

Study Guide

Equations of a Line 02/29/2012

Equations of a Line

Every line on any coordinate graph has a corresponding equation which describes every point on the line. Every linear equation (equation of the line) contains a slope. The slope of a line is the same between any two points on the line.

Before you can find the equation of a line, you must first be able to find the slope of a line when given two coordinate points on the line. These two points are named: (x_1, y_1) and (x_2, y_2) . The formula for the slope of a line follows.

$$\text{Slope (m)} = \frac{y_2 - y_1}{x_2 - x_1}$$

Example 1: Find the slope of the line between Point R (2, 4) and Point S (1, 3).

$$\begin{array}{ll} \text{(1)} & \text{(2)} \\ m = \frac{3-4}{1-2} & m = \frac{-1}{-1} \\ & m = 1 \end{array}$$

Step 1: Substitute the given coordinate points into the formula.

Step 2: Simplify the fraction.

Answer: The slope of the line is 1.

The Point-Slope form for the equation of a line:

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

Example 2: Use the following points to find the equation of the line.

Point T (7, -3)

Point U (-4, 6)

$$\begin{array}{llll} \text{(1)} & \text{(2)} & \text{(3)} & \text{(4)} \\ m = \frac{6 - (-3)}{-4 - 7} & y - (-3) = -\frac{9}{11}(x - 7) & y + 3 = -\frac{9}{11}x + \frac{63}{11} & y + 3 = -\frac{9}{11}x + \frac{63}{11} \\ m = \frac{6 + 3}{-4 - 7} & & & \frac{-3}{y + 3} = \frac{-3}{-\frac{9}{11}x + \frac{30}{11}} \\ m = \frac{9}{-11} = -\frac{9}{11} & & & y = -\frac{9}{11}x + \frac{30}{11} \end{array}$$

Step 1: Solve for the slope of the line between Point T and Point U.

Step 2: Use one of the coordinate points and the slope and substitute them into the Point-Slope form for the equation of a line.

Step 3: Simplify both sides of the equation.

Step 4: Subtract 3 from both sides of the equation.

The equation of the line that passes through (7, -3) and (-4, 6) is $y = -9/11x + 30/11$.