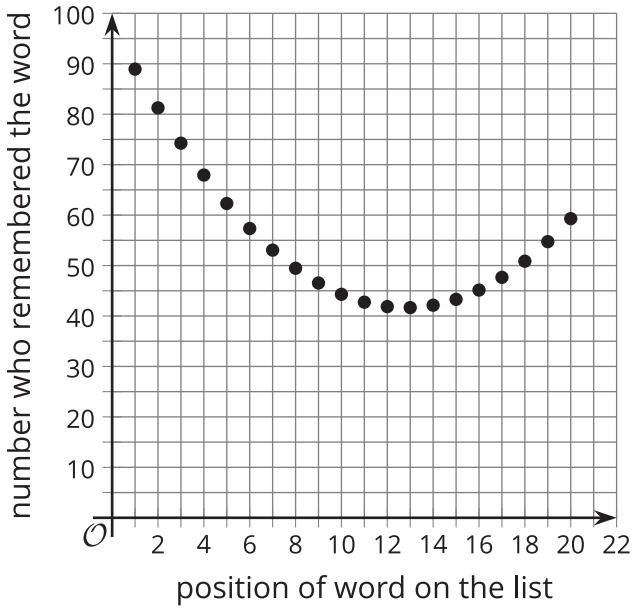
Unit 8, Lesson 2

Equations and Graphs

Let's explore solutions to equations.

2.1 Notice and Wonder: The Word List

A group is asked to memorize a list of 20 words and then to recall as many as possible later. An equation that models the relationship between the position of the word on the list, n, and the number of people in the group who remembered the word, P, is $P = 0.34n^2 - 8.7n + 97.3$.



What do you notice? What do you wonder?

2.2 Seeing Solutions

1. A person is hiking from the top of a mountain into a valley. The function $2{,}000 - 32t$ represents the person's elevation in feet above sea level, t minutes after they started their hike.

   a. What does a solution to the equation $2{,}000 - 32t = 0$ mean?

   b. Use technology to create a graph of $y = 2{,}000 - 32t$. Where do you see the solution to that equation on the graph?

2. A new electronic device originally costs $1,000 but loses $175 worth of value every year.

   a. Write a function that represents the worth of the device after s years.

   b. How many years until the device is worth $0?

   c. Use technology to graph the function. Where can you see the solution to your equation on the graph?

2.3 Understanding Solutions in Situations

1. The expression $5.25 + 0.85x$ represents the amount a rideshare service charges for a ride going x miles.
   a. What does the equation $5.25 + 0.85x = 7.08$ mean in this situation?

   b. What would a solution to this equation mean?

   c. How can you use graphing technology to find the solution to the equation? What is the solution and what does it mean in this situation?

2. A bookstore charges a $5 delivery fee no matter how many items are ordered. Each book at the store costs $12.
   a. Write an equation that represents the amount it costs to have x books delivered.

   b. Write an equation that has a solution representing the number of books ordered to cost $77.

   c. Use technology to graph your equation. Where can you see the solution to the equation on the graph? What is the solution and what does it mean in this situation?

3. The temperature in a deep freezer in a laboratory is -40 degrees Celsius. The freezer breaks, so the temperature starts to rise by 2.5 degrees per hour.
   a. Use technology to graph $y = -40 + 2.5x$.

b. Explain how to use this graph to find the time (after breaking) when the freezer temperature reaches 0 degrees Celsius.

4. The expression $360 - 10x^2$ represents the height, in meters, of an object above the ground x seconds after falling off a 360-meter building.

   a. Write an equation that has a solution that would give the time, in seconds, when the object hit the ground.

   b. Use technology to graph $y = 360 - 10x^2$, and explain where you can see the solution to your equation on the graph.