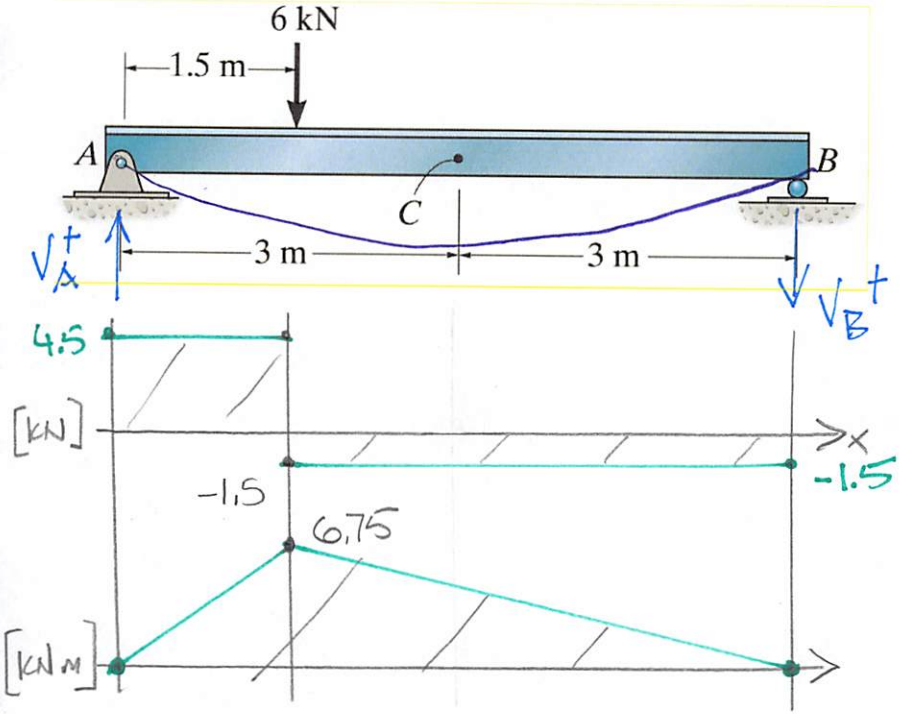
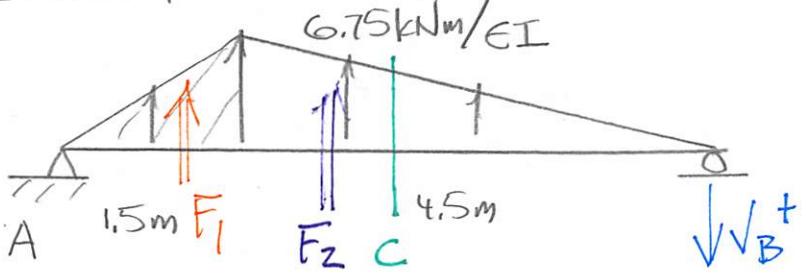
Example 7b-3: Determine the slope and the displacement at *C* on the beam. Assume that *EI* is constant.



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

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

CONJUGATE BEAM



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

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

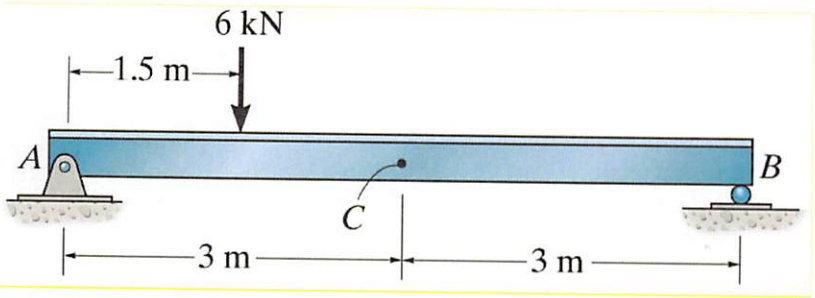
$$d_1 = 4.5\text{m} + \frac{1}{3}(1.5\text{m}) = 5\text{m}$$

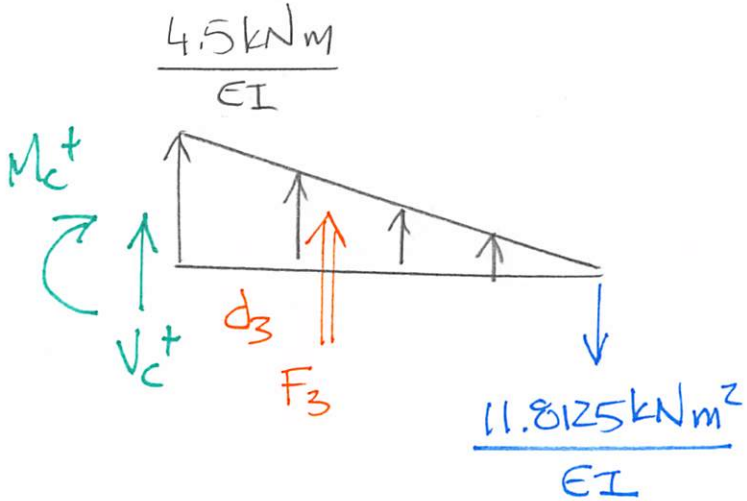
$$d_2 = \frac{2}{3}(4.5\text{m}) = 3\text{m}$$

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

$$V_B = \frac{11.8125\text{kNm}^2}{EI}$$

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





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

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

$$\circlearrowleft + \Sigma M_{cut} = 0 = -M_c + F_3 d_3 - \frac{11.8125\,kNm^2}{EI}(3m)$$

$$M_c = -\frac{28.688\,kNm^3}{EI}$$

$$+\uparrow \Sigma F_y = 0 = V_c + F_3 - \frac{11.8125\,kNm^2}{EI}$$

$$V_c = \frac{5.0625\,kNm^2}{EI}$$