Graphing Lines Using Intercepts

Standard Form of a Line

Recap
Graph the line $5x + 3y = 6$.

Isolate $y$ to rewrite the equation in slope-intercept form.

$5x + 3y = 6$
$3y = -5x + 6$
$y = -\frac{5}{3}x + 2$

The $y$-intercept is at $(0, 2)$ and the slope of the line is $-\frac{5}{3}$.

Example

Determine the intercepts of $y = -2x + 8$, and graph the line.

The $y$-intercept is given, and is at $(0, 8)$.

To find the $x$-intercept, set $y = 0$ and solve for $x$.

$0 = -2x + 8$
$2x = 8$
$x = 4$

Therefore, the $x$-intercept is at $(4, 0)$.
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A graph of \( y = -2x + 8 \) is below.

Example

Determine the intercepts of \( 5x - 4y = 20 \), and graph the line.

Set \( x = 0 \) to find the \( y \)-intercept, and set \( y = 0 \) to find the \( x \)-intercept.

\[
\begin{align*}
5(0) - 4y &= 20 \\
-4y &= 20 \\
y &= -5 \\
5x &= 20 \\
x &= 4
\end{align*}
\]

Therefore, the \( y \)-intercept is at \((0, -5)\) and the \( x \)-intercept is at \((4, 0)\).

Example

Determine the intercepts of \( 2x - 5y = 15 \), and graph the line.

Since 2 is not a factor of 15, the \( x \)-intercept will be rational.

\[
\begin{align*}
2(0) - 5y &= 15 \\
-5y &= 15 \\
y &= -3 \\
2x &= 15 \\
x &= \frac{15}{2} \\
x &= 7.5
\end{align*}
\]

Therefore, the \( y \)-intercept is at \((0, -3)\), and the \( x \)-intercept is at \((\frac{15}{2}, 0)\) or \((7.5, 0)\).
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Alternatively, we can graph the line by converting to slope-intercept form.

\[ 2x - 5y = 15 \]
\[ -5y = -2x + 15 \]
\[ \frac{-5y}{-5} = \frac{-2x}{-5} + \frac{15}{-5} \]
\[ y = \frac{2}{5}x - 3 \]

From the equation, we confirm that the \( y \)-intercept is at \((0, -3)\).

From this point, we can use the slope to "rise two and run five" and graph the line.

Questions?