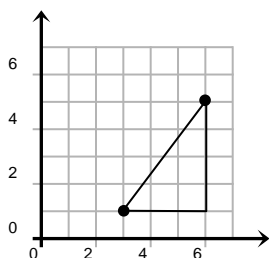
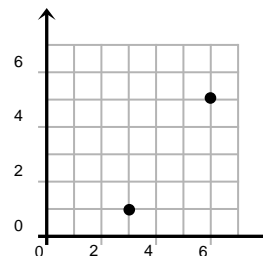




## The Distance Formula and the Pythagorean Theorem

1. You are given two points, (3, 1) and (6, 5). You are asked to find the distance between them. Plot the points.



2. You can draw a right triangle, using these points as two of the vertices, as shown.

3. Find the lengths of the horizontal and vertical sides of the right triangle by subtracting the  $x$ - and  $y$ - values.

Use the Pythagorean Theorem to find the missing length which is the hypotenuse:

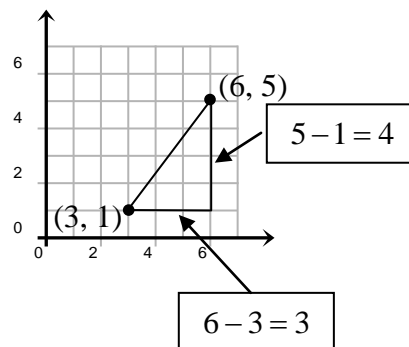
$$c^2 = a^2 + b^2$$

$$c^2 = (6 - 3)^2 + (5 - 1)^2$$

$$c^2 = 3^2 + 4^2$$

$$c^2 = 25$$

$$c = 5$$



Instead of using the ordered pairs (3, 1) and (6, 5), use a pair of general points,  $(x_1, y_1)$  and  $(x_2, y_2)$ . Substituting into the Pythagorean

Theorem once again:

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

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

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

Since we are determining distance, we replace the  $c$  with  $d$ .

So we now have the distance formula:

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

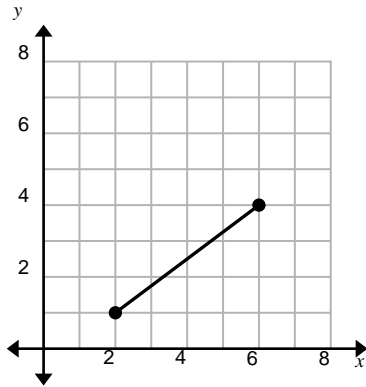
## The Distance Formula and the Pythagorean Theorem (page 2)

Find the distance between the points given.

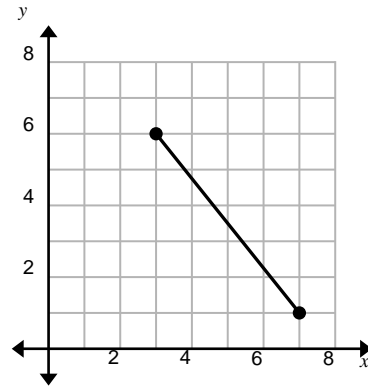
1.  $(1, 2)$  and  $(13, 7)$       2.  $(8, 15)$  and  $(-7, 23)$       3.  $(-15, -18)$  and  $(3, 6)$

Find the length of each segment.

4.



5.



6. Use the map below to find the *flying* distance in blocks between the two landmarks.

- A. What is the distance from the School to City Hall?
- B. What is the distance from City Hall to the Police Station?
- C. What is the flying distance from the Library to the Police Station?

