Name: **KEY**    Hour: _____    Date: _____

# NOTES: Sections 4.1-4.2 – The Coordinate Plane and Graphing Linear Equations

**Goals:** #1 – I can plot points in a coordinate plane.

#2 – I can graph a linear equation using a table of values. 😎 😬 🥴

*Homework:* Linear Equation Worksheet

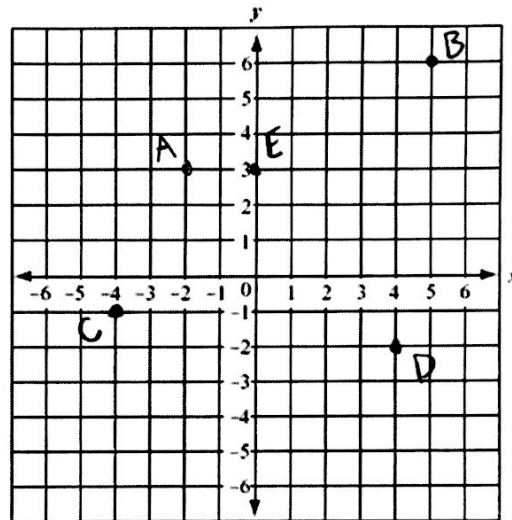**Exploration #1:** Work with a partner.

1. Plot the following points:

   **Point A:** $(-2, 3)$

   **Point B:** $(5, 6)$

   **Point C:** $(-4, -1)$

   **Point D:** $(4, -2)$

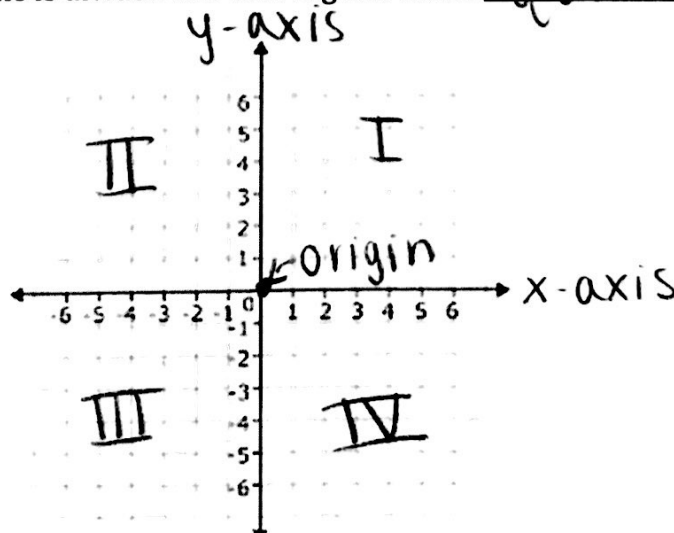   **Point E:** $(0, 3)$

**Notes:**

A _coordinate plane_ is formed by two real number lines that intersect at the _origin_.

The horizontal axis is called the _X - axis_.

The vertical axis is called the _y - axis_.

The coordinate plane is divided into four regions called _quadrants_.

**FILL IN:**

y-axis

II    I

origin    X-axis

III    IV

Each point in a coordinate plane corresponds to an __ordered pair__.

$$(\underline{\phantom{x}}x\underline{\phantom{x}}, \underline{\phantom{y}}y\underline{\phantom{y}})$$

The $\underline{X}$-coordinate tells us how far to move __left__ or __right__.
The $\underline{y}$-coordinate tells us how far to move __up__ or __down__.

**Example #1:** Write the ordered pairs that correspond to points *A, B, C,* and *D.* What quadrants are these points in?
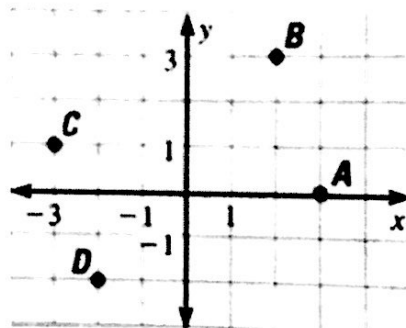


a. *A:* $(3, 0)$  b. *B:* $(2, 3)$  c. *C:* $(-3, 1)$  d. *D:* $(-2, -2)$

x-axis  I  II  III

**Exploration #2:** Work with a partner.

1. Plot the following points:
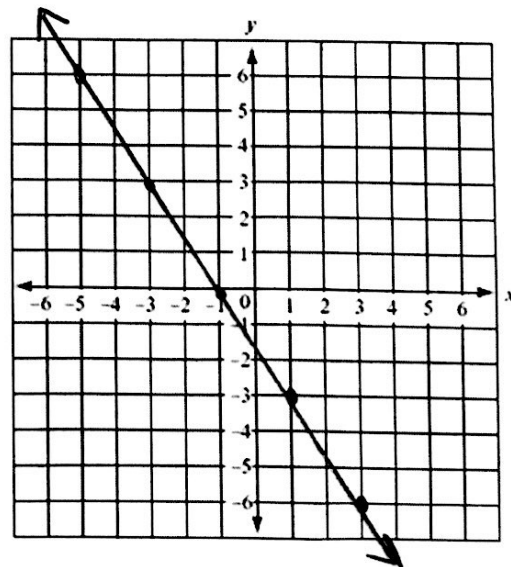
   Point A: $(-5, 6)$

   Point B: $(1, -3)$

   Point C: $(3, -6)$

   Point D: $(-3, 3)$

   Point E: $(-1, 0)$

What do these points form?

line!

**Notes:**

A _linear equation_ is an equation that can be written in the form:

$$Ax + By = C$$

$$Ax + By = C$$
$$-Ax \qquad -Ax$$
$$\frac{By}{B} = \frac{-Ax + C}{B}$$
$$y = \frac{-A}{B}x + \frac{C}{B}$$

An equation that is written in _function_ form is when we solve the equation for _y_.

A _solution_ of an equation is an _ordered pair_ $(x, y)$ that makes the equation true. (Just like when we checked our solutions when we solved equations!)

**Example #2:** Determine whether the ordered pair is a solution of $x + 2y = 5$.

a. $(1, 2)$

$$(1) + 2(2) \overset{?}{=} 5$$
$$1 + 4 \overset{?}{=} 5 \qquad \boxed{Yes}$$
$$5 = 5 \checkmark$$

b. $(7, -3)$

$$(7) + 2(-3) \overset{?}{=} 5$$
$$7 + -6 \overset{?}{=} 5 \qquad \boxed{No}$$
$$1 \neq 5$$

**Example #3:** Write the equation $6x + 3y = 18$ in function form.

$$6x + 3y = 18$$
$$-6x \qquad -6x$$
$$\frac{3y}{3} = \frac{-6x + 18}{3}$$
$$\boxed{y = -2x + 6}$$

**You practice:**

1. Determine whether the ordered pair is a solution of $2x + y = 1$

a. $(-3, 7)$

$$2(-3) + (7) \overset{?}{=} 1$$
$$-6 + 7 \overset{?}{=} 1 \qquad \boxed{Yes}$$
$$1 = 1 \checkmark$$

b. $(\frac{5}{2}, -6)$

$$2(\frac{5}{2}) + (-6) \overset{?}{=} 1$$
$$5 + -6 \overset{?}{=} 1 \qquad \boxed{No}$$
$$-1 \neq 1$$

2. Write the equation $4y - 3x = -28$ in function form.

$$+3x \qquad +3x$$
$$\frac{4y}{4} = \frac{3x - 28}{4}$$
$$\boxed{y = \frac{3}{4}x - 7}$$

**Example #3:** Use a table of values to graph $4y - 2x = 8$.

| $x$ | $y$ |
|-----|-----|
| $-4$ | $0$ |
| $-2$ | $1$ |
| $0$ | $2$ |
| $2$ | $3$ |
| $4$ | $4$ |

$y = \frac{1}{2}(-4) + 2$
$= 0$

$y = \frac{1}{2}(-2) + 2$
$= 1$

$y = \frac{1}{2}(0) + 2$
$= 2$

$y = \frac{1}{2}(2) + 2$
$= 3$

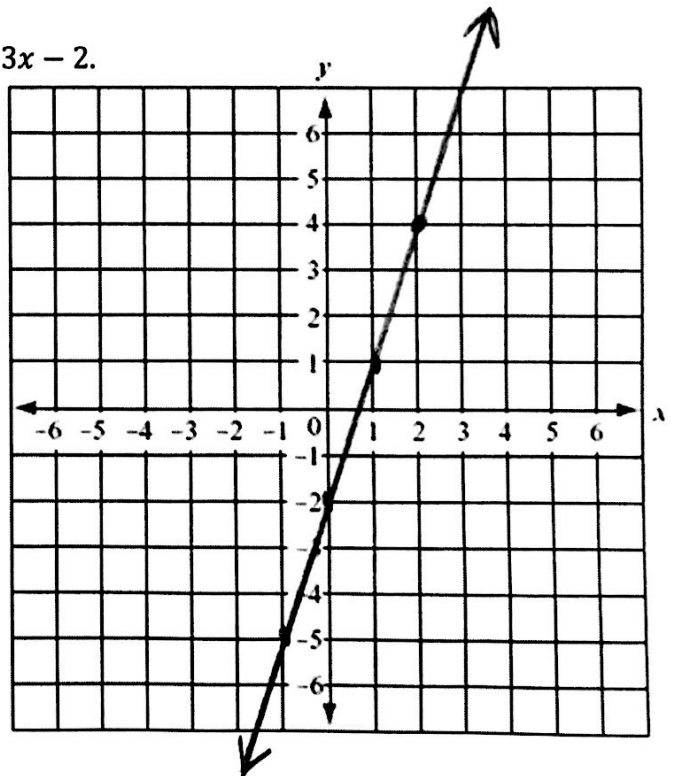$y = \frac{1}{2}(4) + 2$
$= 4$

$4y - 2x = 8$
$\quad\ +2x \quad +2x$
$4y = 2x + 8$
$\dfrac{4y}{4} = \dfrac{2x + 8}{4}$
$y = \frac{1}{2}x + 2$
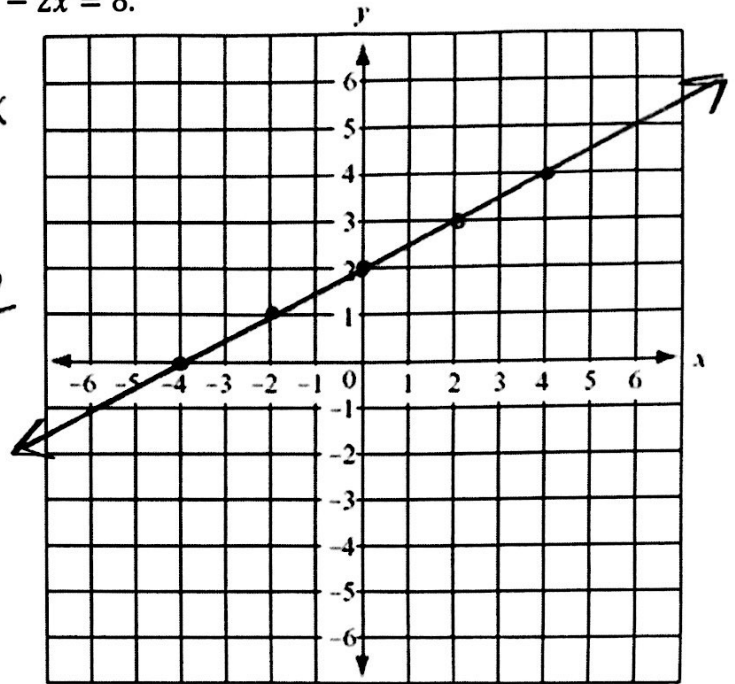


**You practice:** Use a table of values to graph $y = 3x - 2$.

| $x$ | $y$ |
|-----|-----|
| $-2$ | $-8$ |
| $-1$ | $-5$ |
| $0$ | $-2$ |
| $1$ | $1$ |
| $2$ | $4$ |

$y = 3(-2) - 2$
$y = -8$

$y = 3(-1) - 2$
$= -5$

$y = 3(0) - 2$
$= -2$

$y = 3(1) - 2$
$= 1$

$y = 3(2) - 2$
$y = 4$



**CHALLENGE:** How could you graph this line a different way?