3 EQUATIONS TO DESCRIBE A LINE

METHOD 1: \( y = mx + b \)
METHOD 2: \( P/I \) \( y - y_1 = m(x - x_1) \)

5.4 Method 3: Writing Equations in Standard Form

Your Notes:

The standard form of a linear is \( Ax + By = C \) where A, B, and C are INTEGERS.

The best method to graph lines in this form is with \( x \) and \( y \) intercepts.

EXAMPLE 1
Put the following equations in Standard Form:

\[
\begin{align*}
\text{a) } y &= -2x + 6 \\
2x + y &= 6
\end{align*}
\]

\[
\begin{align*}
\text{b) } y + 4 &= -2(x - 5) \\
2x - y &= 10
\end{align*}
\]

\[
\begin{align*}
\text{c) } (4x + .2y) &= 1.2 \\
2x + y &= 6
\end{align*}
\]

\[
\begin{align*}
\text{d) } 2/3x + 1/3y &= 2 \\
2x + y &= 6
\end{align*}
\]

EXAMPLE 2 Write an equation from a graph

Write an equation in standard form of the line shown.

Solution

Step 1 Calculate the slope.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - (-4)}{6 - 2} = \frac{8}{4} = 2
\]

All linear equations can be written in standard form, \( Ax + By = C \).
Since we do not know the y-intercept we must use P/S Form.

**Step 2**
Write an equation in point-slope form.
Use (2, 4). You can pick either point:

\[
M = \frac{-2}{2} \Rightarrow y - 4 = -2(x - 2)
\]

**Step 3**
Rewrite the equation in standard form.

\[
y - 4 = 2x + 4
\]

\[
2 + 4 = 2x + 4
\]

\[
2x + y = 8
\]

**Checkpoint** Complete the following exercise.

3. Write an equation in standard form of the line through (3, -1) and (2, -4).

\[
M = \frac{\Delta y}{\Delta x} = \frac{-1 + 4}{3 - 2} = 3
\]

**Step I** Find slope

**Step II** Pick one point and put in P/S

\[
y - y_1 = M(x - x_1)
\]

\[
P/S (3, -1)
\]

\[
y + 1 = 3(x - 3)
\]

\[
y + 1 = 3x - 9
\]

\[
-3x - 1
\]

\[
-3x + y = -10
\]

\[
\text{Why is this the same equation?}
\]

\[
3x - y = 10
\]