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6-1. If  $\theta = 30^\circ$  and  $T = 4.8\text{ kN}$ , determine the magnitude of the resultant force acting on the eyebolt and its direction measured clockwise from the positive  $x$  axis.

The perpendicular lines of action and the rectangular rule are shown in Figs. a and b, respectively.

Applying the law of cosines to Fig. a,

$$F_R = \sqrt{F_1^2 + F_2^2 - 2F_1F_2 \cos 75^\circ}$$
$$= \sqrt{(4.8)^2 + 3^2 - 2(4.8)(3) \cos 75^\circ}$$

Ans.

$$= 6.60\text{ kN} = 6.60\text{ kN}$$

Applying the law of sines to Fig. a and using this result, yields

$$\frac{\sin \alpha}{3} = \frac{\sin 75^\circ}{6.60}$$
$$\alpha = 43.80^\circ$$

Thus, the direction angle  $\phi$  of  $F_R$ , measured clockwise from the positive  $x$  axis is

$$\phi = 30^\circ + 43.80^\circ = 73.80^\circ$$

Ans.

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