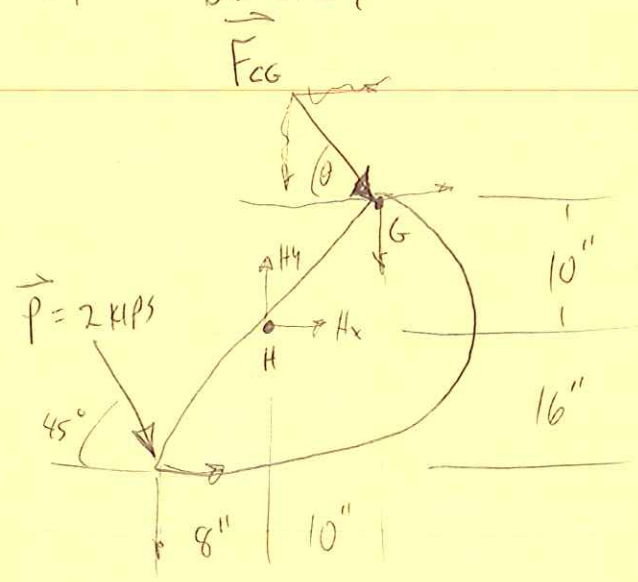


EXAMPLE PROB. 6.157

DETERMINE FORCES EXERTED BY EACH CYLINDER.

FB D OF BUCKET:



$$\vec{P} = (2 \cos 45^\circ) \hat{i} + (-2 \sin 45^\circ) \hat{j} \text{ KIP}$$

$$\vec{P} = (1.41) \hat{i} + (-1.41) \hat{j} \text{ KIP}$$

$$\theta = \text{TAN}^{-1} \left( \frac{60}{45} \right) = 53.1^\circ$$

$$\vec{F}_{CG} = (F_{CG} \cos 53.1^\circ) \hat{i} + (-F_{CG} \sin 53.1^\circ) \hat{j} \text{ KIP}$$

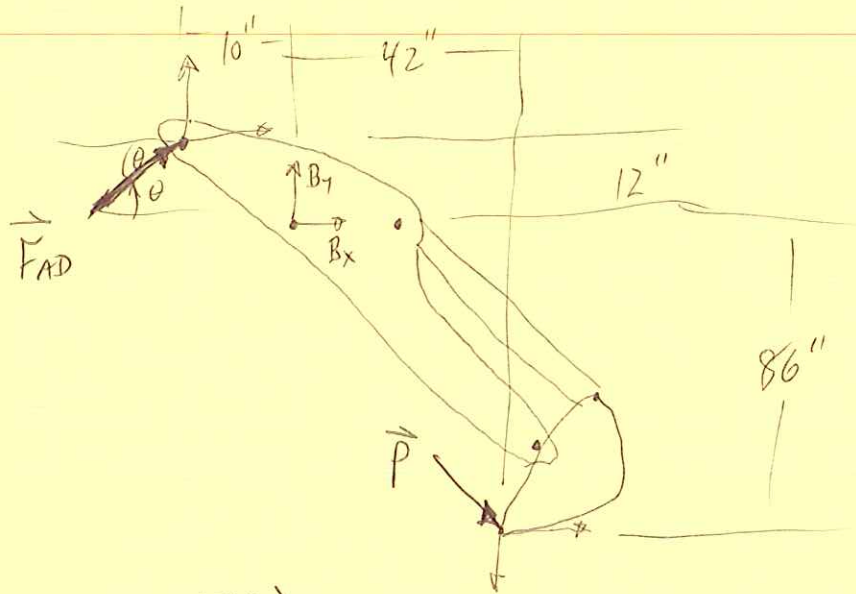
$$\vec{F}_{CG} = (0.6 F_{CG}) \hat{i} + (-0.8 F_{CG}) \hat{j}$$

$$\sum M_H = 0 \quad (+\curvearrowright)$$

$$(8") \times (1.41 \text{ KIP}) + (16") \times (1.41) - (10") \times (0.8 F_{CG}) - (10") \times (0.6 F_{CG}) = 0$$

$$F_{CG} = 2.42 \text{ KIP COMPRESSION}$$

FBD OF ARM ABH AND BUCKET:



$$\theta = \tan^{-1}\left(\frac{36}{48}\right) = 36.9^\circ$$

$$\vec{F}_{AD} = (+F_{AD} \cos 36.9^\circ) \hat{i} + (+F_{AD} \sin 36.9^\circ) \hat{j} \text{ KIP}$$

$$\vec{F}_{AD} = (0.8 F_{AD}) \hat{i} + (0.6 F_{AD}) \hat{j} \text{ KIP}$$

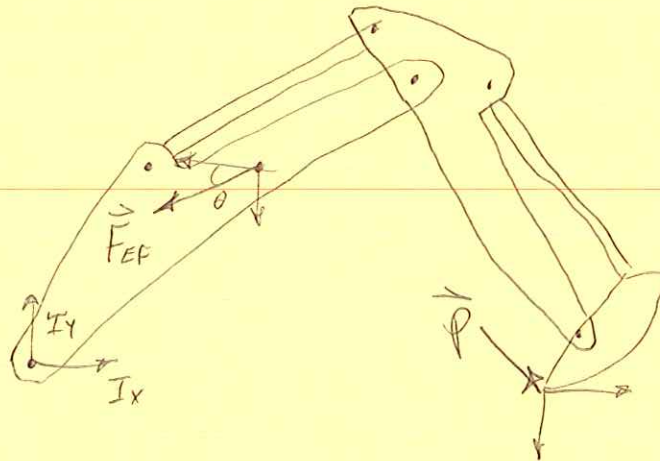
$$\sum M_B = 0 \quad (+\curvearrowright):$$

$$-(10'')(0.6 F_{AD}) - (12)(0.8 F_{AD}) - (42)(1.41) + (86)(1.41) = 0$$

$$F_{AD} = 3.98 \text{ KIP COMPRESSION}$$

PROB. 6.157

FBD OF ARM IDB, ARM ABH AND BUCKET:



$$\theta = \tan^{-1}\left(\frac{16}{40}\right) = 21.8^\circ$$

$$\vec{F}_{EF} = (-F_{EF} \cos 21.8^\circ) \hat{i} + (-F_{EF} \sin 21.8^\circ) \hat{j} \quad \text{KIP}$$

$$\vec{F}_{EF} = (-0.928 F_{EF}) \hat{i} + (-0.371 F_{EF}) \hat{j} \quad \text{KIP}$$

$$\sum M_I = 0 \quad +\curvearrowright$$

$$(34") (0.928 F_{EF}) - (40") (0.371 F_{EF}) + (28") (1.41) - (120") (1.41) = 0$$

$$F_{EF} = 7.76 \text{ KIP TENSION}$$