Lines, Lines, Lines!!!

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Introduction & Overview

Introduction

Lines, Lines, Lines!!! is a unit based on the study of lines as they relate to the coordinate plane. It explains the ins and outs of several different formulas and equations. It guides the teachers and students in a step by step process on how to find, graph, and determine which type of lines they are and their equations.

This unit covers the following topics:

- **Slopes**
  The ratio of the change in y-coordinates to the corresponding change in x-coordinates. The slope measures how steep a line is.

- **Slope-intercept Form of a linear equation**
  This is the equation of a line in the form y = mx + b, wher m is the slope and b is the y-intercept.

- **Point-slope form of a linear equation**
  This is the equation of a line the form $y - y_1 = m(x - x_1)$.

- **Standard form of a linear equation**
  This is a linear equation written in the form Ax + By = C, where A, B, and C are real numbers and A and B are not both zero.

- **Horizontal and Vertical lines**
  This is a comparison of the two different types of lines and their slopes.

- Parallel and Perpendicular lines
  This is a study of Parallel lines as two nonvertical coplanar lines with the same slope and Perpendicular lines as any two oblique lines with opposite reciprocal slopes.

In order to fully understand and get the best out of this unit, a basic knowledge of linear equations, linear functions, and points on the coordinate plane is necessary.

What are linear equations?

A linear equation has no operations other than addition, subtraction, and multiplication of a variable by a constant.
- The variables may not be multiplied.

- The variables my not appear in the denominators.

- Does not contain variable with exponents other than 1.

- The graph of a linear equation is always a line.

What is a linear function?

A linear function is a function who's ordered pairs satisfy a linear equation. It is any linear form which can be written in the form $f(x) = mx + b$, where m and b are real numbers.

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What is the coordinate plane? How do I label the coordinate plane?

The coordinate plane, also known as the Cartesian coordinate plane, is a plane divided into four quadrants by the intersection of the x-axis and the y-axis at the origin. The y-axis is a vertical line with positive number above the intersection and negative numbers bellow it. The x-axis is a horizontal line with positive numbers to the right of the intersection and negative numbers to the left.

The coordinate plane is a combination of two perpendicular (forming a right angle) numbers lines.

y-axis

Quadrant II		Quadrant I

⊙ (5, 4)

5 = x-coordinate
4 = y-coordinate

x-axis

Quadrant III		Quadrant IV
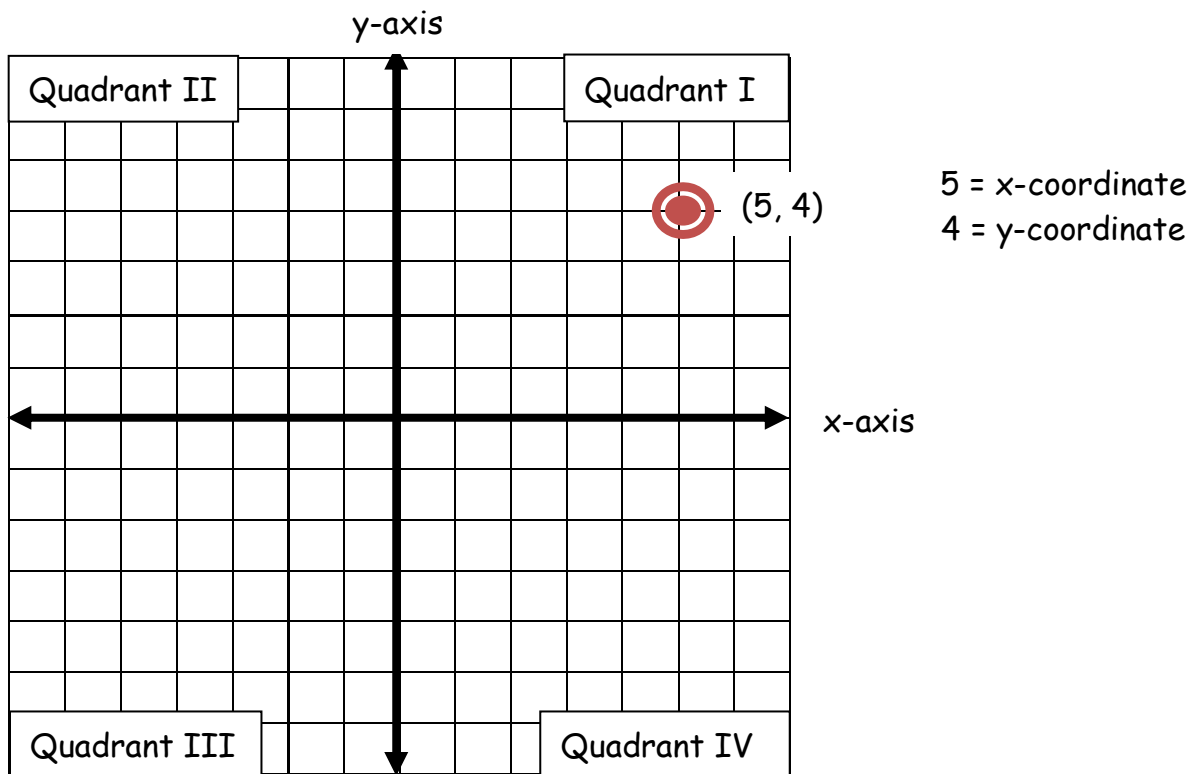
Every point on the number line is composed of two numbers such as (5, 4) illustrated above. The first numbers always give the coordinate of the x-axis and the second number the coordinate of the y-axis. Therefore every time we refer to points of the coordinate plane, we refer to them as (x, y).

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Best of luck in your classrooms and may this material be of aid to you in building the mathematicians of tomorrow, today.