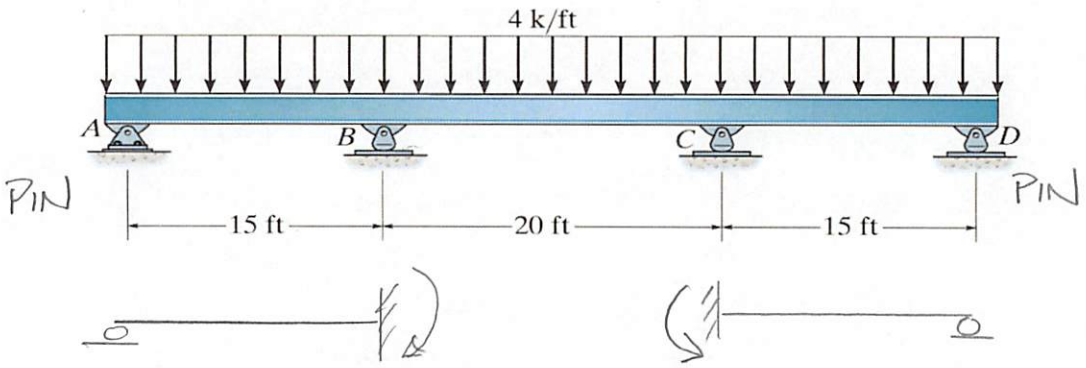
Problem 10a-3 – Determine the internal moments at the supports B and C. Assume *EI* is constant.



$$FEM_{BA} = FEM_{CD} = \frac{WL^2}{8} = \pm\frac{4\,k/ft\,(15\,ft)^2}{8}$$

$$FEM_{BC} = \frac{WL^2}{12} = \pm\frac{4\,k/ft\,(20\,ft)^2}{12} = \pm 133.3\,k\text{-}ft$$

SECTION AB – 1 EQN.

$$M_{BA} = \frac{3EI}{L_{AB}}\left[\theta_B - \cancel{\psi}^{\,0}\right] + 112.5\,k\text{-}ft \quad (1)$$

SECTION BC – 2 EQNS

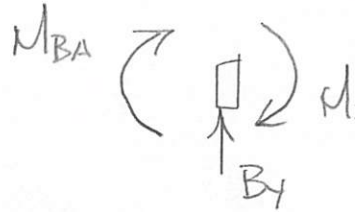
$$M_{BC} = \frac{2EI}{L_{BC}}\left[2\theta_B + \theta_C - 3\cancel{\psi}^{\,0}\right] - 133.3\,k\text{-}ft \quad (2)$$

$$M_{CB} = \frac{2EI}{L_{BC}}\left[2\theta_C + \theta_B - 3\cancel{\psi}^{\,0}\right] + 133.3\,k\text{-}ft \quad (3)$$

SECTION CD

$$M_{CD} = \frac{3EI}{L_{CD}}\left[\theta_C - \cancel{\psi}^{\,0}\right] - 112.5\,k\text{-}ft \quad (4)$$

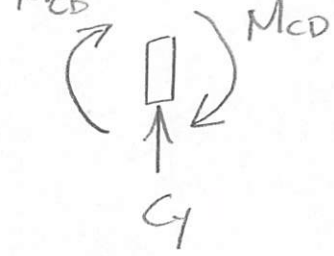
JOINT B



$$\circlearrowleft + \sum M_B = 0$$

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

JOINT C



$$\circlearrowleft + \sum M_C = 0$$

$$= M_{CB} + M_{CD} = 0 \quad (6)$$

Problem 10a-3 – Determine the internal moments at the supports B and C. Assume *EI* is constant.

(5) $M_{BA} + M_{BC} = 0 = \frac{3EI}{15ft}[\theta_B] + 112.5\,kft + \frac{2EI}{20ft}[2\theta_B + \theta_C] - 133.3\,kft$

(5a) $\Rightarrow 0.4\,\theta_B + 0.1\,\theta_C = 20.83\,kft$

(6) $M_{CB} + M_{CD} = 0 = \frac{2EI}{20ft}[2\theta_C + \theta_B] + 133.3\,kft + \frac{3EI}{15ft}[\theta_C] - 112.5\,kft$

(6a) $\Rightarrow 0.1\,\theta_B + 0.4\,\theta_C = -20.83\,kft$

(5a) -4 (6a) $= -1.5\,\theta_C = 104.15\,kft \Rightarrow \theta_C = -\frac{69.43\,kft^2}{EI}$

(5a) $0.4\,\theta_B + 0.1\left(-\frac{69.43\,kft^2}{EI}\right) = 20.83\,kft$

$\theta_B = \frac{69.43\,kft^2}{EI}$

Problem 10a-3 – Determine the internal moments at the supports B and C. Assume *EI* is constant.

$$M_{BA} = \frac{3EI}{15ft}\left[\theta_B\right] + 112.5kft = \underline{\underline{126.39kft}}$$

$$M_{BC} = \frac{2EI}{20ft}\left[2\theta_B + \theta_C\right] - 133.3kft = \underline{\underline{-126.39kft}}$$

$$\rightarrow M_{BA} + M_{BC} = 0 \checkmark$$

$$M_{CB} = \frac{2EI}{20ft}\left[2\theta_C + \theta_B\right] + 133.3kft = \underline{\underline{126.39kft}}$$

$$M_{CD} = \frac{3EI}{15ft}\left[\theta_C\right] - 112.5kft = -126.39kft$$

$$\rightarrow M_{CB} + M_{CD} = 0 \checkmark$$