SECTION 3.2
GRAPHING LINEAR EQUATIONS

A. Show algebraic that (2, 5) and (-3, -5) are solutions of \( y = 2x + 1 \).

\[
\begin{align*}
(2,5) & \quad y = 2x + 1 \\
5 &= 2(2) + 1 \\
5 &= 5 \quad \text{True}
\end{align*}
\]

\[
\begin{align*}
(-3,-5) & \quad y = 2x + 1 \\
-5 &= 2(-3) + 1 \\
-5 &= -5 \quad \text{True}
\end{align*}
\]

B. Graph these two points and sketch a line through them.

C. Determine at least two other solutions to \( y = 2x + 1 \).

To do this locate two other points on the line, \((0,1)\) and \((-1,-1)\) for example.

\[
\begin{align*}
(0,1) & \quad y = 2x + 1 \\
1 &= 2(0) + 1 \\
1 &= 1 \quad \text{True}
\end{align*}
\]

\[
\begin{align*}
(-1,-1) & \quad y = 2x + 1 \\
-1 &= 2(-1) + 1 \\
-1 &= -2 + 1 \\
-1 &= -1 \quad \text{True}
\end{align*}
\]

D. How many solutions are there for \( y = 2x + 1 \)?

An infinite number

E. Choose a point not on the line. Is it a solution to \( y = 2x + 1 \)?

\((5,0)\) for example.

\[
\begin{align*}
(5,0) & \quad y = 2x + 1 \\
0 &= 2(5) + 1 \\
0 &= 10 + 1 \\
0 &= 11 \quad \text{False, so No, not a solution.}
\end{align*}
\]

The line is the graph of the equation.
The line is made up of points that are solutions to the equation.
TO GRAPH A LINEAR EQUATION:

1. Solve the equation for $y$.

2. Select a value for one coordinate and calculate the corresponding value of the other coordinate. Form an ordered pair. This pair is one solution of the equation.

3. Repeat step one to find at least two other ordered pair.

4. Plot the ordered pairs and draw a straight line passing through the points. The line represents all solutions to the equation.

**Example 1:**

$$y = x - 3$$

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
<th>$(x, y)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>-4</td>
<td>$(-1, -4)$</td>
</tr>
<tr>
<td>0</td>
<td>-3</td>
<td>$(0, -3)$</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>$(4, 1)$</td>
</tr>
</tbody>
</table>

**Example 2:**

$$y = -\frac{1}{3}x$$

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
<th>$(x, y)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>1</td>
<td>$(-3, 1)$</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>$(0, 0)$</td>
</tr>
<tr>
<td>3</td>
<td>-1</td>
<td>$(3, -1)$</td>
</tr>
</tbody>
</table>

You may choose any number for $x$. Choose numbers divisible by 3 if you may choose any number!
3. \( y = -2x + 1 \)

<table>
<thead>
<tr>
<th>( X )</th>
<th>( Y )</th>
<th>( (X,Y) )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. \( y = 3x - 2 \)

<table>
<thead>
<tr>
<th>( X )</th>
<th>( Y )</th>
<th>( (X,Y) )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

5. \( y = \frac{4}{3}x - 2 \)

\[
\begin{array}{c|c|c}
\hline
X & Y & (X,Y) \\
\hline
0 & y = \frac{4}{3} \cdot 0 - 2 = 0 - 2 = -2 & (0,-2) \\
3 & y = \frac{4}{3} \cdot 3 - 2 = 4 - 2 = 2 & (3,2) \\
6 & y = \frac{4}{3} \cdot 6 - 2 = 8 - 2 = 6 & (6,6) \\
\hline
\end{array}
\]
Homework for Section 3.2:
Pages 149-150: 1, 2, 3, 5, 53, 54 on notebook paper, odds 15-23, 24, 25, 29, 33 on worksheet.