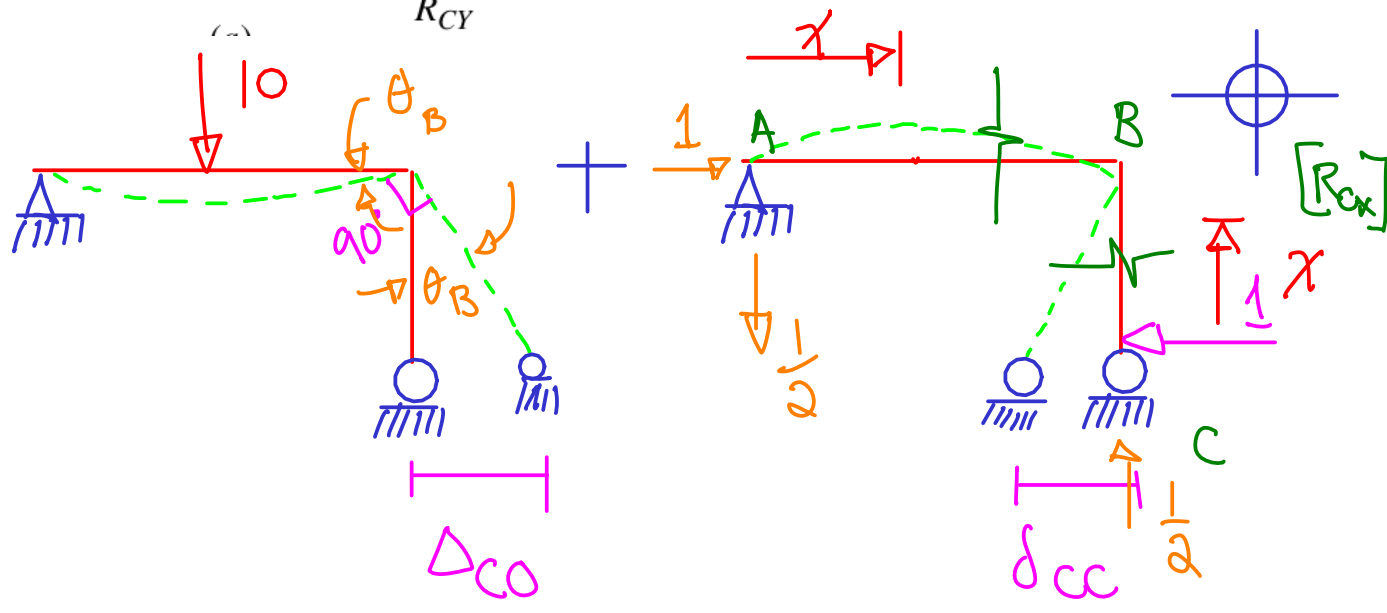


Reacciones

V  
M



$$\theta_B = \frac{Pl^2}{16EI}$$

$$\Delta_{c0} = \frac{Pl^2}{16EI} (6) = \frac{10(12)^2(6)}{16EI} = \frac{540}{EI} \rightarrow$$

$$1 \delta_{cc} = \int \frac{M_p M_a dx}{EI} = \int_0^{12} \frac{x}{2} \frac{x}{2} dx + \int_0^6 x x dx$$

Segmento	Origen	Límites	$M_p$	$M_a$
AB	A	0-12	$\frac{1}{2}x$	$\frac{1}{2}x$
BC	C	0-6	$x$	$x$

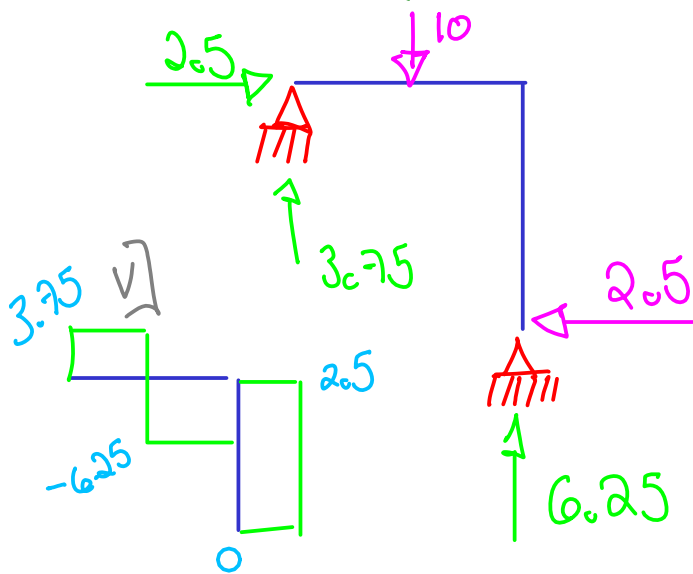
$$\int_0^{12} \frac{x^2}{4} dx + \int_0^6 x^2 dx = \frac{x^3}{12} \Big|_0^{12} + \frac{x^3}{3} \Big|_0^6 = 144 + 72$$

$$\delta_{cc} = \frac{216}{EI}$$

Ecuación de compatibilidad

$$\Delta_{c0} + \delta_{cc} R_{cx} = 0$$

$$\frac{540}{EI} - \frac{216}{EI} R_{cx} = 0 \rightarrow R_{cx} = 2.5$$

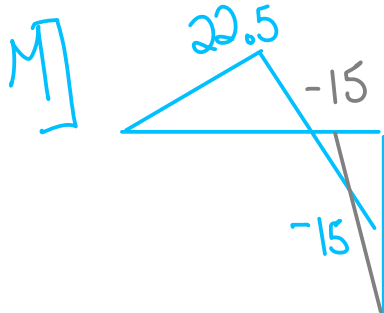


$$\sum M_A = 10(6) + 2.5(6) - R_{cy}(12) = 0$$

$$R_{cy} = 6.25$$

$$\sum F_y = -10 + 6.25 + R_{Ay} = 0$$

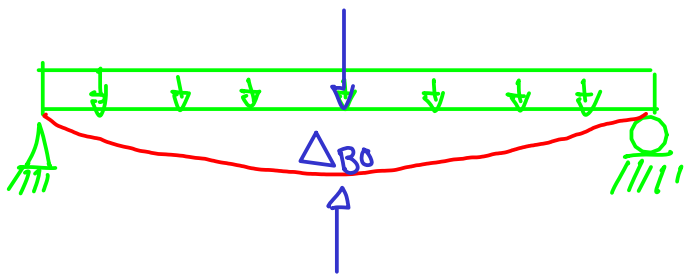
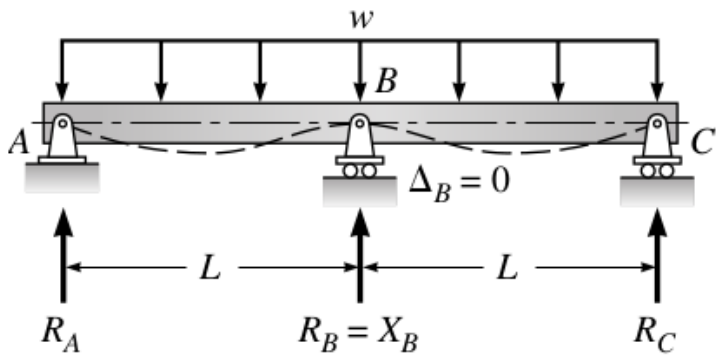
$$R_{Ay} = 3.75$$



$$3.75(6) = 22.5$$

$$22.5 - 6.25(6) = -15$$

$$-15 + 2.5(6) = 0$$



$$\Delta_{B0} = -\frac{5wl^4}{384EI}$$

$$\Delta_{B0} = \frac{-5w(2l)^4}{384EI}$$

Ec. de compatibilidad

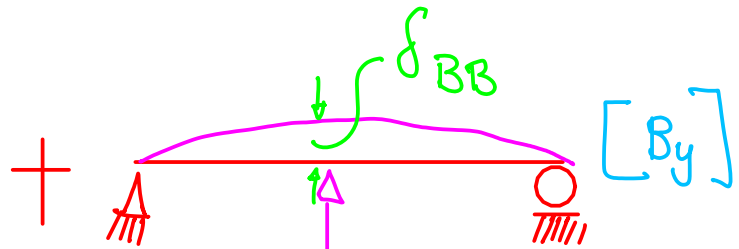
$$\Delta_{B0} + \delta_{BB} B_y = 0$$

$$-\frac{80wl^4}{384EI} + \frac{8l^3}{48EI} B_y = 0$$

$$-\frac{5wl^4}{24EI} + \frac{l^3}{6EI} B_y = 0$$

Reacciones

V  
M

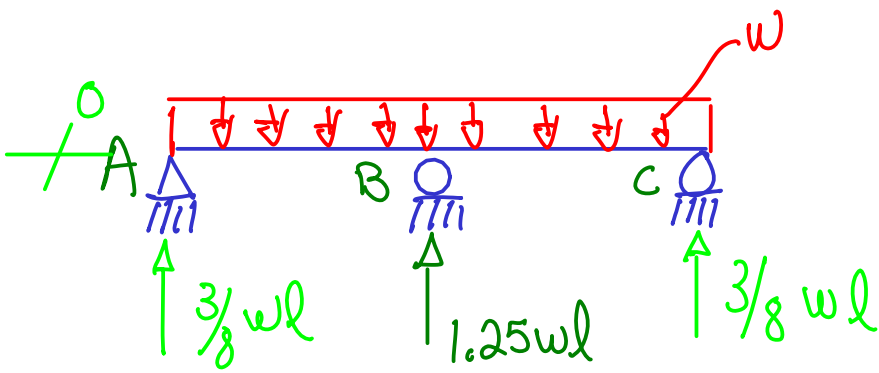


$$\delta_{BB} = \frac{Pl^3}{48EI}$$

$$\delta_{BB} = \frac{1(2l)^3}{48EI}$$

$$\frac{l^3}{6EI} B_y = \frac{5wl^4}{24EI}$$

$$B_y = 1.25wl$$



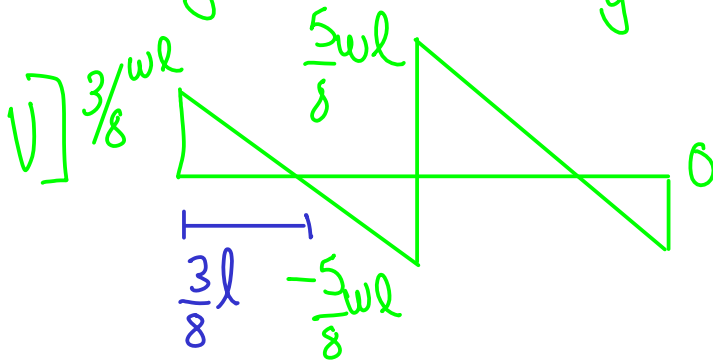
$$\sum M_A = w(2l)(l) - 1.25wl \cdot l - C(2l) = 0$$

$$2wl^2 - 1.25wl^2 = 2Cl$$

$$\frac{0.75wl^2}{2l} = C$$

$$C = \frac{3}{8} wl$$

$$\sum F_y = -w(2l) + A_y + 1.25wl + \frac{3}{8}wl = 0 \rightarrow A_y = \frac{3}{8}wl$$



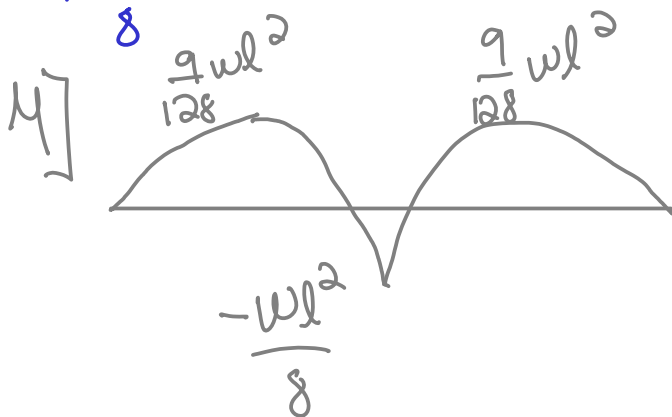
$$\frac{3}{8}wl - wl = -\frac{5}{8}wl$$

$$-\frac{5}{8}wl + \frac{10}{8}wl = \frac{5}{8}wl$$

$$\frac{5}{8}wl - wl = -\frac{3}{8}wl$$

$$\frac{3}{8}wl - w(x) = 0$$

$$x = \frac{3}{8}l$$



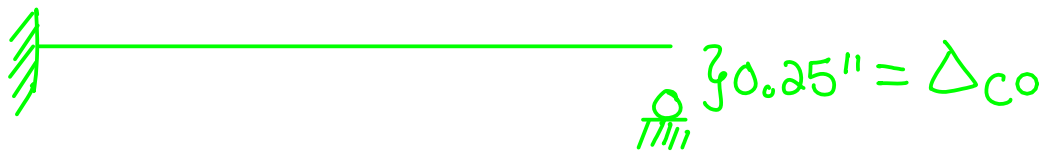
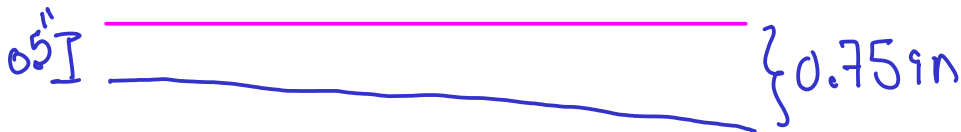
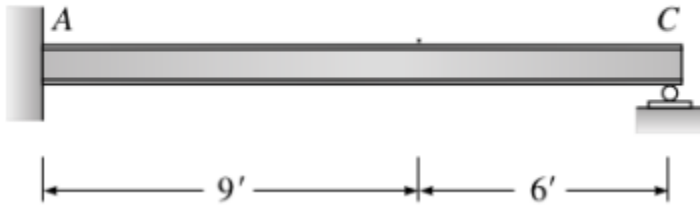
$$\frac{1}{2} \left( \frac{3}{8}l \right) \left( \frac{3}{8}wl \right) = \frac{9}{128}wl^2$$

$$\frac{9}{128}wl^2 - \frac{1}{2} \left( \frac{5}{8}l \right) \left( \frac{5}{8}wl \right) = -\frac{1}{8}wl^2$$

11.9

Asumiendo que no actúa ninguna carga, calcule las reacciones y dibuje el diagrama de fuerza cortante y momento flexionante para la viga mostrada, si el apoyo A se asienta 0.5 in, y el apoyo C se asienta 0.75 in.

Sea  $E = 29,000$  ksi &  $I = 150$  in<sup>4</sup>.



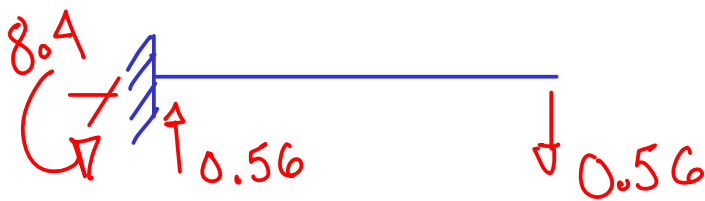
$$\delta_{CC} = \frac{Pl^3}{3EI} = \frac{(1)(15)^3(1728)}{3(29,000)(150)} = 0.447 \text{ in}$$

Ec. compatibilidad

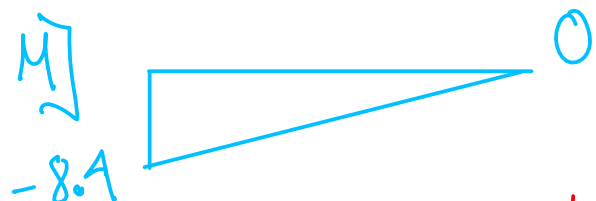
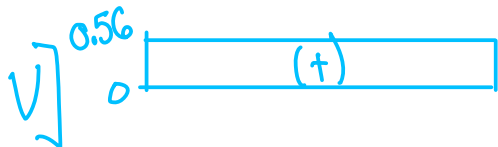
$$-\Delta_{C0} + \delta_{CC} C = 0$$

$$-0.25 + 0.447 C = 0$$

$$C = 0.56 \text{ Kips.}$$

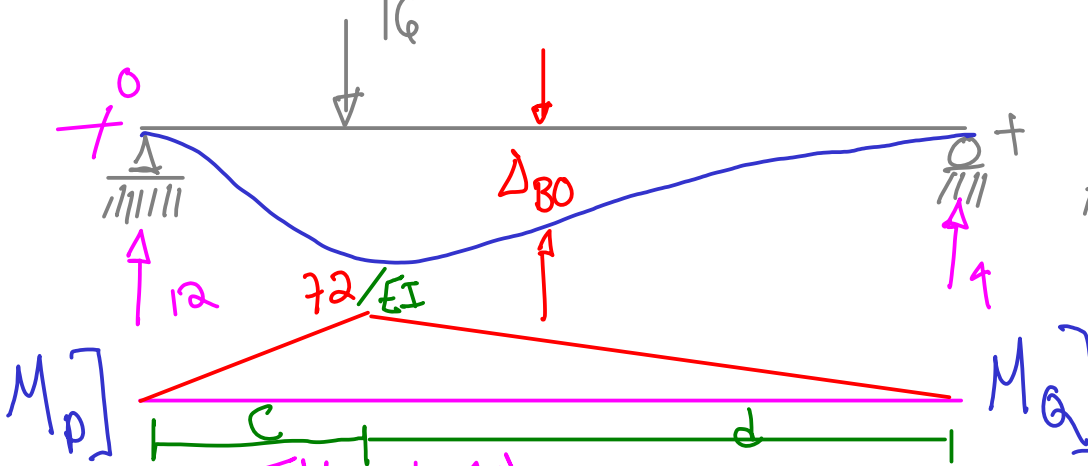
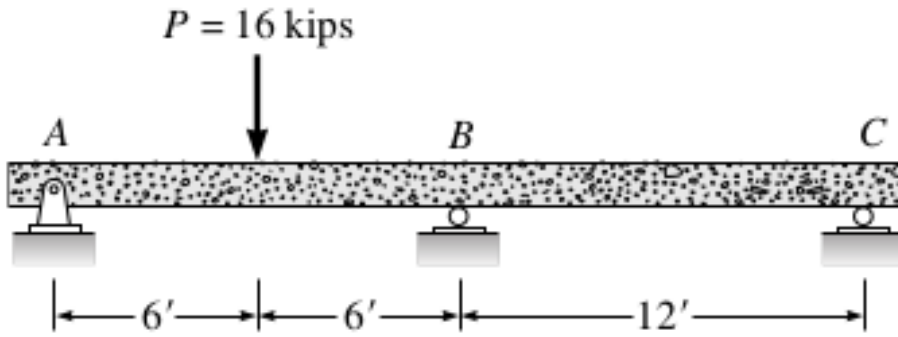


$$(0.56)(15) = 8.4$$



(A) Calcule las reacciones para la viga de la figura asumiendo que los apoyos no se mueven.  $EI = \text{cte}$ .

(B) Repita los cálculos si el apoyo C se mueve hacia arriba una distancia de  $288/EI$  cuando se aplica la carga.



$$\sum M_A = 16(6) - C_y(24) = 0$$

$$C_y = 4$$

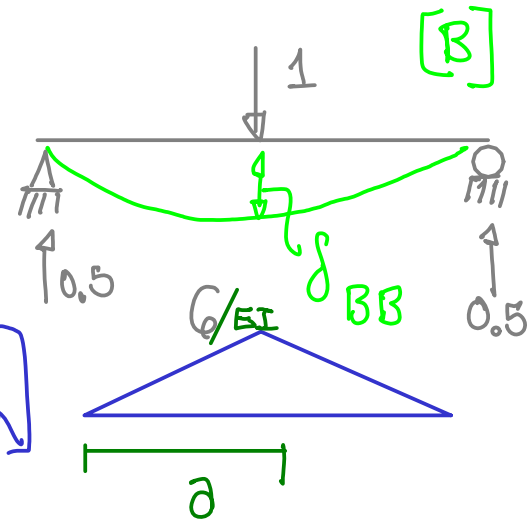
$$12 \times 6 = 72$$

$$4 \times 18 = 72$$

Tabla de integrales

$$\left\{ \begin{aligned} M_p M_Q &= \left( \frac{1}{3} - \frac{(a-c)^2}{6ad} \right) M_1 M_3 L = \left( \frac{1}{3} - \frac{(12-6)^2}{6(12)(18)} \right) (6)(72)(24) \\ \Delta_{B0} &= \frac{3168}{EI} \downarrow \end{aligned} \right.$$

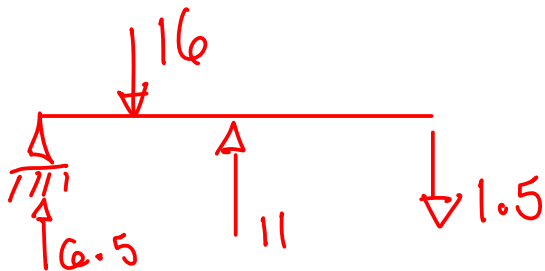
$$\delta_{BB} = \frac{Pl^3}{48EI} = \frac{1(24)^3}{48EI} = \frac{288}{EI} \uparrow$$



# Ecuación de Compatibilidad

$$\Delta_{B0} + \delta_{BB} B = 0$$

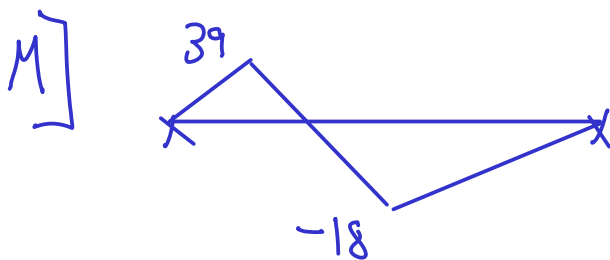
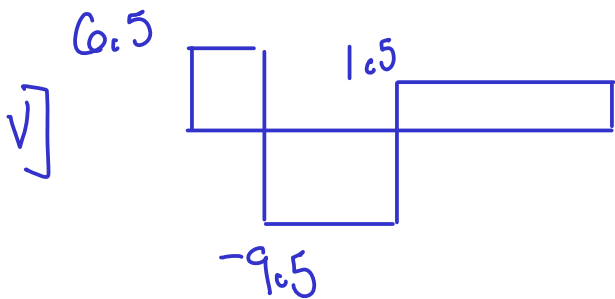
$$-\frac{3168}{EI} + \frac{288}{EI} B = 0 \rightarrow B = 11 \text{ K} \uparrow$$



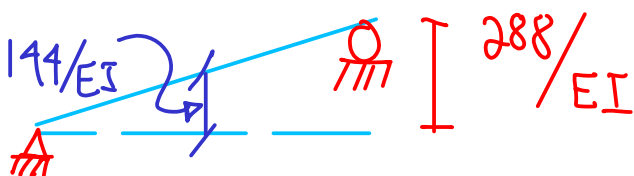
$$\sum M_A = 16(6) - 11(12) - C(24) = 0$$

$$C = 1.5 \text{ K} \downarrow$$

$$\sum F_y = -16 + 11 - 1.5 + A_y = 0 \rightarrow A_y = 6.5 \text{ K}$$



(b)

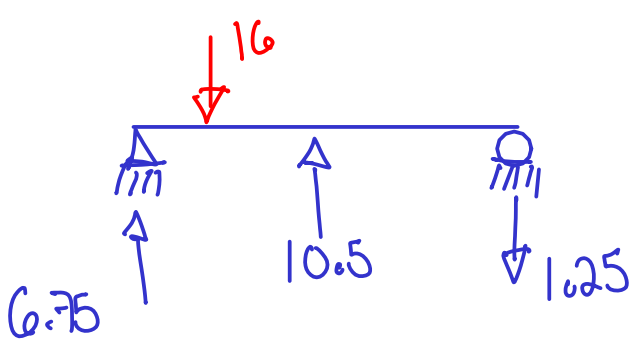


Ec. de Compatibilidad

$$\Delta_{B0} + \delta_{BB} B = -\frac{144}{EI}$$

$$-\frac{3168}{EI} + \frac{288}{EI} B = -\frac{144}{EI}$$

$$B = 10.5 \text{ K}$$

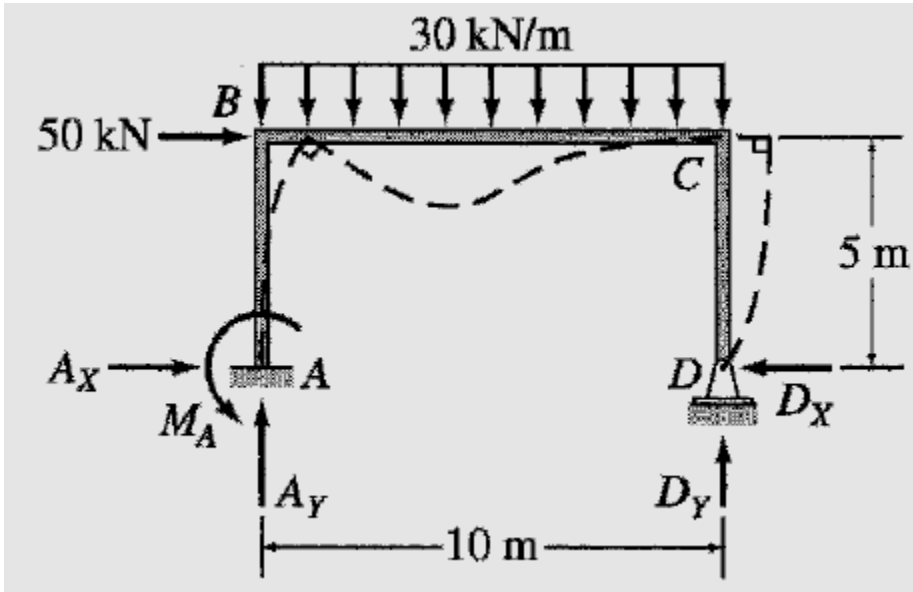


$$\sum M_A = 16(6) - 10.5(12) + C(24) = 0$$

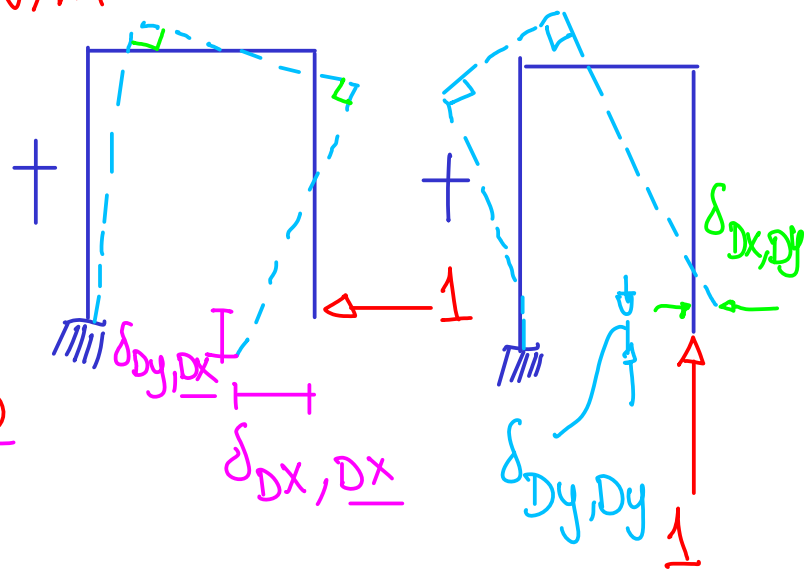
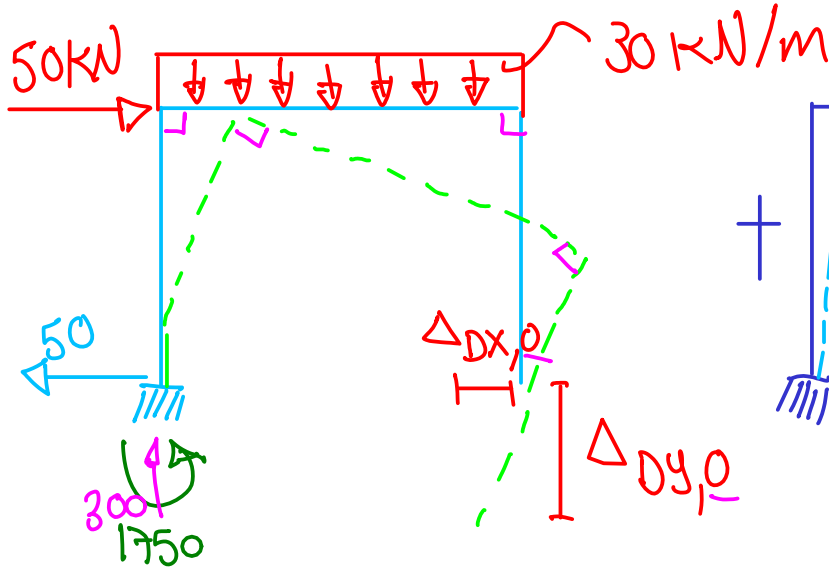
$$C = 1.25 \downarrow$$

$$\sum F_y = A_y - 16 + 10.5 - 1.25 = 0$$

$$A_y = 6.75 \text{ K} \uparrow$$

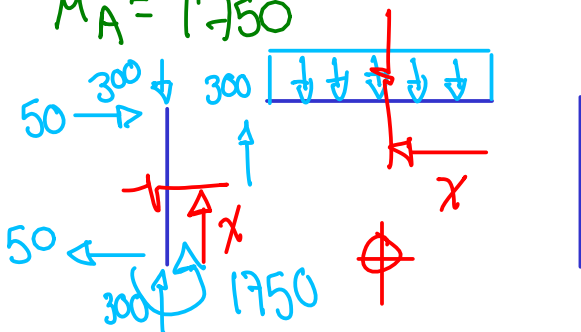


Grado de Hiperestaticidad = 2



$$\sum M_A = 50(5) + 30(10)(5) + M_A = 0$$

$$M_A = 1750$$





Miembro	Origen	Límites	$M_0$
AB	A	0-5	$-1750 + 50x$
BC	C	0-10	$-15x^2$
CD	D	0-5	0