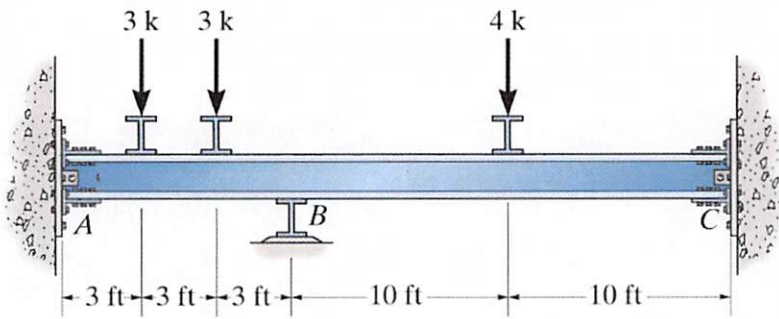


Problem 10-5 – Determine the moments at A, B, and C, then draw the moment diagram. EI is constant. Assume the support at B is a roller and A and C are fixed. 1/4



FEM_{AB}

$$\frac{2PL}{9} \left(\begin{array}{c} P \downarrow \quad P \downarrow \\ \hline \frac{4}{3} \quad \frac{4}{3} \quad \frac{4}{3} \end{array} \right) \frac{2PL}{9}$$

FEM_{BC}

$$\frac{PL}{8} \left(\begin{array}{c} P \downarrow \\ \hline \frac{4}{2} \quad \frac{4}{2} \end{array} \right) \frac{PL}{8}$$

$$M_{AB} = \frac{ZEI}{L_{AB}} [\Theta_B] - \frac{2(3k)(9')}{9} \quad (1)$$

$$M_{BA} = \frac{ZEI}{L_{AB}} [2\Theta_B] + \frac{2(3k)(9')}{9} \quad (2)$$

$$M_{BC} = \frac{ZEI}{L_{BC}} [2\Theta_B] - \frac{4^k(20')}{8} \quad (3)$$

$$M_{CB} = \frac{ZEI}{L_{BC}} [\Theta_B] + \frac{4^k(20')}{8} \quad (4)$$

JOINT B

$$\begin{array}{c} M_{BC} \curvearrowright \\ \uparrow B_y \\ M_{BA} \curvearrowleft \end{array} \quad \sum M_B = 0$$

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

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

Problem 10-5 – Determine the moments at A, B, and C, then draw the moment diagram. EI is constant. Assume the support at B is a roller and A and C are fixed. 2/4

$$\textcircled{5} \quad M_{BA} + M_{BC} = 0 = \underbrace{\frac{2EI}{9'} [2\theta_B] + 6 \text{ kft}}_{M_{BA}} + \underbrace{\frac{2EI}{20'} [2\theta_B] - 10 \text{ kft}}_{M_{BC}}$$

$$\textcircled{5a} \quad \frac{29}{45} \theta_B - \frac{4 \text{ kft}^2}{EI} = 0 \quad \Rightarrow \quad \underline{\underline{\theta_B = \frac{180 \text{ kft}^2}{29EI}}}$$

$$M_{AB} = \frac{2EI}{9'} [\theta_B] - 6 \text{ kft} = \underline{\underline{-4.62 \text{ kft}}}$$

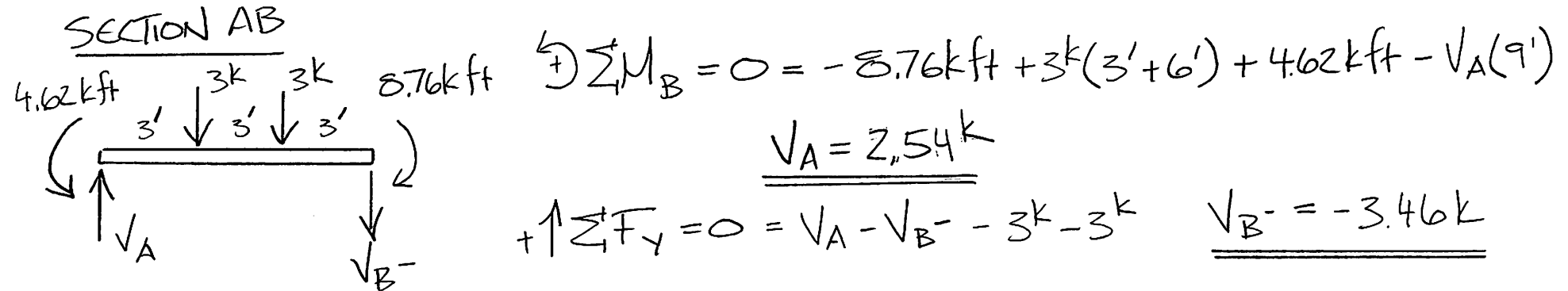
$$\left. \begin{aligned} M_{BA} &= \frac{2EI}{9'} [2\theta_B] + 6 \text{ kft} = \underline{\underline{8.76 \text{ kft}}} \\ M_{BC} &= \frac{2EI}{20'} [2\theta_B] - 10 \text{ kft} = \underline{\underline{-8.76 \text{ kft}}} \end{aligned} \right\} \Rightarrow M_{BA} + M_{BC} = 0 \checkmark$$

$$M_{CB} = \frac{2EI}{20'} [\theta_B] + 10 \text{ kft} = \underline{\underline{10.62 \text{ kft}}}$$

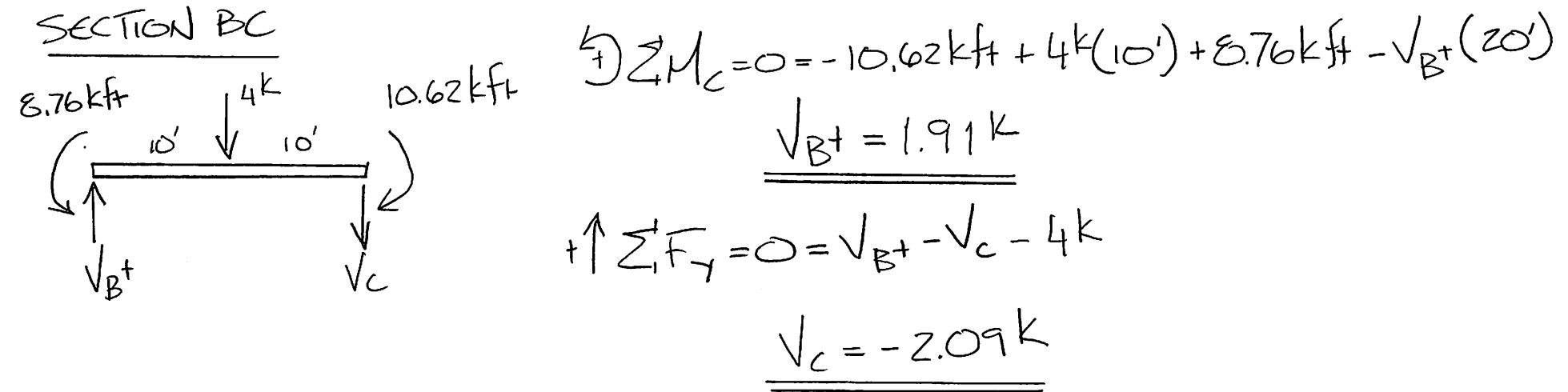
Problem 10-5 – Determine the moments at A, B, and C, then draw the moment diagram. EI is constant. Assume the support at B is a roller and A and C are fixed.

3/4

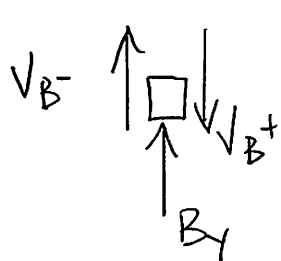
SECTION AB



SECTION BC



JOINT B



$$\sum F_y = 0 = V_B - V_B + B_y$$

$$B_y = 5.37 \text{ k}$$

Problem 10-5 – Determine the moments at A, B, and C, then draw the moment diagram. EI is constant. Assume the support at B is a roller and A and C are fixed. 4/4

