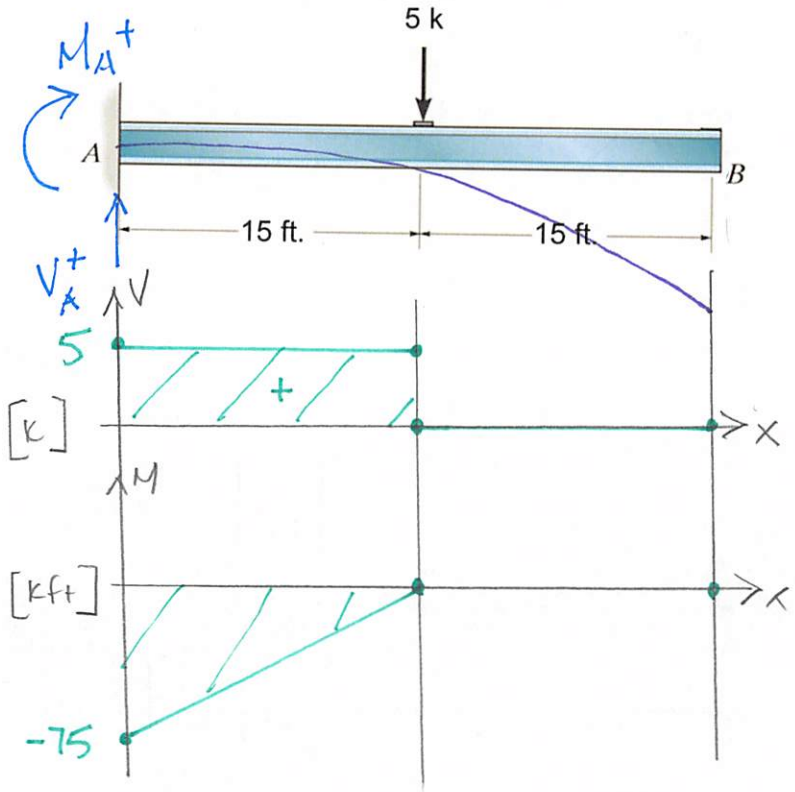
Example 7b-1: Determine the slope and the displacement at point B for the beam. Assume that E = 30,000 ksi and I = 800 in^4.



$$\circlearrowleft^+ \Sigma M_A = 0 = -M_A - 5k(15ft) \qquad M_A = -75 kft$$

$$+\uparrow \Sigma F_Y = 0 = V_A - 5^k \qquad V_A = 5^k$$

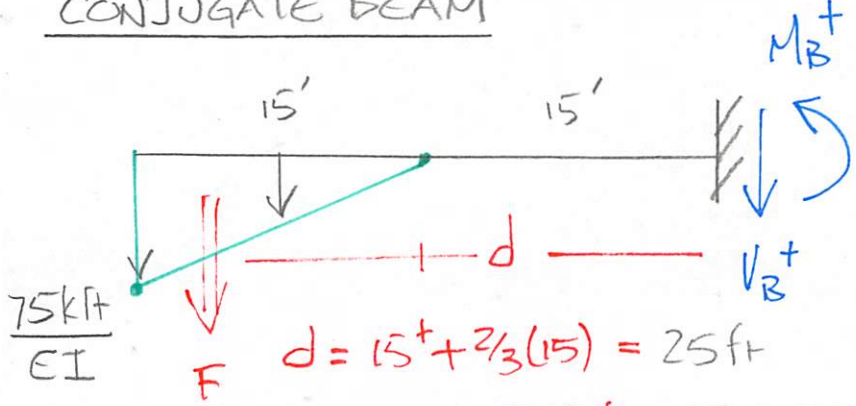
$$\circlearrowleft^+ \Sigma M_B = 0 = M_B + Fd \qquad M_B = -Fd$$

$$M_B = -\frac{14{,}062.5 kft^3}{EI} \Rightarrow Y_B$$

$$Y_B = -\frac{14{,}062.5 kft^3}{30{,}000 k} \left|\frac{IN^2}{800\ IN^4}\right| \left(\frac{12\ in}{1\ ft}\right)^3$$

$$= -1.013\ in$$

CONJUGATE BEAM



$$d = 15' + \tfrac{2}{3}(15) = 25 ft$$

$$F = \tfrac{1}{2}(15')\frac{75 kft}{EI} = \frac{562.5 kft^2}{EI}$$

$$+\uparrow \Sigma F_Y = 0 = -F - V_B \qquad V_B = -F$$

$$V_B = -\frac{562.5 kft^2}{EI} \Rightarrow \Theta_B$$

$$\Theta_B = -\frac{562.5 kft^2}{30{,}000 k} \left|\frac{IN^2}{800\ IN^4}\right| \left(\frac{12\ in}{1\ ft}\right)^2$$

$$= -0.0034\ RADIANS$$