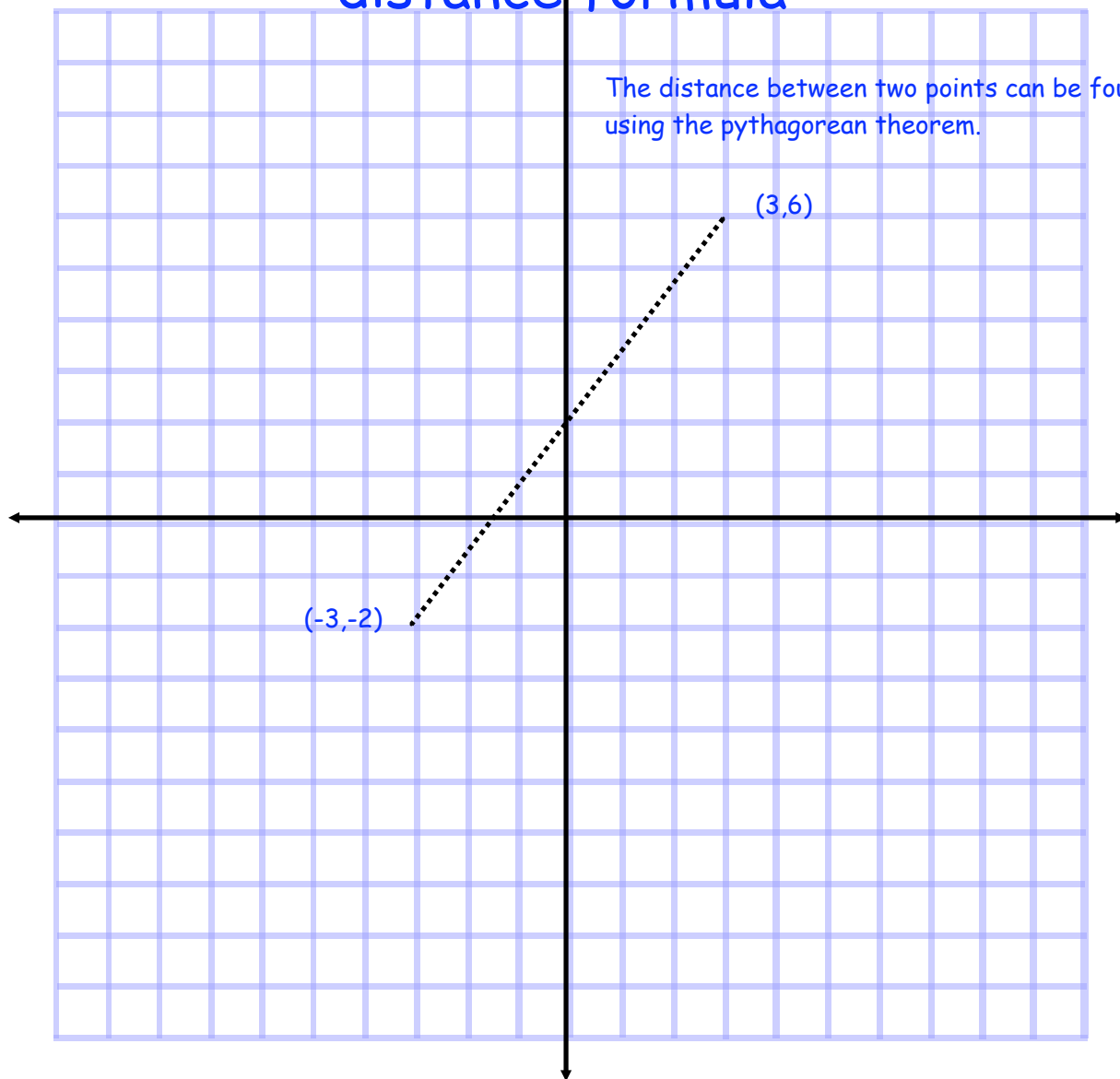


Chapter 9.6
the distance formula
and
the midpoint formula

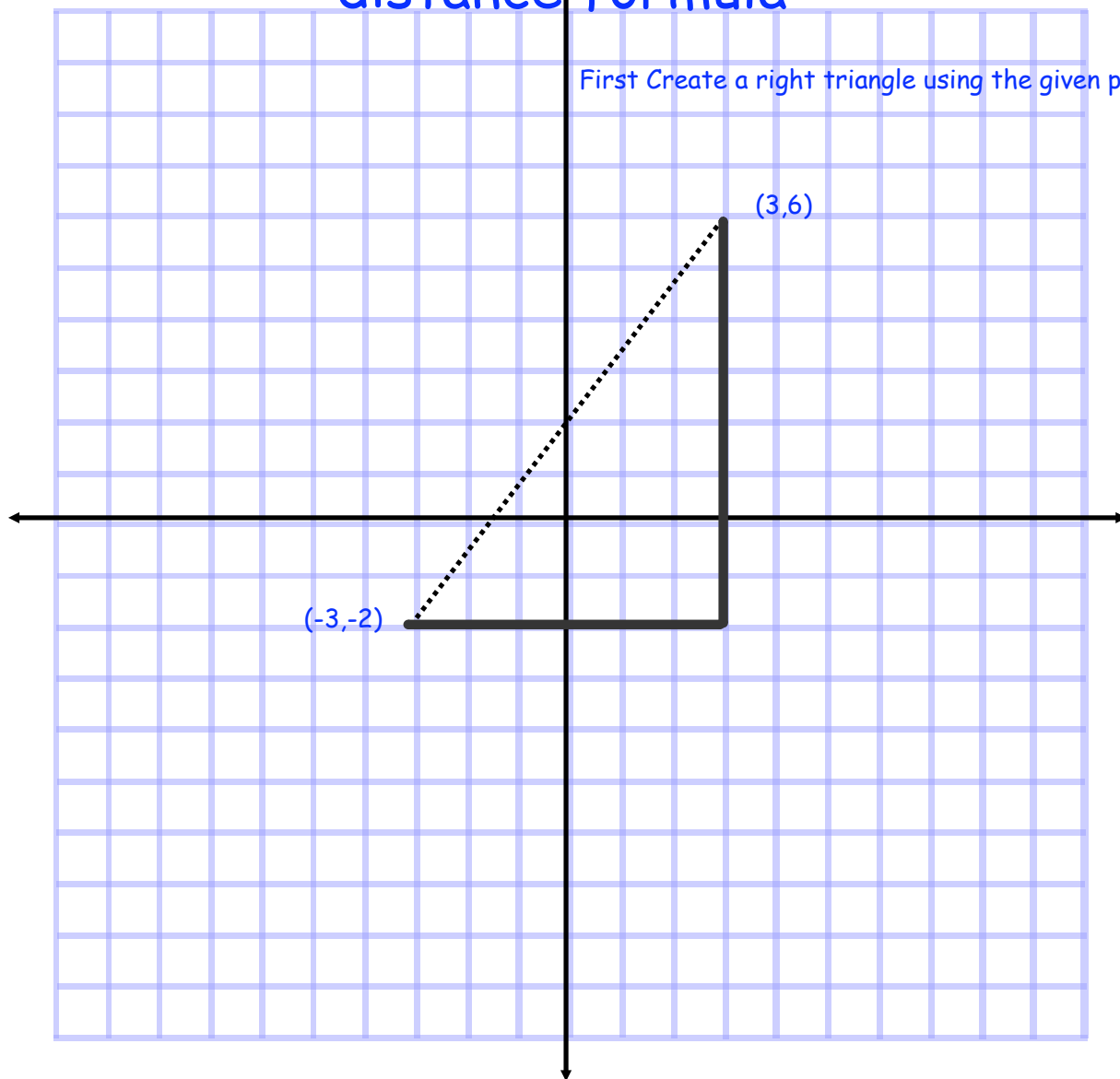
distance formula

The distance between two points can be found by using the pythagorean theorem.

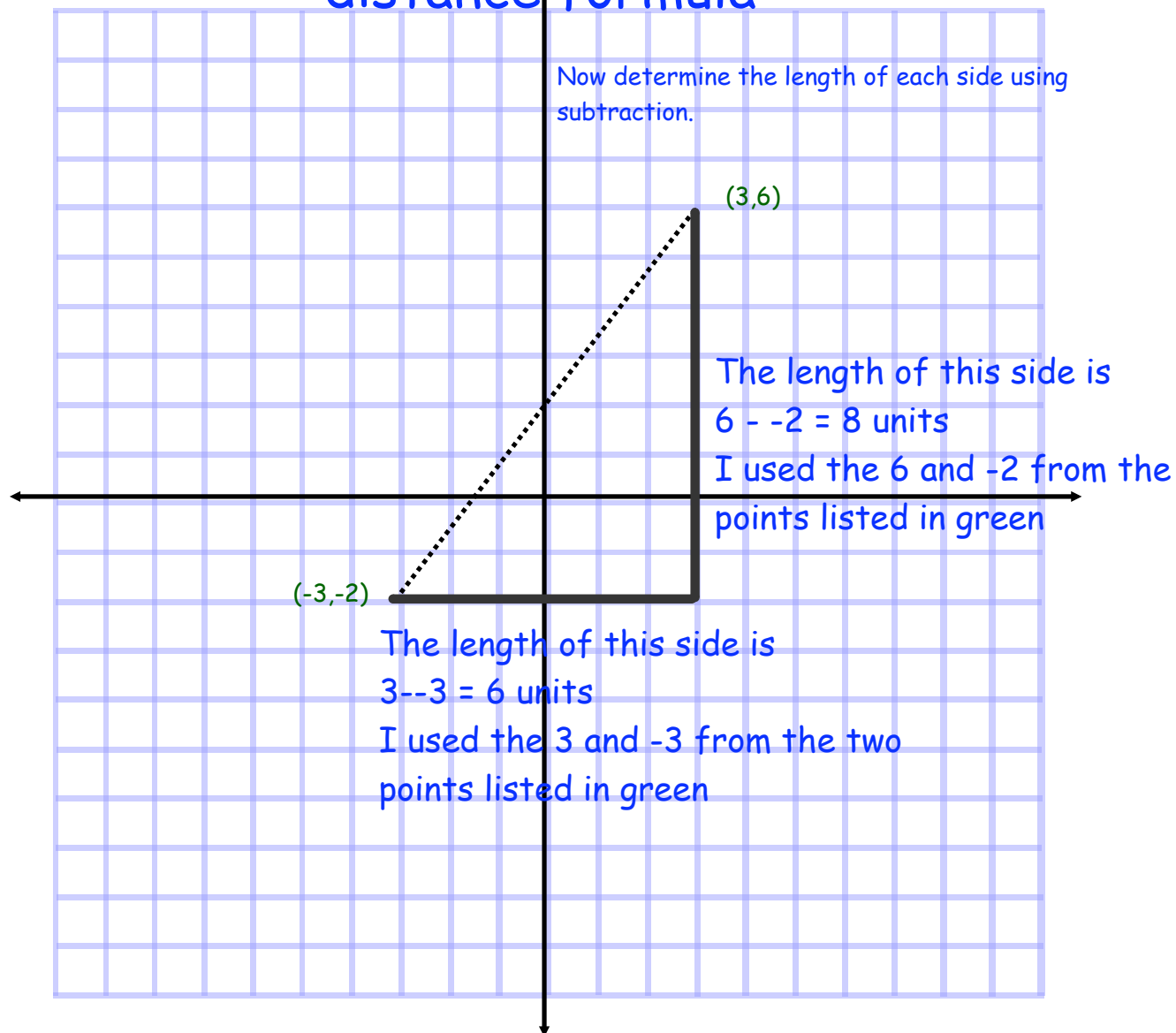


distance formula

First Create a right triangle using the given points



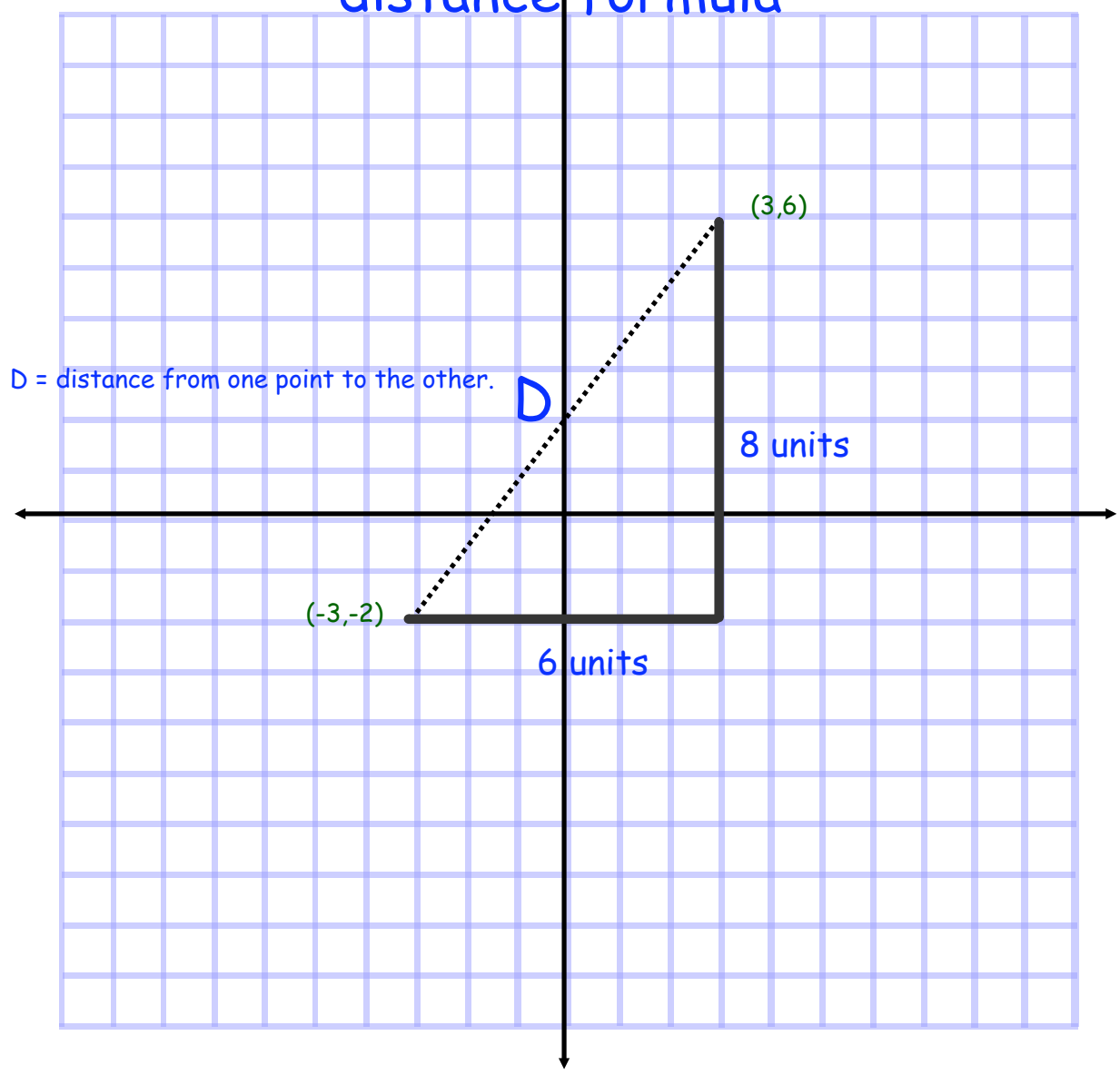
distance formula



distance formula

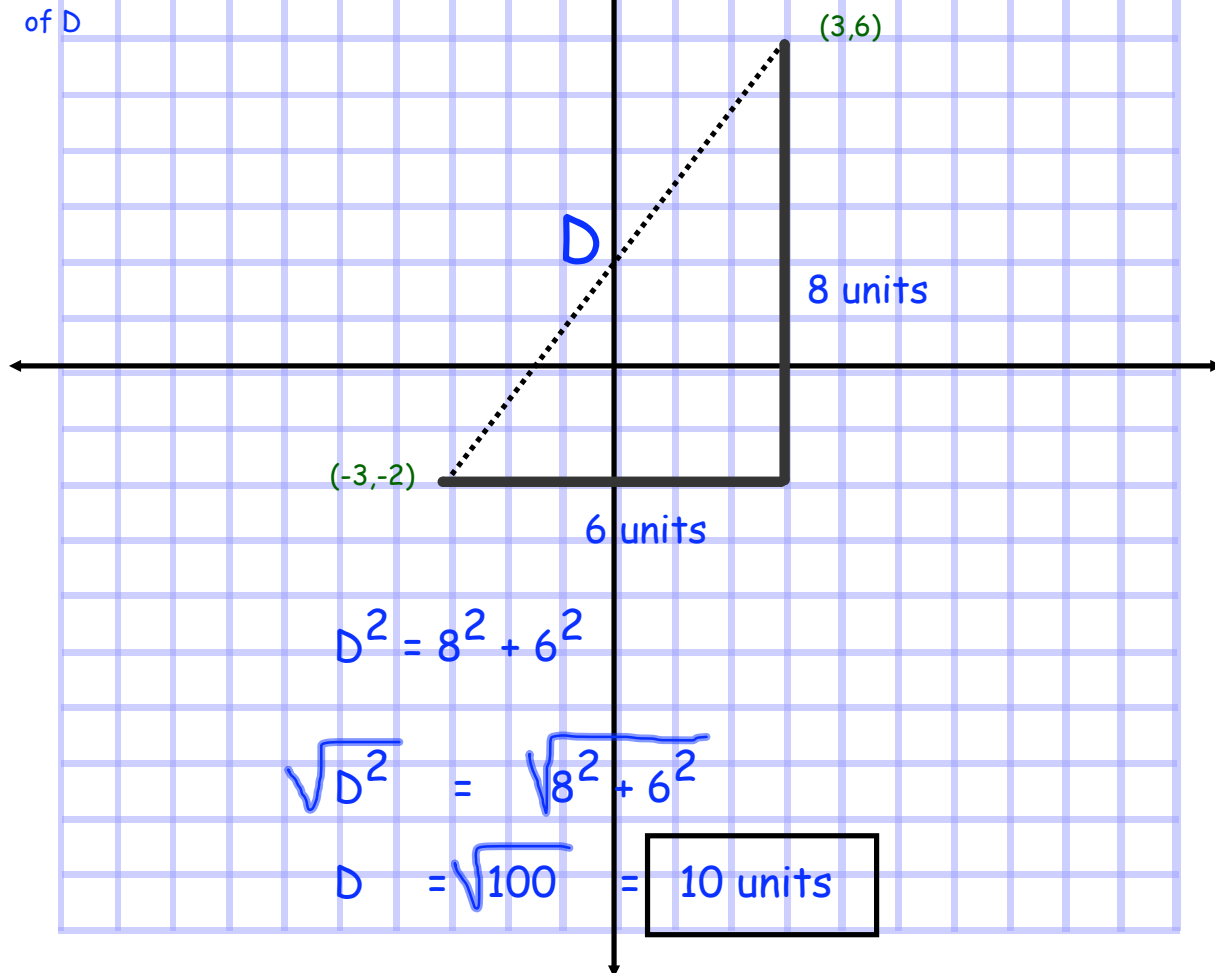
D = distance from one point to the other.

D



distance formula

Using the Pythagorean Theorem determine the length of D



$$D^2 = 8^2 + 6^2$$

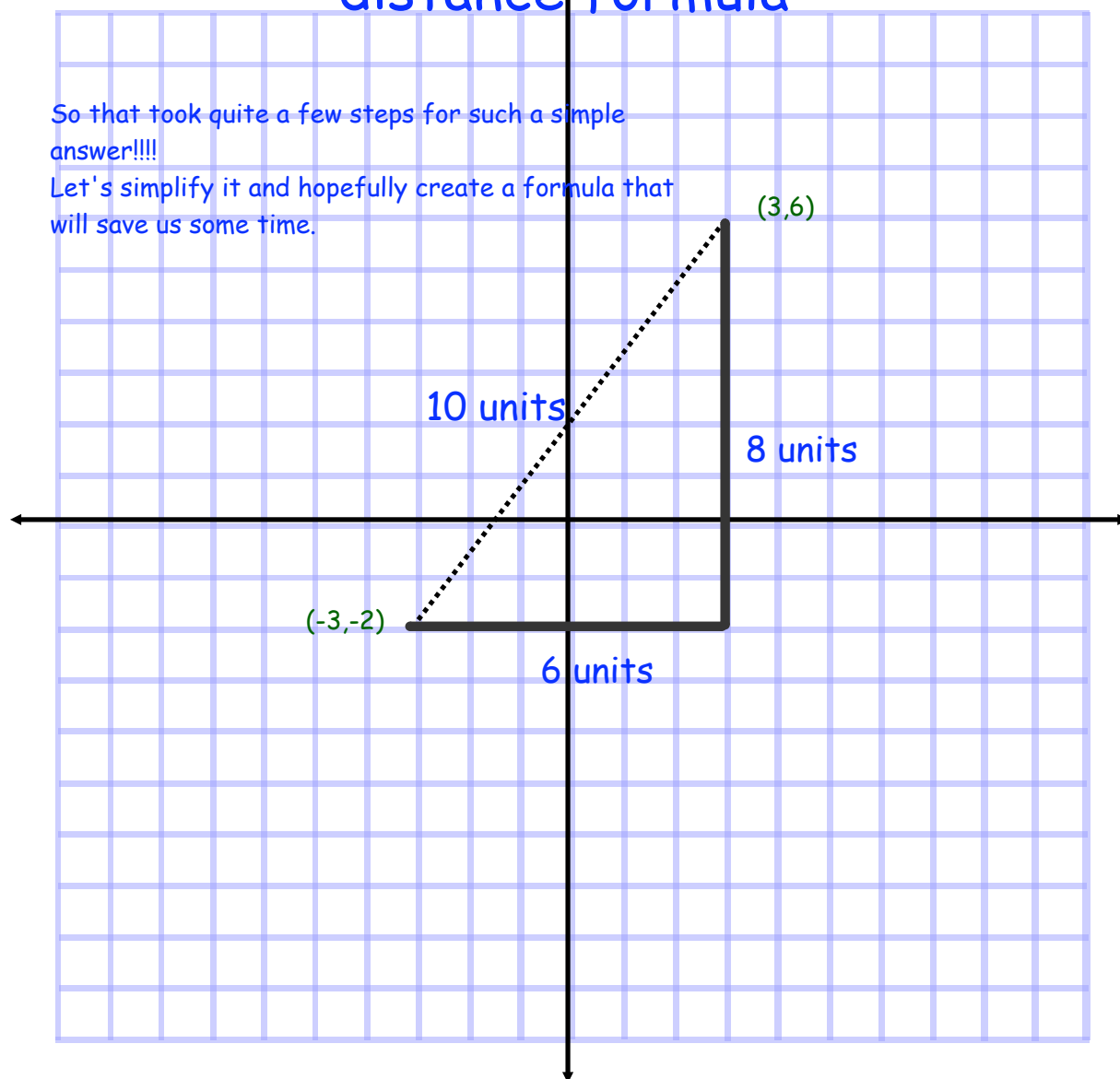
$$\sqrt{D^2} = \sqrt{8^2 + 6^2}$$

$$D = \sqrt{100} = 10 \text{ units}$$

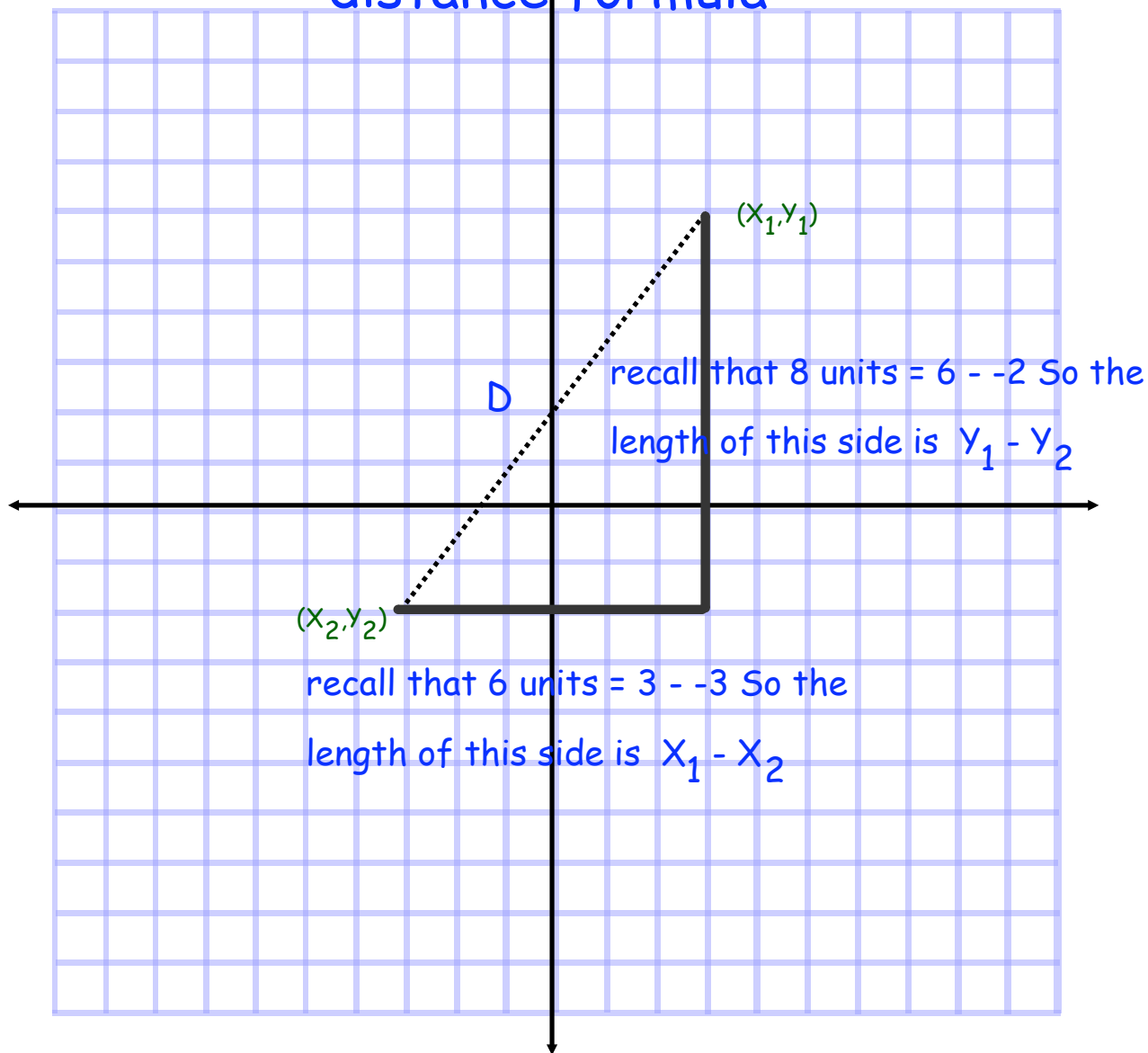
distance formula

So that took quite a few steps for such a simple answer!!!!

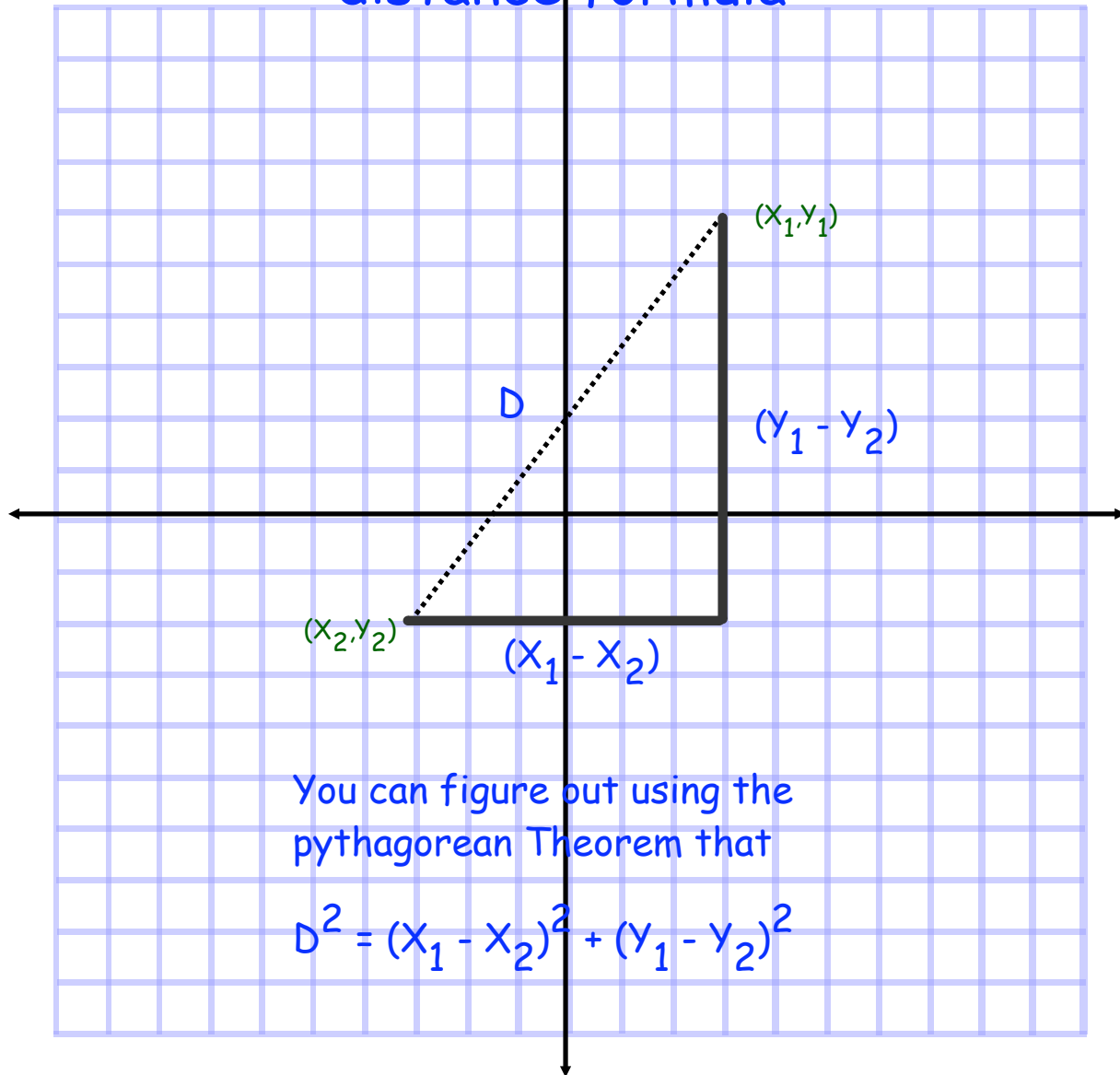
Let's simplify it and hopefully create a formula that will save us some time.



distance formula



distance formula



distance formula

You can figure out using the pythagorean Theorem that

$$D^2 = (X_1 - X_2)^2 + (Y_1 - Y_2)^2$$

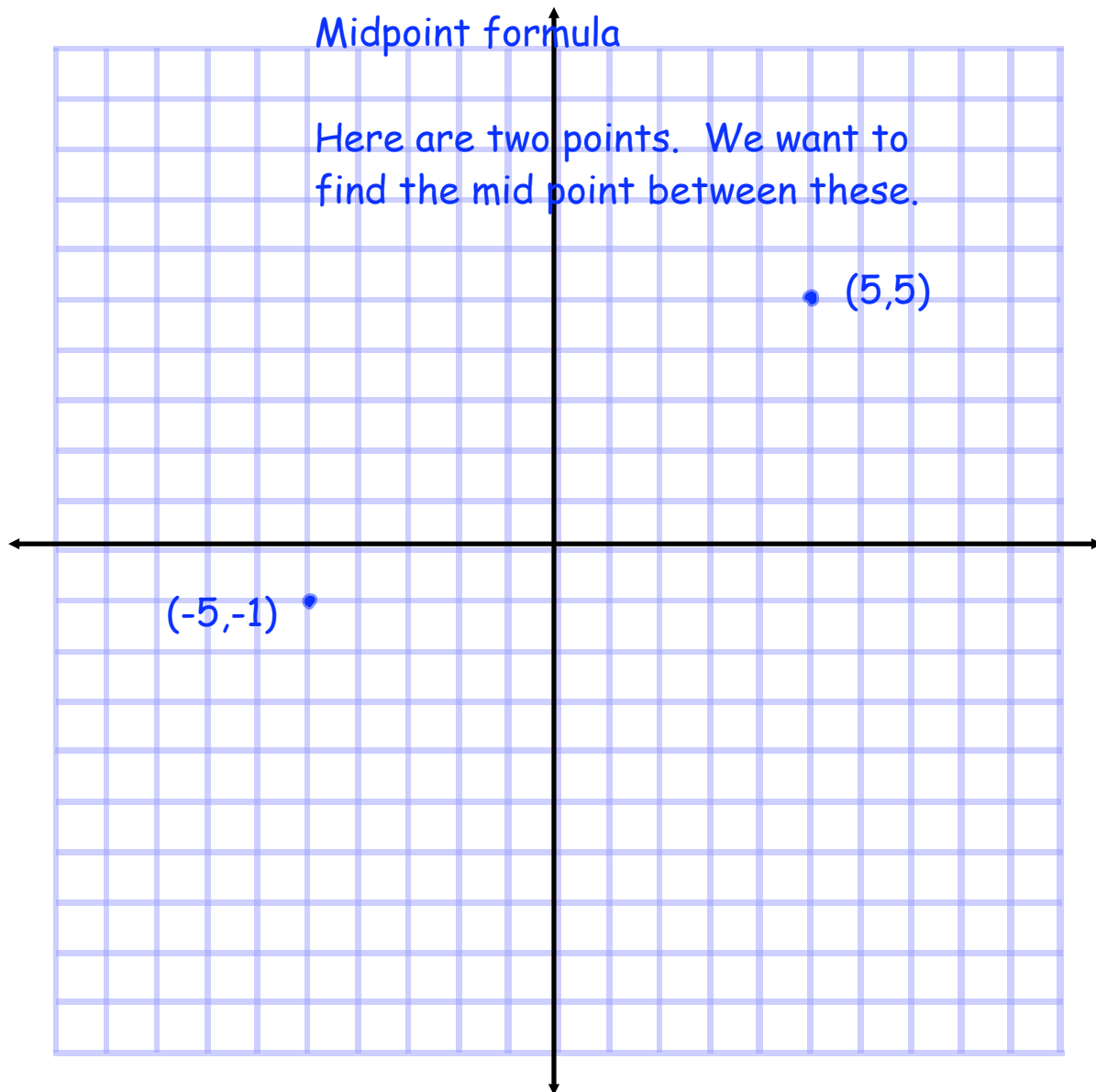
just take the square root of each side to solve for length D

$$D = \sqrt{(X_1 - X_2)^2 + (Y_1 - Y_2)^2}$$

That's it :) Memorize this formula

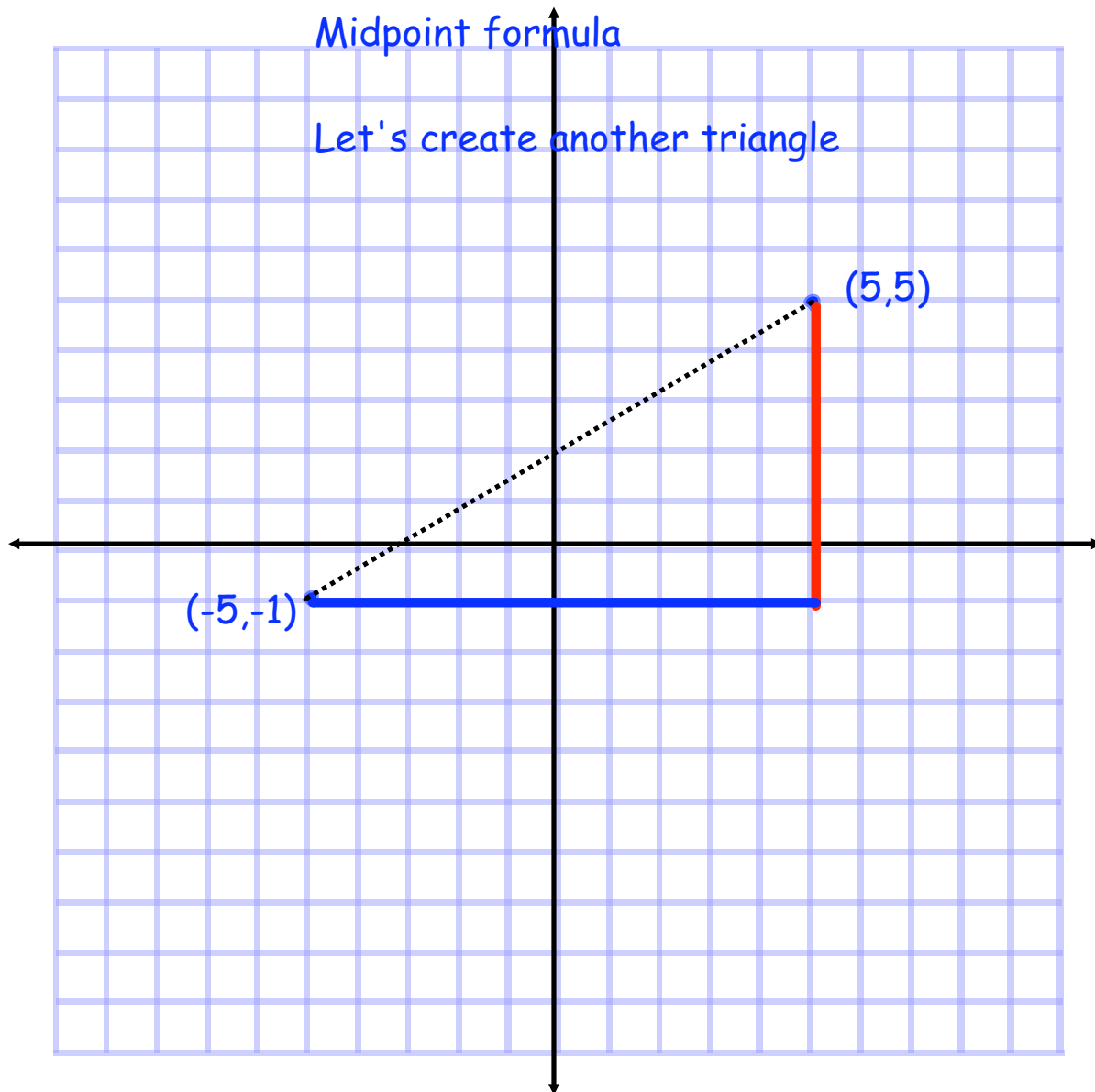
Midpoint formula

Here are two points. We want to find the mid point between these.



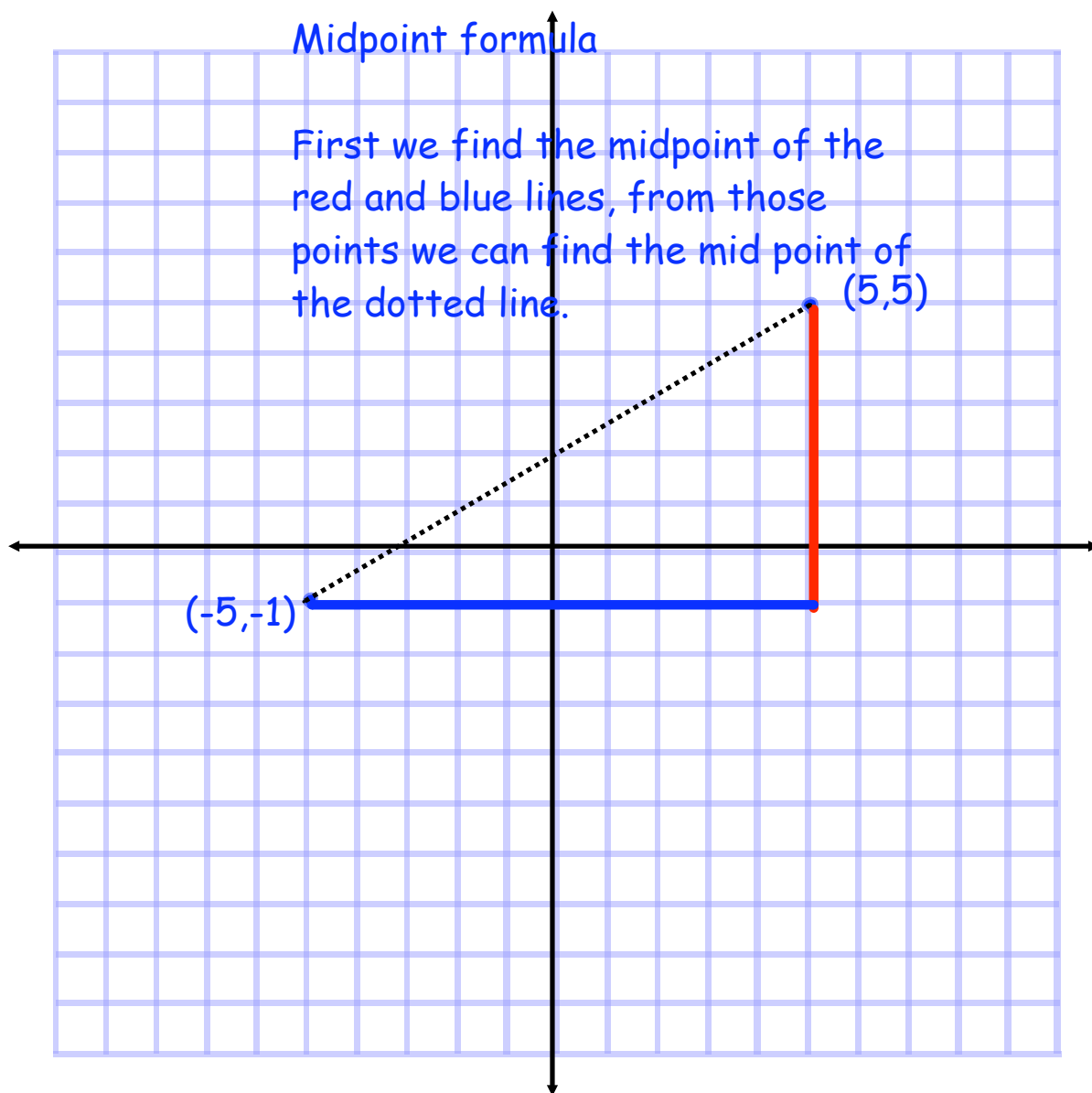
Midpoint formula

Let's create another triangle

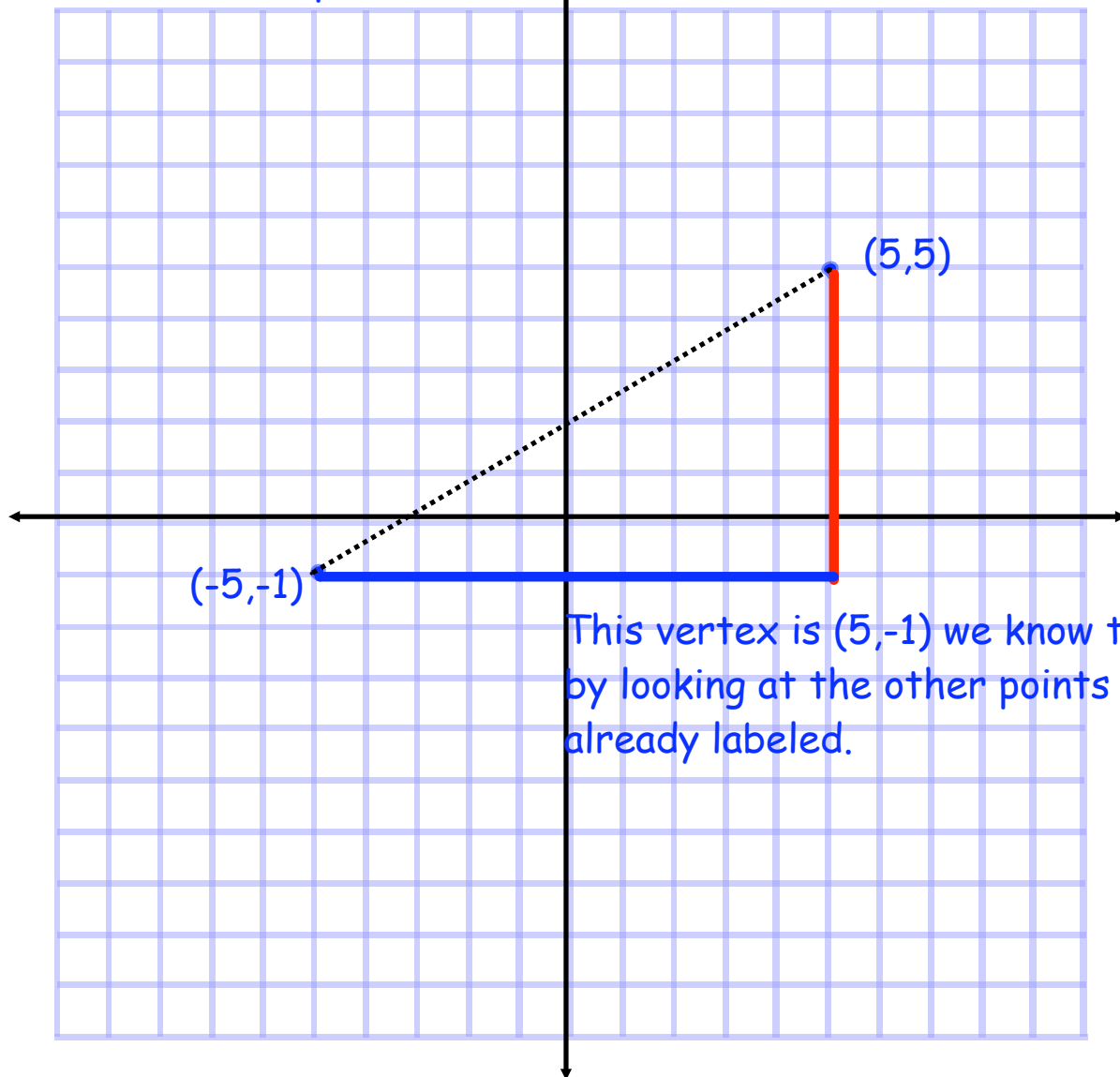


Midpoint formula

First we find the midpoint of the red and blue lines, from those points we can find the midpoint of the dotted line.

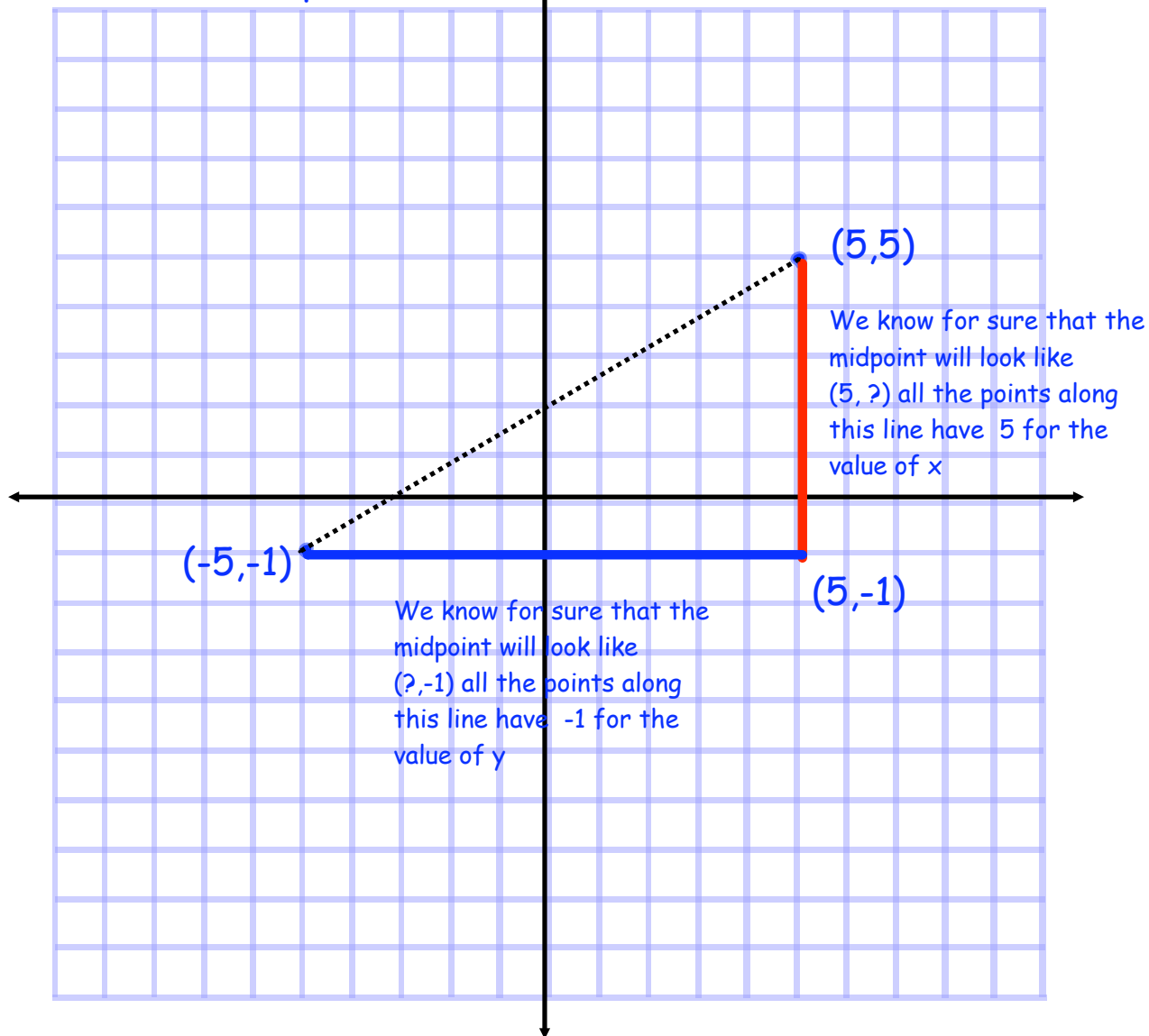


Midpoint formula

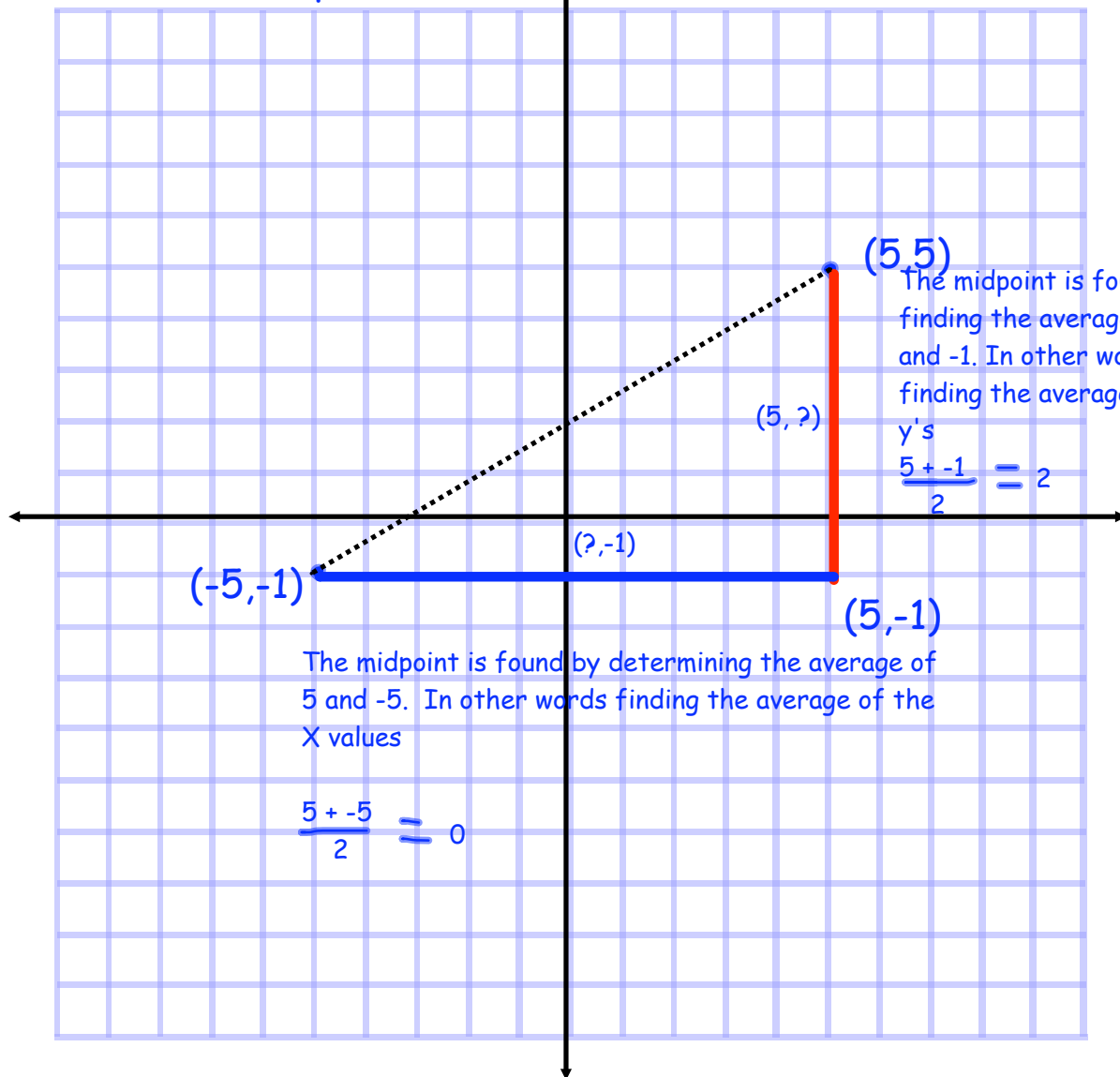


This vertex is $(5, -1)$ we know this by looking at the other points already labeled.

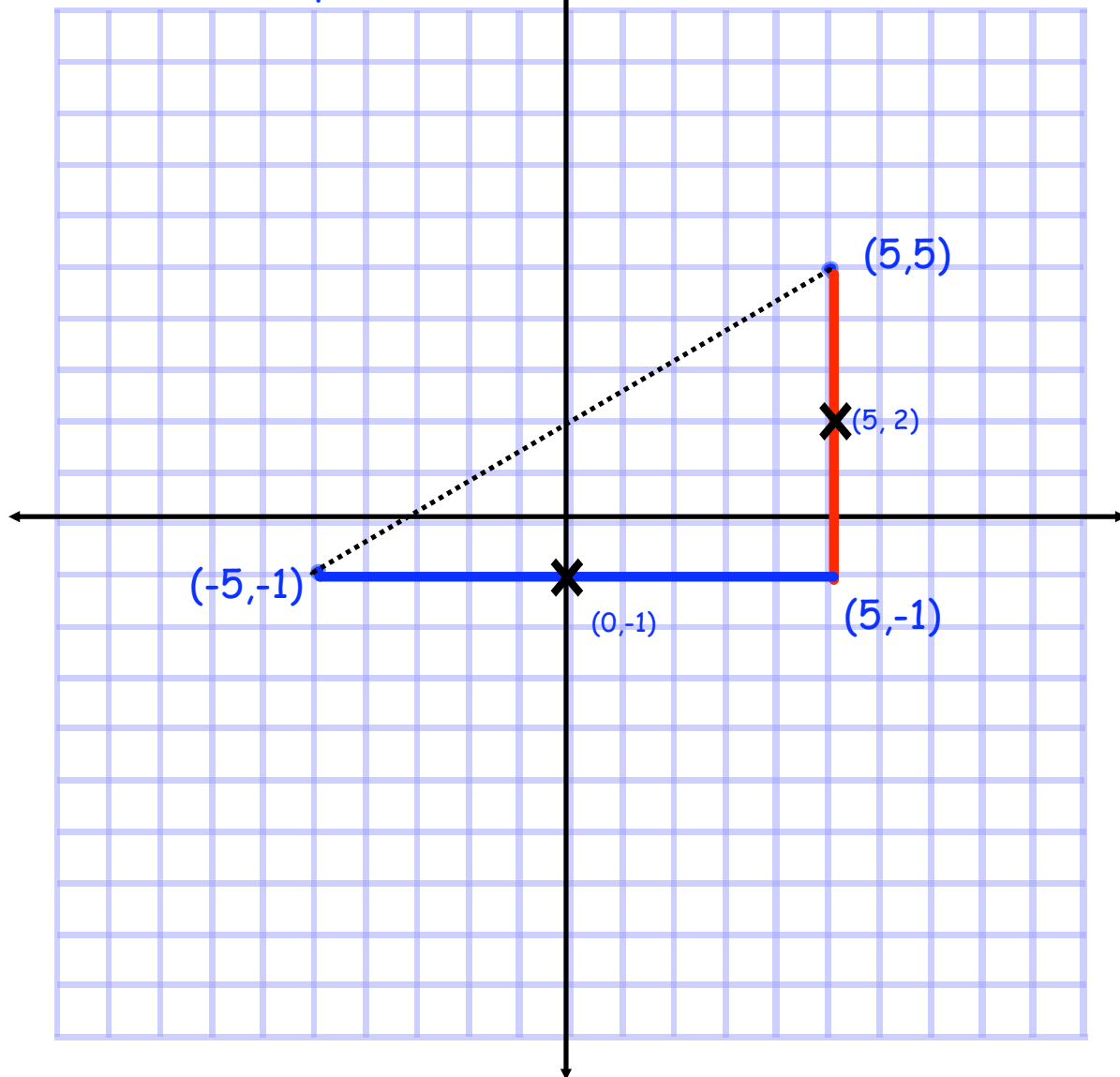
Midpoint formula



Midpoint formula

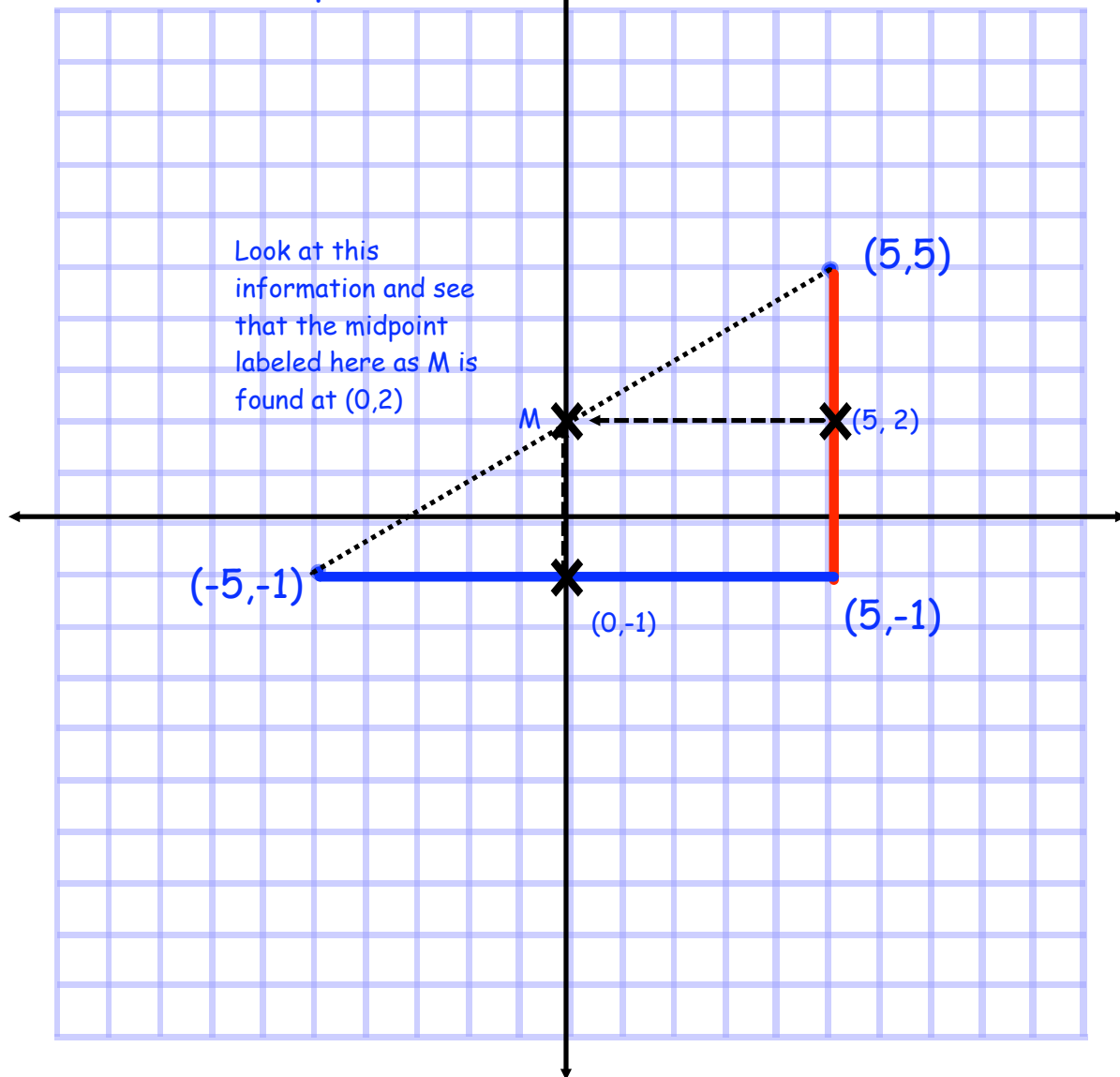


Midpoint formula

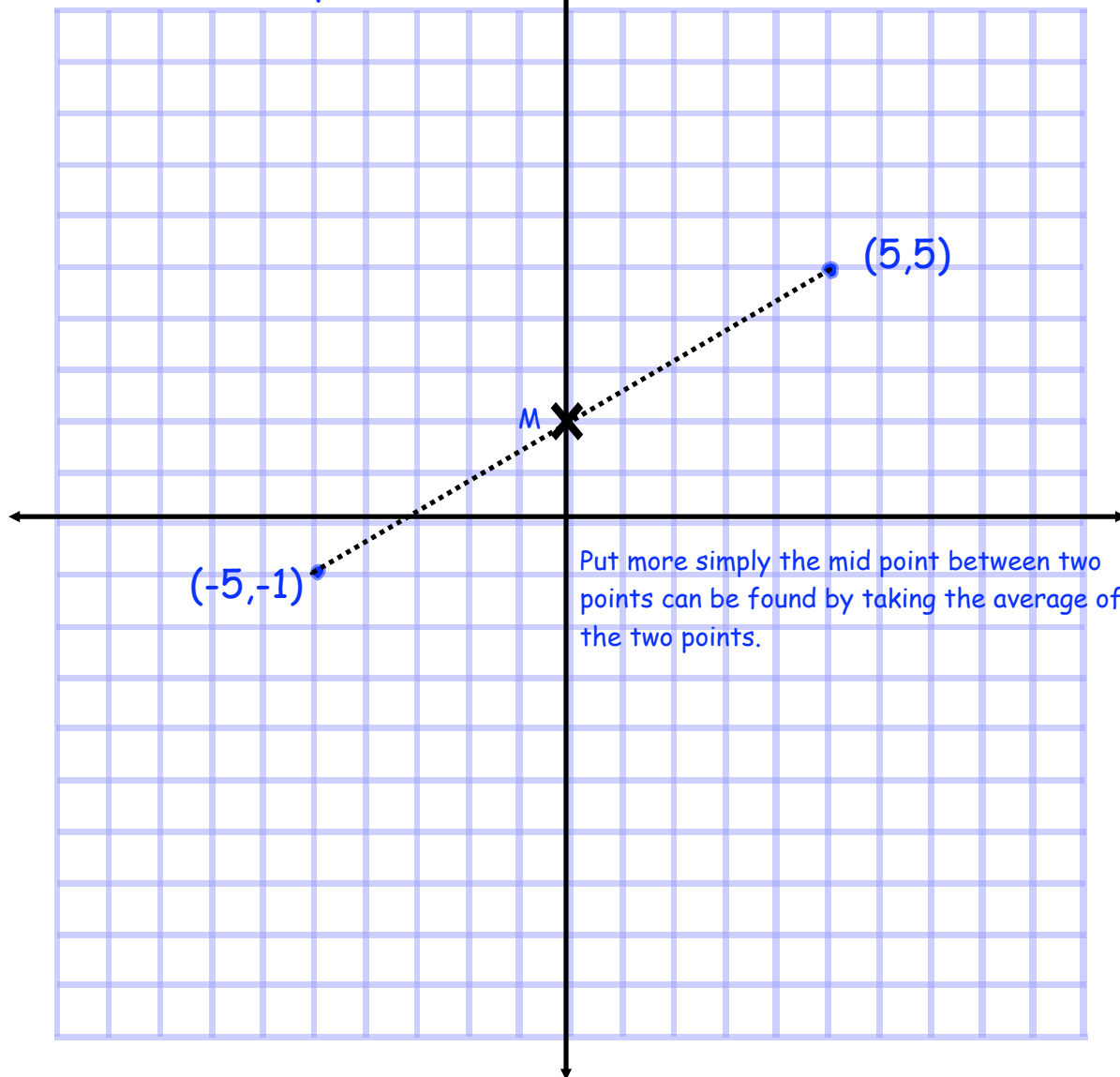


Midpoint formula

Look at this information and see that the midpoint labeled here as M is found at (0,2)

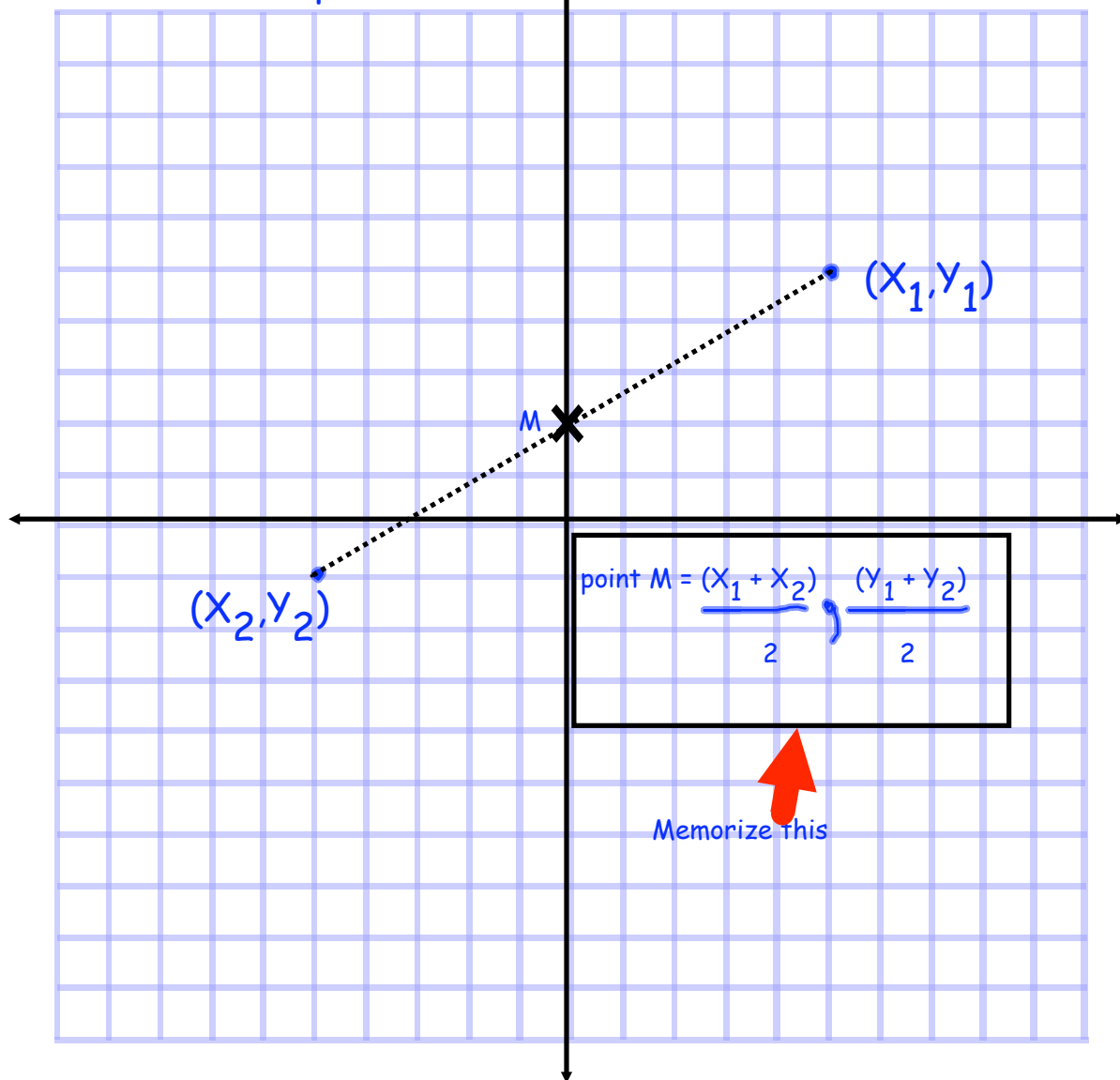


Midpoint formula



Put more simply the mid point between two points can be found by taking the average of the two points.

Midpoint formula



Memorize this