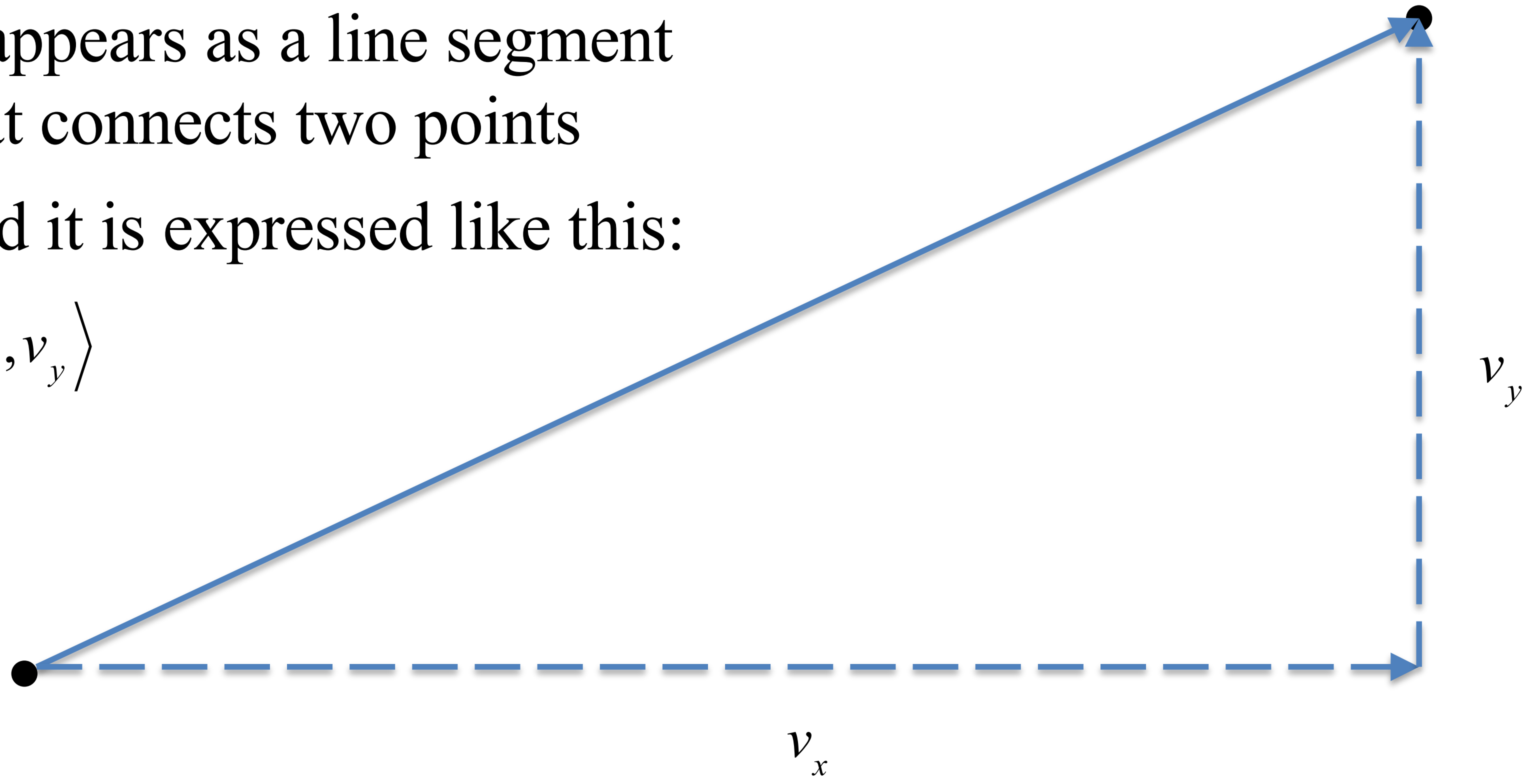
Transformations

This is a Vector

It appears as a line segment that connects two points

and it is expressed like this:

$\langle v_x, v_y \rangle$



It also has something else: Direction

But the best part is it's really just the hypotenuse of a right triangle

What are those symbols inside the chevrons?

They are the *x* and *y* coordinates of the vector.

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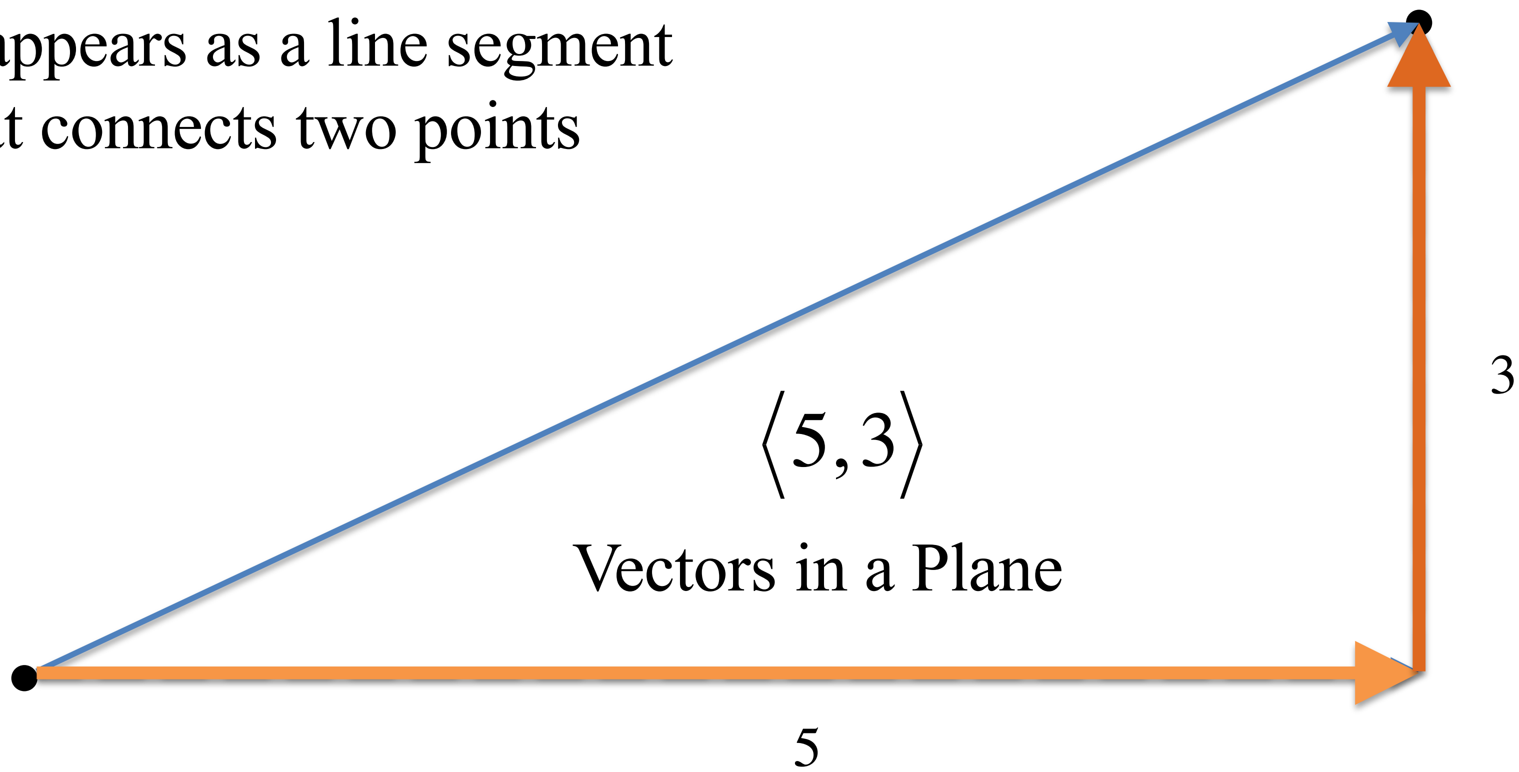


This is not the same as the point (5, 3)

This refers to a horizontal displacement of 5

and a vertical displacement of 3

Now let’s take a look at this on a graph

Translation - Moving the graph across and/or down the *xy* plane

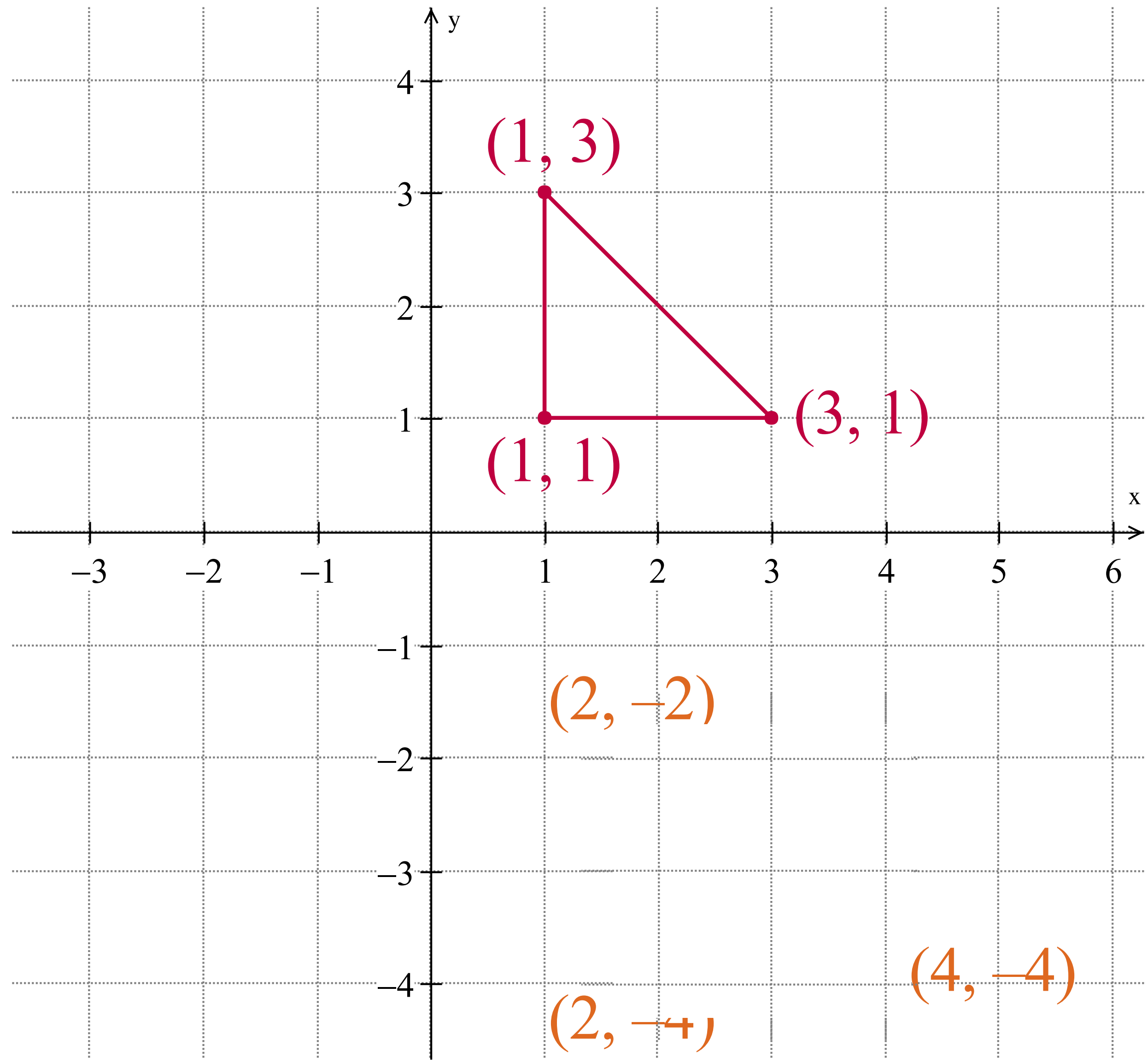
Your book will call it a rigid motion

$(x, y) \rightarrow (x + 1, y - 5)$

Translate the given triangle along the vector $\langle 1, -5 \rangle$

By how much are the x and y coordinates changed here?

A *composition* consists of two or more rigid motions



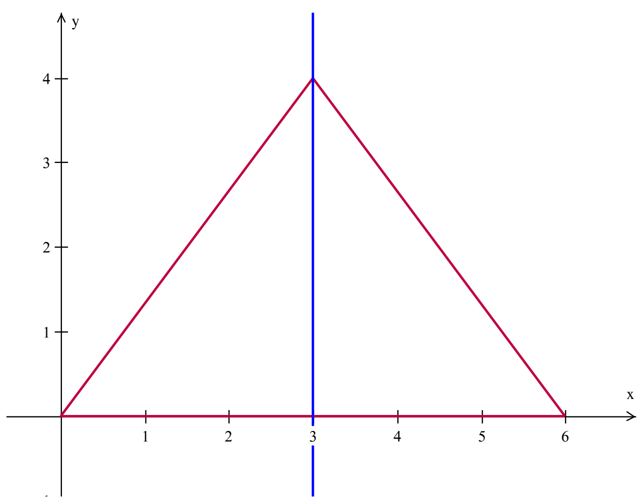
Reflection across the *x-axis*

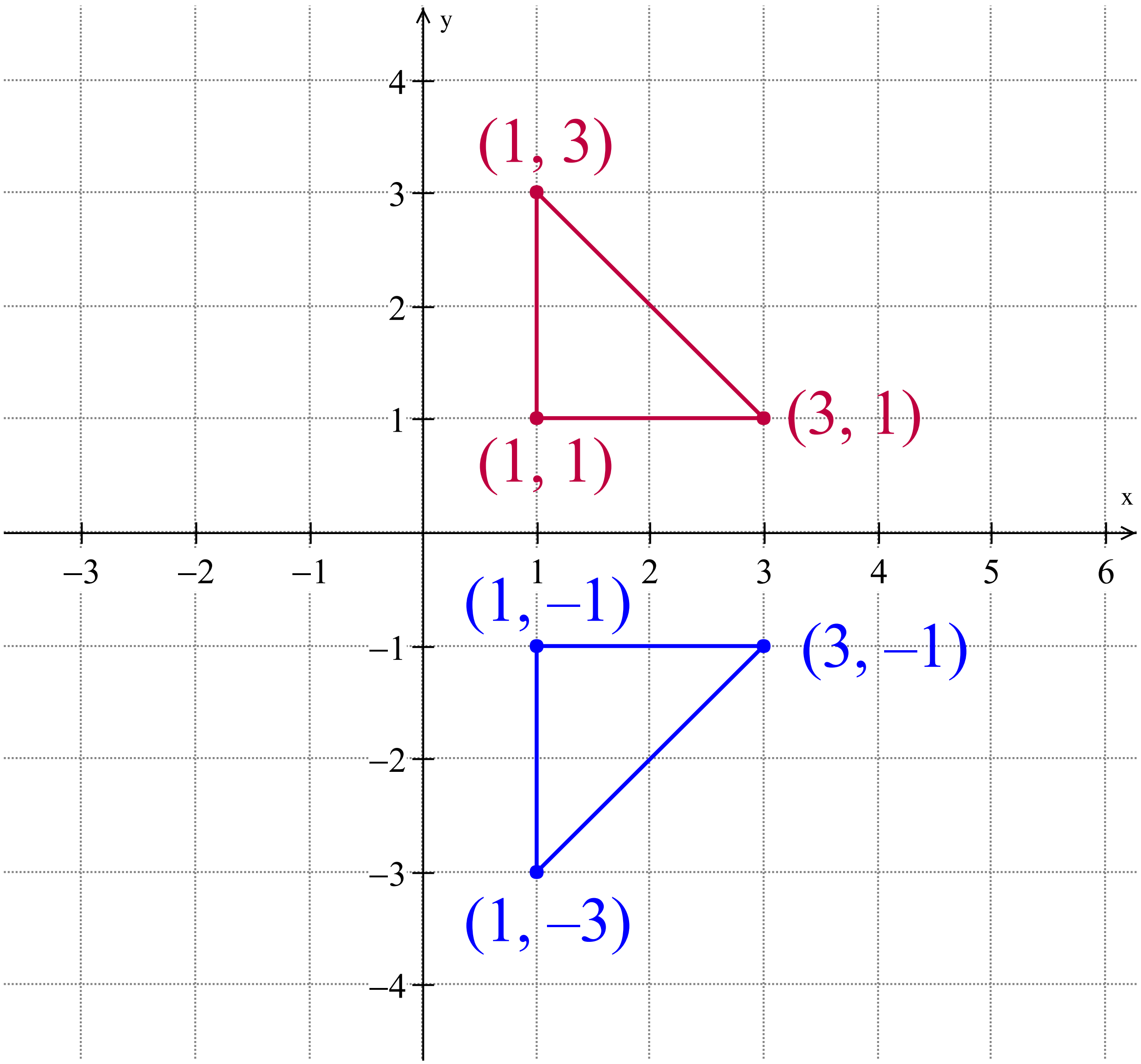
$(x, y) \rightarrow (x, -y)$

Note that the x-axis here is the *axis of symmetry*.

The axis of symmetry acts as a reflector that bisects the combined figure.

Example: $x = 3$ is the axis of symmetry for the isosceles triangle



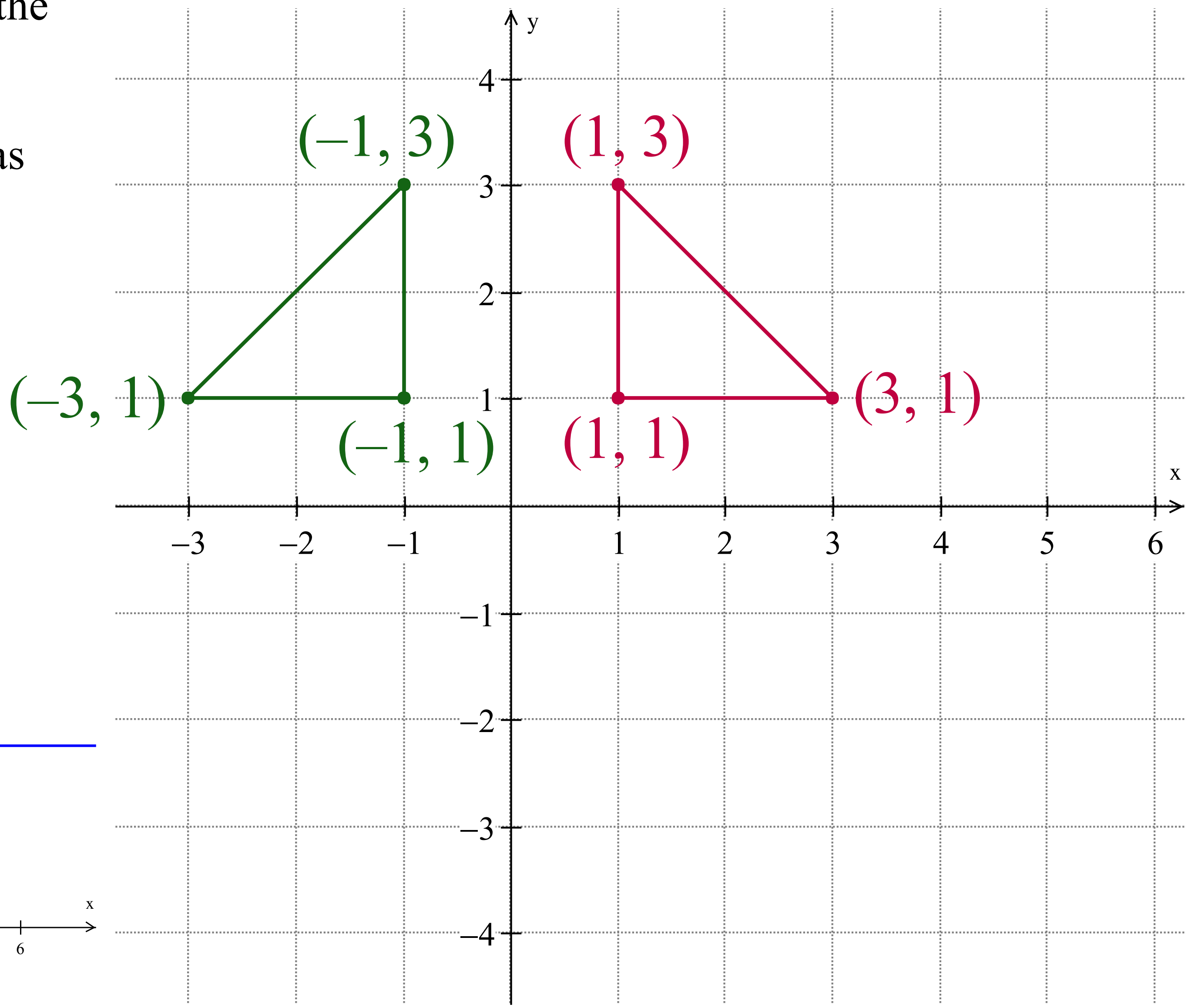


Reflection across the *y-axis*

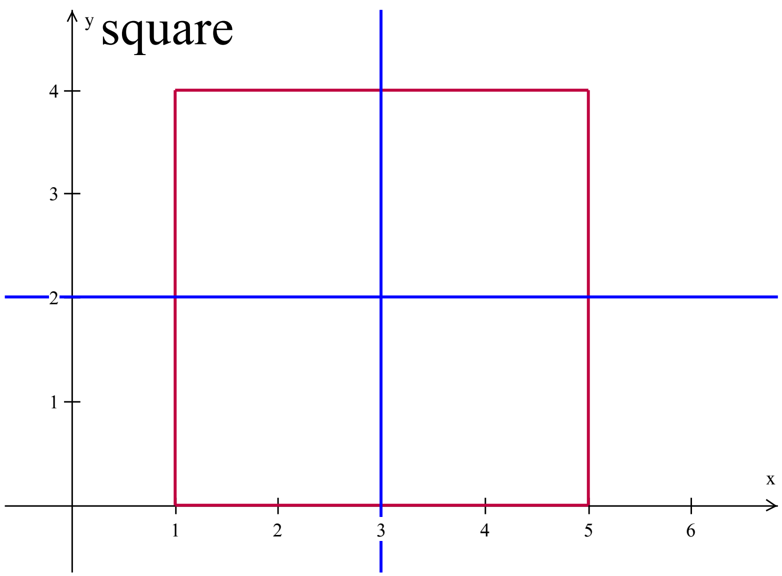
$(x, y) \rightarrow (-x, y)$

Note that the y-axis here is the *axis of symmetry*.

The axis of symmetry acts as a reflector that bisects the combined figure.

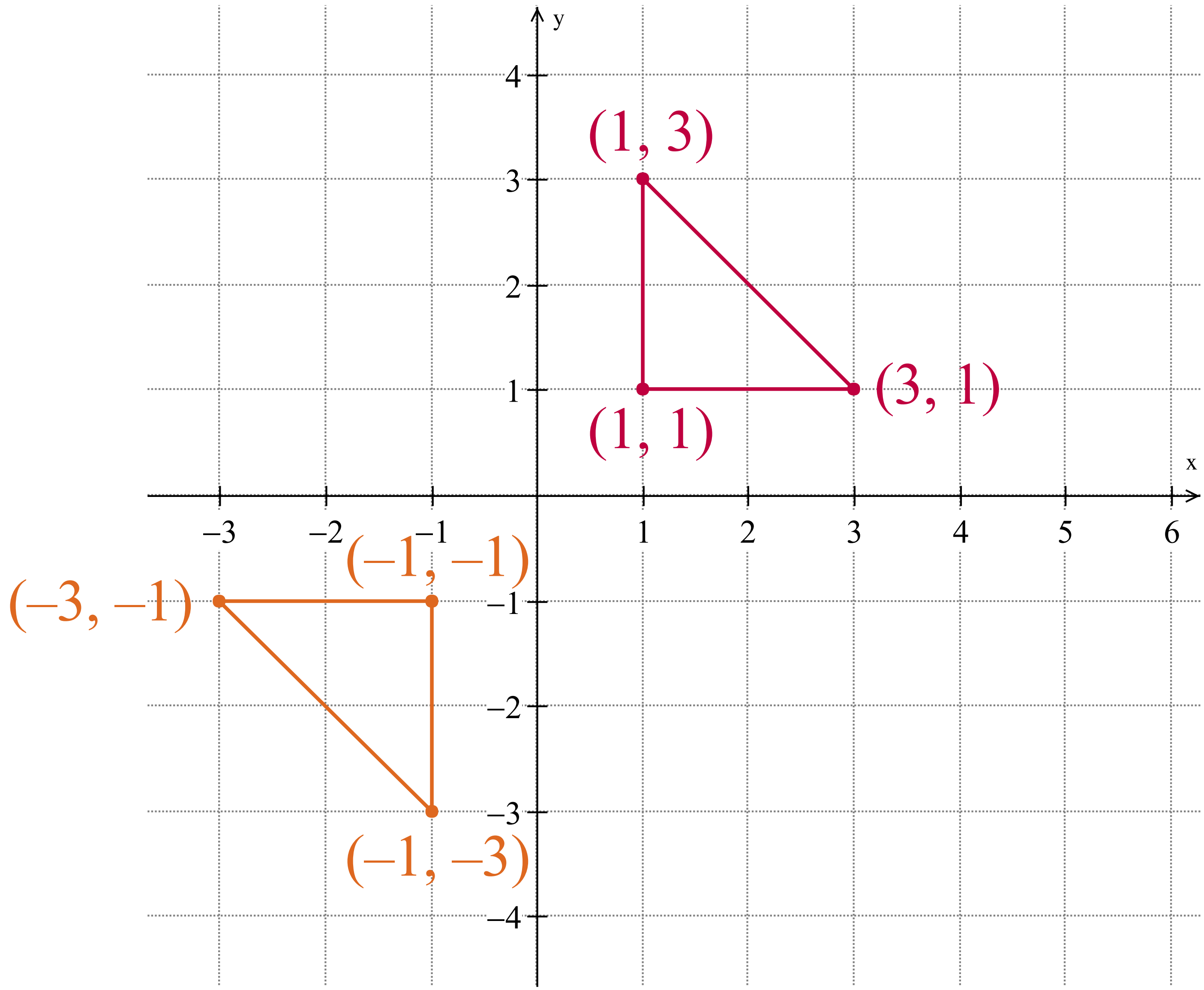


Example: both the lines $x = 3$ and $y = 2$ are axes of symmetry for the square



Reflection across the origin

$(x, y) \rightarrow (-x, -y)$



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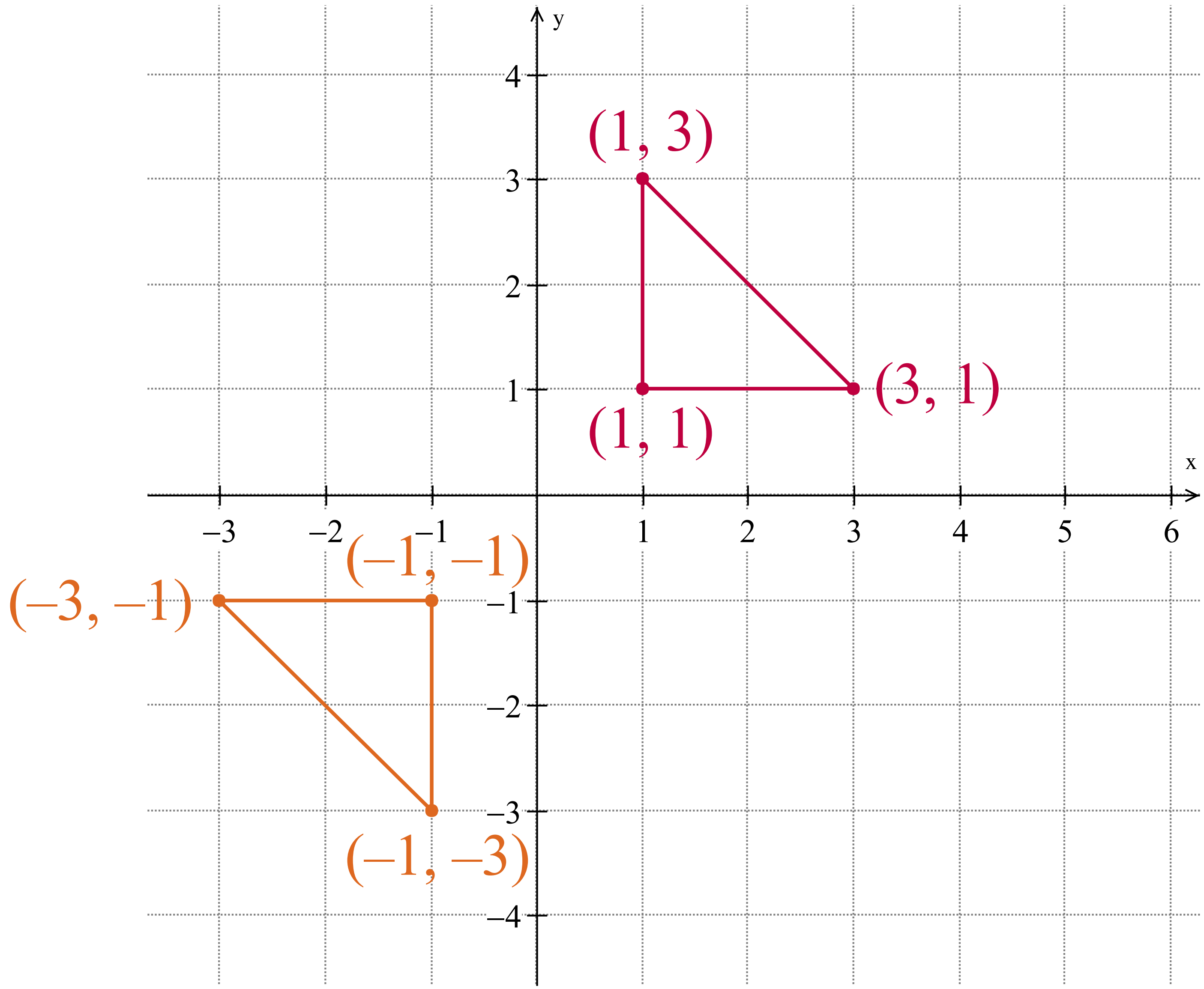
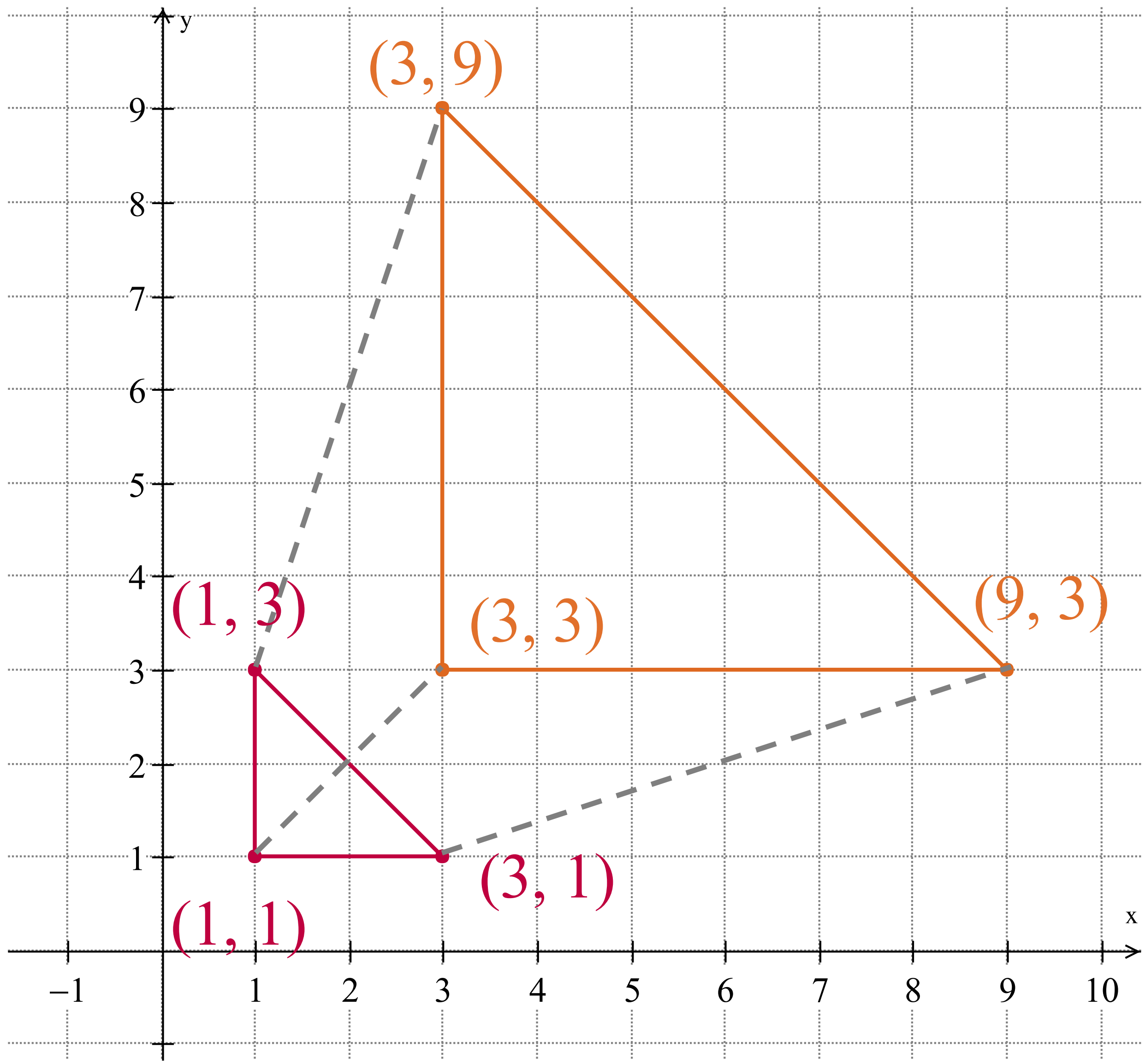


Dilation - Increasing the size by a given scale factor

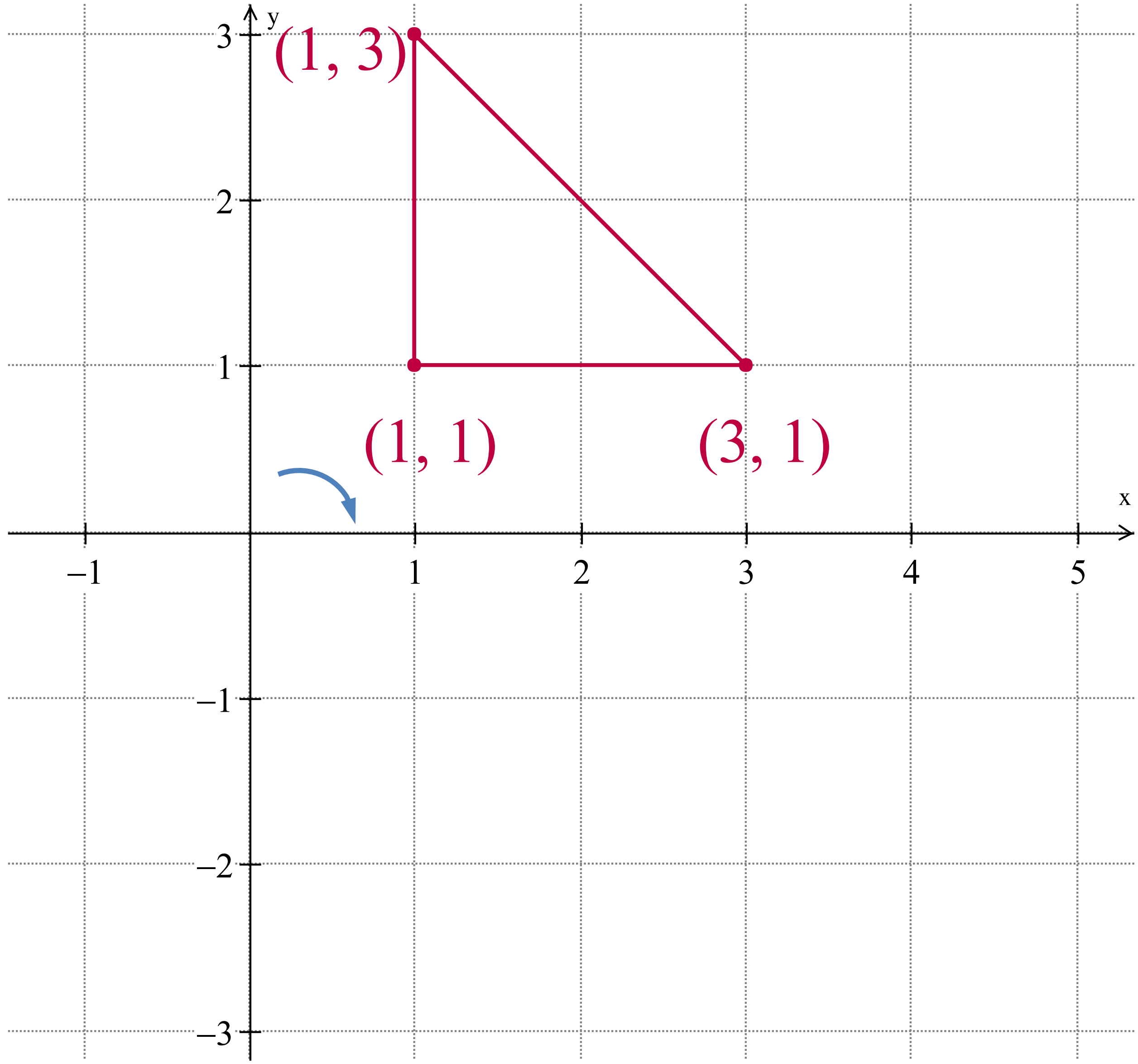
$(x, y) \rightarrow (3x, 3y)$

By how much are the *x* and *y* coordinates changed here?



Rotation - Rotating the *x* and *y* coordinates so that the figure is rotated

$(x, y) \rightarrow (-y, x)$



Here is a 90 degree rotation to the right about the origin

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