

Two vectors \vec{u} and \vec{v} are equal to each other if they have the same magnitude and the same direction. In the xy -coordinate system, they would equal to each other if and only if their corresponding components are the same.

Example

What value(s) of a make \vec{u} and \vec{v} equal vectors, given that $\vec{u} = (4, 5)$ and $\vec{v} = (a^2, 5)$?

$$\vec{u} = \vec{v} \text{ if and only if } 4 = a^2 \quad \text{Square root both sides}$$

$$\pm\sqrt{4} = a$$

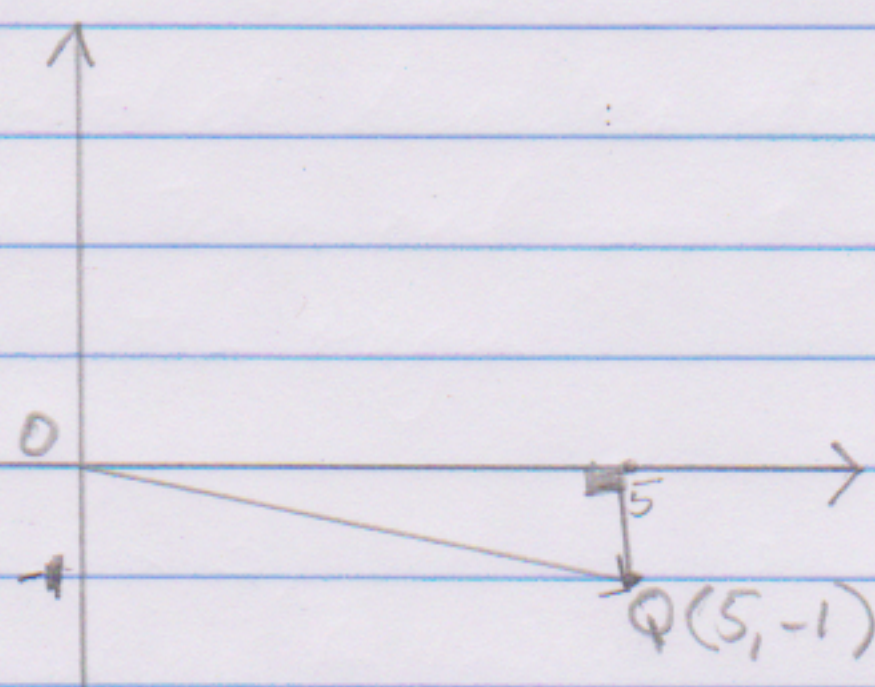
$$a = \pm 2$$

So $x = \pm 2$ will make $\vec{u} = \vec{v}$

How to calculate the length or the magnitude of a vector?

Example

Let $\vec{v} = (5, -1)$



As you can see from the picture, this vector forms a right triangle whose hypotenuse has the length equal to the magnitude of $\vec{v} = \vec{OQ}$. Since $Q(5, -1)$, then the sides of the right triangle are of the length 5 and $|-1| = 1$.

Therefore, by Pythagoras theorem, the length of the vector \vec{v} is

$$\sqrt{5^2 + (-1)^2} = \sqrt{26}$$