

2.23

Given:
 $|\vec{F}_1| = 630 \text{ N}$
 $|\vec{F}_2| = 250 \text{ N}$

Find: Resultant Force

- Find the direction of \vec{F}_1

$$\hat{F}_1 = \frac{25}{25}\hat{j} + \frac{24}{25}\hat{k}$$

- Find \vec{F}_1

$$\vec{F}_1 = 176.4\hat{j} + 604.8\hat{k}$$

- Find \vec{F}_2 using the fact that $\cos \theta = \frac{\vec{F}_{2x}}{|\vec{F}_2|}$

$$|\vec{F}_2| \cos 60 = -x = 125 \text{ N}$$

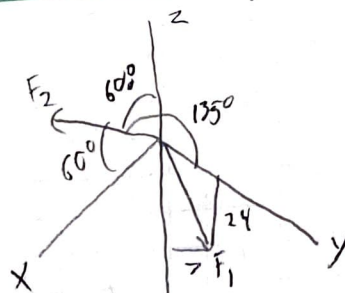
$$|\vec{F}_2| \cos 135 = y = -176.78 \text{ N}$$

$$|\vec{F}_2| \cos 60 = z = 125 \text{ N}$$

$$\vec{F}_2 = 125\text{N}\hat{i} - 176.78\text{N}\hat{j} + 125\text{N}\hat{k}$$

- Sum the components for the resultant vector

$$\vec{F}_{\text{net}} = 125\text{N}\hat{i} - 38\text{N}\hat{j} + 729.8\text{N}\hat{k}$$



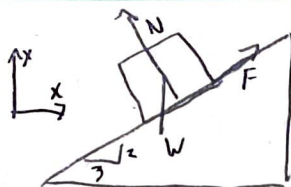
2.24

Given:

$|\vec{W}| = 200 \text{ N}$

$|\vec{V}| = 166.4 \text{ N}$

$|\vec{F}| = 48.6 \text{ N}$



Find: all three forces in vector form

• Find \vec{W}

$$\vec{W} = -200 \text{ N } \hat{j}$$

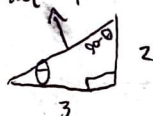
• Find \vec{F}

Find \hat{F}

$$\hat{F} = \frac{3}{\sqrt{13}} \hat{i} + \frac{2}{\sqrt{13}} \hat{j}$$

• Compute \vec{F}

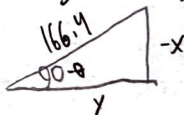
$$\vec{F} = 40.438 \text{ N } \hat{i} + 26.958 \text{ N } \hat{j}$$

• Find \vec{N} 

$$\theta = \tan^{-1}\left(\frac{2}{3}\right)$$

$$\theta = 33.69^\circ$$

$$90^\circ - \theta = 56.31^\circ$$



$$x = -166.4 \sin(90^\circ - \theta)$$

$$y = 166.4 \cos(90^\circ - \theta)$$

$$\vec{N} = -138.453 \text{ N } \hat{i} + 92.302 \text{ N } \hat{j}$$