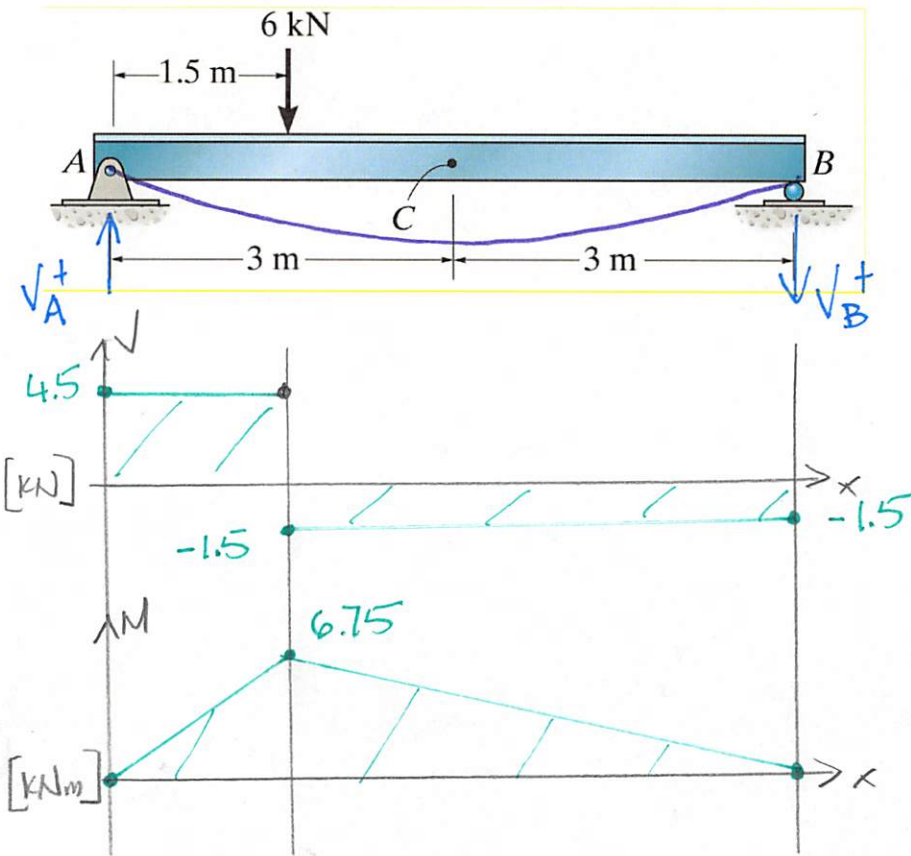
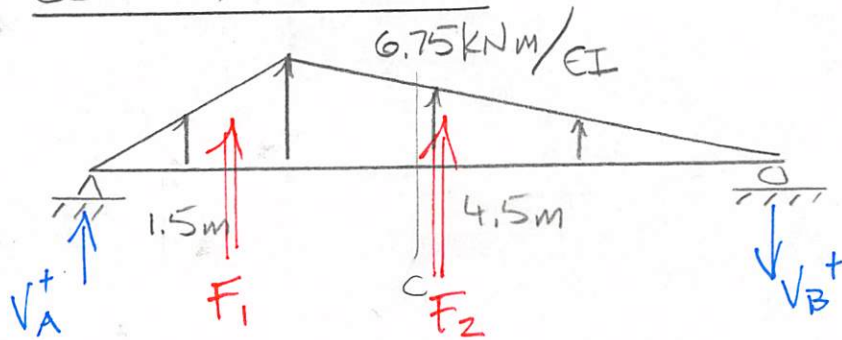


Example 7b-3: Determine the slope and the displacement at C on the beam. Assume that EI is constant.



CONJUGATE BEAM



$$\sum M_B = 0 = 6 \text{ kN}(4.5 \text{ m}) - V_A(6 \text{ m})$$

$$\underline{V_A = 4.5 \text{ kN}}$$

$$+\uparrow \sum F_y = 0 = V_A - V_B - 6 \text{ kN} \quad \underline{V_B = -1.5 \text{ kN}}$$

$$F_1 = \frac{1}{2}(1.5 \text{ m}) \frac{6.75 \text{ kNm}}{EI} = \frac{5.0625 \text{ kNm}^2}{EI}$$

$$d_1 = \frac{2}{3}(1.5 \text{ m}) = 1 \text{ m}$$

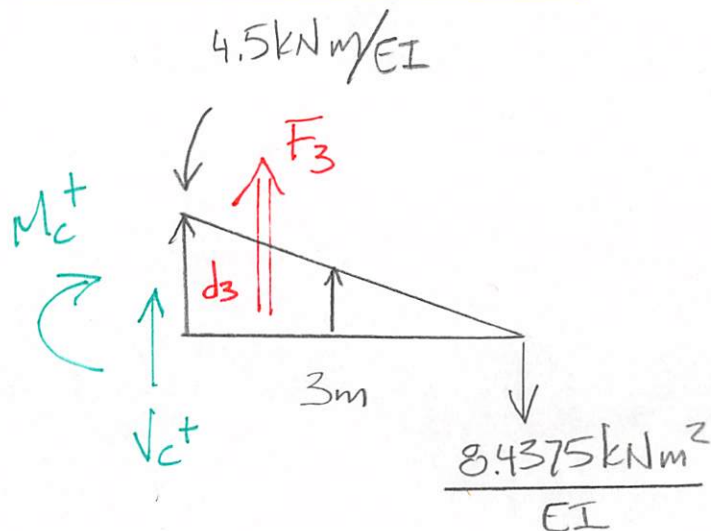
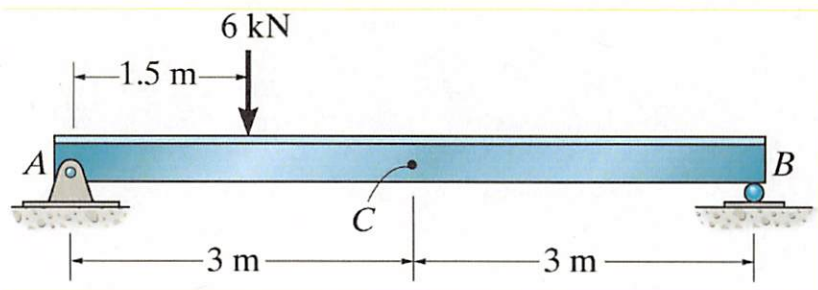
$$F_2 = \frac{1}{2}(4.5 \text{ m}) \frac{6.75 \text{ kNm}}{EI} = \frac{15.1875 \text{ kNm}^2}{EI}$$

$$d_2 = 1.5 + \frac{1}{3}(4.5 \text{ m}) = 3 \text{ m}$$

$$\sum M_A = 0 = F_1 d_1 + F_2 d_2 - V_B(6 \text{ m})$$

$$\underline{V_B = \frac{8.4375 \text{ kNm}^2}{EI}}$$

Example 7b-3: Determine the slope and the displacement at C on the beam. Assume that EI is constant.



$$F_3 = \frac{1}{2}(3\text{m}) \frac{4.5\text{kNm}}{EI} = \frac{6.75\text{kNm}^2}{EI}$$

$$d_3 = \frac{1}{3}(3\text{m}) = 1\text{m}$$

$$\sum M_C = 0 = -M_C + F_3 d_3 - \frac{8.4375\text{kNm}^2}{EI}(3\text{m})$$

$$M_C = -\frac{18.5625\text{kNm}^3}{EI} \Rightarrow \theta_C$$

$$\sum F_y = 0 = V_C + F_3 - \frac{8.4375\text{kNm}^2}{EI}$$

$$V_C = \frac{1.6875\text{kNm}^2}{EI} \Rightarrow \theta_C$$

$$\frac{6.75\text{kNm}}{4.5\text{m}} = \frac{?}{3\text{m}}$$