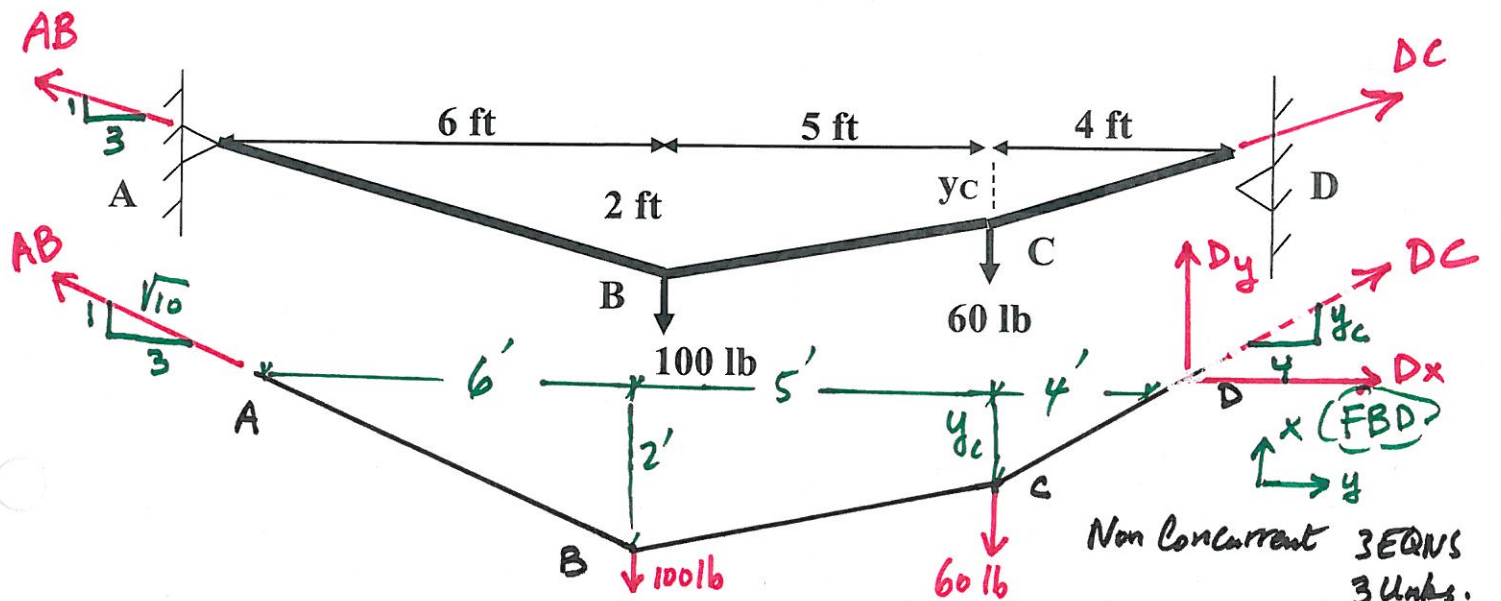


Problem 1: Cables – Concentrated Loads

The cable supports the concentrated loads as shown. Determine:

- Reactions at supports *A* and *D*.
- The tensions T_{AB} , T_{BC} , and T_{CD} of the three cable segments.
- The vertical distances y_c .
- The length, L , of the cable



$$\sum M_D = 0 = -AB \left(\frac{1}{\sqrt{10}} \right) (15 \text{ ft}) + (100 \text{ lb}) (9 \text{ ft}) + 60 \text{ lb} (4 \text{ ft})$$

$$AB = \underline{240 \text{ lb (T)}}$$

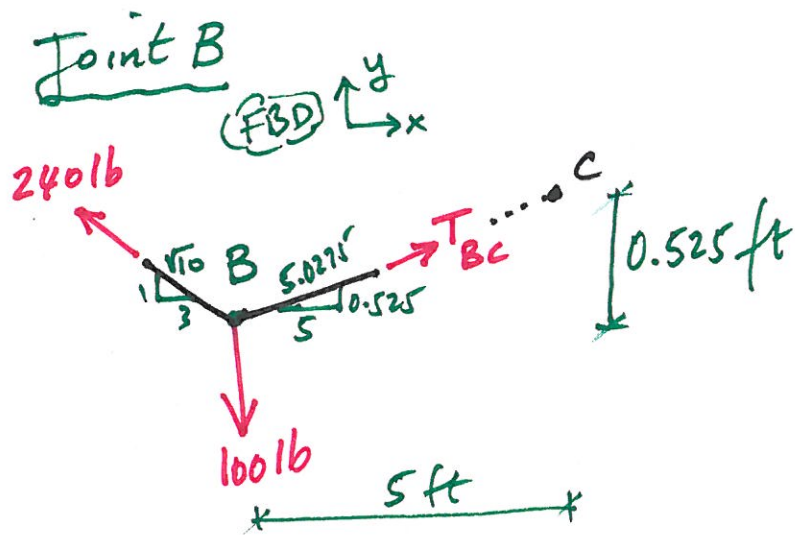
$$\sum F_x = 0 = -AB \left(\frac{3}{\sqrt{10}} \right) + D_x \Rightarrow D_x = \underline{228 \text{ lb}}$$

$$\sum F_y = 0 = AB \left(\frac{1}{\sqrt{10}} \right) + D_y - 100 \text{ lb} - 60 \text{ lb} \Rightarrow D_y = \underline{84.1 \text{ lb}}$$

$$\frac{D_x}{D_y} = \frac{4 \text{ ft}}{y_c} = \frac{228 \text{ lb}}{84.1 \text{ lb}} \Rightarrow y_c = \underline{1.475 \text{ ft}}$$

$$T_{AB} = AB = \underline{240 \text{ lb (T)}}$$

$$T_{DC} = \sqrt{228^2 + 84.1^2} = \underline{243.0 \text{ lb (T)}}$$



$$\rightarrow \Sigma F_x = 0$$

$$0 = T_{BC} \left(\frac{5}{5.0275} \right) - 240 \left(\frac{3}{4} \right)$$

$$T_{BC} = \underline{\underline{229 \text{ lb (T)}}}$$

$$L_{TOT} = \sqrt{6^2 + 2^2} + \sqrt{5^2 + 0.525^2} + \sqrt{4^2 + 1.47^2}$$

$$L_{TOT} = \underline{\underline{15.61 \text{ ft}}}$$