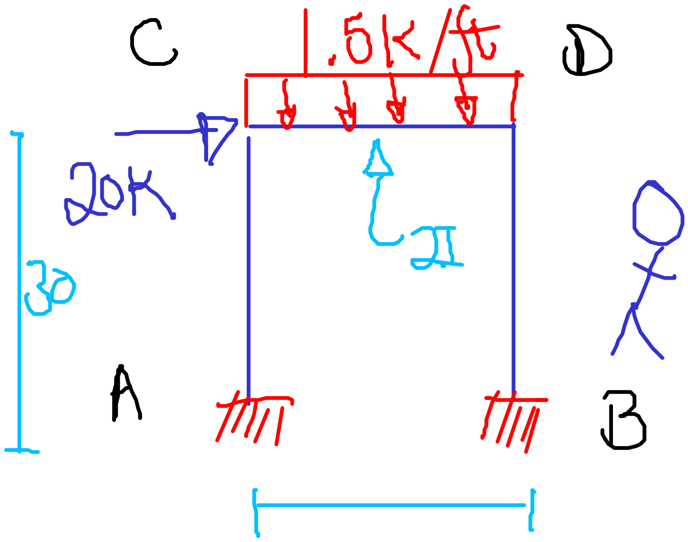
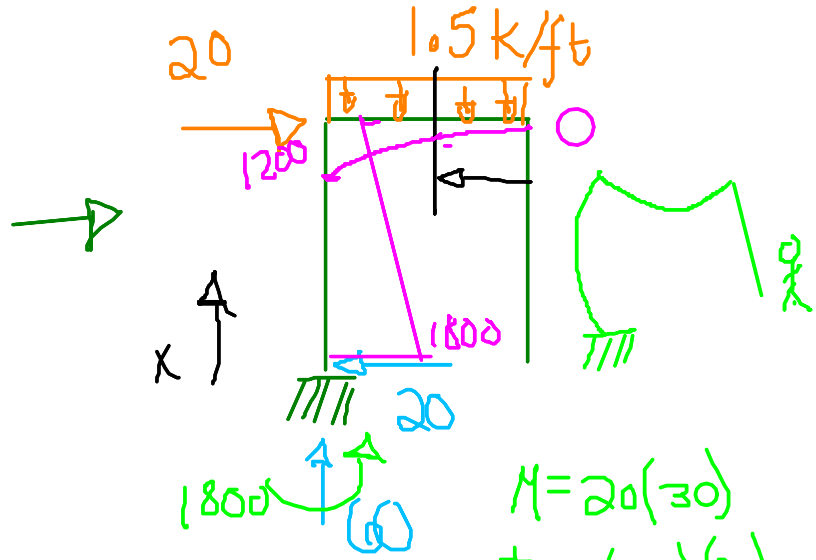
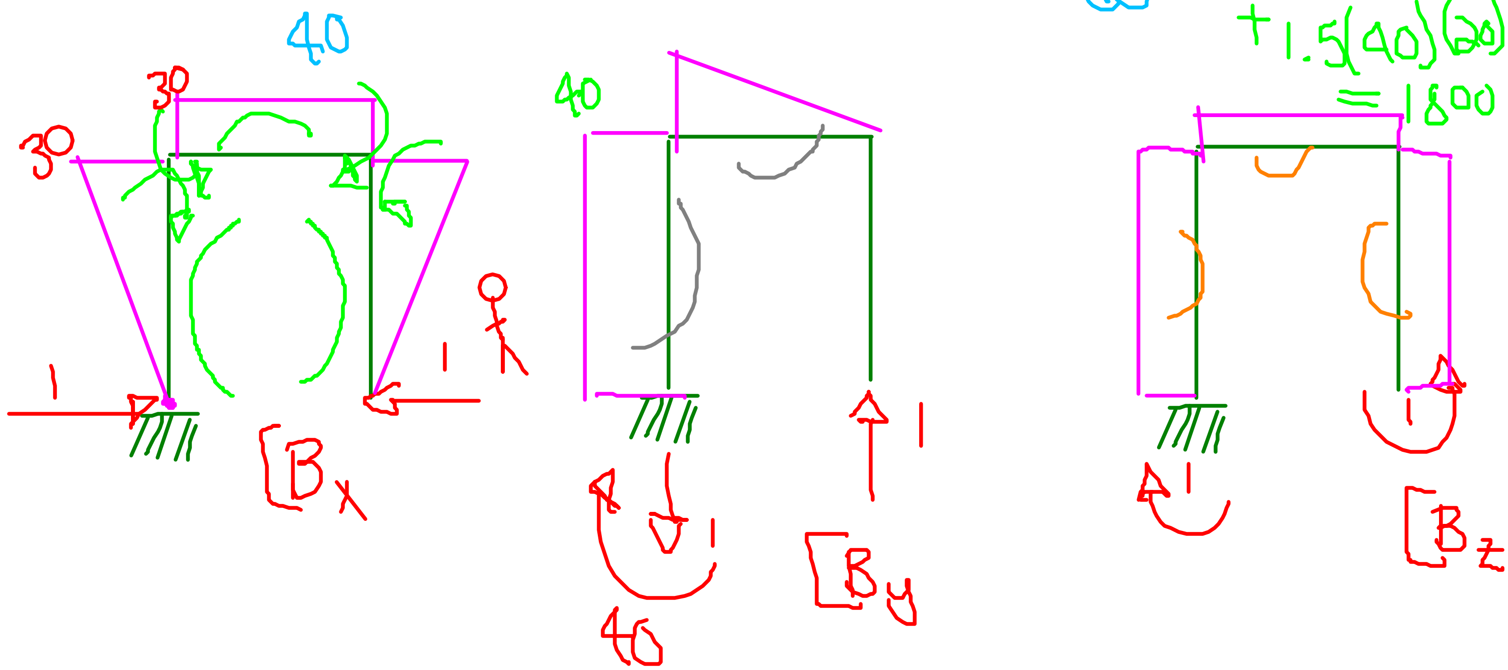




$M = 20(30) + 1.5(40)(20) = 1800$



Tramo	Origen	Límites	M_p	M_{Qx}	M_{Qy}	M_{Qz}
AC	A	0-30	$-1800+20x$	$-x$	40	1
CD	D	0-40	$-1.5x\left(\frac{x}{2}\right)$	-30	x	1
DB	B	0-30	0	x	0	-1

$$\Delta_{x0} = \int_0^{30} \frac{(-1800+20x)(-x)\,dx}{EI} + \int_0^{40} \frac{-0.75x^2(-30)\,dx}{2EI}$$

$$+ \int_0^{30} \frac{(0)(x)\,dx}{EI}$$

$$\Delta_{y_0} = \int_0^{30} \frac{(-1800+20x)(40)\,dx}{EI} + \int_0^{40} \frac{-0.75x^2(x)\,dx}{2EI} + \int_0^{30} \frac{(0)(0)\,dx}{EI}$$

$$\theta_{z_0} = \int_0^{30} \frac{(-1800+20x)(1)\,dx}{EI} + \int_0^{40} \frac{(-0.75x^2)(1)\,dx}{2EI} + \int_0^{30} \frac{(0)(-1)\,dx}{EI}$$

$$\delta_{x,x} = \int_0^{30} \frac{(-x)(-x)\,dx}{EI} + \int_0^{40} \frac{(-30)(-30)\,dx}{2EI} + \int_0^{30} \frac{(x)(x)\,dx}{EI}$$

$$\delta_{y,y} = \int_0^{30} \frac{(40)(40)\,dx}{EI} + \int_0^{40} \frac{(x)(x)\,dx}{2EI} + \int_0^{30} \frac{(0)(0)\,dx}{EI}$$

$$\delta_{z,z} = \int_0^{30} \frac{(1)(1)\,dx}{EI} + \int_0^{40} \frac{(1)(1)\,dx}{2EI} + \int_0^{30} \frac{(-1)(-1)\,dx}{EI}$$

$$\delta_{x,y} = \delta_{y,x} = \int_0^{30} \frac{(-x)(40)\,dx}{EI} + \int_0^{40} \frac{-30(x)\,dx}{2EI} + \int_0^{30} \frac{x(0)\,dx}{EI}$$

$$\delta_{x,z} = \delta_{z,x} = \int_0^{30} \frac{(-x)(1)\,dx}{EI} + \int_0^{40} \frac{-30(1)\,dx}{2EI} + \int_0^{30} \frac{x(-1)\,dx}{EI}$$

$$\delta_{y,z} = \delta_{z,y} = \int_0^{30} \frac{(40)(1)\,dx}{EI} + \int_0^{40} \frac{(x)(1)\,dx}{2EI} + \int_0^{30} \frac{(0)(-1)\,dx}{EI}$$

$$\Delta_{x0} := \int_0^{30} (-1800+20\cdot x)\cdot(-x)\,dx + \int_0^{40} \frac{-0.75\cdot x^2\cdot(-30)}{2}\,dx + \int_0^{30} 0\cdot x\,dx = 8.7\cdot 10^5$$

$$\Delta_{y0} := \int_0^{30} (-1800+20\cdot x)\cdot(40)\,dx + \int_0^{40} \frac{-0.75\cdot x^2\cdot(x)}{2}\,dx + \int_0^{30} 0\cdot 0\,dx = -2.04\cdot 10^6$$

$$\theta_{z0} := \int_0^{30} (-1800+20\cdot x)\cdot(1)\,dx + \int_0^{40} \frac{-0.75\cdot x^2\cdot(1)}{2}\,dx + \int_0^{30} 0\cdot(-1)\,dx = -53000$$

$$\delta_{xx} := \int_0^{30} (-x)^2\,dx + \int_0^{40} \frac{(-30)^2}{2}\,dx + \int_0^{30} x^2\,dx = 36000$$

$$\delta_{yy} := \int_0^{30} (40)^2\,dx + \int_0^{40} \frac{(x)^2}{2}\,dx + \int_0^{30} 0^2\,dx = 58666.6667$$

$$\delta_{zz} := \int_0^{30} (1)^2\,dx + \int_0^{40} \frac{(1)^2}{2}\,dx + \int_0^{30} (-1)^2\,dx = 80$$

$$\delta_{xy} := \int_0^{30} -x\cdot 40\,dx + \int_0^{40} \frac{-30\cdot x}{2}\,dx + \int_0^{30} x\cdot 0\,dx = -30000 \qquad \delta_{yx} := \delta_{xy}$$

$$\delta_{xz} := \int_0^{30} -x\cdot 1\,dx + \int_0^{40} \frac{-30\cdot 1}{2}\,dx + \int_0^{30} x\cdot(-1)\,dx = -1500 \qquad \delta_{zx} := \delta_{xz}$$

$$\delta_{yz} := \int_0^{30} 40\cdot 1\,dx + \int_0^{40} \frac{x\cdot 1}{2}\,dx + \int_0^{30} 0\cdot(-1)\,dx = 1600 \qquad \delta_{zy} := \delta_{yz}$$

$$\Delta_{x0} + \delta_{xx} B_x + \delta_{xy} B_y + \delta_{xz} B_z = 0$$

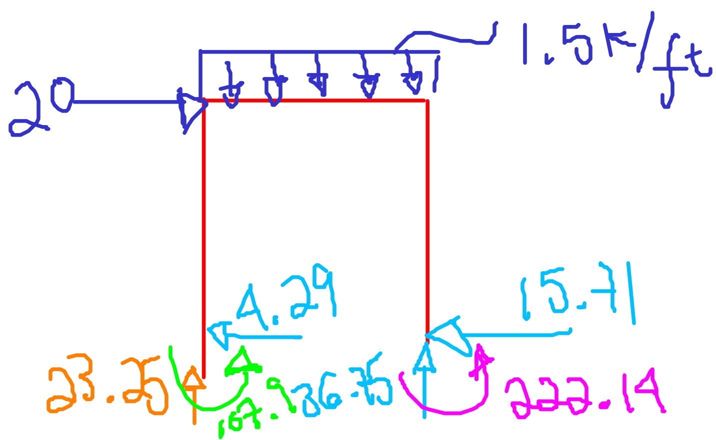
$$\Delta_{y0} + \delta_{yx} B_x + \delta_{yy} B_y + \delta_{yz} B_z = 0$$

$$\theta_{z0} + \delta_{zx} B_x + \delta_{zy} B_y + \delta_{zz} B_z = 0$$

$$\begin{bmatrix} \delta_{xx} & \delta_{xy} & \delta_{xz} \\ \delta_{yx} & \delta_{yy} & \delta_{yz} \\ \delta_{zx} & \delta_{zy} & \delta_{zz} \end{bmatrix}^{-1} \cdot \left(-\begin{bmatrix} \Delta_{x0} \\ \Delta_{y0} \\ \theta_{z0} \end{bmatrix} \right) = \begin{array}{c} \begin{bmatrix} 15.7143 \\ 36.75 \\ 222.1429 \end{bmatrix} \end{array} \begin{array}{l} B_x \\ B_y \\ B_z \end{array}$$

$$\Sigma M_A = 20(30) + 1.5(40)(20) - 36.75(40) - 222.14 + M_A = 0$$

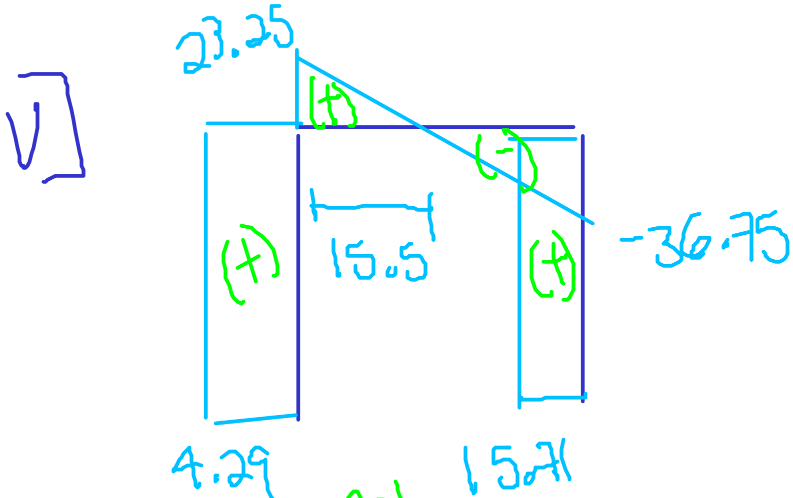
$$M_A = -107.9$$



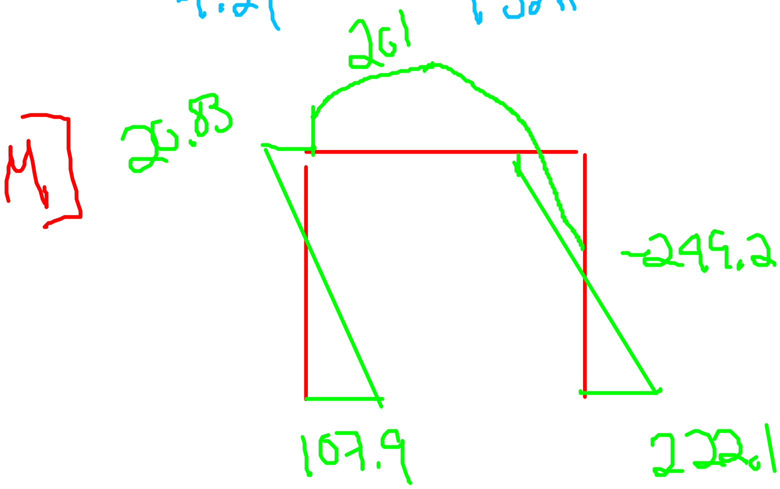
$$(1.5)(40) = 60$$

$$60 - 36.75 = 23.25$$

$$20 - 15.71 = 4.29$$



$$23.25 - 1.5x = 0$$
$$x = 15.5$$



$$-107.9 + 4.29(30) = 20.83$$
$$20.83 + \frac{1}{2}(15.5)(23.25)$$
$$= 201$$
$$201 - \frac{1}{2}(40-15.5)(36.75)$$
$$= -249.2$$
$$-249.21 + 15.71(30) = 222.1$$