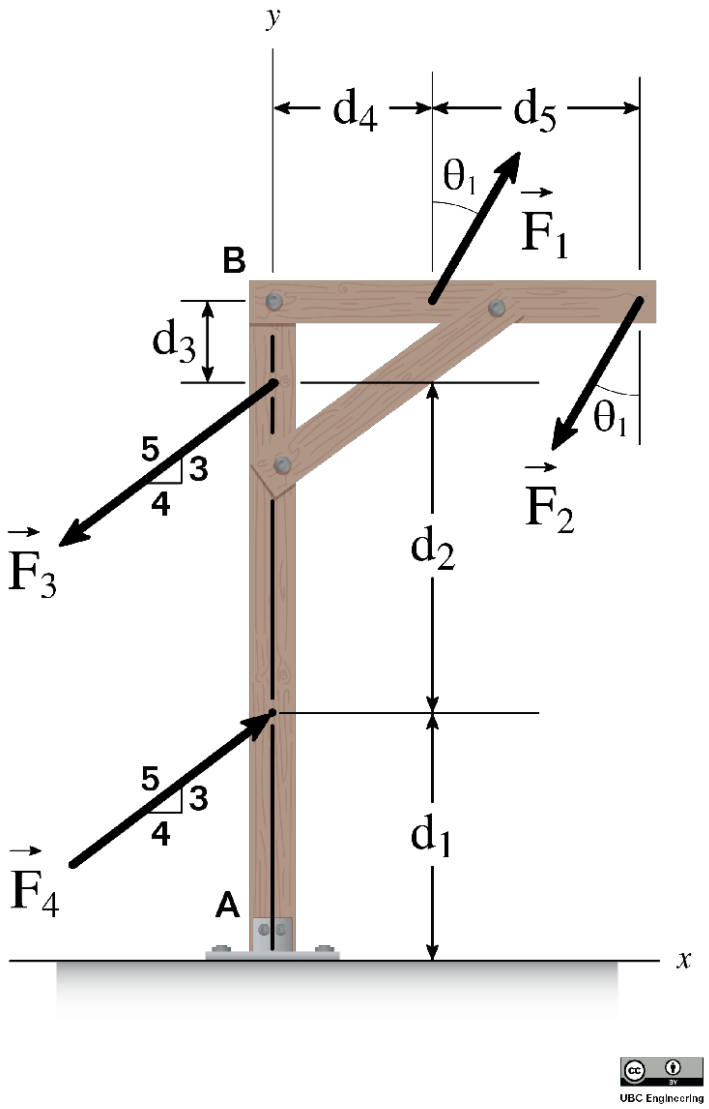

A wooden frame is acted upon by multiple forces. Simplify the loadings into a single resultant force and specify where the line of action intersects the vertical line AB, measured from A.

Find the resultant force vector assuming the positive directions are up and right.

$$F_{Rx} = \Sigma F_x = (F_1 - F_2)\sin(\theta_1) + (F_4 - F_3)\frac{4}{5}$$

$$F_{Ry} = \Sigma F_y = (F_1 - F_2)\cos(\theta_1) + (F_4 - F_3)\frac{3}{5}$$

$$\overrightarrow{F_R} = < F_{Rx}, F_{Ry} >$$

Find the total resultant moment magnitude and direction about point A.

$$(M_{R\,CC})_A = \Sigma(M_{CC})_A = (d_1 + d_2 + d_3)(F_2 - F_1)\sin(\theta_1) + d_4 F_1 \cos(\theta_1) - (d_4 + d_5)F_2 \cos(\theta_1) + (d_1 + d_2)F_3\left(\frac{4}{5}\right) - d_1 F_4\left(\frac{4}{5}\right)$$

$$|(M_R)_A| = |(M_{R\,CC})_A|$$

If $(M_{R\,CC})_A > 0$, moment points out of page

If $(M_{R\,CC})_A < 0$, moment points into page

Specify where the line of action intersects the vertical line AB, measured from A, assuming up is positive.

$$d_{intersect} F_{Rx} = -(M_{R\,CC})_A$$

$$d_{intersect} = -\frac{(M_{R\,CC})_A}{F_{Rx}}$$