5-4 Standard - Slope-Intercept - Point-Slope

Linear equations can look different, but still represent the same line. In Algebra, we often use three common forms: Standard Form ($Ax + By = C$), Slope-Intercept Form ($y = mx + b$), and Point-Slope Form ($y - y_1 = m(x - x_1)$). Each format tells us different things about the same line and helps us solve different types of problems.

The Standard Form of a linear equation is: $Ax + By = C$

where A, B, and C are real numbers, and A and B are not both zero. Usually A is positive and all terms are integers. The standard form can let us: 1) quickly find intercepts (where the line crosses the x- or y-axis); 2) easily solve systems of linear equations by elimination.

 Example: 3x + 2y = 12

To find the intercepts:
Let $x = 0 \rightarrow 2y = 12 \Rightarrow y = 6 \rightarrow$ y-intercept (0, 6)
Let $y = 0 \rightarrow 3x = 12 \Rightarrow x = 4 \rightarrow$ x-intercept (4, 0)

Slope-Intercept Form is: $y = mx + b$

Where m is the slope and b is the y-intercept. The slope intercept form can let us: 1) quickly find intercept at the y-axis; 2) easily identifies the steepness of the line (slope)

Example: y = ⅔ x - 4
Slope = ⅔ and y intercept = (0,-4)
:
To convert to standard form:
   1)   Eliminate fractions: Multiply both sides by 3; $3y = 2x - 12$
   2) Rearrange terms: $-2x + 3y = -12$
   3) Make A positive: $2x - 3y = 12$

Point-Slope Form is: $y - y_1 = m(x - x_1)$

It's useful when we know the slope and a point on the line.

Example: A line passes through (2, -3) with slope 4: $y + 3 = 4(x - 2)$

To convert to standard form:
   1) Distribute and rearrange: $y + 3 = 4x - 8$
   2) Rearrange terms: $y = 4x - 11$