Our Favorite Math Problem

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Coin Word Problem

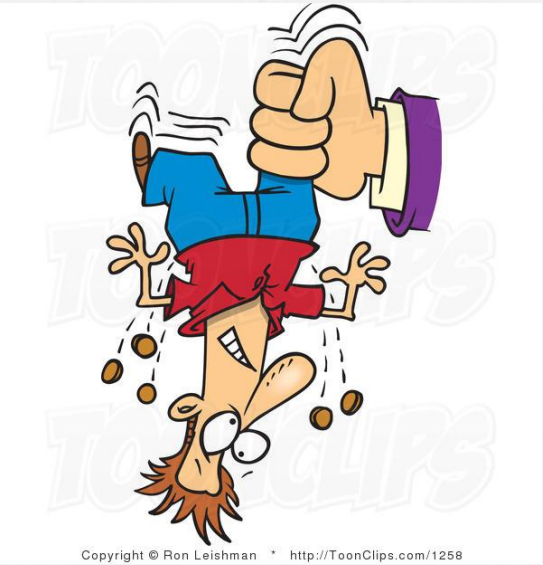
- Your best friend walks into a bar, jingling coins in his pocket. He grins at you and tells you that you can have all the coins if you can figure out how many of each kind of coin he is carrying. You're uninterested, until he tells you the coins add up to seventeen dollars. He tells you there are twenty six coins, which consist only of silver dollars and quarters. How many of each coin does he have?

Hints

- To solve his puzzle, you need to use:
  - The total number of coins
  - The values of the two types of coins
  - The total value of those coins
- Try assigning a variable or expression to the coins
- *Keep in mind the value of each type of coin

Hint

- If you are confused, try setting up a table



Don’t get too frustrated! Math is fun!

- We know there are 26 coins in total.
  - Some of the coins are quarters, which we can assign a variable, lets say "q"
    - "q" represents the total number of quarters
  - But what about the remaining coins?
    - If we have 26 coins, and q of them are quarters, then 26-q must be silver dollars

One more hint…

- If your friend has only one quarter, then 25 x 1 = 25 cents, coming from quarters.
- Similarly, if your friend has two quarters, then 25 x 2 = 50 cents, from quarters.
- Keep this in mind

- Since we know your friend has q quarters, then the value of the quarters must equal…

  25 x q = 25q cents from quarters

*This relates back to our previous hint

- Since we now know an expression for the value of the quarters, we need to find an expression for the value of the silver dollars.
  - We said the amount of silver dollars are equal to 26-q… But what is an expression for the total value?
  - Lets consider converting the silver dollars into cents…
    - So $1.00= 100 cents

- Therefore, since he has 26-q dollars, he has

  100(26-q) cents from the silver dollars

- We know he has seventeen dollars in total (which will soon be yours)
- Lets convert the dollars to cents, since that is what we are working with

$17.00 = 1700 cents

- Part of which is from the quarters, and part of which is from the silver dollars

	Number of coins	Cents per coin	Total cents
Quarters	q	25	25q
Dollars	26-q	100	100(26-q)
Total	26		1700

- The total value comes from adding the value of the quarters and the value of the silver dollars
- So we add the "total cents" expressions from our table, and set them equal to the given total

$$25q + 100(26-q) = 1700$$

Solution!!

$$25q + 100(26-q) = 1700$$
$$25q + 2600 - 100q = 1700$$
$$-75q + 2600 = 1700$$
$$-75q = -900$$
$$q = 12$$

In other words, 12 of the coins are quarters. Since the total number of coins is 26, we know there are

$26-12 = 14$ silver dollars.

Check

- We can check to make sure the answer is right…

(14 x $1) + (12 x $0.25) = $14 + $3 = $17

Explanation

This problem combines a number of different concepts within Algebra. Not only do we use variables to solve the problem, but also we need to understand how to use expressions and equations (and how they differ). Additionally, ideas such as PEMDAS and combining like terms are utilized. Students can use this problem to become familiarized with these mathematical concepts. Furthermore, the coin problem is real world applicable, so we can see a direct connection between the topic and real life.

Also, you have a chance to win some MONEY!!