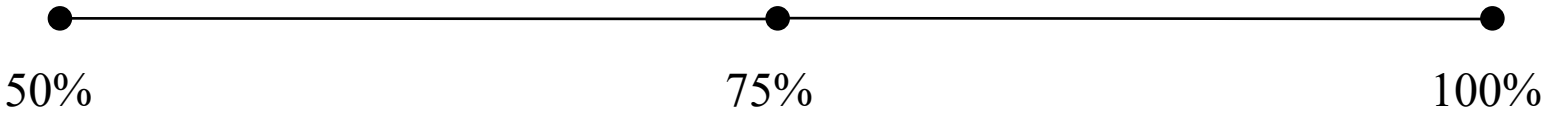
Distance & Midpoint Formulas

You take two tests in a class and score a 50% on one and 100% on the other. What is your average score in the class. 75%

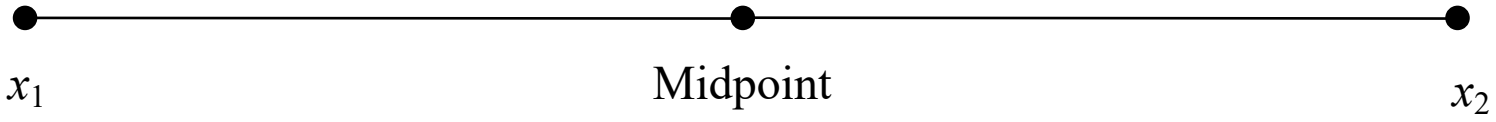
$$\frac{50+100}{2}=75$$

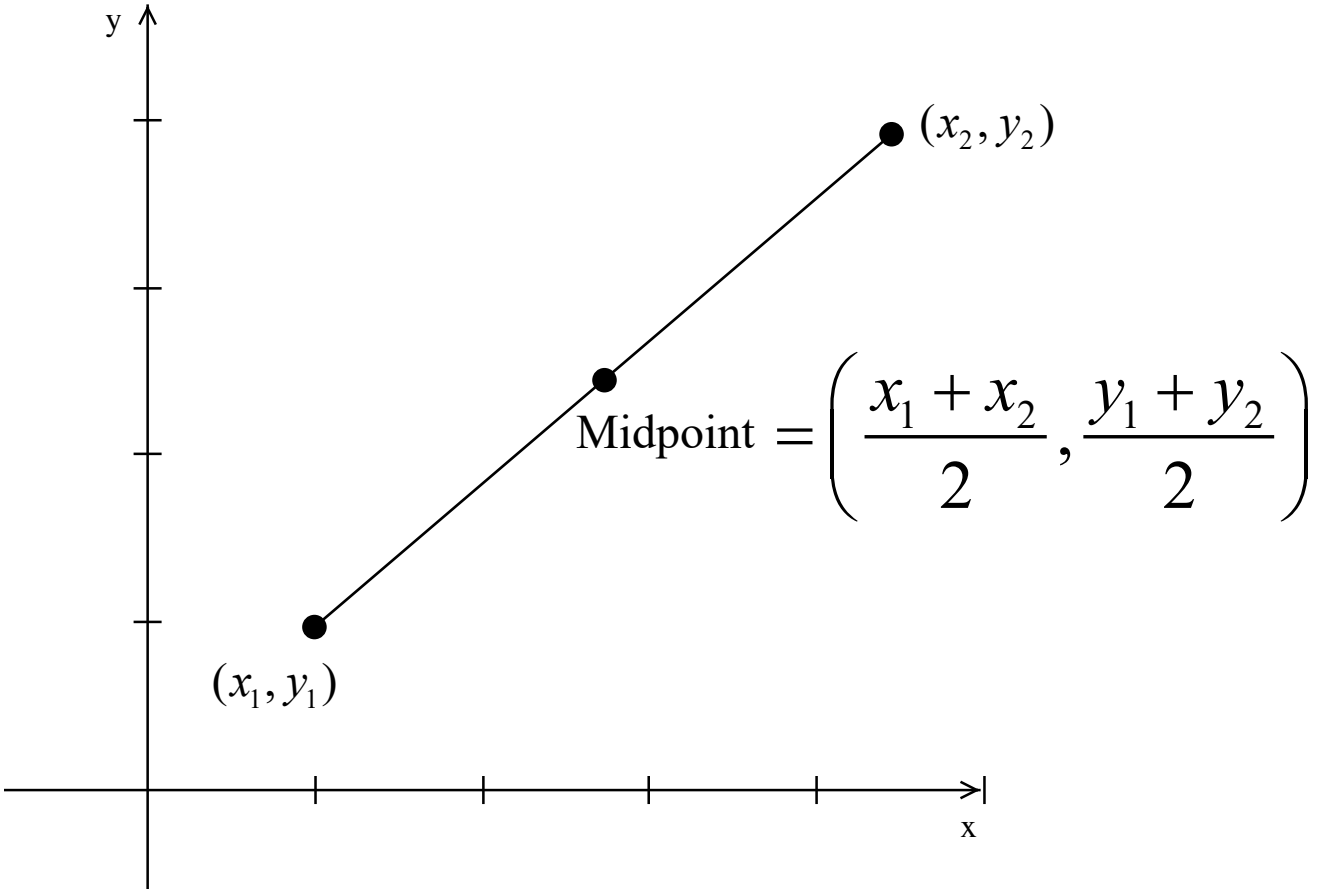


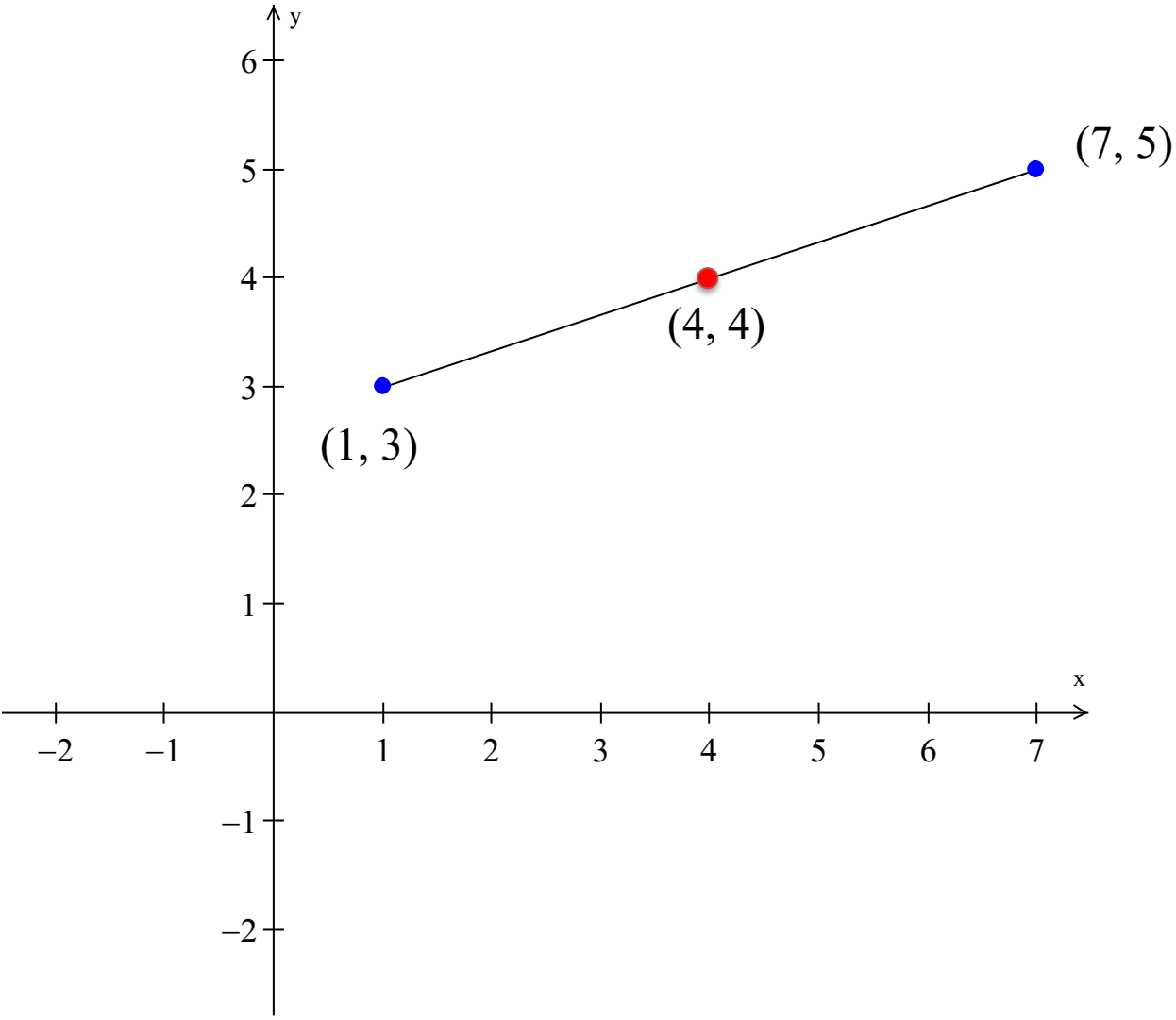
Notice that 75 is the midpoint between 50 and 100 on the number line.

Midpoint Formula

$$\frac{x_1 + x_2}{2}$$





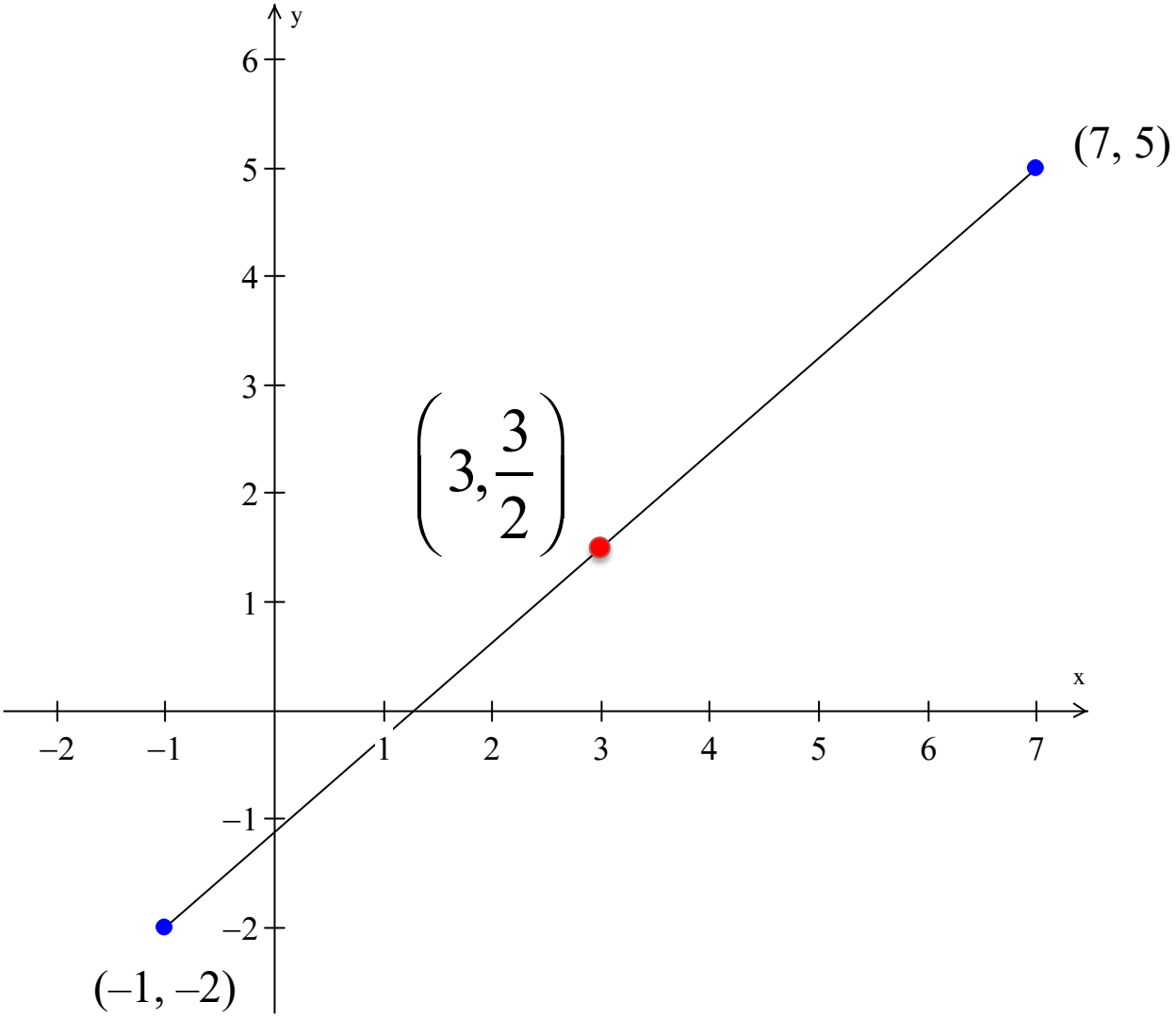


Find the midpoint of the given line segment

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$\left(\frac{1+7}{2}, \frac{3+5}{2} \right)$$

$$(4,4)$$

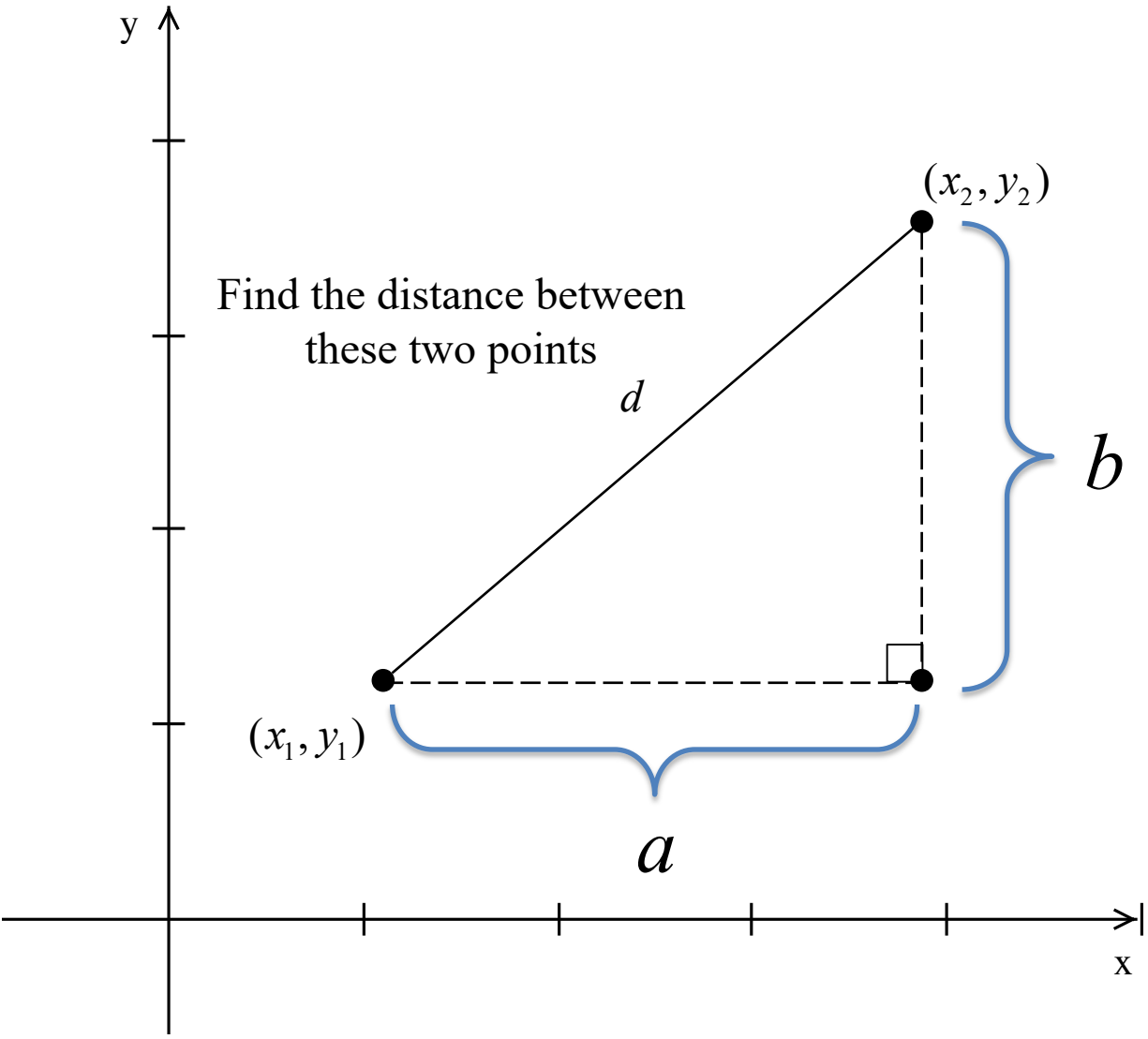


Find the midpoint of the given line segment

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

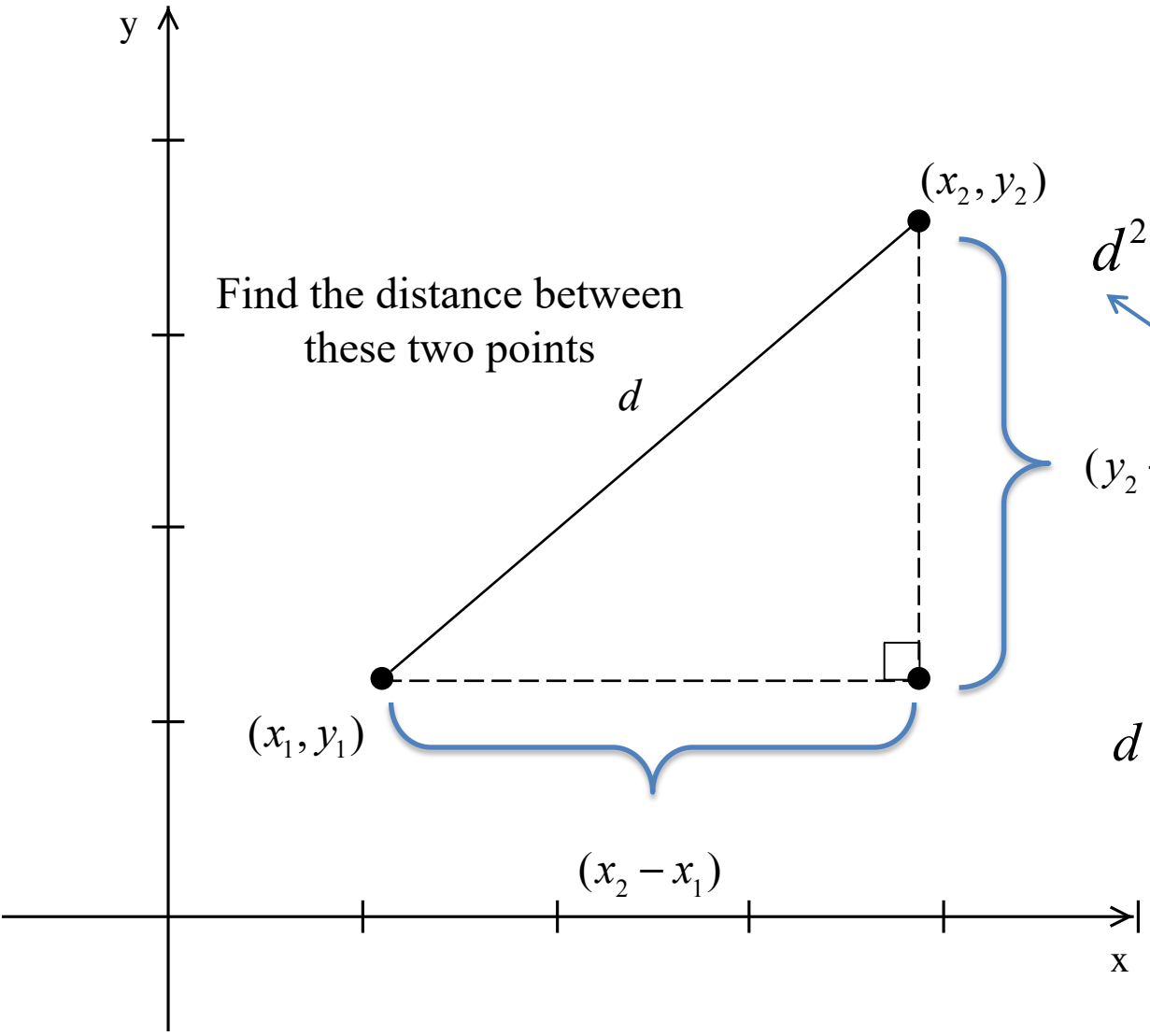
$$\left(\frac{-1+7}{2}, \frac{-2+5}{2}\right)$$

$$\left(3, \frac{3}{2}\right)$$



Remember the Pythagorean Theorem

$$c^2 = a^2 + b^2$$



Find the distance between these two points

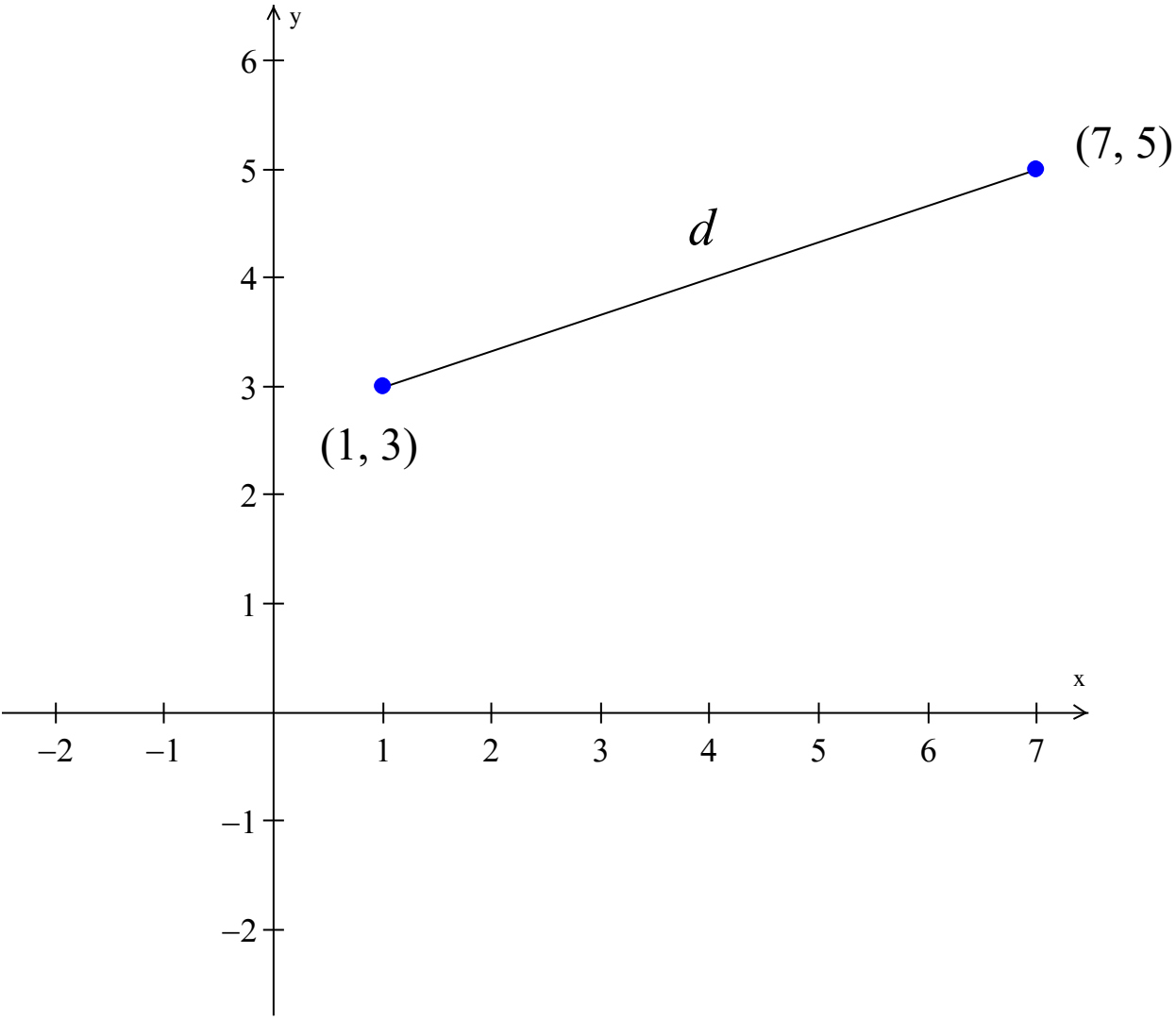
$$d^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$

$$c^2 = a^2 + b^2$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

The Distance Formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$



Find the length of the given line segment

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

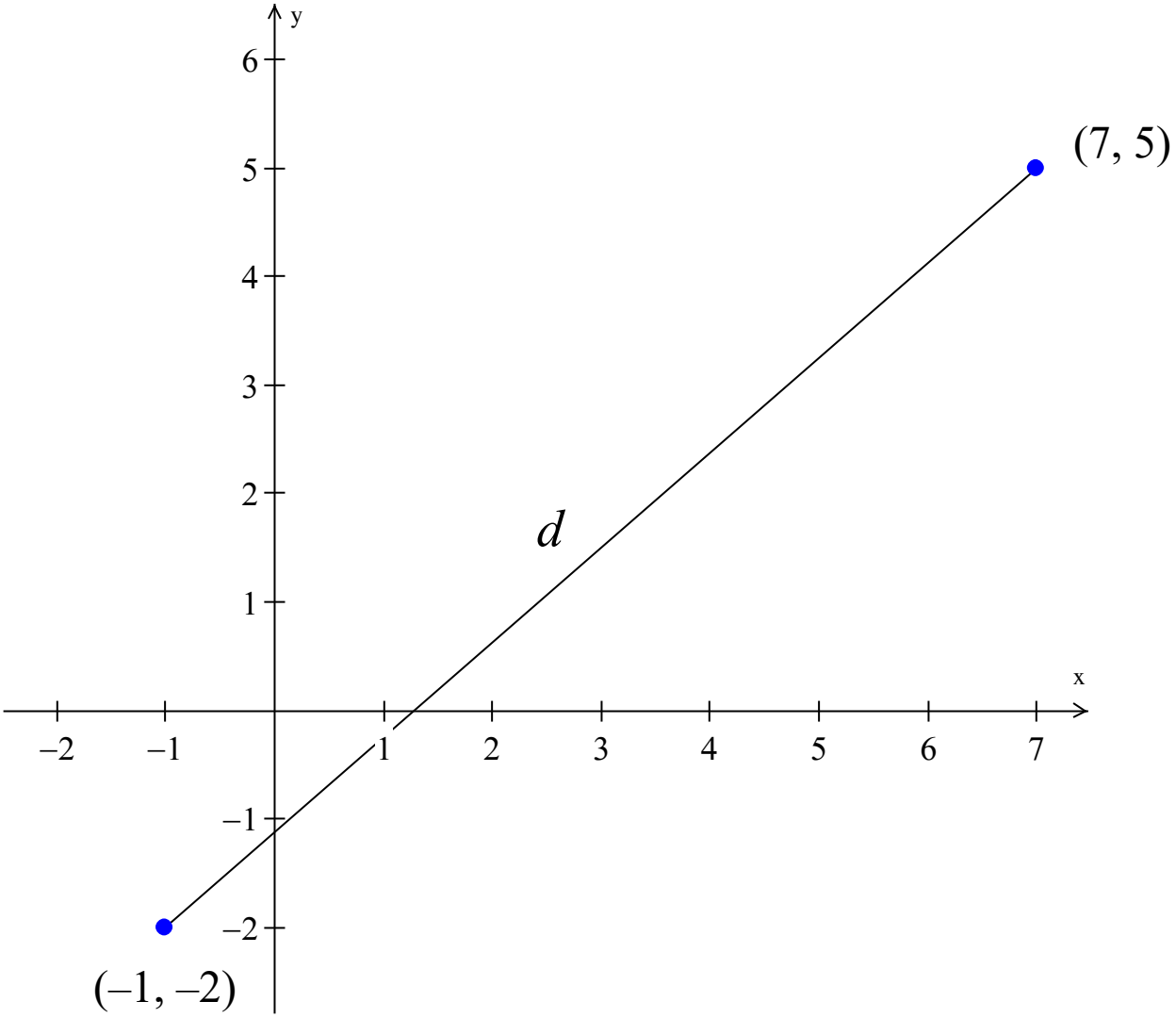
$$d = \sqrt{(7-1)^2 + (5-3)^2}$$

$$d = \sqrt{(6)^2 + (2)^2}$$

$$d = \sqrt{36+4}$$

$$d = \sqrt{40}$$

$$d = 2\sqrt{10}$$



Find the length of the given line segment

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$d = \sqrt{(7+1)^2 + (5+2)^2}$$

$$d = \sqrt{(8)^2 + (7)^2}$$

$$d = \sqrt{64 + 49}$$

$$d = \sqrt{113}$$

So to recap:

Midpoint Formula

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

The Distance Formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$c^2 = a^2 + b^2$$

Remember that this is just the Pythagorean Theorem