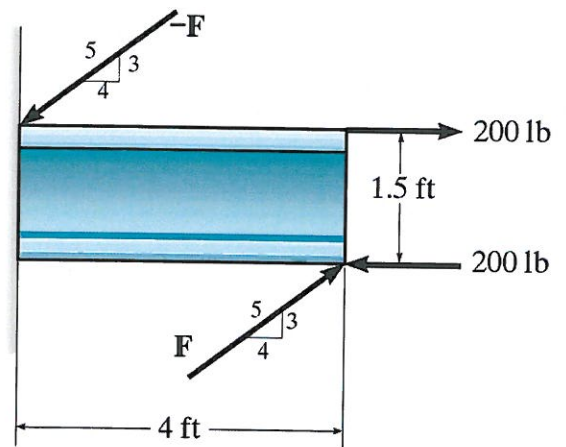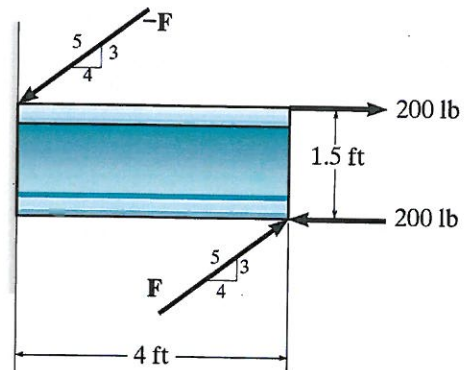4-77

Two couples act on the beam as shown. If $F = 150$ lb, determine the resultant couple moment.

$$\circlearrowleft C = (150 \text{ lb})\left(\frac{4}{5}\right)(1.5 \text{ ft}) + (150 \text{ lb})\left(\frac{3}{5}\right)(4 \text{ ft}) - (200 \text{ lb})(1.5 \text{ ft})$$

$$= 180 + 360 - 300$$

$$= 240 \text{ lb.ft} \;\circlearrowleft$$

Two couples act on the beam as shown. Determine the magnitude of **F** so that the resultant couple moment is 300 lb · ft counterclockwise. Where on the beam does the resultant couple act?

$$\zeta \; C = 300 \, lb\cdot ft \; = \; F\left(\tfrac{4}{5}\right)1.5ft \; + \; F\left(\tfrac{3}{5}\right)4ft \; - \; 200\,lb\,(1.5ft)$$

$$300 \; = \; 3.6\,F \; - \; 300$$

$$F = 166.7 \; lb$$

Resultant couple can act anywhere