Solutions to Linear Equations

Let's think about what it means to be a solution to a linear equation with two variables in it.

13.1 Avocados and Pineapples

At the market, avocados cost $1 each and pineapples cost $2 each. Find the cost of:

1. 6 avocados and 3 pineapples

2. 4 avocados and 4 pineapples

3. 5 avocados and 4 pineapples

4. 8 avocados and 2 pineapples

13.2 More Avocados and Pineapples

At the market, avocados cost $1 each and pineapples cost $2 each.

1. Noah has $10 to spend at the produce market. Can he buy 7 avocados and 2 pineapples? Explain or show your reasoning.

2. What combinations of avocados and pineapples can Noah buy if he spends all of his $10?

3. Write an equation that represents $10 combinations of avocados and pineapples, using a for the number of avocados and p for the number of pineapples.

4. What are 3 combinations of avocados and pineapples that make your equation true? What are three combinations of avocados and pineapples that make it false?

Are you ready for more?

1. Create a graph relating the number of avocados and the number of pineapples that can be purchased for exactly $10.
2. What is the slope of the graph? What is the meaning of the slope in terms of the context?

3. Suppose Noah has $20 to spend. Graph the equation describing this situation. What do you notice about the relationship between this graph and the earlier one?

13.3 Solutions and Everything Else

There are two numbers. When the first number is doubled and added to the second number, the sum is 10.

1. Let x represent the first number and let y represent the second number. Write an equation showing the relationship between x, y, and 10.

2. Draw and label a coordinate plane.

3. Find 5 pairs of x- and y-values that make the statement and your equation true. Plot each pair of values as a point (x, y) on the coordinate plane. What do you notice?

4. List 10 pairs of x- and y-values that do not make the statement and equation true. Using a different color, plot each pair of values as a point (x, y) on the coordinate plane. What do you notice about these points compared to your first set of points?

Lesson 13 Summary

A **solution to an equation with two variables** is any pair of values for the variables that make the equation true. For example, the equation $2x + 2y = 8$ represents the relationship between the width x and length y for rectangles with a perimeter of 8 units. One solution to the equation $2x + 2y = 8$ is that the width and length could be 1 and 3, since $2 \cdot 1 + 2 \cdot 3 = 8$. Another solution is that the width and length could be 2.75 and 1.25, since $2 \cdot (2.75) + 2 \cdot (1.25) = 8$. There are many other possible pairs of width and length that make the equation true.

The pairs of numbers that are solutions to an equation can be seen as points on the coordinate plane where every point represents a different rectangle whose perimeter is 8 units. Here is part of the line created by all the points (x, y) that are solutions to $2x + 2y = 8$. In this situation, it makes sense for the graph to only include positive values for x and y since there is no such thing as a rectangle with a negative side length.