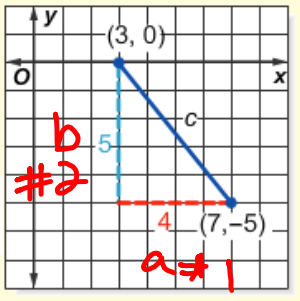
# L5-7 Distance on A Coordinate Plane

1. Graph the ordered pairs (3, 0) and (7, –5). Then find the distance *c* between the two points. Round to the nearest tenth.




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

(horizontal difference)$^2$ + (vertical difference)$^2$ = (diagonal length)$^2$

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

$(7-3)^2 + (-5-0)^2 = c^2$

$(4)^2 + (-5)^2 = c^2$

$(4.4) + (-5.-5) = c^2$

$16 + 25 = c^2$

$\sqrt{41} = \sqrt{c^2}$

$\pm 6.4 \approx c$

$6.4 \text{ units} \approx c$

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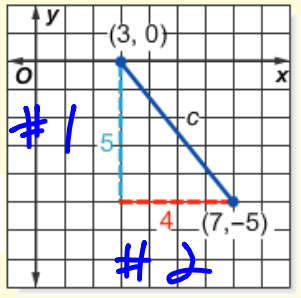



d = distance (length) of hypotenuse

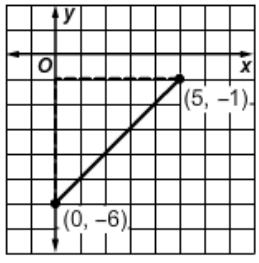
$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

$$= \sqrt{(3-7)^2 + (0-(-5))^2}$$

$$= \sqrt{(-4)^2 + (5)^2}$$

$$= \sqrt{16+25} = \sqrt{41} \approx 6.4 \text{ units}$$

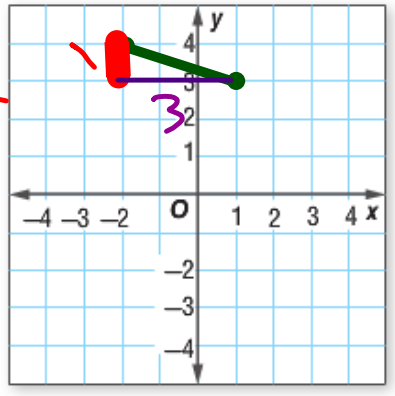
Graph the ordered pairs (0, –6) and (5, –1). Then find the distance between the points. Round to the nearest tenth.



**Got It?** Do this problem to find out.

#1 #2

**a.** (1, 3), (−2, 4)




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

$(-(-2))^2+(3-4)^2=$

$3^2+-1^2=$

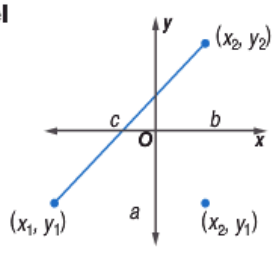
$9+1=\sqrt{10}\approx 3.2$ units

## Key Concept — Distance Formula

**Symbols** The distance $d$ between two points with coordinates $(x_1, y_1)$ and $(x_2, y_2)$ is given by the formula

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

**Model**



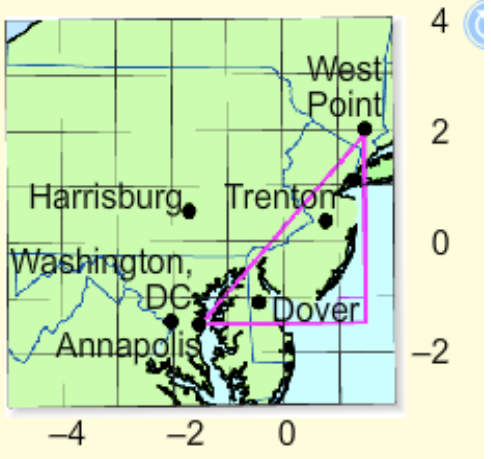

You can also use the **Distance Formula** to find the distance between two points on the coordinate plane. You can use the model from the Key Concept box to see how the Distance Formula is based on the Pythagorean Theorem as shown below.

$c^2 = a^2 + b^2$ — Pythagorean Theorem

$c^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$ — Substitute. The length of side $a$ is $(x_2 - x_1)$, and the length of side $b$ is $(y_2 - y_1)$.

$c = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ — Definition of square root

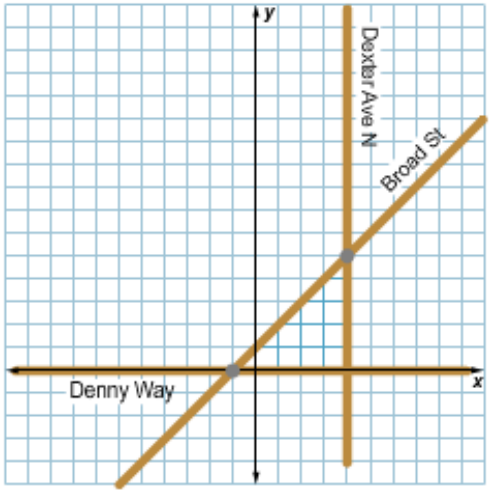
2. On the map, each unit represents 45 miles. West Point, New York, is located at (1.5, 2) and Annapolis, Maryland, is located at (–1.5, –1.5). What is the approximate distance between West Point and Annapolis?




$c \approx 4.6$ units

$4.6 \cdot 45 \approx 207$ miles

Reed lives in Seattle, Washington. One unit on this map is 0.08 mile. Find the approximate distance he drives between Broad Street at Denny Way (–1, 0) and Broad Street at Dexter Ave N. (4, 5).



**Got It?** Do this problem to find out.

**b.** Cromwell Field is located at (2.5, 3.5) and Dedeaux Field at (1.5, 4.5) on a map. If each map unit is 0.1 mile, about how far apart are the fields?

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

$(2.5-1.5)^2 + (3.5-4.5)^2 = c^2$

$1^2 + -1^2 = c^2$

$1+1 = \sqrt{2} = 1.4 \cdot 0.1 \approx 0.14$ miles apart.

3. Use the Distance Formula to find the distance between $X(5, -4)$ and $Y(-3, -2)$. Round to the nearest tenth if necessary.

Use the Distance Formula to find the distance between $G(-3, -2)$ and $H(-6, 5)$. Round to the nearest tenth.

February 12, 2015