



A metal member supports 3 forces  $\vec{F}_1$ ,  $\vec{F}_2$ , and  $\vec{F}_3$  with magnitudes  $F_1$ ,  $F_2$ , and  $F_3$  respectively. If  $\vec{F}_1$  acts on the member at an angle of  $\theta^\circ$  above the x - axis, find the magnitude of the resultant force  $\vec{F}_R$  on the member, as well as the smallest positive counterclockwise angle  $\phi$  from the x - axis at which the force acts on the member.

$$\vec{F}_R = \Sigma \vec{F} = \vec{F}_1 + \vec{F}_2 + \vec{F}_3$$

$$F_{Rx} = \Sigma F_x = \frac{3}{5}F_3 - F_1 \cos(\theta)$$

$$F_{Ry} = \Sigma F_y = -F_2 - F_1 \sin(\theta) - \frac{4}{5}F_3$$

$$\Rightarrow ||\vec{F}_R|| = \sqrt{F_{Rx}^2 + F_{Ry}^2}$$

$$\phi = 180^\circ + \tan^{-1} \left( \frac{F_{Ry}}{F_{Rx}} \right)$$