

Stephen Has 42 Coins That Are All Dimes And Nickels. The Value Of The Coins Is \$3.65. How Many Dimes

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Understanding how to determine the number of specific coins in a collection based on their total count and value is a common problem in basic algebra and arithmetic. In this particular scenario, Stephen possesses a total of 42 coins, all of which are either nickels or dimes, and the combined value of these coins amounts to \$3.65. The goal is to find out how many of these coins are dimes. This problem involves setting up and solving a system of equations based on the information provided.

In this article, we will explore the problem step-by-step, beginning with understanding the basic details, translating the problem into mathematical equations, and then solving those equations systematically. We will also discuss alternative methods for solving such problems, including intuitive reasoning and algebraic techniques.

Understanding the Problem

Before diving into the mathematics, it's important to clarify what information is given and what we need to find:

- Total number of coins: 42
- All coins are either nickels or dimes
- Total value of coins: \$3.65

Our primary goal: Determine the number of dimes among the 42 coins.

Given that each coin is either a nickel or a dime, this is a classic problem involving two variables and two equations.

Defining Variables

To proceed systematically, we assign variables:

- Let x = number of dimes
- Let y = number of nickels

Since all coins are either nickels or dimes:

- $x + y = 42$ (Equation 1)

Next, we consider the value contributed by each type of coin:

- Dimes are worth 10 cents each
- Nickels are worth 5 cents each

The total value of all coins is \$3.65, which is 365 cents. Therefore:

- $10 \text{ cents} \times x + 5 \text{ cents} \times y = 365$ (Equation 2)

With these two equations, we can now proceed to find the values of x and y .

Setting Up the System of Equations

The problem translates into the following system:

1. $x + y = 42$
2. $10x + 5y = 365$

Our goal is to solve for x (the number of dimes).

Solving the Equations

Step 1: Simplify the second equation

Divide the entire second equation by 5 to make calculations easier:

$$(10x + 5y) / 5 = 365 / 5$$
$$\Rightarrow 2x + y = 73 \text{ (Equation 3)}$$

Step 2: Use substitution or elimination

From Equation 1:

$$y = 42 - x$$

Substitute into Equation 3:

$$2x + (42 - x) = 73$$

Simplify:

$$2x + 42 - x = 73$$

$$x + 42 = 73$$

Subtract 42 from both sides:

$$x = 73 - 42$$

$$x = 31$$

Step 3: Find y

Recall $y = 42 - x$:

$$y = 42 - 31 = 11$$

Step 4: Verify the solution

- Total number of coins: 31 dimes + 11 nickels = 42 (checks out)
- Total value: $(31 \times 10\text{¢}) + (11 \times 5\text{¢}) = 310\text{¢} + 55\text{¢} = 365\text{¢} = \3.65 (checks out)

Thus, the solution is consistent.

Answer: How Many Dimes Does Stephen Have?

Based on the calculations:

- Stephen has 31 dimes.

The remaining 11 coins are nickels.

Additional Insights and Alternative Methods

While algebra provides a straightforward solution, there are other approaches or considerations worth discussing.

Using Visual or Logical Reasoning

- Recognize that the total value is \$3.65, and with only nickels and dimes, estimate the proportion of each.
- Since dimes are worth twice as much as nickels, a higher count of dimes would be expected to reach \$3.65 with 42 coins.

Checking for Multiple Solutions

- The problem constraints (whole numbers of coins, positive counts) lead to a

unique solution.

- Ensuring the counts are realistic (non-negative integers) confirms the solution's validity.

Summary

By translating the problem into algebraic equations, we systematically solved for the number of dimes Stephen has. The key steps involved:

- Defining variables for the counts of each coin type
- Writing equations based on total count and total value
- Simplifying and substituting to solve for the variables
- Verifying the solution's consistency

Final answer: Stephen has 31 dimes among his 42 coins, with the remaining 11 being nickels, totaling \$3.65 in value.

This problem exemplifies how basic algebra can be applied to solve real-world money and counting problems efficiently. Understanding how to set up and manipulate such equations is a vital skill in mathematics and everyday problem-solving.

Frequently Asked Questions

How many dimes does Stephen have if he has 42 coins totaling \$3.65, all of which are dimes and nickels?

Stephen has 19 dimes.

What is the total value of the nickels if Stephen has 42 coins worth \$3.65 and all are either dimes or nickels?

The total value of the nickels is \$0.60.

How many nickels does Stephen have if he has 42 coins totaling \$3.65 with only dimes and nickels?

Stephen has 23 nickels.

What is the number of dimes in Stephen's collection

if his coins total \$3.65 and he has 42 coins?

There are 19 dimes.

If Stephen has 42 coins consisting only of dimes and nickels, how do you find the number of dimes?

Set up equations for total coins and total value, then solve simultaneously to find the number of dimes.

Can you verify the number of dimes by calculation when Stephen has 42 coins totaling \$3.65?

Yes, by solving the system of equations, we find Stephen has 19 dimes.

What is the key step to determine the number of dimes in this problem?

Formulate and solve the system of equations based on total coins and total value to find the number of dimes.

Is the problem about solving a system of equations, and what are the equations involved?

Yes, the equations are: $d + n = 42$ and $0.10d + 0.05n = 3.65$, where d is dimes and n is nickels.

Additional Resources

Coins: Unraveling the Dilemma of Dimes and Nickels – A Detailed Exploration

When navigating the world of coins, especially in a scenario where the total number and value are known but the composition isn't, it becomes a fascinating puzzle that combines basic arithmetic with real-world currency understanding. Today, we delve into a classic problem involving Stephen's collection of coins—specifically, 42 coins all of which are either dimes or nickels, totaling \$3.65. Our goal is to determine precisely how many of these coins are dimes. This analysis not only sharpens problem-solving skills but also offers insights into the practical applications of algebra and logical reasoning in everyday contexts.

Understanding the Problem: The Basics of Coins and Their Values

Before diving into calculations, it's essential to grasp the foundational details of the coins involved:

The Coins in Question

- Nickel: A coin worth 5 cents (or \$0.05)
- Dime: A coin worth 10 cents (or \$0.10)

The Given Data

- Total number of coins: 42
- Total value of coins: \$3.65

The Objective

- Determine how many of the coins are dimes.

Breaking Down the Problem: Variables and Equations

To systematically approach the problem, we employ algebraic methods by defining variables that represent the unknown quantities.

Defining Variables

Let's denote:

- x = the number of dimes
- y = the number of nickels

Given these, we can establish two fundamental equations based on the problem statement:

1. The total number of coins:

$$\begin{aligned} &\backslash[\\ &x + y = 42 \\ &\backslash] \end{aligned}$$

2. The total value of coins:

$$\backslash[$$

$$(10 \text{ cents} \times x) + (5 \text{ cents} \times y) = 365 \text{ cents}$$

Expressed in cents for simplicity. This gives:

$$10x + 5y = 365$$

Solving the System of Equations: Step-by-Step Approach

Step 1: Express one variable in terms of the other

From the first equation:

$$x + y = 42 \rightarrow y = 42 - x$$

Step 2: Substitute into the second equation

Replace y in the value equation:

$$10x + 5(42 - x) = 365$$

Expanding:

$$10x + 210 - 5x = 365$$

Simplify:

$$(10x - 5x) + 210 = 365$$

$$5x + 210 = 365$$

Step 3: Isolate x

Subtract 210 from both sides:

$$\begin{aligned} & \backslash[\\ 5x &= 365 - 210 \\ & \backslash] \end{aligned}$$

$$\begin{aligned} & \backslash[\\ 5x &= 155 \\ & \backslash] \end{aligned}$$

Divide both sides by 5:

$$\begin{aligned} & \backslash[\\ x &= \frac{155}{5} = 31 \\ & \backslash] \end{aligned}$$

Step 4: Find y

Recall:

$$\begin{aligned} & \backslash[\\ y &= 42 - x = 42 - 31 = 11 \\ & \backslash] \end{aligned}$$

Interpreting the Results: How Many Dimes?

Based on our calculations:

- Number of dimes (x): 31
- Number of nickels (y): 11

Thus, Stephen has 31 dimes in his collection.

Verifying the Solution: Ensuring Accuracy

To ensure our solution is correct, let's verify both the total number of coins and the total value:

Total number of coins:

$$\begin{aligned} & \backslash[\\ x + y &= 31 + 11 = 42 \quad \checkmark \end{aligned}$$

\]

Total value:

\[
(10 \text{ cents} \times 31) + (5 \text{ cents} \times 11) = 310 + 55 = 365
\text{ cents} = \\$3.65 \quad \checkmark
\]

Since both conditions are satisfied, our solution is confirmed.

Implications and Practical Insights

This problem exemplifies how algebraic reasoning can be applied to everyday scenarios involving currency and inventory management. Whether you're sorting coins, planning a purchase, or analyzing collections, understanding how to set up and solve such systems can be incredibly useful.

Additional Considerations

- Variations in coin combinations: For instance, if the total value or number of coins changes, the same approach applies—just adjusting the equations accordingly.
- Real-world applications: Cashiers, coin collectors, and financial planners often use similar methods for quick calculations.

Tips for Solving Similar Problems

- Always define clear variables.
- Convert monetary values to a consistent unit (cents are preferred for simplicity).
- Set up equations based on total counts and total value.
- Use substitution or elimination methods for solving systems.
- Verify your solutions by plugging the numbers back into original equations.

Conclusion: Mastering the Coin Puzzle

In conclusion, through systematic algebraic reasoning, we've determined that Stephen has 31 dimes out of his 42 coins, totaling \$3.65. This problem highlights the power of basic mathematical principles in solving practical puzzles and underscores the importance of precise problem formulation and verification.

Whether you're a student sharpening your algebra skills or a curious coin enthusiast, understanding how to dissect such problems enhances your analytical thinking and decision-making capabilities. The next time you encounter a similar puzzle—be it with coins, items, or data—remember the approach: define variables, establish equations, solve systematically, and verify your results. With this methodology, solving complex-looking problems becomes a straightforward and rewarding exercise.

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