

Linear Systems

Systems of Linear Equations

A **system of linear equations** is a group of linear equations that involve the same set of variables. For example, the following equations are a system if x and y represent the same item in both equations:

$$\begin{cases} x = 2y + 1 \\ y = x \end{cases}$$

A real-life example will illustrate this idea.

Long Distance Inc. charges \$3 per month plus \$0.30 per minute. Far Away Calls charges \$10 per month plus \$0.02 per minute.

The system of linear equations for this problem is

$$\begin{cases} y = 0.30x + 3 \\ y = 0.02x + 10 \end{cases}$$

The x -value in each equation represents the number of minutes of long distance calls. Multiplying the cost per minute by the number of minutes, $0.30x$ and $0.02x$, will give the amount spent on phone calls with each company. Adding the monthly fee to the amount spent on phone calls, \$3 and \$10, respectively, will give the total amount for each company, which is what the y -value represents in each equation.

How many minutes would you have to spend on the phone before the cost would be the same for both companies? How many minutes do you

think you will use in any given month? When would it be better to use Long Distance Inc.? When would it be better to use Far Away Calls?

These are some of the questions you can answer using systems of linear equations. The **solution** to the system is the ordered pair that makes both equations true and answers the question: How many minutes would you have to spend on the phone before the cost would be the same for both companies?

A group of linear equations is called a...

The solution to a system of linear equations is...
