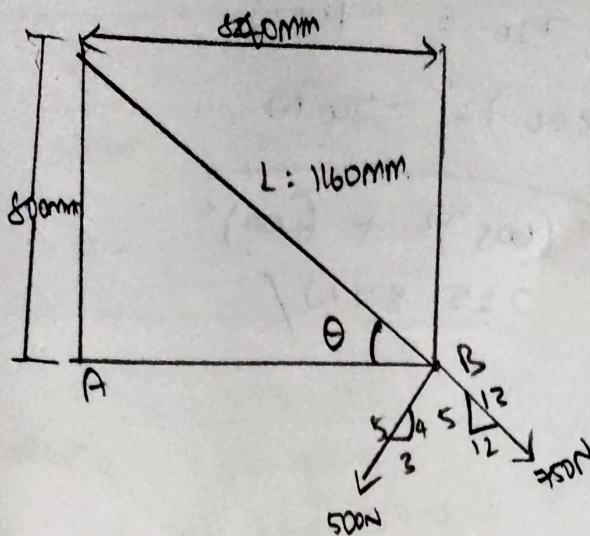


22PHY106 - Assignment 1

①



$$F_{BC} = 725\text{N}$$

From $\triangle ABC$

$$\sin\theta = \frac{800}{1160}$$

$$\cos\theta = \frac{840}{1160}$$

Resolving forces at BC

$$F_x = -725 \cos\theta = -725 \left(\frac{840}{1160} \right) = -525\text{N}$$

$$F_y = 725 \sin\theta = 725 \left(\frac{800}{1160} \right) = 500\text{N}$$

Resolving forces at 500N

$$F_x = -500 \left(\frac{3}{5} \right) = -300\text{N} \quad \left[\because \cos\theta = 3/5 \right]$$

$$F_y = -500 \left(\frac{4}{5} \right) = -400\text{N} \quad \left[\because \sin\theta = 4/5 \right]$$

Resolving forces at 725N

$$F_x = 725 \left(\frac{12}{13} \right) = 720\text{N} \quad \left[\because \cos\theta = 12/13 \right]$$

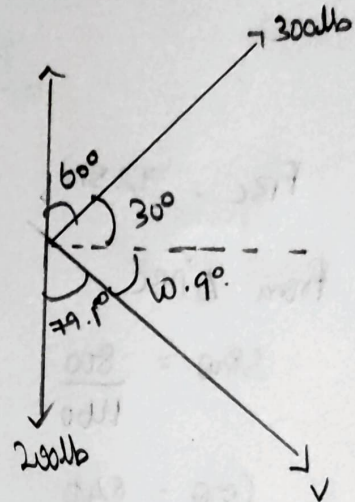
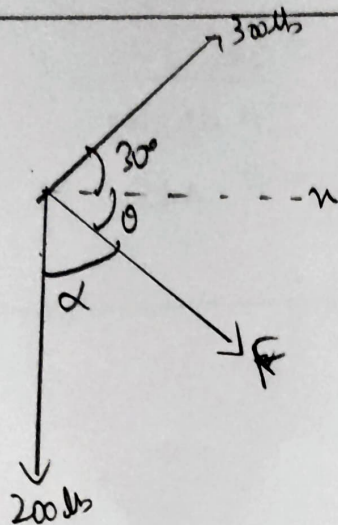
$$F_y = -725 \left(\frac{5}{13} \right) = -300\text{N} \quad \left[\because \sin\theta = 5/13 \right]$$

$$F_x = -525 + (-300) + 720 = -105 \text{ N}$$

$$F_y = 500 + (-400) + (-300) = -200 \text{ N.}$$

$$F = \sqrt{F_x^2 + F_y^2} = \sqrt{(105)^2 + (200)^2} = 225.89 \text{ N/}$$

(2)



$$\Sigma F_x = 300 \cos 30^\circ + F \cos \theta$$

$$\Sigma F_y = 300 \sin 30^\circ - F \sin \theta - 200$$

$$\Sigma F_x = 0 ; \Sigma F_y = 0$$

$$F \cos \theta = -300 \cos 30^\circ$$

$$F \sin \theta = 300 \sin 30^\circ - 200$$

$$\frac{F \sin \theta}{F \cos \theta} = \frac{300 \sin 30^\circ - 200}{-300 \cos 30^\circ} = \frac{-50}{-259.8}$$

$$\tan \theta = \frac{-50}{259.8}$$

$$\theta = \tan^{-1} \left(\frac{-50}{259.8} \right)$$

$$\theta = 10.9^\circ$$

$$\alpha = 90^\circ - 10.9^\circ = 79.1^\circ$$

[Law of sines]

$$\frac{V}{\sin 60^\circ} = \frac{200}{\sin 40.9^\circ}$$

$$V = \frac{200 \times \sin 60^\circ}{\sin 40.9^\circ}$$

$$= \frac{1.73 \cdot 200}{\sin 40.9}$$

$$V = 264.57 \text{ N.} /$$