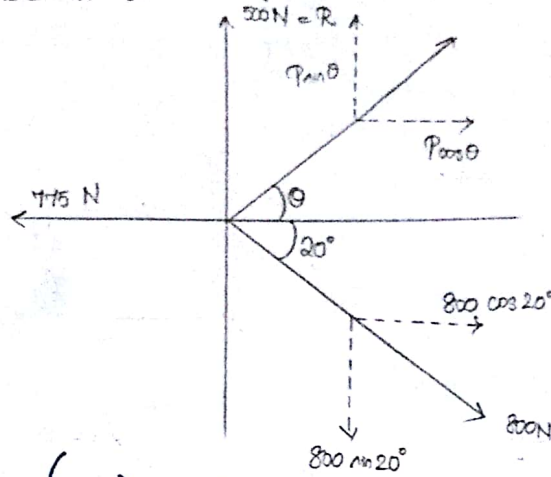


Problem No. 6:

The three coplanar forces are acting at a point as shown in figure. One of the forces is unknown and its magnitude is P . The resultant having a magnitude of 500 N . And acting along Y direction (positive). Determine the unknown force and find its inclination with X axis



Sol.

$$R = 500\text{ N (+ve)} = \sum V$$

Resolving forces horizontally

$$\sum H = P \cos \theta + 800 \cos 20^\circ - 775$$

$$0 = P \cos \theta - 23.25$$

$$P \cos \theta = 23.25\text{ N} \quad \text{--- (1)}$$

Resolving forces vertically

$$\sum V = P \sin \theta - 800 \sin 20^\circ$$

$$500 = P \sin \theta - 273.61$$

$$P \sin \theta = 773.61 \quad \text{--- (2)}$$

$$\text{(1)}^2 + \text{(2)}^2 \Rightarrow P^2 \cos^2 \theta + P^2 \sin^2 \theta = (23.25)^2 + (773.61)^2$$

$$P^2(1) = 599012.9946$$

$$P = 773.959\text{ N}$$

$$\frac{\text{(2)}}{\text{(1)}} \Rightarrow \frac{P \sin \theta}{P \cos \theta} = \frac{773.61}{23.25}$$

$$\tan \theta = 33.2735$$

$$\theta = \tan^{-1}(33.2735)$$

$$\theta = 88^\circ$$