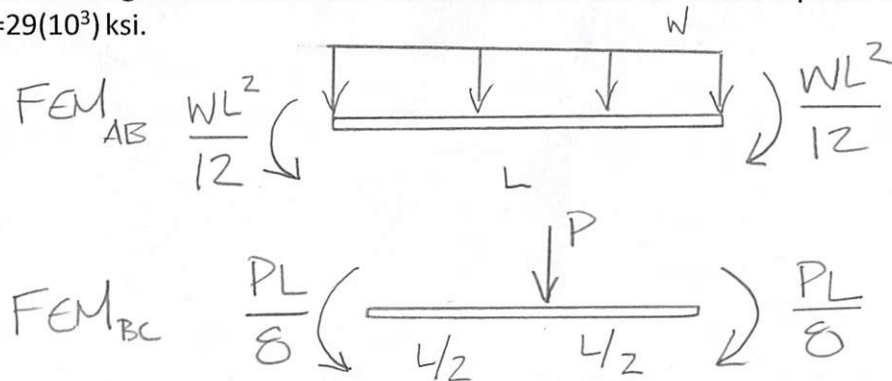
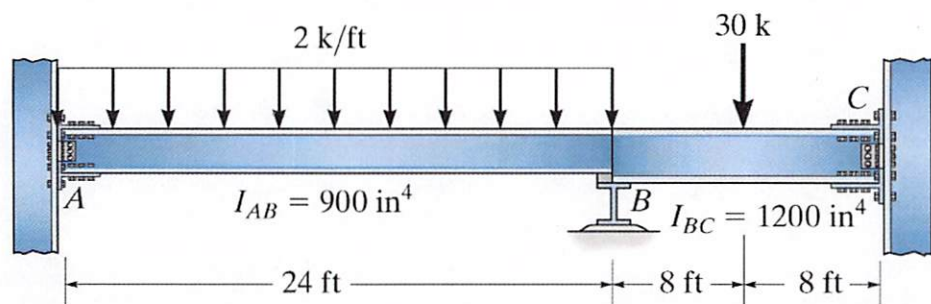


Problem 10-7 - Determine the moments at A, B, and C, then draw the moment diagram for the beam. The moment of inertia of each span is indicated in the figure. Assume the support at B is a roller and A and C are fixed. $E=29(10^3)$ ksi.



$$M_{AB} = \frac{2EI}{24'} [\theta_B] - \frac{2k/ft(24')^2}{12} \quad (1)$$

$$M_{BA} = \frac{2EI}{24'} [2\theta_B] + \frac{2k/ft(24')^2}{12} \quad (2)$$

$$M_{BC} = \frac{2EI}{16'} [2\theta_B] - \frac{30k(16')}{8} \quad (3)$$

$$M_{CB} = \frac{2EI}{16'} [\theta_B] + \frac{30k(16')}{8} \quad (4)$$

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

JOINT B

$$\sum M_{cut} = 0$$

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

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

Problem 10-7 - Determine the moments at A, B, and C, then draw the moment diagram for the beam. The moment of inertia of each span is indicated in the figure. Assume the support at B is a roller and A and C are fixed. $E=29(10^3)$ ksi.

$$(5a) \quad M_{BA} + M_{BC} = 0 = \frac{2EI_{AB}}{24'} [2\theta_B] + 96 \text{ kft} + \frac{2E(\frac{4}{3}I_{AB})}{16'} [2\theta_B] - 60 \text{ kft}$$

$$\frac{1}{2} \theta_B + \frac{36 \text{ kft}^2}{EI_{AB}} = 0$$

$$\underline{\underline{\theta_B = -\frac{72 \text{ kft}^2}{EI_{AB}}}}$$

$$M_{AB} = \frac{2EI_{AB}}{24'} [\theta_B] - 96 \text{ kft} = \underline{\underline{-102 \text{ kft}}}$$

$$M_{BA} = \frac{2EI_{AB}}{24} [2\theta_B] + 96 \text{ kft} = \underline{\underline{84 \text{ kft}}}$$

$$M_{BC} = \frac{2E(\frac{4}{3}I_{AB})}{16'} [2\theta_B] - 60 \text{ kft} = \underline{\underline{-84 \text{ kft}}}$$

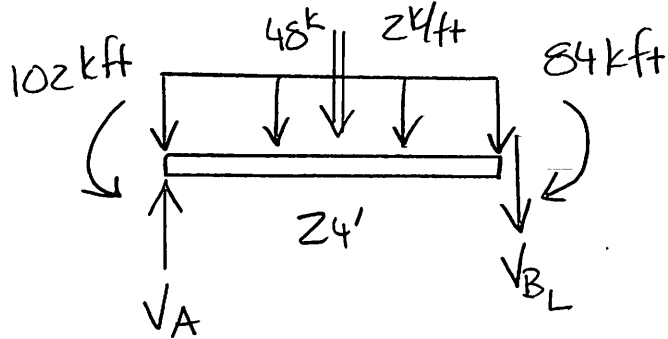
$$M_{CB} = \frac{2E(\frac{4}{3}I_{AB})}{16'} [\theta_B] + 60 \text{ kft} = \underline{\underline{48 \text{ kft}}}$$

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

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Problem 10-7 - Determine the moments at A, B, and C, then draw the moment diagram for the beam. The moment of inertia of each span is indicated in the figure. Assume the support at B is a roller and A and C are fixed. $E=29(10^3)$ ksi.

SECTION AB



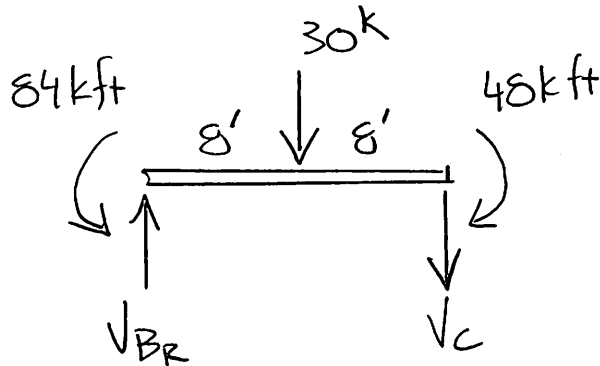
$$\sum M_B = 0 = -84 \text{ kft} + 102 \text{ kft} + 48 \text{ k}(12') - V_A(24')$$

$$\underline{\underline{V_A = 24.75 \text{ k}}}$$

$$+\uparrow \sum F_y = 0 = V_A - V_{B_L} - 48 \text{ k}$$

$$\underline{\underline{V_{B_L} = -23.25 \text{ k}}}$$

SECTION BC



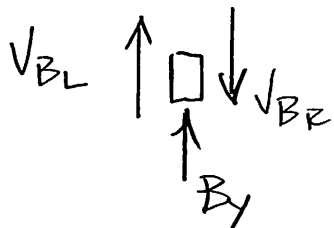
$$\sum M_C = 0 = -48 \text{ kft} + 84 \text{ kft} + 30 \text{ k}(8') - V_{B_R}(16')$$

$$\underline{\underline{V_{B_R} = 17.25 \text{ k}}}$$

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

$$\underline{\underline{V_C = -12.75 \text{ k}}}$$

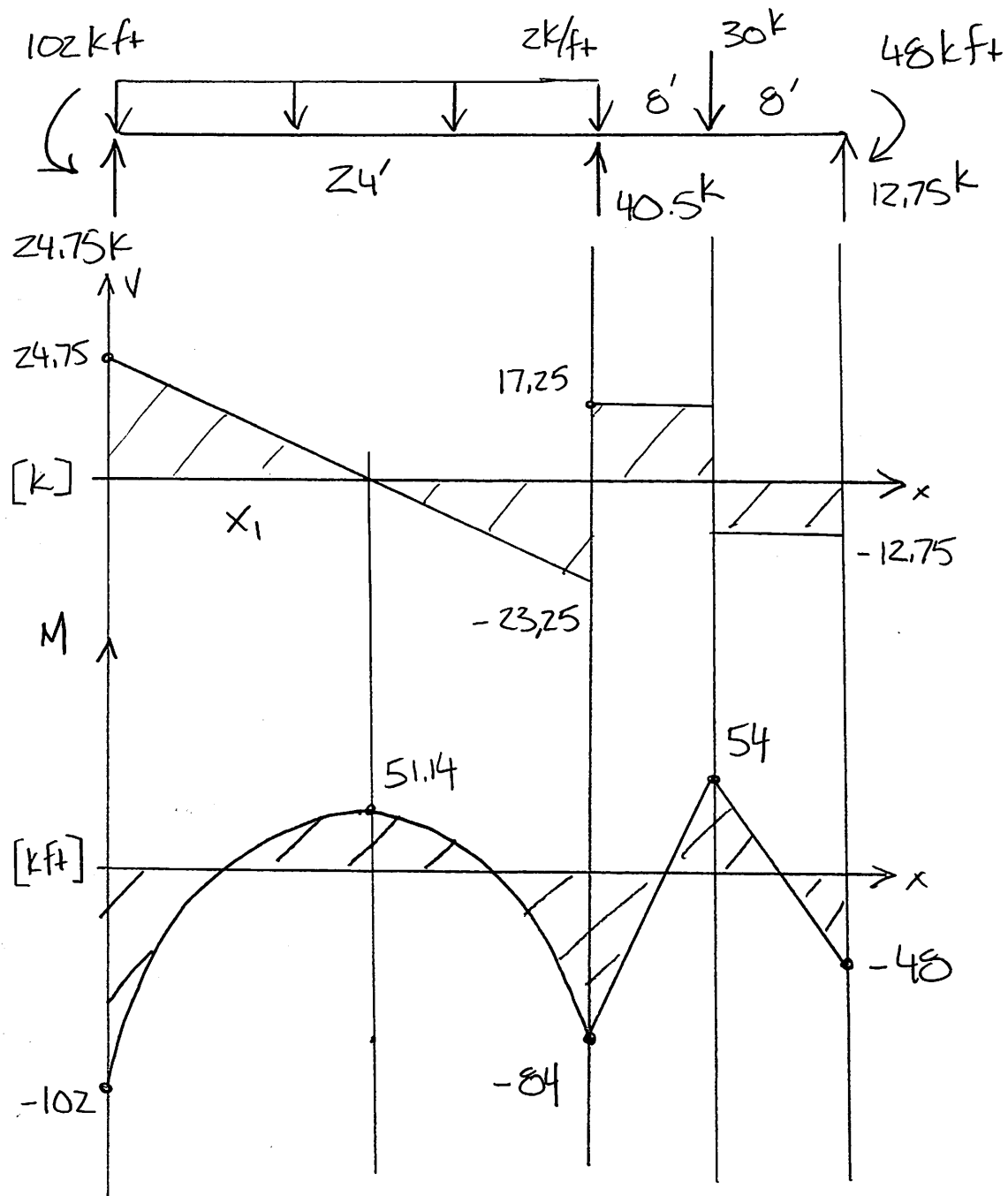
JOINT B



$$+\uparrow \sum F_y = 0 = V_{B_L} - V_{B_R} + B_y$$

$$\underline{\underline{B_y = 40.50 \text{ k}}}$$

Problem 10-7 - Determine the moments at A, B, and C, then draw the moment diagram for the beam. The moment of inertia of each span is indicated in the figure. Assume the support at B is a roller and A and C are fixed. $E=29(10^3)$ ksi.



$$x_1 = \frac{24.75 \text{ k}}{2 \text{ k/ft}} = 12.38'$$