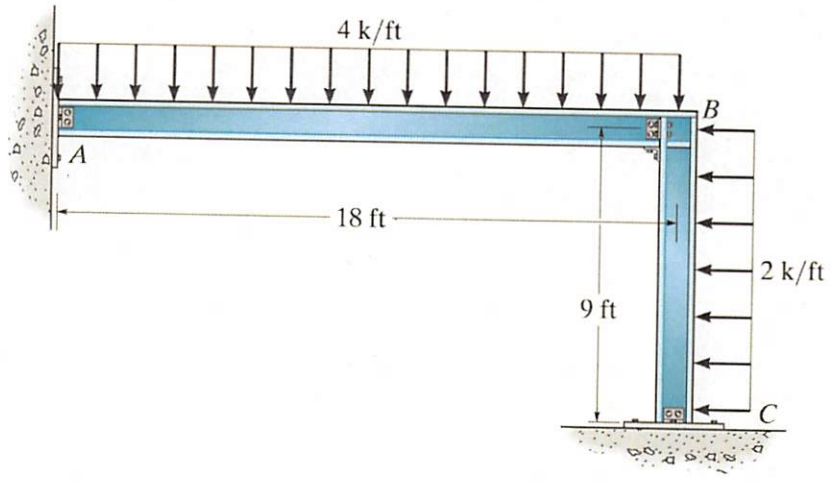
Problem 10b-1 – Determine the reactions at the supports. Assume the connections at *A*, *B*, and *C* are fixed, and *EI* is constant.



FEM_{AB} (↓ ↓ ↓) $\frac{WL^2}{12}$

$\frac{4k/ft(18ft)^2}{12} = \pm 108 k\,ft$

$FEM_{BC} \Rightarrow \frac{2k/ft(9ft)^2}{12} = \pm 13.5 k\,ft$

SECTION AB – 2 EQNS.

$$M_{AB} = \frac{2EI}{18ft}\left[2\phi_A + \theta_B - 3\psi\right] - 108 k\,ft \quad (1)$$

$$M_{BA} = \frac{2EI}{18ft}\left[2\theta_B + \phi_A - 3\psi\right] + 108 k\,ft \quad (2)$$

SECTION BC – 2 EQNS

$$M_{BC} = \frac{2EI}{9ft}\left[2\theta_B + \phi_c - 3\psi\right] - 13.5 k\,ft \quad (3)$$

$$M_{CB} = \frac{2EI}{9ft}\left[2\phi_c + \theta_B - 3\psi\right] + 13.5 k\,ft \quad (4)$$

JOINT B

M_{BA} ↺ B M_{BC}

$\circlearrowleft + \sum M_B = 0 = -M_{BA} - M_{BC}$

$$M_{BA} + M_{BC} = 0 \quad (5)$$

Problem 10b-1 – Determine the reactions at the supports. Assume the connections at *A*, *B*, and *C* are fixed, and *EI* is constant.

(5) $M_{BA} + M_{BC} = 0 = \frac{2EI}{18ft}\left[2\theta_B\right] + 108\,kft + \frac{2EI}{9ft}\left[2\theta_B\right] - 13.5\,kft$

$3/3\,\theta_B = -94.5\,kft/EI$ $\qquad \theta_B = -\frac{141.75\,kft^2}{EI}$

SECTION AB

$M_{AB} = \frac{2EI}{18ft}\left[\theta_B\right] - 108kft = \underline{-123.75kft}$

$M_{BA} = \frac{2EI}{18ft}\left[2\theta_B\right] + 108kft = \underline{76.5kft}$

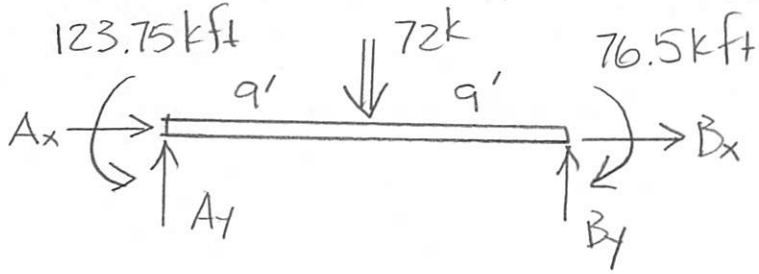
SECTION BC

$M_{BC} = \frac{2EI}{9ft}\left[2\theta_B\right] - 13.5kft = \underline{-76.5kft}$

$M_{CB} = \frac{2EI}{9ft}\left[\theta_B\right] + 13.5kft = \underline{-18kft}$

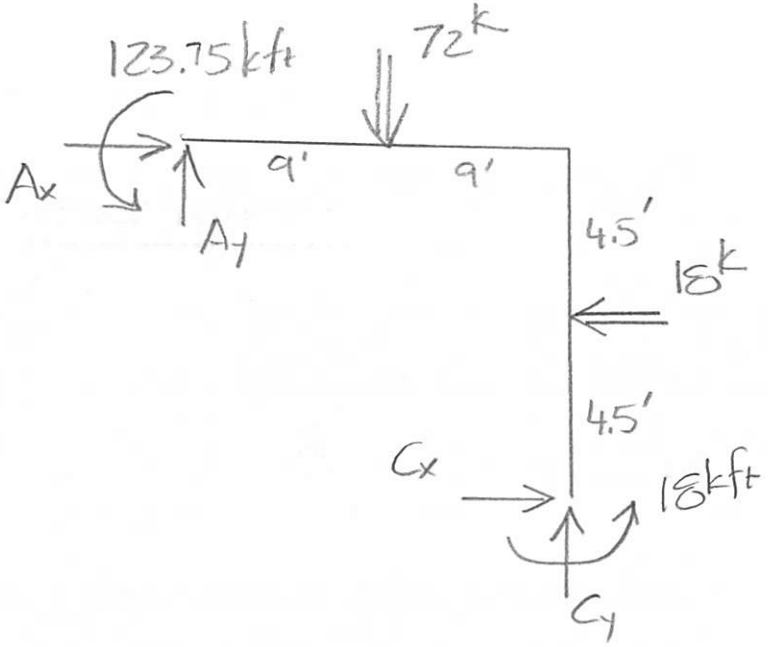
Problem 10b-1 – Determine the reactions at the supports. Assume the connections at *A*, *B*, and *C* are fixed, and *EI* is constant.

FBD AB



$$\circlearrowleft + \sum M_B = 0 = 72^k(9') - 76.5\,kft + 123.75\,kft - A_y(18')$$

$$A_y = 38.63^k$$



$$\circlearrowleft + \sum M_C = 0 = 18^k(4.5') + 72^k(9') - A_y(18') - A_x(9') + 123.75\,kft + 18\,kft$$

$$A_x = 19.49^k$$

$$+\uparrow \sum F_y = 0 = A_y + C_y - 72^k$$

$$C_y = 33.37^k$$

$$\xrightarrow{+} \sum F_x = 0 = A_x + C_x - 18^k$$

$$C_x = -1.49^k$$