Key Concepts for Graphs and Slopes of Lines (7.1)

I. Linear Equation in Standard Form: $Ax + By = C$

II. x-intercept: $(x, 0)$ – point where the line crosses the x-axis

y-intercept: $(0, y)$ – point where the line crosses the y-axis

Ex: $2x + 3y = 12$

To find x-intercept: set $y = 0$ and solve for $x \rightarrow (6, 0)$

To find y-intercept: set $x = 0$ and solve for $y \rightarrow (0, 4)$

III. Slope of a Line – a number that measures the steepness and direction of the line

If $(x_1, y_1)$ and $(x_2, y_2)$ are two points on the line, then

$$\text{Slope} = m = \frac{\text{Rise}}{\text{Run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

Once we know these two points, we can calculate the slope of the line:

$$m = \frac{0 - 4}{6 - 0} = -\frac{4}{6} = -\frac{2}{3}$$

Notice what happens if we take the above equation and solve for $y$:

$$3y = -2x + 12$$

$$y = -\frac{2}{3}x + 4$$

The constant in front of the variable $x$ is the slope of the line. Therefore, given the standard equation of a line, you can find the slope of the line by solving for $y$.

IV. Graph each line that satisfies the conditions:

a.) Passes through $(0, -1)$; $m = \frac{1}{2}$

b.) Passes through $(2, 2)$; $m = -\frac{3}{2}$

V. Parallel / Perpendicular Lines

Parallel lines have the same slope: $m_1 = m_2$

Perpendicular lines have slopes that are negative reciprocals: $m_1 = -\frac{1}{m_2}$ or $m_1 \cdot m_2 = -1$

Ex: Determine if the lines $3x - 8y = 8$ and $32x + 12y = -10$ are parallel, perpendicular, or neither.