

In this technology assignment, you create a system of equations for your project. Once you have created the system of equations, you'll use a shared Google Docs document to write down the system. Each member of your team should write down the system of equations for a different level of contamination in Well 3.

Find the Equations for the Project

One strategy for solving problems is to examine another similar problem. Since this problem involves mixing liquids, let's examine a simpler problem.

A nurse has two solutions that contain different concentrations of a certain medication. One is a 12% concentration, and the other is an 8% concentration. How many cubic centimeters (cc) of each should she mix together to obtain 20 cc of a 9% solution?

College Algebra in Content (2ed), Harshberger and Yocco

A good place to start any problem is by determining what it is that we need to find. In this example, we need to find the amounts of 12% and 8% medication that must be mixed together. These unknown quantities correspond to the variables in the problem. So write

x : amount (in cc) of 12% medication

y : amount (in cc) of 8% medication

The equations for this problem result from totals hidden in the problem statement. For instance, this mixture must be a total of 20cc or

$$\text{amount of 12\% medication} + \text{amount of 8\% medication} = 20$$

In terms of the variables,

$$x + y = 20$$

The other total in this problem is the total amount of pure medicine in the final mixture. To find this amount, multiply the concentration times the volume,

$$9 \text{ percent of } 20 \text{ cc} = (.09)(20) = 1.8$$

This tells you that the final mixture of 20 cc will contain 1.8 ccs of pure medicine. We can also find the amount of medicine in the components using a similar strategy:

$$12 \text{ percent of } x \text{ cc} = (.12)(x) = .12x$$

$$8 \text{ percent of } y \text{ cc} = (.08)(y) = .08y$$

These amounts combine to give the total of 1.8 cc of pure medicine,

$$.12x + .08y = 1.8$$

Let's summarize this information in a table.

	Amount of Medicine	Amount of Pure Medicine
12% medication	x	$.12x$
8% medication	y	$.08y$
Mixture	20	$.09(20)$

Each row in the second column relates to amounts of medicine, as individual components or as part of the mixture. The third column describes the amounts of pure medicine in the corresponding liquids. This helps us to see that the system of equations for this problem is

$$x + y = 20$$

$$.12x + .08y = 1.8$$

Use this strategy to find a system of equations for your project. Instead of amount of diluted medicine and amounts of pure medicine, you'll need to find an equation for the total amount of contaminated water and an equation for arsenic in that mixture. Once you have those equations, watch the video in the tech assignment folder on how to use the shared document to communicate your equations.