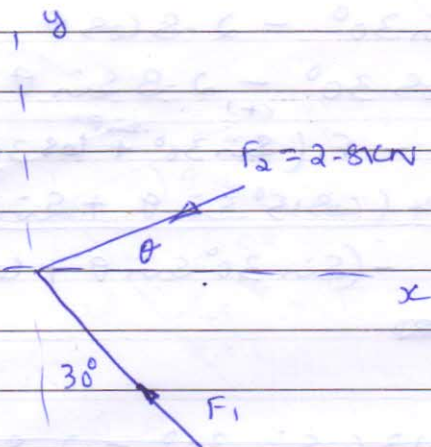


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Data, Given

$$R = 3.5 \text{ kN}$$

 $\alpha = 15^\circ$ above -ve x-axis

To find

$$F_1 = ?$$

$$\theta = ?$$

Solution

$$\vec{F}_1 = -F_1 \sin 30^\circ \hat{i} + F_1 \cos 30^\circ \hat{j}$$

$$\vec{F}_2 = -F_2 \cos \theta \hat{i} - F_2 \sin \theta \hat{j}$$

$$\vec{R} = (-F_1 \sin 30^\circ - 2.8 \cos \theta) \hat{i} + (F_1 \cos 30^\circ - 2.8 \sin \theta) \hat{j}$$

$$= R_x \hat{i} + R_y \hat{j}$$

$$\therefore R_x = -3.5 \cos 15^\circ \hat{i}$$

$$R_y = +3.5 \sin 15^\circ \hat{j}$$

$$\therefore -3.5 \cos 15^\circ = -F_1 \sin 30^\circ - 2.8 \cos \theta \times \cos 30^\circ$$

$$+3.5 \sin 15^\circ = F_1 \cos 30^\circ - 2.8 \sin \theta \times \sin 30^\circ$$

$$-3.5 \cos 15^\circ \times \cos 30^\circ + 3.5 \sin 15^\circ \times \sin 30^\circ = -F_1 \sin 30^\circ \times \cos 30^\circ + F_1 \cos 30^\circ \times \sin 30^\circ - 2.8 \cos \theta \times \cos 30^\circ - 2.8 \sin \theta \times \sin 30^\circ$$

$$\therefore 3.5 (\sin 15^\circ \times \sin 30^\circ - \cos 15^\circ \times \cos 30^\circ) = -2.8 (\cos \theta \cos 30^\circ + \sin \theta \sin 30^\circ)$$

$$\therefore -2.4748 = 0.866 \cos \theta + 0.5 \sin \theta - 2.8$$

$$0.8838 = 0.866 + 0.5 \tan \theta$$