3.2 Graphing Linear Equations

The **solution of an equation** in two variables x and y is an ordered pair (x, y) that **makes the equation true.**

The **graph of an equation** in x and y is the set of all points (x, y) that are **solutions of the equation.**

Determine whether each ordered pair is a solution of $x + 2y = 5$.

1. $(7, -3)$ not a solution

$7 + 2(-3) \stackrel{?}{=} 5$

$7 + -6 = 5$

$1 \neq 5$

2. $(1, 2)$ solution

$1 + 2(2) \stackrel{?}{=} 5$

$1 + 4 = 5$

$5 = 5$ ✓

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

3. $(\frac{1}{2}, 0)$ solution

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

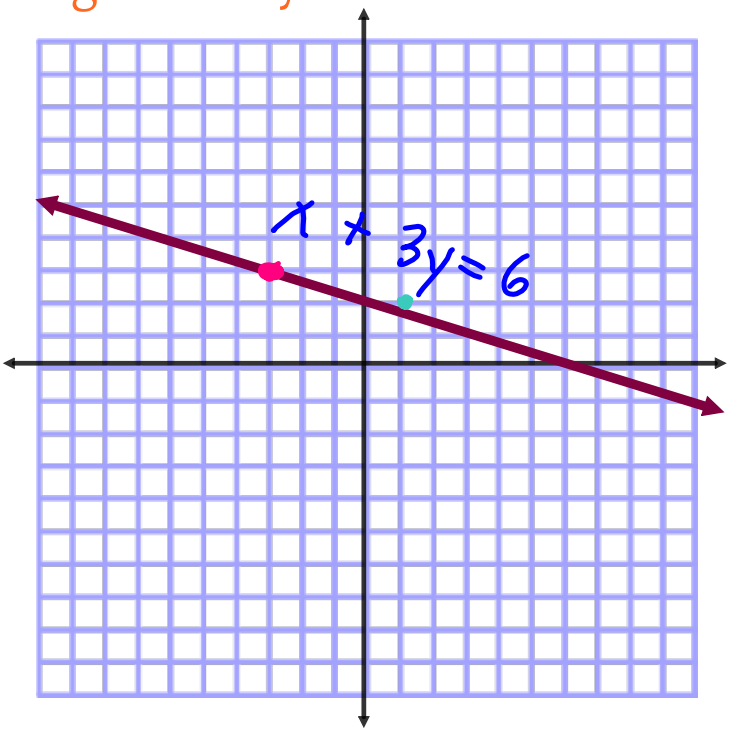
$1 = 1$ ✓

4. $(\frac{5}{2}, -6)$ not a solution

$2(\frac{5}{2}) + -6 \stackrel{?}{=} 1$

$-1 \neq 1$

Use the graph to decide whether the point lies on the graph of $x + 3y = 6$. Justify your answer algebraically.



5. $(1, 2)$ not a sol.

$1 + 3(2) \stackrel{?}{=} 6$

$7 \neq 6$

6. $(-3, 3)$ solution

$-3 + 3(3) \stackrel{?}{=} 6$

$6 = 6\checkmark$

A linear equation is an equation that can be written in the form $Ax + By = C$, called **standard form**, where A, B, & C are numbers, and A and B are not both zero.

A two-variable equation is written in **function form** (solve for y) if one of its variables is isolated on one side of the equation.

$y = 3x + 4$ is in function form

$2x + 3y = 6$ is **not** in function form

Write the equation above in function form.

$+2x + 3y = 6$

$-2x \qquad -2x$

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

$y = -\frac{2}{3}x + 2$ function form

Steps to Graphing a Linear Equation

Step 1: Rewrite the equation in **function form**.
solve for y

Step 2: Choose a few values of *x* and make a table.

Step 3: Plot the points from the table of values. A line through these points is the graph of the equation.

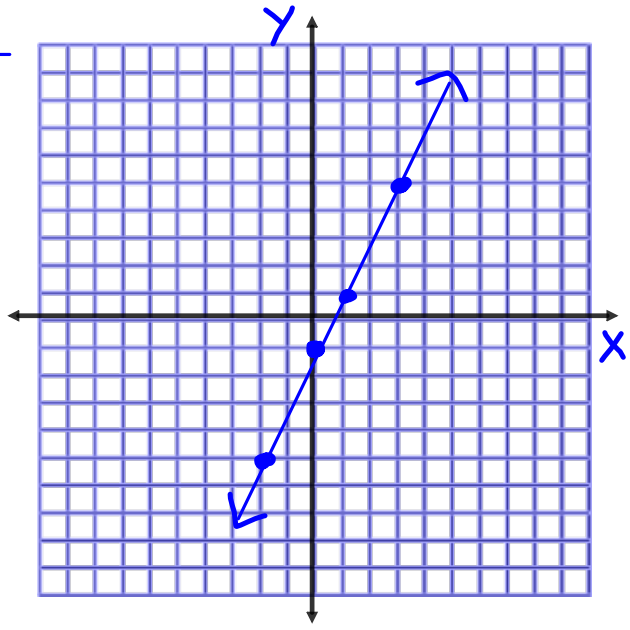
Example 7

already in function form

Draw the graph of $y = 2x - 1$.

x		y
-2	2(-2) - 1	-5
0	2(0) - 1	-1
1	2(1) - 1	1
3	2(3) - 1	5

any 4 #'s

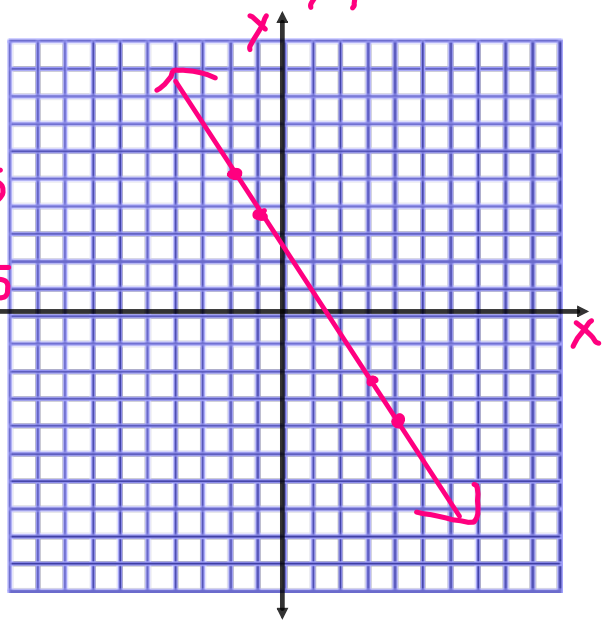


Example 8

Draw the graph of $3x + 2y = 4$.

$+3x + 2y = 4$
$-3x \quad -3x$
$\frac{2y}{2} = \frac{-3x}{2} + \frac{4}{2}$
$y = -1.5x + 2$

x		y
-2	$-1.5(-2) + 2$	5
-1	$-1.5(-1) + 2$	3.5
3	$-1.5(3) + 2$	-2.5
4	$-1.5(4) + 2$	-4



Example 9

Draw the graph of $2x - 5y = 8$.

$+2x - 5y = 8$
$-2x \quad -2x$
$\frac{-5y}{-5} = \frac{-2x}{-5} + \frac{8}{-5}$
$y = .4x - 1.6$

x		y
-1	$.4(-1) - 1.6$	-2
-2	$.4(-2) - 1.6$	-2.4
2	$.4(2) - 1.6$	-.8
4	$.4(4) - 1.6$	0