Graphing Linear Equations – Section 7.2

Graph linear equations by **Plotting Points**

1) Solve the equation for y.
2) Pick a value for x, use that value to find the corresponding y value. Do this with at least 2 more x values.
3) Plot all three points. Using a straightedge, draw a line through all three points. Draw arrows at the ends of the line to show the line continues in both directions.

**Graph:** \( 2x + y = 3 \)

\[
\begin{align*}
\text{Graph:} & \quad 2x + y = 3 \\
& \quad -2x & \quad -2x \\
& \quad y = -2x + 3 \\
\end{align*}
\]

\[
\begin{array}{c|c|c}
\hline
x & -2x + 3 & y \\
\hline
1 & -2(1) + 3 & 1 \\
0 & -2(0) + 3 & 3 \\
-2 & -2(-2) + 3 & 7 \\
\hline
\end{array}
\]

**Graph:** \( 3x - 2y = 6 \)

\[
\begin{align*}
\text{Graph:} & \quad 3x - 2y = 6 \\
& \quad -3x & \quad -3x \\
& \quad -2y = -3x + 6 \\
& \quad y = \frac{-3x + 6}{-2} \\
& \quad y = \frac{3x}{2} - 3 \\
\end{align*}
\]

\[
\begin{array}{c|c|c}
\hline
x & \frac{3x}{2} - 3 & y \\
\hline
-2 & \frac{3(-2)}{2} - 3 & -6 \\
0 & \frac{3(0)}{2} - 3 & -3 \\
2 & \frac{3(2)}{2} - 3 & 0 \\
\hline
\end{array}
\]
Graph linear equations by **finding intercepts**

Let \( x = 0 \), find \( y \).

Let \( y = 0 \), find \( x \).

Let \( x \) = another value not used yet, find \( y \).

Plot all three points. Using a straight edge, draw a line through all three points. Draw arrowheads at the ends of the line to show the line continues in both directions.
BY INTERCEPTS

Graph:

\[ \frac{1}{2}x + 2y = 4 \]

\[ x = 0, \quad \frac{1}{2}(0) + 2y = 4 \]
\[ y = 2 \]

\[ y = 0, \quad \frac{1}{2}x = 4 \]
\[ \frac{2}{1} \cdot \frac{1}{2}x = \frac{2}{1} \cdot 4 \]
\[ x = 8 \]

\[ x = 4, \quad \frac{1}{2}(4) + 2y = 4 \]
\[ 2 + 2y = 4 \]
\[ 2y = 2 \]
\[ y = 1 \]

BY INTERCEPTS

Graph:

\[ x - 3y = 0 \]

\[ x = 0, \quad -3y = 0 \]
\[ y = 0 \]

\[ y = 0, \quad x - 3(0) = 0 \]
\[ x = 0 \]

\[ x = 3, \quad 3 - 3y = 0 \]
\[ -3y = -3 \]
\[ y = 1 \]
Graph vertical and horizontal lines.

When a linear equation has **ONLY ONE VARIABLE**, its graph will be either a **VERTICAL** or a **HORIZONTAL** line.

Graph: \( x + 5 = 0 \)

**SOLVE FOR** \( x \) \( \Rightarrow x = -5 \)

\[ \begin{array}{c|c|c}
 x & y & \n \\
\hline
 0 & 4 & \n \\
 2 & 4 & \n \\
 5 & 4 & \n \\
\end{array} \]

**GRAPH** \( x = 3 \)

\( x = 3 \)

Graph:

\( y - 4 = 0 \)

**SOLVE FOR** \( y \) \( \Rightarrow y = 4 \)

\[ \begin{array}{c|c|c}
 x & y & \n \\
\hline
 0 & 4 & \n \\
 2 & 4 & \n \\
 5 & 4 & \n \\
\end{array} \]

\( y = -3 \)

If the only variable is \( x \),
the line intersects the \( x \) axis and is **VERTICAL**.

If the only variable is \( y \),
the line intersects the \( y \) axis and is **HORIZONTAL**.