8.2 Linear Equations in Two Variables

Goal: Find solutions of equations in two variables.

Vocabulary

Equation in two variables:	
Solution of an equation in two variables:	
Graph of an equation in two variables:	
Linear equation:	*an equation that, when graphed, forms a ex: $y = \frac{1}{4}x + 4$*
Function form:	

linear equation

Example 1   Checking Solutions

Tell whether $(5, -1)$ is a solution of $x - 3y = 8$.

Solution (x, y)

$x - 3y = 8$ Write original equation.

$5 - 3(-1) \stackrel{?}{=} 8$ Substitute for x and for y.

$5 + 3 = 8$ Simplify.

$8 = 8$

Answer: $(5, -1)$ *is* a solution of $x - 3y = 8$.

✅ **Checkpoint** Tell whether the ordered pair is a solution of $2x - y = 5$.

1. $(0, -5)$	2. $(3, 2)$	3. $(-2, -9)$

Example 2 *Graphing a Linear Equation*

Graph $y = -x + 1.$

1. Make a table of solutions.

x	-2	-1	0	1	2
y					
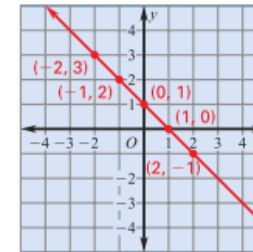
2. List the solutions as ordered pairs.

$(-2, \boxed{3}), (-1, \boxed{2}), (0, \boxed{1}),$
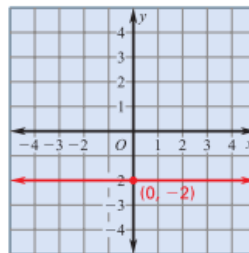
$(1, \boxed{0}), (2, \boxed{-1})$

3. Graph the ordered pairs, and note that the points lie on a ▢. Draw the ▢, which is the graph of $y = -x + 1$.

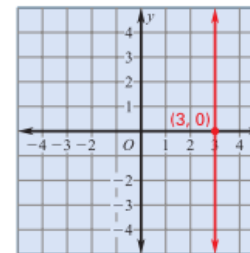**Example 3** *Graphing Horizontal and Vertical Lines*

Graph $y = -2$ and $x = 3$.

a. The graph of the equation $y = -2$ is ▢
   ▢.

b. The graph of the equation $x = 3$ is ▢
   ▢.

(handwritten notes, left side)

x	$-x + 1$	y
-2	$--2 + 1$	3
-1	$+1 + 1$	2
0	$0 + 1$	1
1	$-1 + 1$	0
2	$-2 + 1$	-1

$$\begin{array}{c|c}
x & 3x-2 \\
\hline
-1 & 3(-1)-2 \\
 & -3-2 \\
0 & 3(0)-2 \\
 & 0-2 \\
1 & 3(1)-2 \\
 & 3-2 \\
2 & 3(2)-2 \\
 & 6-2
\end{array}$$

y: -5, -2, 1, 4

Example 4 — Writing an Equation in Function Form

Write $3x - y = 2$ in function form. Then graph the equation.

(handwritten: $3x \quad -3x$, $b - 3x$)

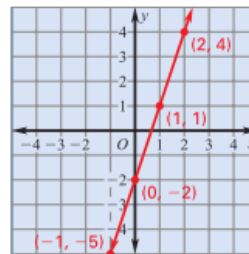To write the equation in function form, solve for ☐.

$3x - y = 2$ Write original equation.

$y = -3x + 2$ Subtract $3x$ from each side.
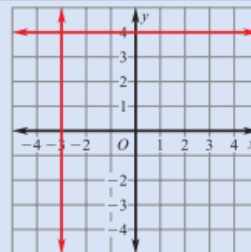
$y = 3x - 2$ Divide / Multiply each side by -1.

To graph the equation, use its function form to make a table of solutions. Graph the ordered pairs (x, y) from the table, and draw a line through the points.

x	−1	0	1	2
y	−5	−2	1	4

Graph points: (2, 4), (1, 1), (0, −2), (−1, −5)

✔ Checkpoint

4. Graph $y = 4$ and $x = -3$. Tell whether each equation is a function.

5. Write $x - 2y = 4$ in function form. Then graph the equation.