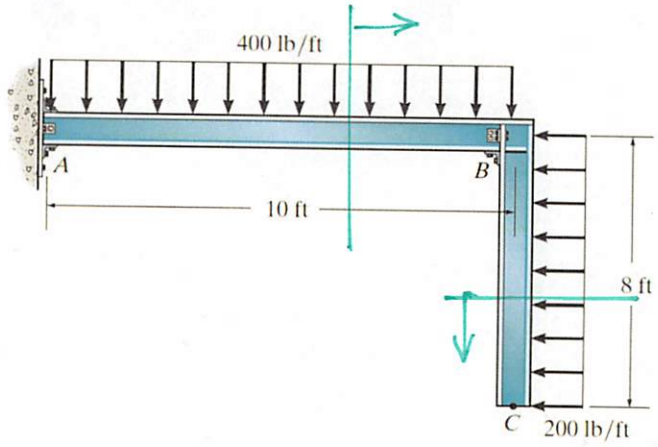
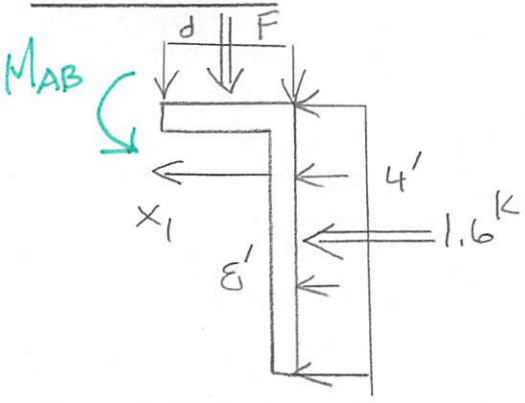
Example 8c-2: Determine the horizontal displacement at point C. Assume *EI* is constant.

Real loads



SECTION AB



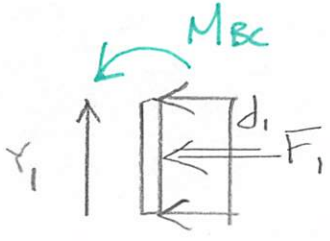
$F = 0.4x_1 \quad d = \frac{1}{2}(x_1)$

$\circlearrowleft + \sum M_{cut} = 0$

$= M_{AB} - 0.4x_1\left(\frac{1}{2}x_1\right) - 1.6^{k}(4')$

$M_{AB} = \left[0.2x_1^2 + 6.4\right]$ kft

SECTION BC



$F_1 = 0.2y_1 \quad d_1 = \frac{1}{2}(y_1)$

$\circlearrowleft + \sum M_{cut} = 0 = M_{BC} - 0.2y_1\left(\frac{1}{2}y_1\right)$

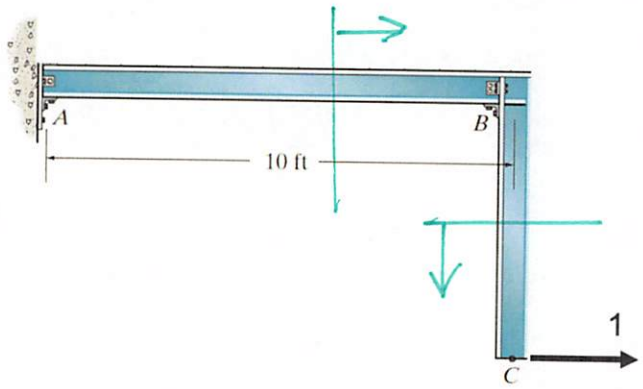
$M_{BC} = \left[0.1y_1^2\right]$ kft

$M_{BC}(y_1 = 0) = 0$ ✓

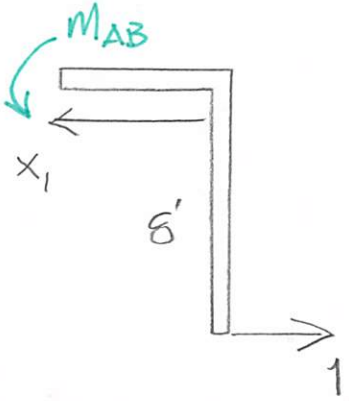
$M_{BC}(B) = M_{AB}(B)$ ✓

Example 8c-2: Determine the horizontal displacement at point C. Assume *EI* is constant.

Virtual load



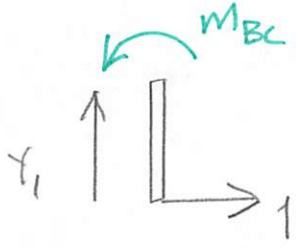
SECTION AB



$$\curvearrowleft + \Sigma M_{CUT} = 0 = m_{AB} + 1(8')$$

$$m_{AB} = [-8]\ ft$$

SECTION BC



$$\curvearrowleft + \Sigma M_{CUT} = 0 = m_{BC} + 1 Y_1$$

$$m_{BC} = [-Y_1]\ ft$$

$$m_{BC}(Y_1 = 0) = 0 \quad \checkmark$$

$$m_{BC}(B) = m_{AB}(B) \quad \checkmark$$

$$Y_{C_{HOR.}} = \frac{1}{EI}\left[\int_0^{10} M_{AB} m_{AB}\, dx_1 + \int_0^{8} M_{BC} m_{BC}\, dY_1\right]$$

$$= \frac{1}{EI}\left[\int_0^{10} (0.2x_1^2 + 6.4)(-8)\, dx_1 + \int_0^{8} (0.1Y_1^2)(-Y_1)\, dY_1\right]$$

$$y_{C_{HOR}} = \frac{1}{EI}\left[-\frac{8x_1(x_1+96)}{15}\Big|_0^{10} - \frac{y_1^4}{40}\Big|_0^8\right] = -\frac{16{,}166\,kft^3}{15EI}$$