Relations and Functions – 3.8 General Form

Today’s Outcome: Relate linear relations written in general form (Ax+By+C=0).

Slope-Intercept Form: \( y = mx + b \)

General Form:

\[ Ax + By + C = 0 \]

1. All real numbers.
2. No fractions/decimals
3. "A" always positive $\uparrow$
a whole number.
4. Order $\&$ equal zero.

Some examples of General Form are:

\[
\begin{align*}
5x + 2y + 9 &= 0 \\
7x + 3y - 14 &= 0 \\
x + y - 1 &= 0 \\
x + 2 &= 0 \\
4y - 5 &= 0
\end{align*}
\]
Practice: Rearrange the following equations into slope-intercept AND general form:

**Slope-intercept form:**

1. \( y = \frac{4x}{2} - \frac{2}{2} \)
2. \( y = \frac{3x - 12}{4 + 8x} \)
3. \( 3y = -3x + 12 \)

**General form:**

1. \( 2y = 4x - 2 \)
2. \( 3x - y = 12 \)
3. \( 9x - 2y + 4 = 0 \)

Practice: Rewrite the equations in general form.

**General form:**

1. \( 3y = -2x + 18 \)
2. \( 2x + 3y = 18 \)
3. \( 4y = 3x - 8 \)

**Slope-intercept form:**

1. \( y = \frac{3}{4}x - \frac{2}{4} \)
2. \( y = \frac{2}{3}x + 6 \)
Remember: How do we find the x and y-intercepts?

**x-intercept:**
Make \( y = 0 \)
Solve for \( x \)

**y-intercept:**
Make \( x = 0 \)
Solve for \( y \)

Practice: Find the x and y-intercepts for these lines:

\[
2x - 3y - 6 = 0
\]

**x-intercept:**
\[
2x - 3(0) - 6 = 0
\]
\[
2x - 6 = 0
\]
\[
\frac{x}{3} = 3
\]
\[
x = 3
\]

**y-intercept:**
\[
2x - 3y - 6 = 0
\]
\[
2(0) - 3y - 6 = 0
\]
\[
-3y - 6 = 0
\]
\[
\frac{3y}{3} = \frac{6}{3}
\]
\[
y = -2
\]

\[
4x + 5y - 20 = 0
\]

**x-intercept:**
\[
4x + 5(0) - 20 = 0
\]
\[
4x - 20 = 0
\]
\[
\frac{4x}{4} = \frac{20}{4}
\]
\[
x = 5
\]

**y-intercept:**
\[
4x + 5y - 20 = 0
\]
\[
4(0) + 5y - 20 = 0
\]
\[
5y - 20 = 0
\]
\[
\frac{5y}{5} = \frac{20}{5}
\]
\[
y = 4
\]
Practice: Graph the following equations:

\[ y = 2x + 2 \]

\[ y = mx + b \]

\[ y \text{-int: } 2 \]

\[ m = \frac{\text{rise}}{\text{run}} = \frac{2}{1} \]

\[ 6x - 3y + 6 = 0 \]

\[ 6(x) - 3y + 6 = 0 \]

\[-3y + 6 = 0 \]

\[ -3y = -6 \]

\[ y = \frac{-6}{-3} = 2 \]

\[ x \text{-int: } \]

\[ 6x - 3(x) + 6 = 0 \]

\[ 6x + 6 = 0 \]

\[ -6 \]

\[ \frac{6x = -6}{6} \]

\[ x = -1 \]

Linear relations can have 1, 0, or an infinite number of intercepts.