Magnitude of a vector

The magnitude $|a|$ of a vector $a$ is its length.

If $aIf a=\left(\begin{matrix}x\\y\end{matrix}\right)   \left|a\right|=\sqrt{x^{2}+y^{2}}$

Examples:



$2. a=\left(\begin{matrix}4\\-1\end{matrix}\right)$ $3. b=\left(\begin{matrix}2\\0\end{matrix}\right)$

Direction of a Vector

The direction of a vector can be found using basic trigonometry.

Examples

1. Find the angle that vector$ a=\left(\begin{matrix}4\\-1\end{matrix}\right)$ makes with the positive x axis.

2. Find the angle that vector$ b=\left(\begin{matrix}-5\\-12\end{matrix}\right)$ makes with ***j***.

Unit vector

A unit vector is a vector whose magnitude is 1.

If $a$ is a vector, then the unit vector $\hat{a} $in the same direction is

$$\hat{a}=\frac{a}{\left|a\right|}$$

Example:

Find a unit vector in the direction of $a=\left(\begin{matrix}3\\4\end{matrix}\right)$

**Test Your Understanding:** Convert the following vectors to unit vectors.

$a=\left(\begin{matrix}12\\-5\end{matrix}\right)$ $b=\left(\begin{matrix}1\\1\end{matrix}\right)$

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