4.1.2 How many equations do I need?

One Equation or Two?

In a previous lesson, you created one or two mathematical sentences that represented word problems. Today you will represent a word problem with two equations. You will also explore how to use the Equal Values Method to solve systems containing equations that are not in y = mx + b form.

4-20. ONE EQUATION OR TWO?

Elsie took all of her cans and bottles from home to the recycling plant. The number of cans was one more than four times the number of bottles. She earned 12ϕ for each bottle and 10ϕ for each can, and ended up earning \$2.18 in all. How many cans and bottles did she recycle?

Solomon decided to solve the problem by writing one equation. He said, "*I can let b* represent the number of bottles. Then 4b + 1 would be the number of cans. My equation would be 12b + 10(4b+1) = 218."

Marcus agreed with Solomon's answer, but said, "It is easier to solve this problem with two equations. I can let b represent the number of bottles and c represent the number of cans. That way my two equations are c = 4b + 1 and 12b + 10c = 218."

- a. Solomon's equation has three terms: 12b, 10(4b + 1), and 218. What do each of these terms represent in the problem?
- b. What do the parts of each of Marcus' equations, c = 4b + 1 and 12b + 10c = 218 represent?
- c. Solve this problem using Solomon's equation. Be sure to label your answer. You do not need to solve Marcus' equations.





4-21. Renard thought that writing two equations for problem 4-20 was easy, but he's not sure if he knows how to solve the system of equations. He wants to use two equations with two variables to solve this problem:

Ariel bought several bags of caramel candy and taffy. The number of bags of taffy was 5 more than the number of bags of caramels. Taffy bags weigh 8 ounces each, and caramel bags weigh 16 ounces each. The total weight of all of the bags of candy was 400 ounces. How many bags of candy did she buy?

a. Renard lets t = the number of taffy bags and c = the number of caramel bags. Help him write two equations to represent the information in the problem.



b. Now Renard is stuck. He says, "If both of the equations were in the form 't = something,' I could set the two equations equal to each other to find the solution." Help him change the equations into a form he can solve.

c. Solve Renard's equations to find the number of caramel and taffy bags that Ariel bought.

d. Discuss with your team how you can make sure your solution is correct.

4-22. When you write equations to solve word problems, you sometimes end up with two equations Change the first equation into "y =" form.

4x + y = 2y = -3x

4-23. A set of two or more equations with the same variables is called a **system of equations**. When you set the two equations equal to each other, you are using the **equal values method** of solving a system of equations. Now that you have both equations above in "y =" form solve the system of equations and check your solution.

Two more Systems of Equations. Solve using the Equal Values Method

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y = x - 6	x = -3y + 10
y = 12 - x	x = -6y - 2