Geometry 1- 3 Notes and Examples
Distance and Midpoints

Name: _____
Date: _____Hour:_____

THE DISTANCE BETWEEN 2 POINTS:

***Distance on a Number Line

Distance $= |b - a|$ *or* $|a - b|$

+6

P ⌢⌢⌢⌢⌢ Q

–2   0   4
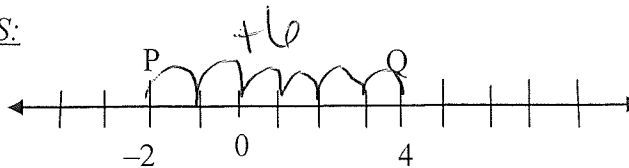
Example: Find the distance between P and Q above.

$|-2-4| = |-6| = 6$ $|4+2| = |6| = 6$

***Distance on the Coordinate Plane
Now suppose you were trying to find the distance between points A and B shown on the coordinate plane below. By drawing a horizontal line to the right from point A and a vertical line down from point B you can create a triangle. Call the third point C. Now name the side across from Angle A "a", the side across from Angle B "b", and the side across from Angle C, "c".

(7, 9)

x_2 y_2

B

C 8 a

A 6
x_1 y_1 b C

(1, 1)

(7, 1)

y   x
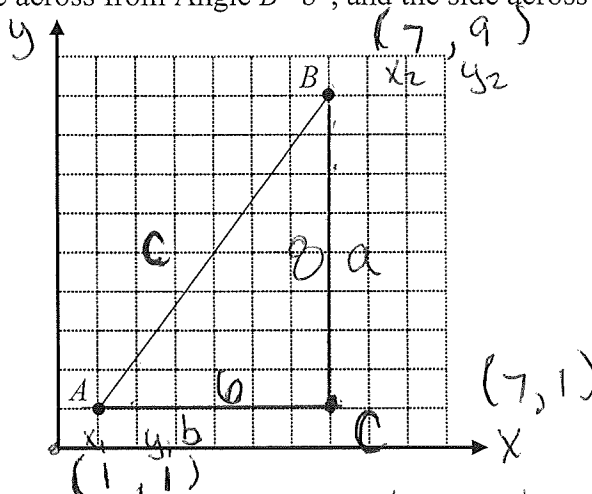
- What type of triangle have you created? __Right triangle__

- What is AC (the length of *side b*)? __6 units__

- What is BC (the length of *side a*)? __8 units__

- How can you calculate AB (the length of *side c*), which is the distance you were trying to find from the start? Use the **Pythagorean Theorem: $a^2 + b^2 = c^2$...(c is the longest side).**

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

The **Distance Formula** can be used to find the distance between two points on a coordinate plane without graphing:

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

$d = 10$

$d = \sqrt{(7-1)^2 + (9-1)^2}$

Find the distance between
A and B above by using the formula.

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

$d = \sqrt{36 + 64}$

$d = \sqrt{100}$