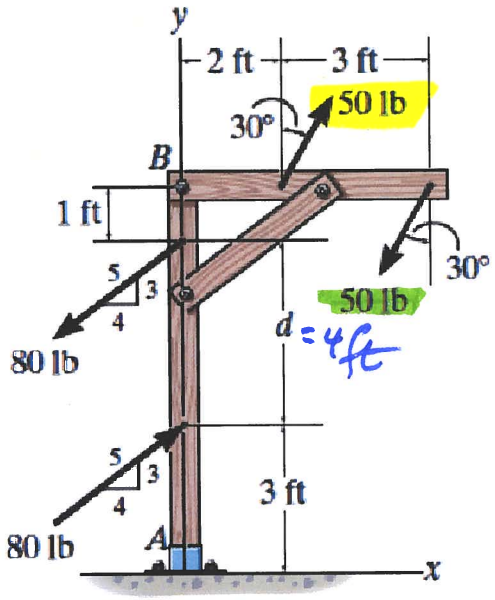
2-D Couple 2

***4–80.**

Two couples act on the frame. If $d = 4$ ft, determine the resultant couple moment. Compute the result by resolving each force into x and y components and (a) finding the moment of each couple (Eq. 4–13) and (b) summing the moments of all the force components about point A.



(a)

Couple due to the 50 lb | Couple due to the 80 lb

lb ft | lb ft

$$\curvearrowleft \Sigma C = (50\cos 30)(3) - (80 \times \tfrac{4}{5})(4)$$

$$= 129.9 - 256 = -126.1$$

$$\Sigma C = 126.1 \text{ ft-lb } \circlearrowright$$

(b) $$\curvearrowleft \Sigma M_A = C = (-80 \times \tfrac{4}{5} \times 3) + (80 \times \tfrac{4}{5} \times 7)$$
$$+ (50\cos 30)(2) - (50\sin 30)(8)$$
$$- (50\cos 30)(5) + (50\sin 30)8$$

$$= -192 + 448$$
$$+ 86.80 - 200$$
$$- 216.5 + 200$$

$$\Sigma M_A = \Sigma C = 126.1 \text{ ft-lb } \circlearrowright$$ same answer