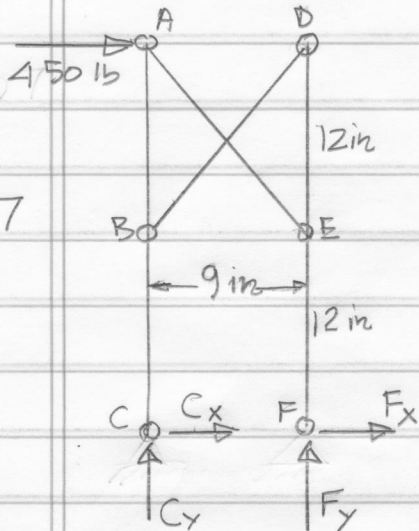


Homework #6 Solution

1/2

6.107



$$\sum M_C = 0: -450 \text{ lb} \cdot 24 \text{ in} + F_y \cdot 9 \text{ in} = 0$$

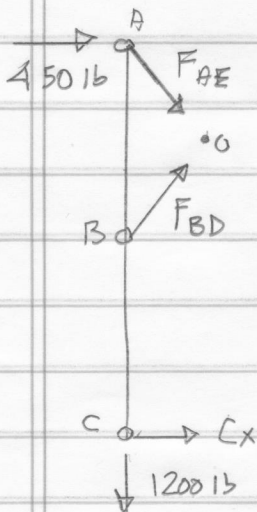
$$\Rightarrow F_y = 1200 \text{ lb}$$

$$\sum F_y = 0: C_y + F_y = 0$$

$$\Rightarrow C_y = -1200 \text{ lb}$$

$$\sum F_x = 0: 450 \text{ lb} + C_x + F_x \quad (C_x = -150 \text{ lb} \text{ see below})$$

$$\Rightarrow F_x = -300 \text{ lb}$$



$$\sum M_D = 0: -450 \text{ lb} \cdot 6 \text{ in} + 1200 \text{ lb} \cdot 4.5 \text{ in} + C_x \cdot 18 \text{ in} = 0$$

$$\Rightarrow C_x = -150 \text{ lb}$$

$$\sum M_B = 0: -450 \text{ lb} \cdot 12 \text{ in} - (F_{AE})_x \cdot 12 \text{ in} + C_x \cdot 12 \text{ in} = 0$$

$$\Rightarrow (F_{AE})_x = -600 \text{ lb}$$

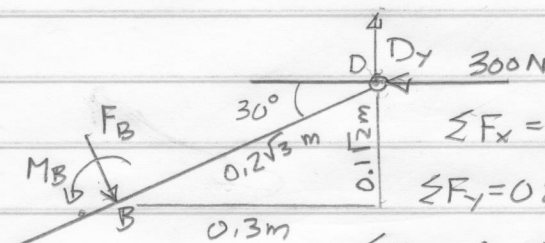
$$F_{AE} = (F_{AE})_x \cdot \frac{5}{3} = -1000 \text{ lb} \quad (C)$$

$$\sum F_x = 0: 450 \text{ lb} + (F_{AE})_x + (F_{BD})_x + C_x = 0$$

$$\Rightarrow (F_{BD})_x = 300 \text{ lb}$$

$$F_{BD} = (F_{BD})_x \cdot \frac{5}{3} = 500 \text{ lb} \quad (T)$$

6.136

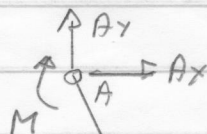


$$\sum F_x = 0: F_B \sin 30^\circ - 300 \text{ N} = 0 \Rightarrow F_B = 600 \text{ N}$$

$$\sum F_y = 0: -F_B \cos 30^\circ + D_y = 0 \Rightarrow D_y = 300\sqrt{3} \text{ N}$$

$$\sum M_B = 0: M_B + D_y \cdot 0.3 \text{ m} + 300 \text{ N} \cdot 0.1\sqrt{3} \text{ m} = 0$$

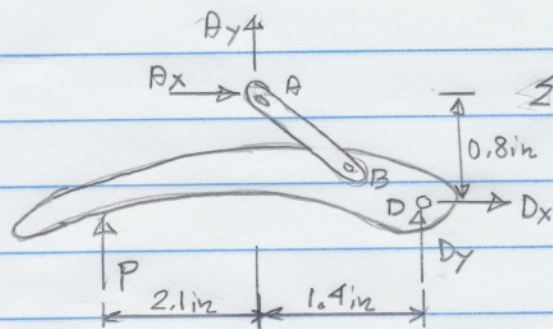
$$\Rightarrow M_B = -120\sqrt{3} \text{ Nm}$$



$$\sum M_A = 0: -M - M_B = 0$$

$$\Rightarrow M = -M_B = 120\sqrt{3} \text{ Nm} = 208 \text{ Nm} \quad \text{as shown}$$

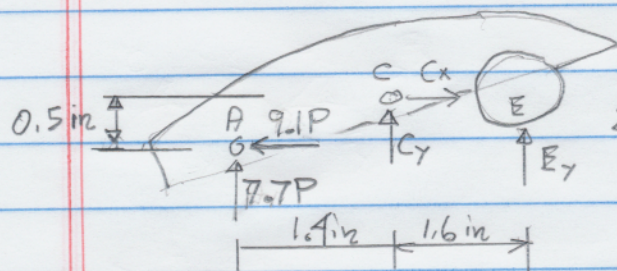
6.146



$$\sum M_D = -P \cdot 3.5 \text{ in} - A_x \cdot 0.8 \text{ in} + A_y \cdot 1.4 \text{ in} = 0$$

$$A_x/A_y = -65/55$$

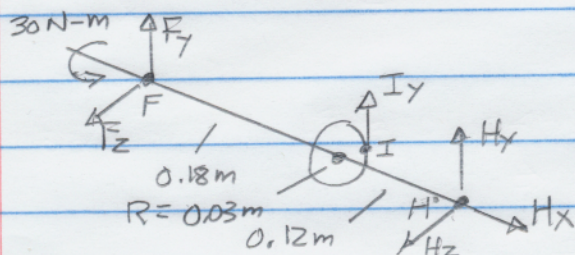
$$\text{Solve: } A_x = 9.1P, A_y = -7.7P$$



$$\sum M_C = -9.1P \cdot 0.5 \text{ in} - 7.7P \cdot 1.4 \text{ in} + E_y \cdot 1.6 \text{ in} = 0$$

$$E_y = 9.58P$$

6.160



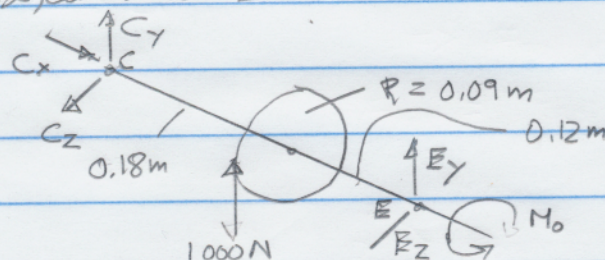
$$\sum M_F = 30 \text{ N-m} + I_y \cdot 0.03 \text{ m} = 0$$

$$\Rightarrow I_y = -1000 \text{ N}$$

$$\sum M_H = I_y \cdot 0.18 \text{ m} + H_y \cdot 0.3 \text{ m} = 0$$

$$\Rightarrow H_y = 600 \text{ N}$$

$$(\text{Also, can show } F_z = H_z = H_x = 0) \quad \sum F_y = 0 \Rightarrow F_y = 400 \text{ N}$$



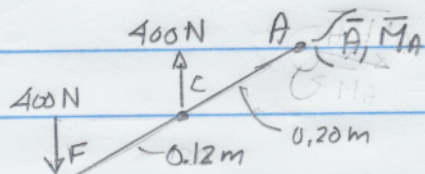
$$\sum M_C = -1000 \text{ N} \cdot 0.09 \text{ m} + M_0$$

$$\Rightarrow M_0 = 90 \text{ N-m} \quad \text{as shown}$$

$$\sum M_E = 1000 \text{ N} \cdot 0.18 \text{ m} + E_y \cdot 0.3 \text{ m} = 0$$

$$\Rightarrow E_y = -600 \text{ N}$$

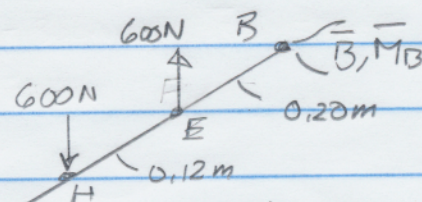
$$(\text{Also, can show } C_z = E_z = C_x = 0) \quad \sum F_y = 0 \Rightarrow C_y = -400 \text{ N}$$



Only reaction at A is M_{Ax}

$$\sum M_{Ax} = 400 \text{ N} \cdot 0.2 \text{ m} + M_{Ax} = 0$$

$$M_{Ax} = -48 \text{ N-m}$$



Only reaction at B is M_{Bx}

$$\sum M_{Bx} = 600 \text{ N} \cdot 0.12 \text{ m} + M_{Bx} = 0$$

$$M_{Bx} = -72 \text{ N-m}$$