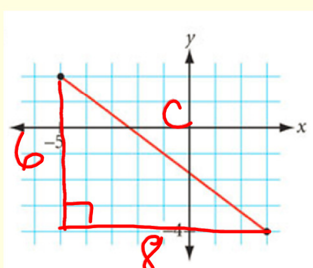
10.1b
Distance in Coordinate Geometry

a. I can calculate the distance between two points using the distance formula or the Pythagorean Theorem.
b. I can find the perimeter of a polygon on the coordinate plane.

10.1b
The Distance Formula

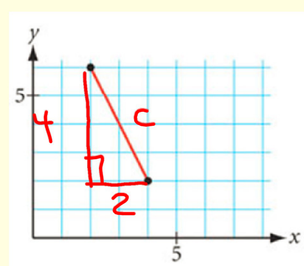
Find the distance between the points. Give an exact answer (*hint: use Pythagorean Thm.).

1.



$6^2+8^2=c^2$
$36+64=c^2$
$\sqrt{100}=\sqrt{c^2}$
$10=c$

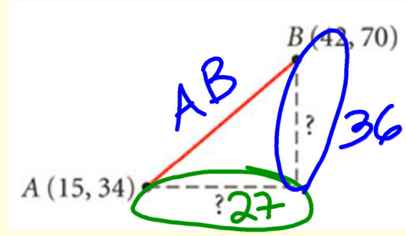
2.



$4^2+2^2=c^2$
$16+4=c^2$
$\sqrt{20}=\sqrt{c^2}$
2 10
2 5
$c=2\sqrt{5}$

How about when two points are too far? It is unrealistic to plot them.

3. Given the points (15, 34) and (42, 70)



a. Find the horizontal distance between these points.

42 − 15

27

b. Find the vertical distance between these points.

70 − 34

36

c. Use Pythagorean Thm. to find the distance between point A and B.

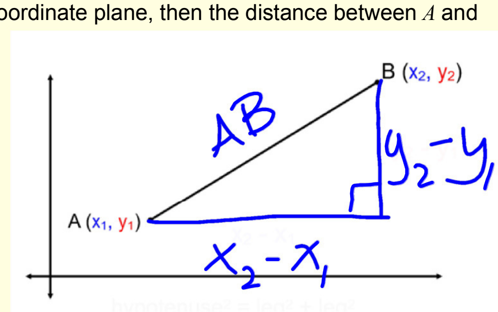
$27^2 + 36^2 = (AB)^2$

$\sqrt{2025} = AB$

$45 = AB$

Exploring the distance formula.

If $A(x_1, y_1)$ and $B(x_2, y_2)$ are points in a coordinate plane, then the distance between A and B is:



a. Write an expression to represent the horizontal distance between the two points.

$(x_2 - x_1)$

b. Write an expression to represent the vertical distance between the two points.

$(y_2 - y_1)$

c. Use your expressions from **a**, **b**, and plug into the Pythagorean Thm.

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

d. Solve for AB.

Distance Formula

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

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

Examples: Find the distance between the following sets of points. Give an exact answer (no decimals).

4. $\overset{x_1\ y_1}{(5, 0)}$ and $\overset{x_2\ y_2}{(3, 8)}$

$d=\sqrt{(3-5)^2+(8-0)^2}$

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

$d=\sqrt{4+64}$

$d=\sqrt{68}$

2 · 34

2 · 17

$d=2\sqrt{17}$

5. $\overset{x_1\ y_1}{(-4, 6)}$ and $\overset{x_2\ y_2}{(8, -1)}$

$d=\sqrt{(8+{+4})^2+(-1-6)^2}$

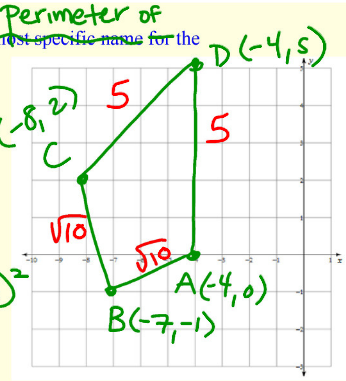
$d=\sqrt{12^2+(-7)^2}$

$d=\sqrt{144+49}$

$d=\sqrt{193}$

6. Use the distance formula to determine the ~~most specific name for the~~ Perimeter of following quadrilateral.

$A(-4,0), B(-7,-1), C(-8,2), D(-4,5)$



$AB=\sqrt{(-4--7)^2+(0--1)^2}$

$AB=\sqrt{10}$

$BC=\sqrt{(-8--7)^2+(2--1)^2}$

$BC=\sqrt{10}$

$CD=\sqrt{(-8--4)^2+(2-5)^2}$

$CD=\sqrt{25}$

$CD=5$

$DA=\sqrt{(-4--4)^2+(5-0)^2}$

$DA=\sqrt{25}$

$DA=5$

Perimeter: $5+5+\sqrt{10}+\sqrt{10}$

$10+1\sqrt{10}+1\sqrt{10}$

$10+2\sqrt{10}$