Example: During one cold football game, the math club made $685 selling large cups of hot chocolate and coffee. They used 420 cups and sold the hot chocolate for $1.75 per cup and the coffee for $1.25 per cup. Write a system of equations that could be used to determine how many cups of each type of drink they sold.

Solution:
Let h = the number of cups of hot chocolate they sold
Let c = the number of cups of coffee they sold

If they used 420 total cups, then h + c = 420 represents the number of cups used that game.
If they made $685 dollars and sold each cup of hot chocolate for $1.75 and each cup of coffee for $1.25, then the equation that represents all of the money is 1.75h + 1.25c = 685.

Consequently, they system modeling this situation is $\begin{aligned} h + c &= 420 \\ 1.75h + 1.25c &= 685 \end{aligned}$

Example: A gardener has two kinds of solutions containing fertilizer and water. One is 5% fertilizer and the other is 15% fertilizer. The gardener needs 50 liters of a 12% solution and needs to make it by mixing. What system of equations could be used to find out how much of each solution should be used?

Solution:
Let x = the number of liters of the solution containing 5% fertilizer
Let y = the number of liters of the solution containing 15% fertilizer

Since the gardener is going to mix these two fertilizer solutions into one solution that is a total of 50 liters, one of the equations representing the total amount of the solution is x + y = 50.
The other equation needs to represent just the amount of fertilizer in the solutions. The amount of fertilizer that is in the 5% solution would be found by multiplying 5% and the number of liters for that solution. (The other 95% is some other liquid, most likely water.) We would change the percent to a decimal and multiply, so the amount of fertilizer in the 5% solution that would be mixed into the total fertilizer solution would be 0.05x. Likewise, the amount of fertilizer in the 15% solution would be 0.15y and the amount of fertilizer in the total package would be 0.12(50) or 6 liters of fertilizer out of the 50 liters total.

Therefore, the system that could be used to find x and y, the number of liters of the two solutions that the gardener needs to mix together is $\begin{aligned} x + y &= 50 \\ 0.05x + 0.15y &= 6 \end{aligned}$