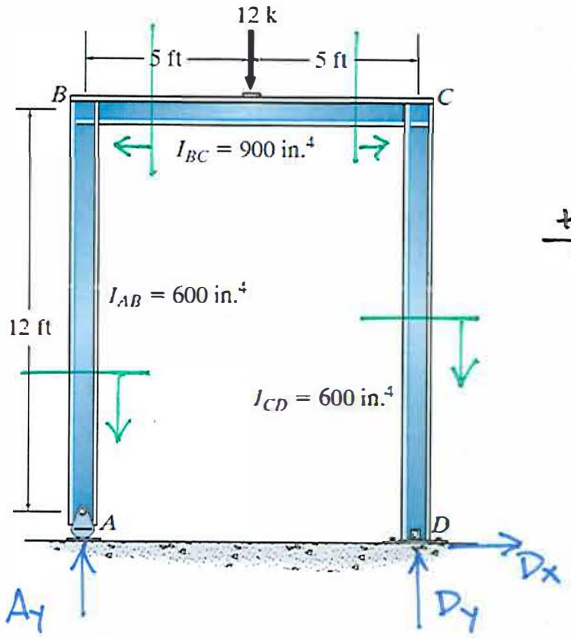
Example 8c-3 - Determine the slope at point A. Assume E = 29,000 ksi.



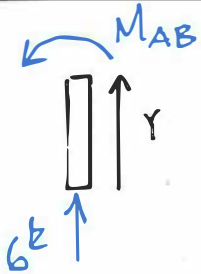
$\circlearrowleft \sum M_D = 0 = 12^k(5') - A_y(10')$ $\quad + \uparrow \sum F_y = 0 = A_y + D_y - 12^k$

$A_y = 6^k$ $\quad D_y = 6^k$

$\rightarrow \sum F_x = 0 = D_x$

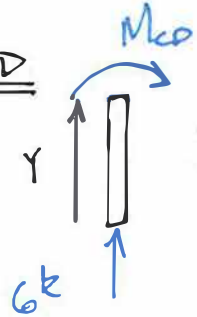
M – REAL FORCES

AB



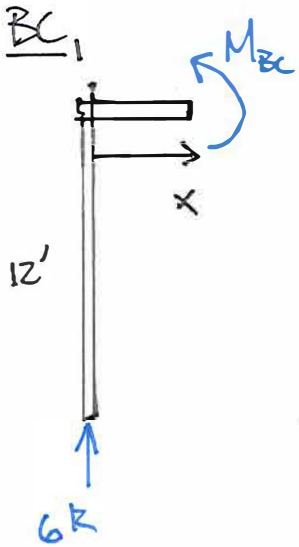
$\circlearrowleft \sum M_{CUT} = 0 = M_{AB}$

CD



$\circlearrowleft \sum M_{CUT} = 0 = -M_{CD}$

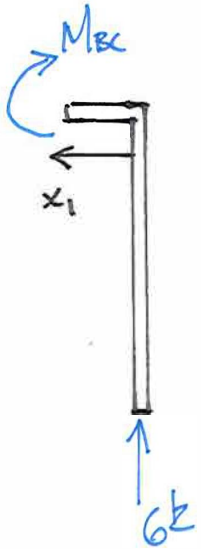
BC$_1$



$\circlearrowleft \sum M_{CUT} = 0 = M_{BC} - 6x$

$M_{BC} = 6x$

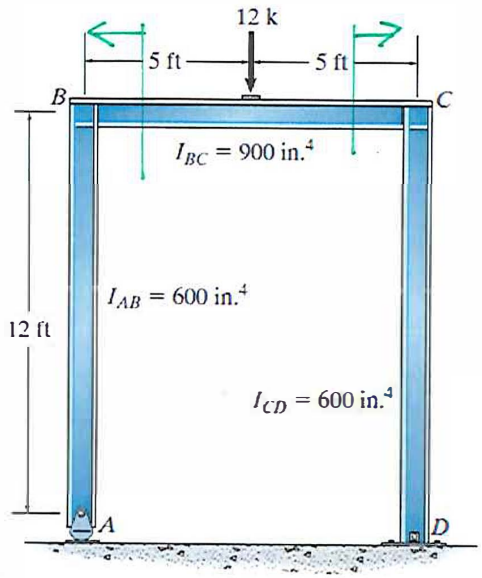
BC$_2$



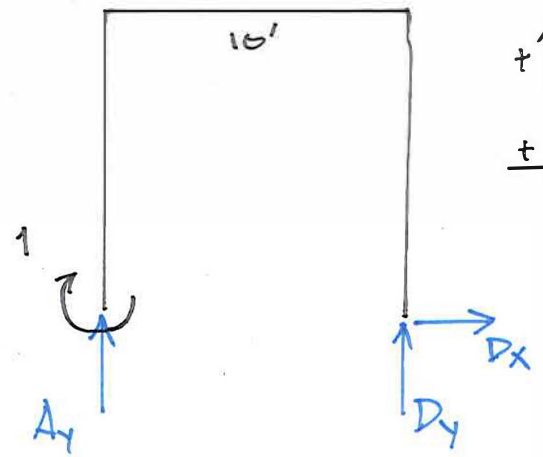
$\circlearrowleft \sum M_{CUT} = 0 = -M_{BC} + 6(x_1)$

$M_{BC} = 6x_1$

Example 8c-3 - Determine the slope at point A. Assume E = 29,000 ksi.



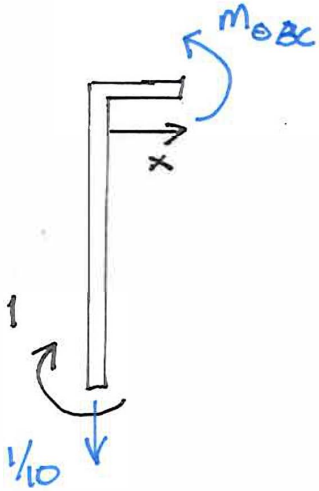
VIRTUAL SYSTEM



$$\circlearrowleft +\sum M_D = 0 = -1 - A_Y(10') \qquad A_Y = -1/10$$

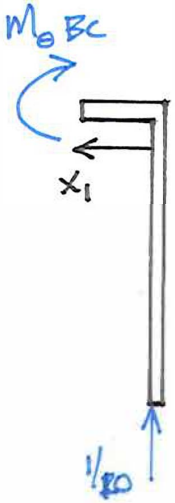
$$+\uparrow \sum F_Y = 0 = A_Y + D_Y \qquad D_Y = 1/10$$

$$\xrightarrow{+} \sum F_X = 0 = D_X$$



$$\circlearrowleft +\sum M_{CUT} = 0 = m_{\theta BC} + \frac{1}{10}(x) - 1$$

$$m_{\theta_{BC}} = 1 - \frac{x}{10}$$



$$\circlearrowleft +\sum M_{CUT} = 0 = -m_{\theta BC} + \frac{1}{10}x_1$$

$$m_{\theta BC} = \frac{x_1}{10}$$

$$EI\theta_A = \int_0^5 (6x)\left(1 - \frac{x}{10}\right)dx + \int_0^5 (6x_1)\left(\frac{x_1}{10}\right)dx_1 = \int_0^5 6x\,dx = \frac{6x^2}{2}\Big|_0^5 = 75\ \text{k-ft}^2$$

$$\theta_A = \frac{75\ \text{k-ft}^2}{29{,}000\ \text{k/in}^2} \cdot \frac{\text{in}^2}{900\ \text{in}^4} \cdot \frac{144\ \text{in}^2}{\text{ft}^2} = 0.00041 \text{ RADIANS}$$