

Section 2.3 and 2.4 Forms of Linear Equations Parallel and Perpendicular Lines

Slope of a line:

The slope m of the line that contains the points (x_1, y_1) and (x_2, y_2) is given by:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Example:

Find the slope of the line that contains the points $(2, -3)$ and $(-4, -1)$.

The equation of the horizontal line that contains the point (a, b) is $y = b$. The slope of a horizontal line is 0.

The equation of the vertical line that contains the point (a, b) is $x = a$. The slope of a vertical line is undefined. In other words, a vertical line has no slope.

Point-Slope equation for a line:

The line that contains the point (a, b) and has a slope of m is given by the equation:

$$y - b = m(x - a)$$

Slope-Intercept equation for a line:

The line that has a slope m and a y -intercept of b is given by the equation:

$$y = mx + b$$

Note: If you take any equation of a line and you solve for y and simplify you will get the slope-intercept equation.

Example:

Find the slope-intercept equation for the line that contains the points $(2, -1)$ and $(4, -6)$

Two lines are parallel if and only if they have the same slope.

Two lines are perpendicular if and only if their slopes are opposite reciprocals.

Find the equation of the line in slope-intercept form for the line that contains the point $(3, -2)$ and is perpendicular to the line $2y + 3x = 4$.

Find the equation of the line in slope-intercept form for the line that contains the point $(\frac{1}{4}, -\frac{5}{8})$ and is parallel to the line $x = -3$