Instruction

Prerequisite Skills

This lesson requires the use of the following skills:

- evaluating equations to complete a table of values

- connecting a table of values to ordered pair solutions of an equation

- plotting ordered pairs in the coordinate plane

- connecting plotted points with a curve that will represent all solutions to the equation

- solving equations in standard form for y

- creating equations from context

- evaluating negative exponents

Introduction

In an equation with one variable, x, the solution will be the value that makes the equation true. For example:

1 is the solution for the equation $x = 1$.

2 is the solution for the equation $2^x = 4$.

The solution of an equation with two variables x and y is the pair of values (x, y) that make the equation true. For example:

$(1, 2)$ is a solution to the equation $y = 2x$ because the statement $2 = 2$ is true.

$(1, 3)$ is not a solution for $y = 2x$ because the statement $3 = 2$ is false.

The pairs of values (x, y) are called **ordered pairs**, and the set of all ordered pairs that satisfy the equation is called the **solution set**. Each ordered pair in the solution set represents a point in the coordinate plane. When we plot these points, they will begin to form a curve. A **curve** is a graphical representation of the solution set for the equation. In the special case of a linear equation, the curve will be a straight line. A **linear equation** is an equation that can be written in the form $ax + by = c$, where a, b, and c are rational numbers. It can also be written as $y = mx + b$, in which m is the slope, and b is the y-intercept.

It is important to understand that the solution set for most equations is infinite; therefore, it is impossible to plot every point. There are several reasons the solution set is infinite; one reason is that there is always a number between any two numbers x_1 and x_2, and for that number there will be a y that satisfies the equation. So when we graph the solution set for an equation, we plot several points and then connect them with the appropriate curve. The curve that connects the points represents the infinite solution set to the equation.

Key Concepts

- A solution to an equation with two variables is an ordered pair, written (x, y).

- Ordered pairs can be plotted in the coordinate plane.

- The path the plotted ordered pairs describe is called a curve.

- A curve may be without curvature, and therefore is a line.

- An equation whose graph is a line is a linear equation.

- The solution set of an equation is infinite.

- When we graph the solution set of an equation, we connect the plotted ordered pairs with a curve that represents the complete solution set.

Common Errors/Misconceptions

- believing the number of solutions an equation has is limited to points seen on the graph

- incorrectly evaluating the equation for different given values

- incorrectly plotting ordered pair solutions on a coordinate plane