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Study Guide

Graphing Linear Equations

You can graph a **linear equation** $Ax + By + C = 0$, where A and B are not both zero, by using the x- and y-intercepts. To find the x-intercept, let $y = 0$. To find the y-intercept, let $x = 0$.

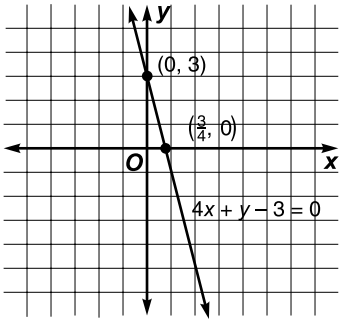
Example 1 **Graph $4x + y - 3 = 0$ using the x- and y-intercepts.**
Substitute 0 for y to find the x-intercept. Then substitute 0 for x to find the y-intercept.

x-intercept

$$\begin{aligned} 4x + y - 3 &= 0 \\ 4x + 0 - 3 &= 0 \\ 4x - 3 &= 0 \\ 4x &= 3 \\ x &= \frac{3}{4} \end{aligned}$$

y-intercept

$$\begin{aligned} 4x + y - 3 &= 0 \\ 4(0) + y - 3 &= 0 \\ y - 3 &= 0 \\ y &= 3 \end{aligned}$$



The line crosses the x-axis at $\left(\frac{3}{4}, 0\right)$ and the y-axis at $(0, 3)$.

Graph the intercepts and draw the line that passes through them.

The **slope** of a nonvertical line is the ratio of the change in the y-coordinates of two points to the corresponding change in the x-coordinates of the same points. The slope of a line can be interpreted as the ratio of change in the y-coordinates to the change in the x-coordinates.

Slope	The slope m of a line through two points (x_1, y_1) and (x_2, y_2) is given by $m = \frac{y_2 - y_1}{x_2 - x_1}$.

Example 2 **Find the slope of the line passing through $A(-3, 5)$ and $B(6, 2)$.**

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{2 - 5}{6 - (-3)} \quad \textit{Let } x_1 = -3,\ y_1 = 5,\ x_2 = 6, \textit{ and } y_2 = 2. \\ &= \frac{-3}{9} \text{ or } -\frac{1}{3} \end{aligned}$$