

$$|\vec{v}| = (1^2 + 2^2 + 1^2)^{1/2} = \sqrt{6}$$

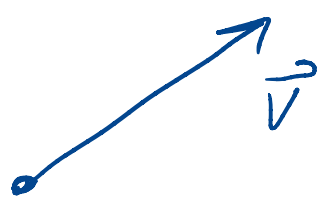
unit vector: $\left\langle \frac{1}{\sqrt{6}}, \frac{2}{\sqrt{6}}, \frac{1}{\sqrt{6}} \right\rangle$

$$\vec{v} \cdot \vec{w} = |\vec{v}| |\vec{w}| \cos \theta$$

$$\Rightarrow \theta = \arccos \left(\frac{\vec{v} \cdot \vec{w}}{|\vec{v}| |\vec{w}|} \right)$$

$$|\vec{v}| = \sqrt{6}, |\vec{w}| = 1, \vec{v} \cdot \vec{w} = -1.$$

$$\theta = \arccos \left(\frac{-1}{\sqrt{6} \cdot 1} \right) = \arccos \left(-\frac{1}{\sqrt{6}} \right) = 1.99 \dots \text{ rad} \\ \approx 114.1^\circ$$



\vec{F}_c is parallel to \vec{v} ,
 $|\vec{F}_c| = 500 \text{ N}$.

unit vector: $\vec{u} = \left\langle \frac{1}{\sqrt{6}}, \frac{2}{\sqrt{6}}, \frac{1}{\sqrt{6}} \right\rangle$

$$\vec{F}_c = 500 \text{ N} \left\langle \frac{1}{\sqrt{6}}, \frac{2}{\sqrt{6}}, \frac{1}{\sqrt{6}} \right\rangle = \left\langle \frac{500}{\sqrt{6}}, \frac{1000}{\sqrt{6}}, \frac{500}{\sqrt{6}} \right\rangle \text{ N}$$

$$\vec{F}_c = \left\langle \frac{500}{\sqrt{6}}, \frac{1000}{\sqrt{6}}, \frac{500}{\sqrt{6}} \right\rangle \text{ N}$$

$$\vec{F}_g = \langle 0, 0, -1000 \rangle \text{ N}$$

$$\vec{F} = \vec{F}_c + \vec{F}_g = \left\langle \frac{500}{\sqrt{6}}, \frac{1000}{\sqrt{6}}, \frac{500}{\sqrt{6}} - 1000 \right\rangle \text{ N}$$