Name: KEY Hour: _____ Date: _____

NOTES: Section 12.7/8 – Distance and Midpoint Formula

Goals: #1 - I can find the distance between two points on a coordinate plane.

#2 - I can find the midpoint of a line segment in a coordinate plane.

Homework: Section 12.7/8 Worksheet

Warm Up:

1. Let a and b represent the lengths of the legs of a right triangle and let c represent the length of the hypotenuse. Find the unknown length. $a^2 + b^2 = c^2$
   a. $a = 12, c = 25$

$12^2 + b^2 = 25^2$

$144 + b^2 = 625$

$b^2 = 481$

$\boxed{b = \sqrt{481}}$

2. Determine whether the given lengths are sides of a right triangle.
   a. 8, 12, 17

$8^2 + 12^2 = 17^2$

$64 + 144 = 289$

$213 \neq 289$

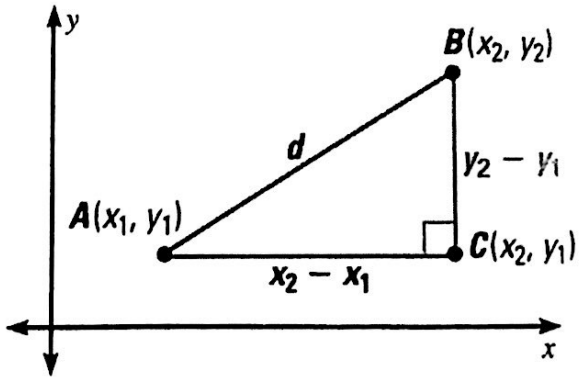
$\boxed{\text{No}}$

Notes:

We can use the Distance Formula to find the distance between 2 points in a coordinate plane.

- Distance Formula:

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



Name:_____ Hour: _____ Date: _____

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

Example #1: Find the distance between the two points.

1. $(1, 4), (-2, 3)$ — x_1, y_1, x_2, y_2

$d = \sqrt{(-2-1)^2 + (3-4)^2}$

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

$d = \sqrt{9+1}$

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

2. $(-4, 2), (-1, 3)$ — x_1, y_1, x_2, y_2

$d = \sqrt{(-1-(-4))^2 + (3-2)^2}$

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

$d = \sqrt{9+1}$

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

You practice: Find the distance between the two points.

1. $(2, 5), (0, 4)$ — x_1, y_1, x_2, y_2

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

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

$d = \sqrt{4+1}$

$d = \boxed{\sqrt{5}}$

2. $(-3, 2), (2, -2)$ — x_1, y_1, x_2, y_2

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

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

$d = \sqrt{16+25}$

$d = \boxed{\sqrt{41}}$

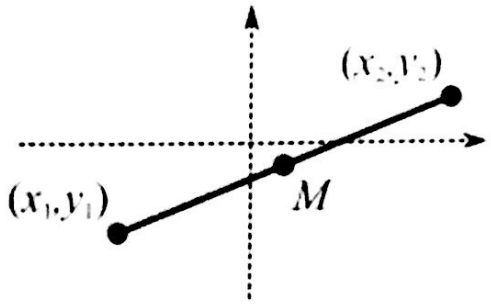
Name:_____ Hour: _____ Date: _____

Notes:

We can use the Midpoint Formula to find the midpoint of a line segment in a coordinate plane.

- Midpoint Formula:

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



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

Example #2: Find the midpoint of the line segment with the given endpoints.

1. $(-2, 3), (4, 1)$ (x_1, y_1, x_2, y_2)

$$\left(\frac{-2+4}{2}, \frac{3+1}{2}\right)$$

$$\left(\frac{2}{2}, \frac{4}{2}\right)$$

$$\boxed{(1, 2)}$$

2. $(-3, -3), (6, 7)$ (x_1, y_1, x_2, y_2)

$$\left(\frac{-3+6}{2}, \frac{-3+7}{2}\right)$$

$$\left(\frac{3}{2}, \frac{4}{2}\right)$$

$$\boxed{(1.5, 2)}$$

You practice: Find the midpoint of the line segment with the given endpoints.

1. $(-9, 17), (5, -7)$ (x_1, y_1, x_2, y_2)

$$\left(\frac{-9+5}{2}, \frac{17+-7}{2}\right)$$

$$\left(\frac{-4}{2}, \frac{10}{2}\right)$$

$$\boxed{(-2, 5)}$$

2. $(-4, 0), (-1, -5)$ (x_1, y_1, x_2, y_2)

$$\left(\frac{-4+-1}{2}, \frac{0+-5}{2}\right)$$

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

$$\boxed{(-2.5, -2.5)}$$