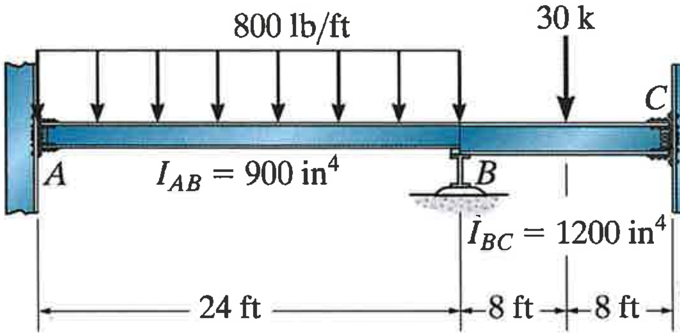
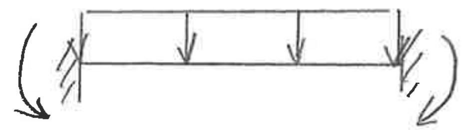
Problem 10a-4 – Determine the moments at *A*, *B*, and *C*. Assume *A* and *C* are fixed, *B* is a roller, and *EI* is constant.



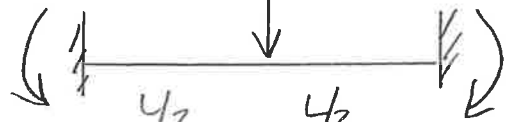
FEM_{AB}



$\frac{WL^2}{12}$

$$\frac{800\,\text{lb/ft}\,(24')^2}{12} = \pm\ 38.4\,\text{kft}$$

FEM_{BC}



$\frac{PL}{8}$

$$\frac{30\text{k}\,(16')}{8} = \pm\ 60\,\text{kft}$$

$$I_{AB} = \frac{3}{4} I_{BC} \qquad I_{BC} = \frac{4}{3} I_{AB}$$

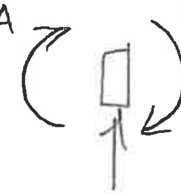
$$M_{AB} = \frac{2EI_{AB}}{L_{AB}}\left[2\overset{0}{\cancel{\theta_A}} + \theta_B - 3\overset{0}{\cancel{\psi}}\right] - 38.4\,\text{kft} \quad (1)$$

$$M_{BA} = \frac{2EI_{AB}}{L_{AB}}\left[2\theta_B + \overset{0}{\cancel{\theta_A}} - 3\overset{0}{\cancel{\psi}}\right] + 38.4\,\text{kft} \quad (2)$$

$$M_{BC} = \frac{2E(4/3\,I_{AB})}{L_{BC}}\left[2\theta_B + \overset{0}{\cancel{\theta_C}} - 3\overset{0}{\cancel{\psi}}\right] - 60\,\text{kft} \quad (3)$$

$$M_{CB} = \frac{2E(4/3\,I_{AB})}{L_{BC}}\left[2\cancel{\theta_C} + \theta_B - 3\overset{0}{\cancel{\psi}}\right] + 60\,\text{kft} \quad (4)$$

JOINT B

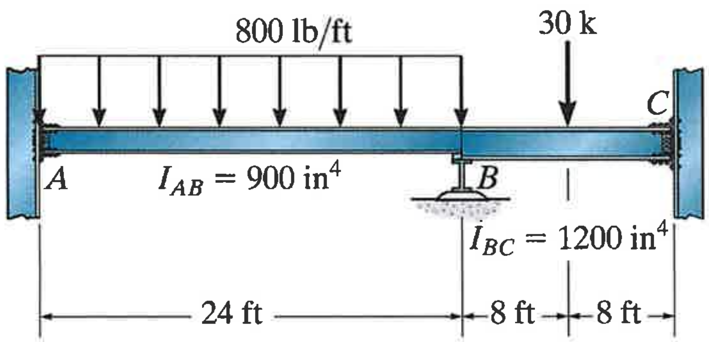


$\circlearrowleft + \sum M_B = 0$

$= -M_{BA} - M_{BC}$

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

Problem 10a-4 – Determine the moments at *A*, *B*, and *C*. Assume *A* and *C* are fixed, *B* is a roller, and *EI* is constant.



$$M_{BA} + M_{BC} = 0 = \underbrace{\frac{2EI_{AB}}{24\text{ ft}}\left[2\theta_B\right] + 38.4\text{kft}}_{M_{BA}} + \underbrace{\frac{2E(\tfrac{4}{3}I_{AB})}{16\text{ ft}}\left[2\theta_B\right] - 60\text{kft}}_{M_{BC}}$$

$$\tfrac{1}{2}\theta_B = \frac{21.6\text{kft}^2}{EI_{AB}} \qquad \underline{\underline{\theta_B = \frac{43.2\text{kft}^2}{EI_{AB}}}}$$

$$M_{AB} = \frac{2EI_{AB}}{24\text{ ft}}\left[\theta_B\right] - 38.4\text{kft} = \underline{-34.8\text{kft}}$$

$$M_{BA} = \frac{2EI_{AB}}{24\text{ ft}}\left[2\theta_B\right] + 38.4\text{kft} = \underline{45.6\text{kft}}$$

$$M_{BC} = \frac{2E(4/3)I_{AB}}{16\text{ft}}\left[2\theta_B\right] - 60\text{kft} = \underline{-45.6\text{kft}}$$

$$M_{CB} = \frac{2E(4/3)I_{AB}}{16\text{ ft}}\left[\theta_B\right] + 60\text{kft} = \underline{67.2\text{kft}}$$