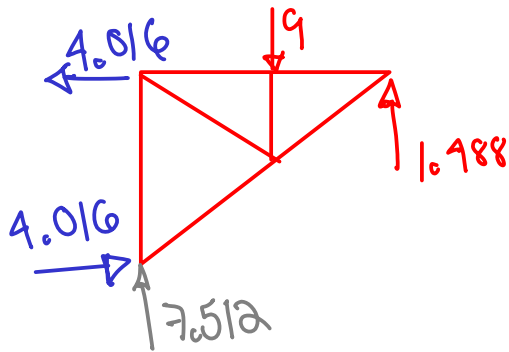
$$\Delta_{c0} = -\frac{3750}{AE} \quad (\downarrow)$$

$$(1) \delta_{cc} = \sum \frac{F_Q^2 L}{AE}$$

$$\frac{\left(\frac{4}{3}\right)^2 (20 \times 12)}{AE} + \frac{\left(\frac{4}{3}\right)^2 (20 \times 12)}{AE} + \frac{\left(\frac{5}{3}\right)^2 (25 \times 12)}{AE} + \frac{\left(\frac{5}{3}\right)^2 (25 \times 12)}{AE} = 1 \delta_{cc}$$

$$\delta_{cc} = 2520 / AE$$

$$-\frac{3750}{AE} + \frac{2520}{AE} (R_C) = 0 \rightarrow R_C = 1.488$$



$$\sum F_y = -9 + 1.488 + E_y = 0$$

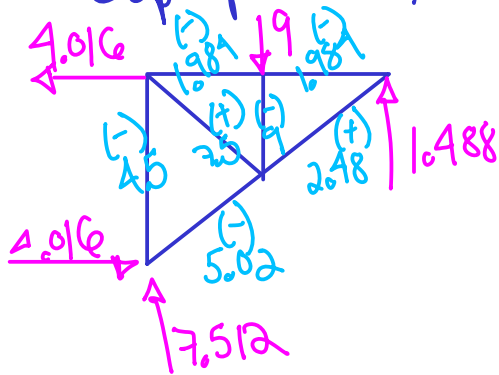
$$E_y = 7.512$$

$$\sum M_E = 9(20) - 1.488(10) - A_x(30) = 0$$

$$A_x = 4.016$$

$$\sum F_x = -A_x + E_x = 0 \rightarrow E_x = 4.016$$

Superposición



$$F_{AB} = 0 - \frac{4}{3}(1.488) = -1.984$$

$$F_{BC} = 0 - \frac{4}{3}(1.488) = -1.984$$

$$F_{AE} = -4.5 + 0(1.488) = -4.5$$

$$F_{AD} = 7.5 + 0(1.488) = 7.5$$

$$F_{BD} = -9 + 0(1.488) = -9$$

$$F_{ED} = -7.5 + \frac{5}{3}(1.488) = -5.02$$

$$F_{CD} = 0 + \frac{5}{3}(1.488) = 2.48$$