Problem 7-8

Determine the normal force, shear force, and moment at a section passing through point C. Assume the support at A can be approximated by a pin and B as a roller.

Units used:

$$\text{kip} = 10^3 \text{ lb}$$

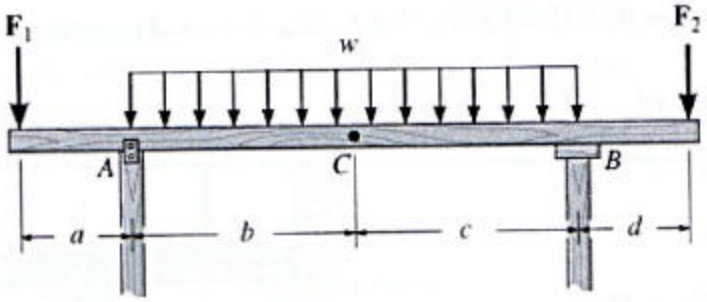
Given:

$F_1 = 10$ kip $\quad a = 6$ ft

$F_2 = 8$ kip $\quad b = 12$ ft

$w = 0.8 \dfrac{\text{kip}}{\text{ft}} \quad c = 12$ ft

$d = 6$ ft

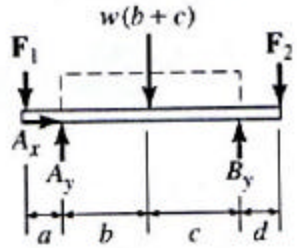


Solution:

$$\circlearrowleft + \Sigma M_A = 0;$$

$$-w(b+c)\left(\frac{b+c}{2}\right) - F_2(b+c+d) + B_y(b+c) + F_1 a = 0$$

$$B_y = \frac{w\dfrac{(b+c)^2}{2} + F_2(b+c+d) - F_1 a}{b+c} \qquad B_y = 17.1 \text{ kip}$$



$$\xrightarrow{+} \Sigma F_x = 0; \qquad N_C = 0$$

$$+\uparrow \Sigma F_y = 0; \qquad V_C - wc + B_y - F_2 = 0$$

$$V_C = wc - B_y + F_2 \qquad V_C = 0.5 \text{ kip}$$

$$\circlearrowleft + \Sigma M_C = 0; \qquad -M_C - wc\left(\frac{c}{2}\right) + B_y c - F_2(c+d) = 0$$

$$M_C = -w\left(\frac{c^2}{2}\right) + B_y c - F_2(c+d) \qquad M_C = 3.6 \text{ kip}\cdot\text{ft}$$