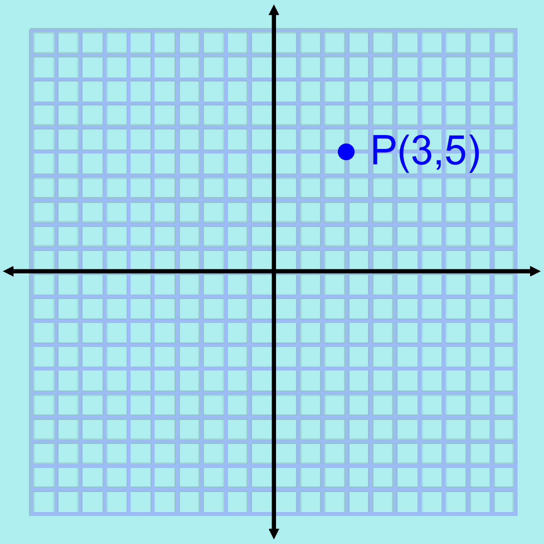
Vectors in R^2

Recall: The cartesian plane is a representation of a two-dimensional space.

The position of any point can be represented as a combination of x- and y-coordinates.

For example,

P(3,5)



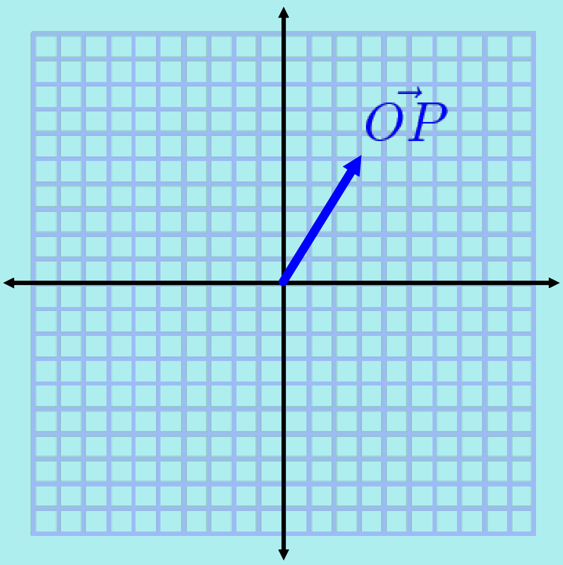
May 1-8:29 AM

We could also describe the position of this point using a vector from the origin.

Notice the vector notation is the same as the coordinate notation from the original point.

$$P(3,5)$$

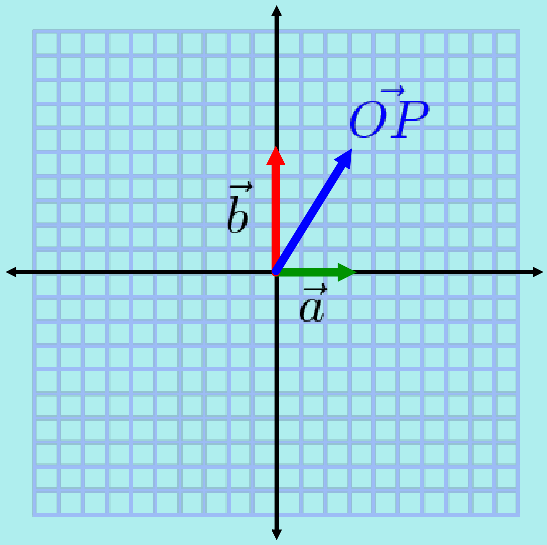
$$\vec{OP} = (3,5)$$



May 1-8:29 AM

We could also consider **OP** to be the vector sum of the vectors **a** and **b**.

$$\vec{OP} = \vec{a} + \vec{b}$$



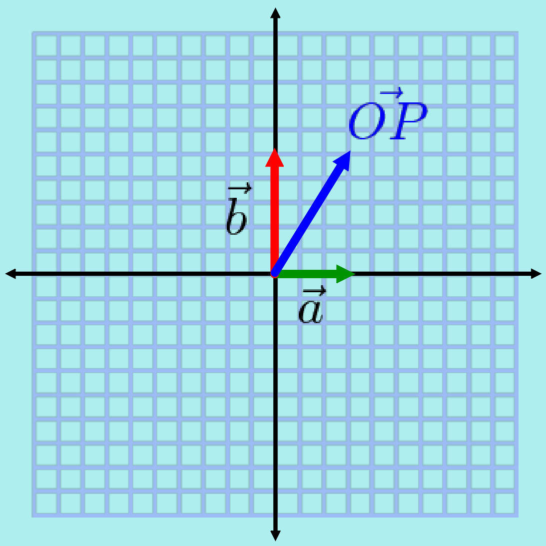
May 1-8:29 AM

We could also consider **OP** to be the vector sum of the vectors **a** and **b**.

$$\vec{OP} = \vec{a} + \vec{b}$$

Since **a** and **b** follow the cartesian axes (x and y), they are known as <u>component vectors</u>.

$$\begin{aligned} \vec{OP} &= \vec{a} + \vec{b} \\ &= (3,0) + (0,5) \\ &= (3,5) \end{aligned}$$



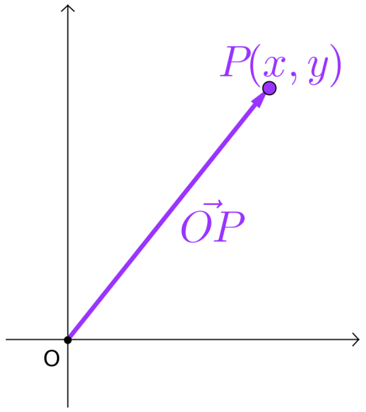
May 1-8:29 AM

Vectors in R^2

Apr.25/2018

The x-y plane, R^2, spans two dimensions (e.g., length & width).

Any point P(x,y) can be located in terms of a vector from the origin O(0,0) to the point P(x,y). This is the position vector of the point P.



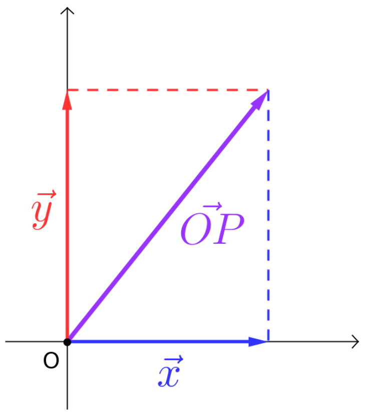
$$\vec{OP} = (x, y)$$

The magnitude, or length, of the vector is given by

$$\left|\vec{OP}\right| = \sqrt{x^2 + y^2}$$

May 1-1:07 PM

In R^2, any vector can also be expressed in terms of its component vectors, which are vectors that lie entirely along the x- or y-axis.



$$\begin{aligned}\vec{OP} &= \vec{x} + \vec{y} \\ &= (x,0) + (0,y) \\ &= (x,y)\end{aligned}$$

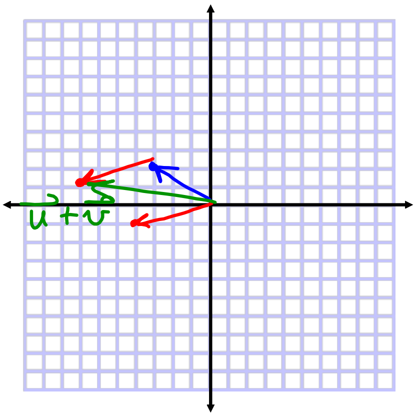
May 1-1:07 PM

Ex.1 Given vectors:

$$\vec{u} = (-3, 2)$$
$$\vec{v} = (-4, -1)$$

(a) write each vector in terms of vector components.

(b) determine the vector sum graphically and using vector addition.



(a) $\vec{u} = (-3,0) + (0,2)$

$\vec{v} = (-4,0) + (0,-1)$

(b)

$\vec{u}+\vec{v} = (-7,0) + (0,1)$

$= (-7,1)$

May 1-1:15 PM

Assigned work:

see web page

May 1-1:44 PM