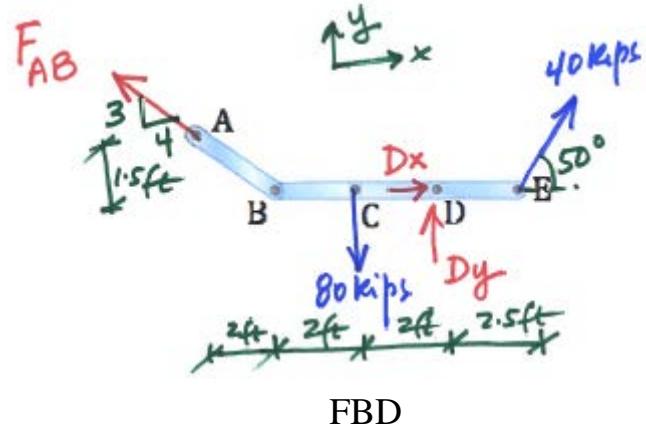
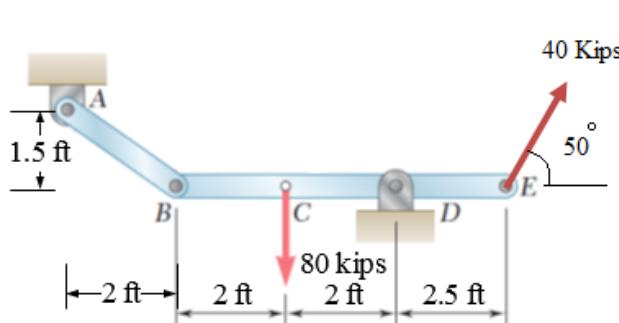


# EGM 3420C - Engineering Mechanics

## Statics Review 1 Problems

### Problem 8

- a. For the system shown below, draw the complete free body diagram of  $ABCDE$ .  
Recognize that  $AB$  is a two-force member.



- b. Determine the reactions at supports  $A$  and  $D$ .

$$\leftarrow \sum M_D = 0 = F_{AB} \left( \frac{3}{5} \right) (4) - 80(2) - 40(\sin 50^\circ)(2.5)$$

$$0 = 2.4 F_{AB} - 236.6 \Rightarrow F_{AB} = \underline{\underline{98.6 \text{ kips}}} \quad A$$

$$\rightarrow \sum F_x = 0 = -F_{AB} \left( \frac{4}{5} \right) + D_x + 40 \cos 50^\circ \Rightarrow D_x = \underline{\underline{53.2 \text{ kips}}} \rightarrow$$

$$\uparrow \sum F_y = 0 = F_{AB} \left( \frac{3}{5} \right) - 80 + D_y + 40 \sin 50^\circ \Rightarrow D_y = \underline{\underline{-9.80}}$$

Check

$$\begin{aligned} \sum M_E &= F_{AB} \left( \frac{3}{5} \right) (6.5) - 80 (4.5) + D_y (2.5) \\ &= 384.54 - 360 - 24.5 = 384.54 - 384.5 \approx 0 \quad \underline{\underline{0.K.}} \end{aligned}$$

**ANSWER:**

$$F_{AB} = \underline{\underline{98.6 \text{ kips}}} \quad A \quad ; \quad D_x = \underline{\underline{53.2 \text{ kips}}} \rightarrow \quad ; \quad D_y = \underline{\underline{9.80 \text{ kips}}} \downarrow$$