

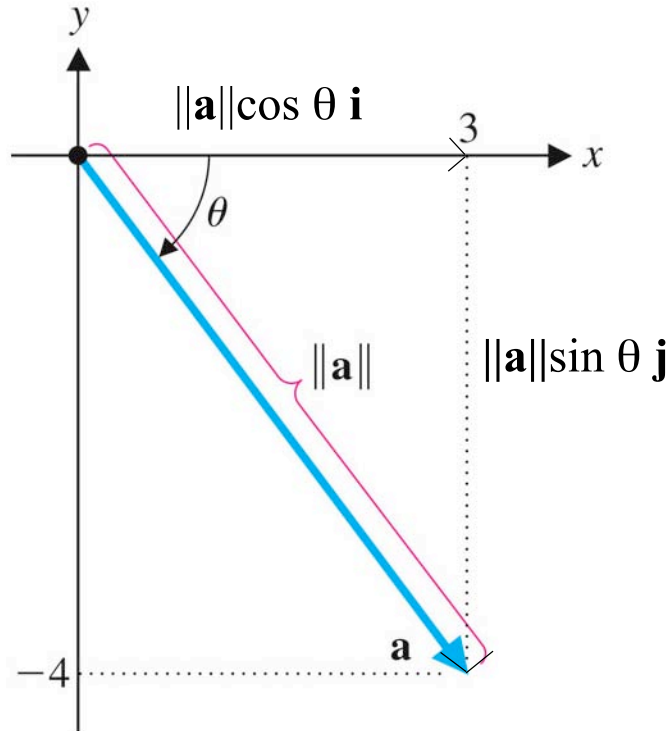
EXAMPLE. Find a unit vector in the same direction as $\mathbf{a} = \langle 6, 8 \rangle$.

$$\|\mathbf{a}\| = \|\langle 6, 8 \rangle\| = \sqrt{36 + 64} = \sqrt{100} = 10.$$

Therefore

$$\mathbf{u} = \frac{1}{10} \langle 6, 8 \rangle = \left\langle \frac{3}{5}, \frac{4}{5} \right\rangle.$$

Resolving a vector \mathbf{a} into horizontal and vertical components:



$$\begin{aligned} \mathbf{a} &= \|a\| \cos \theta \mathbf{i} + \|a\| \sin \theta \mathbf{j} \\ &= \|a\| (\cos \theta \mathbf{i} + \sin \theta \mathbf{j}) \\ &= \|a\| \langle \cos \theta, \sin \theta \rangle \end{aligned}$$

NOTE. $\|\langle \cos \theta, \sin \theta \rangle\| = 1$.