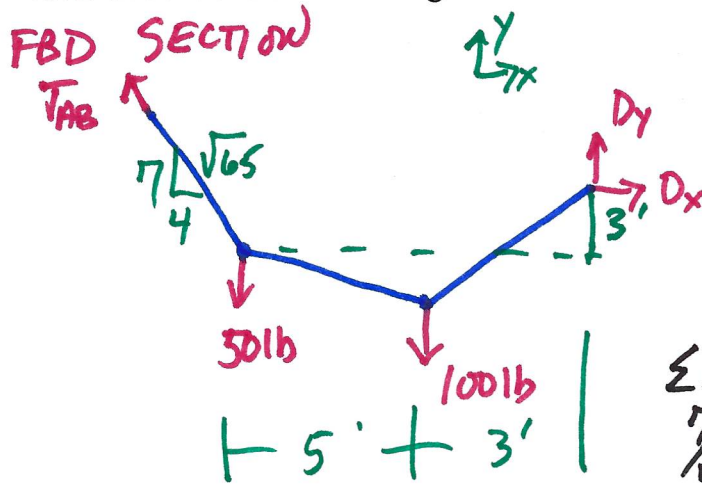
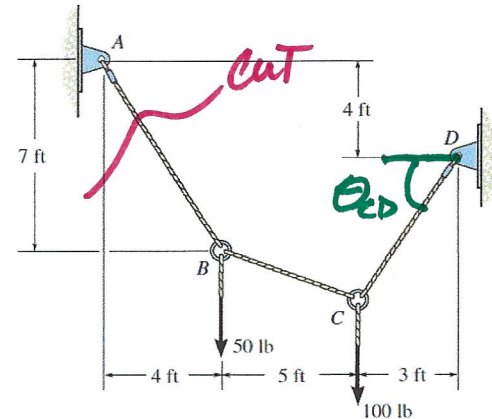


Problem 16: Determine the tension in each segment of the cable and the cable's total length..



$$\sum M_D = 0$$

$$\frac{7}{\sqrt{65}} T_{AB} (8) + \frac{4}{\sqrt{65}} (T_{AB}) (3) - 50(8) - 100(3) = 0$$

$$T_{AB} = 83 \text{ lbs}$$

$$\sum F_x = 0$$

$$-\frac{4}{\sqrt{65}} (83) + D_x = 0 \quad D_x = 41.2 \text{ lbs} \rightarrow$$

$$\sum F_y = 0$$

$$\frac{7}{\sqrt{65}} (83) - 50 - 100 + D_y = 0 \quad D_y = 77.9 \text{ lbs}$$

$$T_{CD} = \sqrt{D_x^2 + D_y^2} = \sqrt{41.2^2 + 77.9^2} = 88.2 \text{ lbs}$$

$$\phi_{CD} = \tan^{-1} \frac{77.9}{41.2} = 62.1^\circ$$

$$83 \text{ lbs}$$



FBD JOINT B

$$\sum F_y = 0 = -50 + \frac{7}{\sqrt{65}} (83) - T_{BC} \sin \theta \quad (1)$$

$$\sum F_x = 0 = \frac{4}{\sqrt{65}} (83) + T_{BC} \cos \theta \quad (2)$$

$$\text{SOLVE (1) + (2)} \quad T_{BC} = 46.7 \text{ lbs} \quad \theta = 28.1^\circ$$

$$L = \sqrt{65} + \frac{5}{\cos 28.1} + \frac{3}{\cos 62.1} = 20.2'$$

ANSWER: $T_{AB} = 83 \text{ lbs}$

$T_{BC} = 46.7 \text{ lbs}$

$T_{CD} = 88.2 \text{ lbs}$

Length = 20.2 feet