4.3
Graph Using Intercepts

Goal: Graph a linear equation using intercepts.

VOCABULARY

- **x-intercept**: The x-coordinate of a point where the line crosses the x-axis.
  - The variable a represents the x-int.
- **y-intercept**: The y-coordinate of a point where the line crosses the y-axis.
  - The variable b represents the y-int.

Example 1: Find the intercepts of the graph of an equation

Find the x-intercept and the y-intercept of the graph of $8x - 2y = 32$.

**Solution**

1. Substitute 0 for y and solve for x.
   
   $8x - 2y = 32$
   
   $8x - 2(0) = 32$
   
   $8x = 32$
   
   $x = 4$

   **Write original equation.**
   **Substitute 0 for y.**
   **Solve for x.**

2. Substitute 0 for x and solve for y.
   
   $8x - 2y = 32$
   
   $8(0) - 2y = 32$
   
   $-2y = 32$
   
   $y = -16$

   **Write original equation.**
   **Substitute 0 for x.**
   **Solve for y.**

- The x-intercept is $4$.
- The y-intercept is $-16$.
Your Notes

**Checkpoint** Find the x-intercept and y-intercept of the graph of the equation.

1. \(2x + 3y = 18\)
   - \(x: 9\)
   - \(y: 6\)
   - \((9, 0)\)
   - \((0, 6)\)

2. \(-12x - 4y = 36\)
   - \(x: -3\)
   - \(y: -9\)
   - \((-3, 0)\)
   - \((0, -9)\)

**Example 2** Use intercepts to graph an equation

Graph \(3.5x + 2y = 14\) Label the points where the line crosses the axis.

**Solution**

Step 1 Find the **INTERCEPTS**

\[
\begin{align*}
\text{X-int:} & \quad 3.5x + 2y = 14 \\
& \quad 3.5x + 2(0) = 14 \\
& \quad 3.5x = 14 \\
& \quad x = \frac{14}{3.5} = 4 \\
\text{Y-int:} & \quad 3.5x + 2y = 14 \\
& \quad 3.5(0) + 2y = 14 \\
& \quad 2y = 14 \\
& \quad y = \frac{14}{2} = 7
\end{align*}
\]

Step 2 Plot the points that correspond to the intercepts.

The x-intercept is \(4\), so plot the point \((4, 0)\).

The y-intercept is \(7\), so plot the point \((0, 7)\).

Step 3 Connect the points by drawing a line through them.

**CHECK**

You can check the graph of the equation by using a third point. When \(x = 2\), \(y = \frac{3.5}{2}\), so the ordered pair \((2, 3.5)\) is a third solution of the equation. You can see that this point lies on the graph, so the graph is correct.
Example 3  Use a graph to find the intercepts

Identify the $x$-intercept and $y$-intercept of the graph.

Solution
To find the $x$-intercept, look to see where the graph crosses the $x$-axis. The $x$-intercept is $-2$. To find the $y$-intercept, look to see where the graph crosses the $y$-axis. The $y$-intercept is $2$.

Checkpoint  Complete the following exercises.

3. Graph $2x - 7y = 14$. Label the points where the line crosses the axes.

$$2x - 7y = 14$$

$x$: 7

$y$: -2

4. Identify the $x$ and $y$ intercepts.

$x$: 1

$y$: 3
Find intercepts

1. First put equations in standard form:
   \[ AX + BY = C \] where \( A, B, C \) are integers.

Example: Graph with intercepts

\[ y = 2x - 8 \]

Put in standard form:

\[-2x + y = -8\]

Then find intercepts:

\[
\begin{align*}
  x &= 4 & (4,0) \\
  y &= -8 & (0,-8)
\end{align*}
\]

Graph of the line with intercepts at (4,0) and (0,-8)