Section 2.4—More on Slope

Slope is defined as the ratio of the change in y to the corresponding change in x.
It describes how fast y changes with respect to x.

Parallel Lines—two nonintersecting lines in the same plane

Slopes & Parallel Lines:

- ✓ Parallel lines have the same slope.
- ✓ If 2 lines have the same slope, then they are parallel.
- ✓ If 2 lines are vertical and have undefined slopes, they are parallel.

same slope

Example: Write an equation of the line passing through $(-2,5)$ and parallel to the line whose equation is $y = 3x + 1$. Express the equation in point-slope form and slope-intercept form.

$y - y_1 = m(x - x_1)$

$y - 5 = (3)(x - (-2))$

$y - 5 = 3(x + 2)$

↳ point slope

$y - 5 = 3x + 6$

$+5 \qquad +5$

$y = 3x + 11$

↳ slope intercept

Perpendicular Lines—two lines that intersect at a right angle

Slopes & Perpendicular Lines:

flip & change the sign

- ✓ Perpendicular lines have slopes that are negative reciprocals.
- ✓ If the product of the slopes of two lines is (-1), the lines are perpendicular.
- ✓ A horizontal line have zero slope is perpendicular to a vertical line with an undefined slope.

Example: Write the equation of the line passing through $(-2,-6)$ and perpendicular to the line whose equation is $x + 3y - 12 = 0$. Express the equation in slope intercept and general form.

$Ax + By + C = 0$

$x + 3y - 12 = 0$

$-x \qquad -x$

$3y - 12 = -x$

$+12 \qquad -12$

$3y = -x - 12$

$\frac{3y}{3} = \frac{-x}{3} - \frac{12}{3}$

$y = -\frac{1}{3}x - 4$

$m = -\frac{1}{3}$

$m\perp = 3$

$y - y_1 = m(x - x_1)$

$y - (-6) = 3(x - (-2))$

$y + 6 = 3(x + 2)$

$y + 6 = 3x + 6$

$-6 \qquad -6$

$y = 3x$ → slope intercept

$y = 3x$

$-3x \quad -3x$

$-3x + y = 0$

$3x - y = 0$