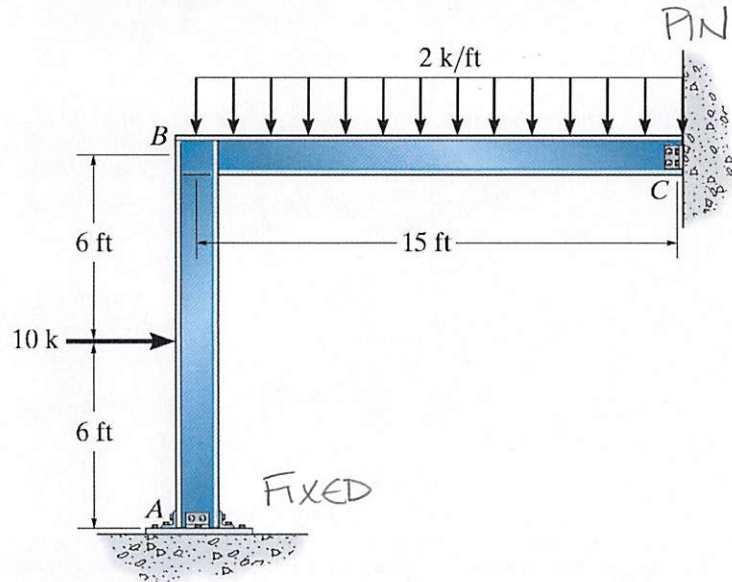


Problem 10-19 – Determine the moment that each member exerts on the joint at B , then draw the moment diagram for each member of the frame. Assume the support at A is fixed, and C is a pin. EI is constant.



$$FEM_{BC} = -\frac{WL^2}{8} = -\frac{2\text{ k/ft}(15')^2}{8} = -56.25\text{ kft}$$

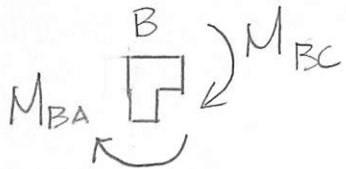
$$FEM_{AB} = \pm \frac{PL}{8} = \pm \frac{10\text{ k}(12')}{8} = \pm 15\text{ kft}$$

$$M_{AB} = \frac{2EI}{12'} [\theta_B] - 15\text{ kft} \quad (1)$$

$$M_{BA} = \frac{2EI}{12'} [2\theta_B] + 15\text{ kft} \quad (2)$$

$$M_{BC} = \frac{3EI}{15'} [\theta_B] - 56.25\text{ kft} \quad (3)$$

JOINT B



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

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

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

$$= \frac{2EI}{12'} [2\theta_B] + 15\text{ kft} + \frac{3EI}{15'} [\theta_B] - 56.25\text{ kft}$$

$$\frac{8}{15} \theta_B = \frac{41.25\text{ kft}^2}{EI}$$

$$\underline{\underline{\theta_B = \frac{77.34\text{ kft}^2}{EI}}}$$

Problem 10-19 – Determine the moment that each member exerts on the joint at B, then draw the moment diagram for each member of the frame. Assume the support at A is fixed, and C is a pin. EI is constant. 2/3

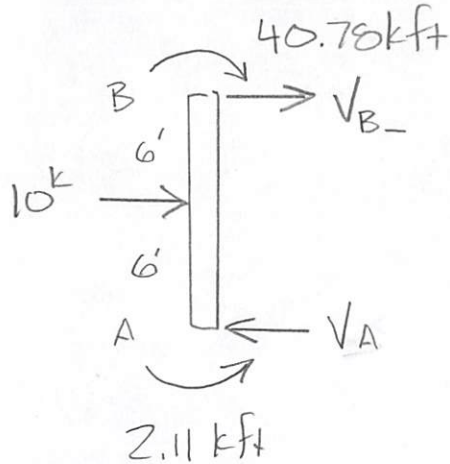
$$M_{AB} = \frac{2EI}{12'} [\theta_B] - 15 \text{ kft} = \underline{-2.11 \text{ kft}}$$

$$M_{BA} = \frac{2EI}{12} [2\theta_B] + 15 \text{ kft} = \underline{40.78 \text{ kft}}$$

$$M_{BC} = \frac{3EI}{15'} [\theta_B] - 56.25 \text{ kft} = \underline{-40.78 \text{ kft}}$$

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

SECTION A-B



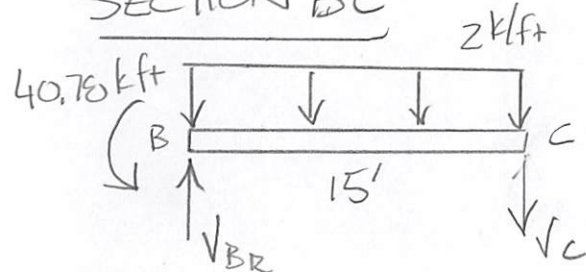
$$\sum \curvearrowright M_B = 0 = -40.78 \text{ kft} + 2.11 \text{ kft} + 10 \text{ k}(6') - V_A(12')$$

$$\underline{V_A = 1.78 \text{ k}}$$

$$\sum \rightarrow F_x = 0 = -V_A + V_{B-} + 10 \text{ k}$$

$$\underline{V_{B-} = -8.22 \text{ k}}$$

SECTION B-C

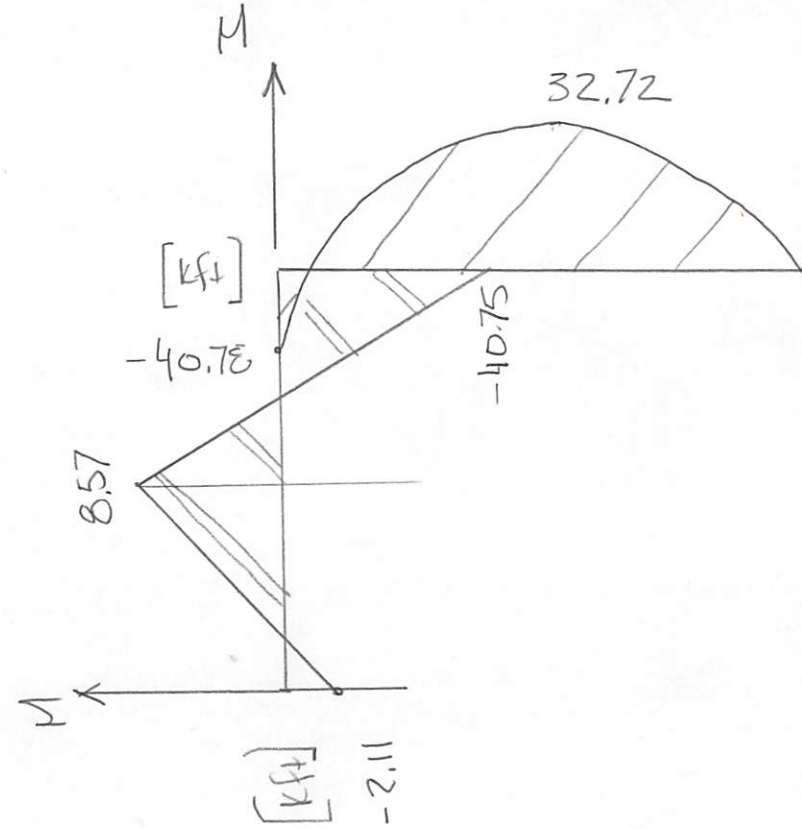
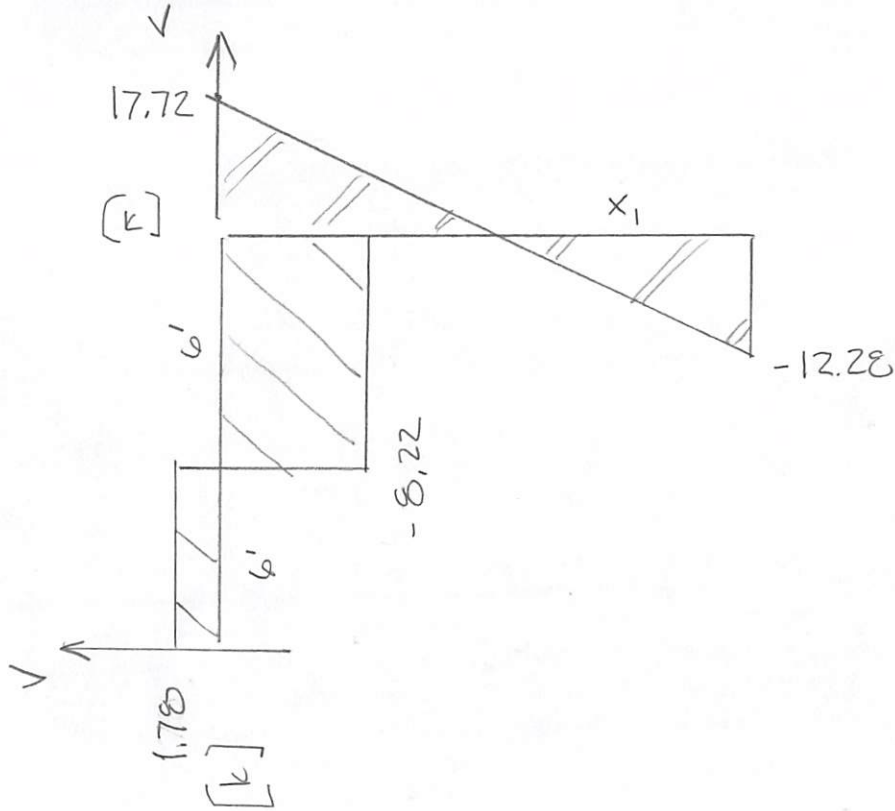


$$\sum \curvearrowright M_B = 0 = 40.78 \text{ kft} - 30 \text{ k}(7.5') - V_C(15') \quad \underline{V_C = -12.28 \text{ k}}$$

$$\sum \uparrow F_y = 0 = V_{BR} - V_C - 30 \text{ k}$$

$$\underline{V_{BR} = 17.72 \text{ k}}$$

Problem 10-19 – Determine the moment that each member exerts on the joint at B, then draw the moment diagram for each member of the frame. Assume the support at A is fixed, and C is a pin. EI is constant.



$$x_1 = \frac{12.28k}{2k/ft} = 6.14ft$$