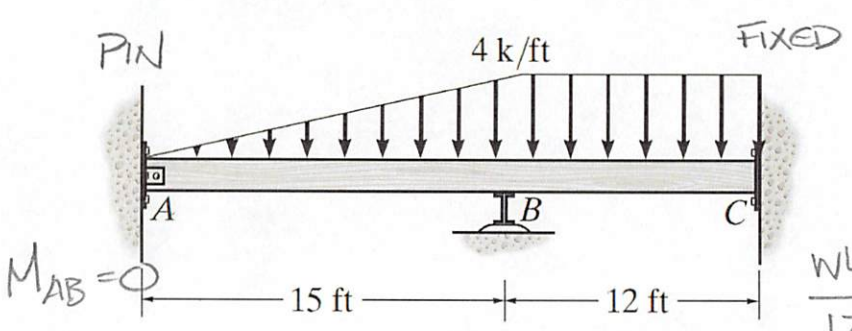
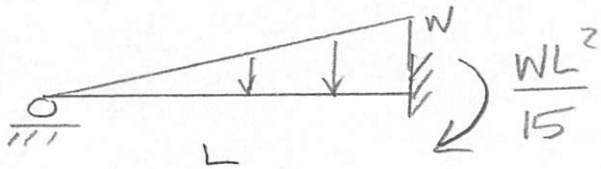
Problem 10a-2 – Determine the moment at *B*. Assume the support at *A* is pinned, *B* is a roller, *C* is fixed, and *EI* is constant.

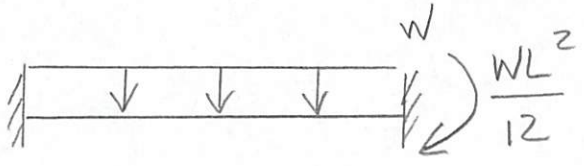


$M_{AB} =$



$\frac{WL^2}{15}$

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



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

$$FEM_{BA} = \frac{WL^2}{15} = \frac{4k/ft(15ft)^2}{15} = \underline{60kft}$$

$$FEM_{BC} = \frac{WL^2}{12} = \pm\frac{4k/ft(12ft)^2}{12} = \pm\underline{48kft}$$

SECTION AB – 1 EQN

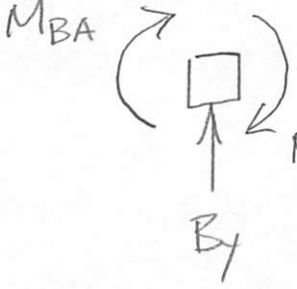
$$M_{BA} = \frac{3EI}{L_{AB}}\left[\theta_B - \cancel{\psi}^{\,0}\right] + 60kft \quad (1)$$

SECTION BC – 2 EQNS

$$M_{BC} = \frac{2EI}{L_{BC}}\left[2\theta_B + \cancel{\phi_C}^{\,0} - 3\cancel{\psi}^{\,0}\right] - 48kft \quad (2)$$

$$M_{CB} = \frac{2EI}{L_{BC}}\left[2\cancel{\theta_C}^{\,0} + \theta_B - 3\cancel{\psi}^{\,0}\right] + 48kft \quad (3)$$

JOINT B



$\circlearrowleft + \sum M_B = 0$

$M_{BC} = M_{BC} + M_{BA} = 0$ (4)

Problem 10a-2 – Determine the moment at *B*. Assume the support at *A* is pinned, *B* is a roller, *C* is fixed, and *EI* is constant.

④ $M_{BC} + M_{BA} = 0 = \left[\frac{2EI}{L_{BC}}(2\theta_B) - 48kft\right] + \left[\frac{3EI}{L_{AB}}(\theta_B) + 60kft\right]$

$= \overset{1/3}{\frac{4EI}{12}}\theta_B + \overset{1/5}{\frac{3EI}{15}}\theta_B + 12kft \Rightarrow \frac{8EI}{15}\theta_B = -12kft$

$$\theta_B = -\frac{180kft^2}{8EI}$$

SECTION AB

$$M_{BA} = \frac{3EI}{15ft}\left[\theta_B\right] + 60kft = \underline{55.5kft}$$

SECTION BC

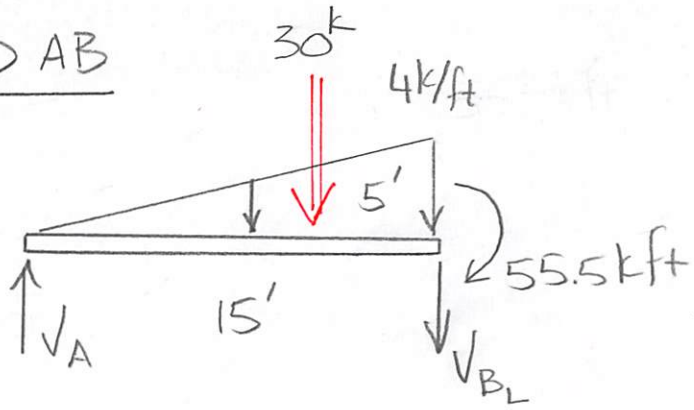
$$M_{BC} = \frac{2EI}{12ft}\left[2\theta_B\right] - 48kft = \underline{-55.5kft}$$

$\rightarrow M_{BA} + M_{BC} = 0$ ✓

$$M_{CB} = \frac{2EI}{12ft}\left[\theta_B\right] + 48kft = \underline{44.25kft}$$

Problem 10a-2 – Determine the moment at *B*. Assume the support at *A* is pinned, *B* is a roller, *C* is fixed, and *EI* is constant.

FBD AB

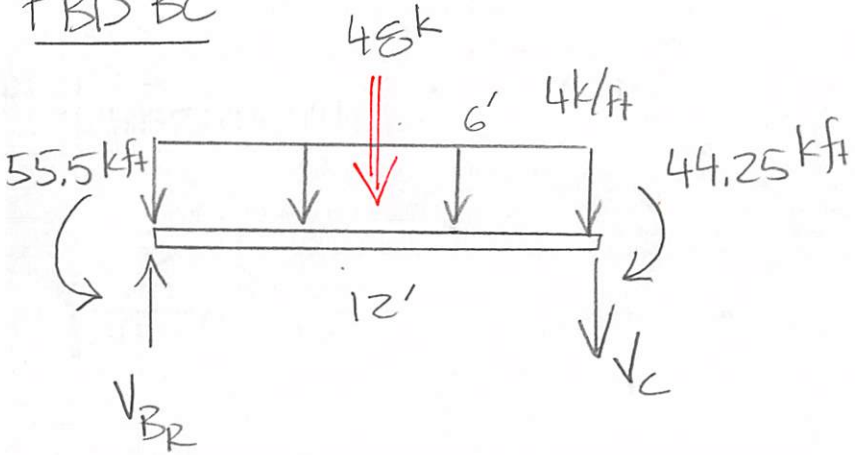


$$\circlearrowleft +\sum M_B = 0 = 30^k(5') - V_A(15') - 55.5\,kft$$

$$V_A = 6.3^k$$

$$+\uparrow \sum F_y = 0 = V_A - V_{B_L} - 30k \qquad V_{B_L} = -23.7^k$$

FBD BC

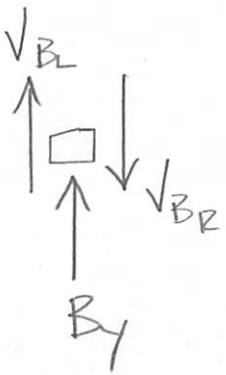


$$\circlearrowleft +\sum M_C = 0 = 48^k(6') + 55.5\,kft - 44.25\,kft - V_{B_R}(12')$$

$$V_{B_R} = 24.94^k$$

$$+\uparrow \sum F_y = 0 = V_{B_R} - V_C - 48^k \qquad V_C = -23.06^k$$

JOINT B



$$+\uparrow \sum F_y = 0 = B_y + V_{B_L} - V_{B_R} \qquad B_y = 48.64^k$$