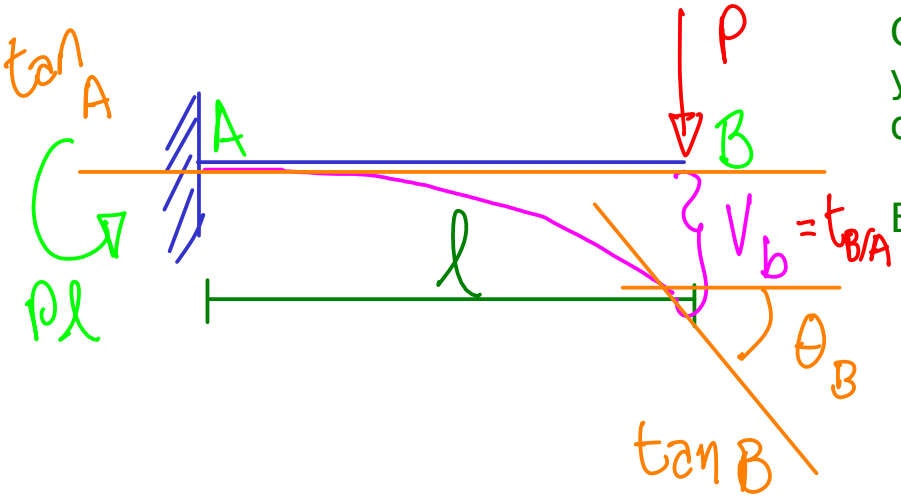
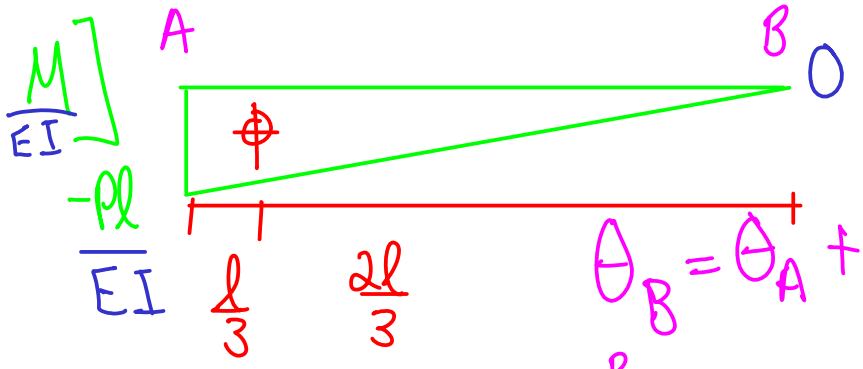
Método del Área Momento



Calcule la pendiente theta b, y la deflexión vb en el extremo de la viga en voladizo.

EI es constante.

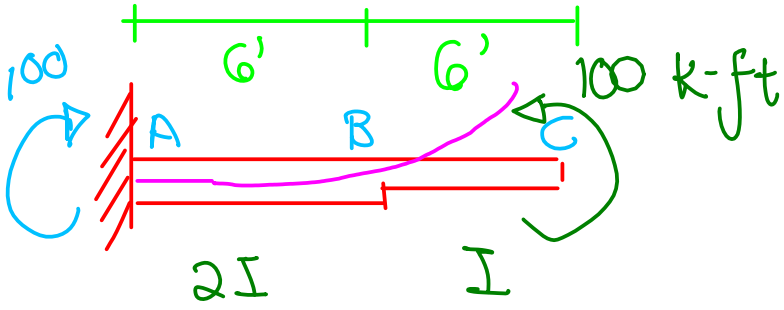


$$\theta_B = \theta_A + \Delta\theta_{AB}$$

$$\theta_B = 0 + \int_A^B \frac{M}{EI}\,dx$$

$$\theta_B = 0 + \frac{1}{2}(l)\left(\frac{-Pl}{EI}\right) = \frac{-Pl^2}{2EI} \quad \checkmark$$

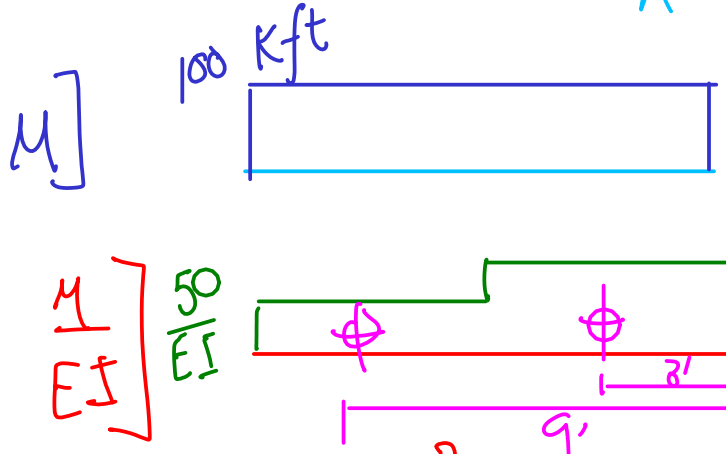
$$y_B = \delta_B = V_B = \int_A^B \frac{M_x}{EI}\,dx = \frac{1}{2}\,l\left(\frac{-Pl}{EI}\right)\left(\frac{2}{3}\,l\right) = \frac{-Pl^3}{3EI} \quad \checkmark$$



Calcule la deflexión en el punto C en el extremo de la viga en voladizo, si E = 29,000 ksi; I ab = 2I; I bc = I; E = constante, e I = 400 in^4.

$$\theta_C = \theta_A + \Delta\theta_{AC}$$

$$\theta_C = 0 + \int_A^B \frac{M}{EI}\,dx + \int_B^C \frac{M}{EI}\,dx$$



$$\theta_C = (6')\left(\frac{50}{EI}\right) + (6')\left(\frac{100}{EI}\right)$$

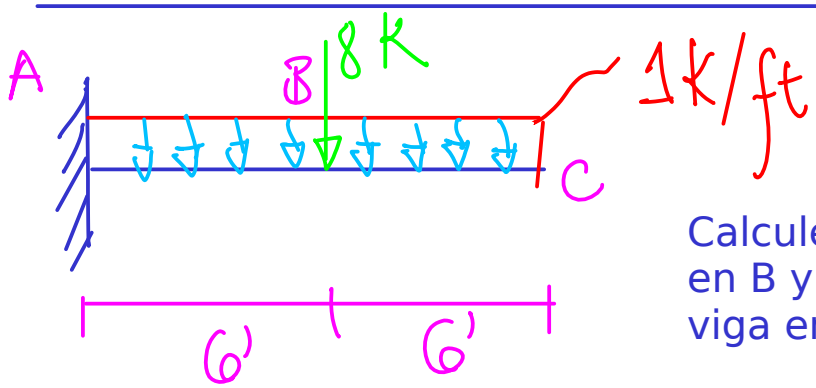
$$\theta_C = \frac{900}{EI}$$

$$V_C = \int_A^B \frac{M}{EI}x\,dx + \int_B^C \frac{M}{EI}x\,dx$$

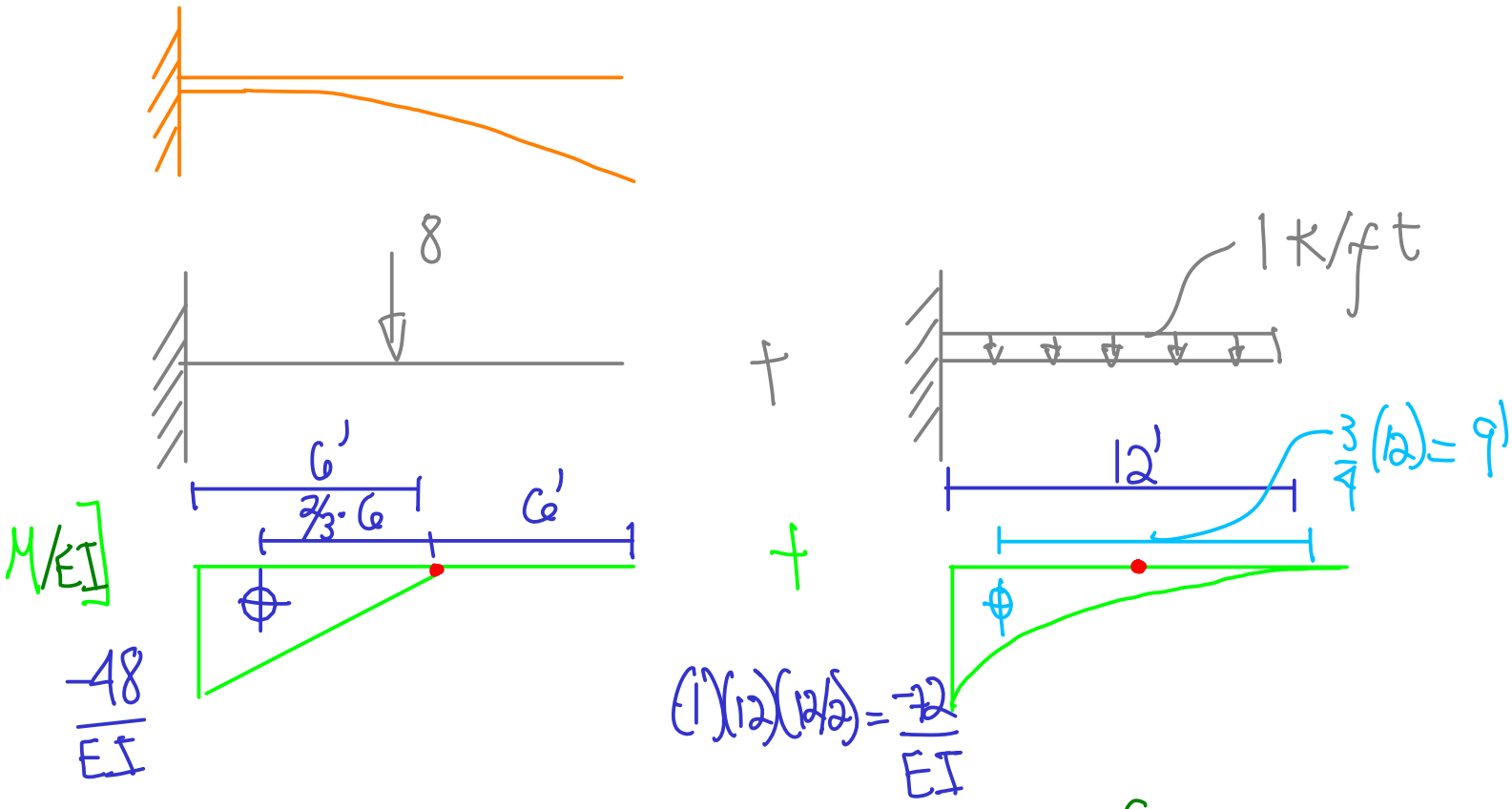
$$V_C = (6)\left(\frac{50}{EI}\right)(9) + 6\left(\frac{100}{EI}\right)(3) = \frac{4500}{EI}\uparrow$$

$12^3 = 1728$

$$\frac{4500\ \text{kft}^3\,(1728\ \text{in}^3/\text{ft}^3)}{(29{,}000\ \text{ksi})(400\ \text{in}^4)} = 0.67\ \text{in}\uparrow$$



Calcule la pendiente de la curva elástica en B y en C; y la deflexión en C para la viga en voladizo.



$$\theta_C = \theta_A + \Delta\theta_{AC} = 0 + \int_A^C \frac{M}{EI}\,dx + \int_A^C \frac{M}{EI}\,dx$$

$$\theta_C = 0 + \frac{1}{2}(6)\left(\frac{-48}{EI}\right) + \frac{1}{3}(12')\left(\frac{-72}{EI}\right) = \frac{-432}{EI}$$

$$V_C = \frac{1}{2}(6)\left(\frac{-48}{EI}\right)(10) + \frac{1}{3}(12)\left(\frac{-72}{EI}\right)(9) = \frac{-4032}{EI}$$