

Stacks of Coins

Dylan broke open his piggy bank and found a pile of quarters, dimes and pennies. He had a total of 52 coins. He used all of his coins to buy a book for \$5.98.

As he was stacking up his coins to pay the clerk, he realized 2 of the stacks had the same number of coins, while the 3rd stack had twice as many coins. How many quarters, dimes and pennies did Dylan have?

Exemplars

Stacks of Coins

Suggested Grade Span

3-5

Task

Dylan broke open his piggy bank and found a pile of quarters, dimes and pennies. He had a total of 52 coins. He used all of his coins to buy a book for \$5.98.

As he was stacking up his coins to pay the clerk, he realized 2 of the stacks had the same number of coins, while the 3rd stack had twice as many coins. How many quarters, dimes and pennies did Dylan have?

Alternate Versions of Task

More Accessible Version:

Dylan wants to buy a book for \$5.98. He broke open his piggy bank and found a variety of coins. What coins could he use to pay for the book?

More Challenging Version:

Dylan broke open his piggy bank and found a pile of quarters, dimes and pennies. He had a total of 52 coins. He used all of his coins to buy a book for \$5.98.

As he was stacking up his coins to pay the clerk, he realized 2 of the stacks had the same number of coins, while the 3rd stack had twice as many coins. How many quarters, dimes and pennies did Dylan have? If $\frac{1}{2}$ of the dimes were turned into nickels, how many nickels would there be, and what relation to the other piles would they have?

Context

This task was given to students who have been working with creating a chart to organize and solve problems. They had previously worked on "The Handshake Problem" and "The Twelve Days of Christmas."

What This Task Accomplishes

This task encourages students to use charts to organize information to solve problems.

Exemplars

What the Student Will Do

Some students will recognize that "twice as many" and two equal stacks will lead to the first part of the solution, the number of coins (13, 13 and 26). Others will arrive at this answer by using a chart or by repeated estimations. Once students have found the number of coins, they will need to determine the value for each stack of coins. To accomplish this, students will probably create a table to organize their information as they solve this part of the problem.

Time Required for Task

45 minutes

Interdisciplinary Links

This problem can be used in conjunction with a unit on money or in conjunction with a consumer education unit. It is also a nice introduction to using some of the tools of science or the scientific method.

Teaching Tips

I prepared my students for the problem by working with them using charts and tables to organize their thinking as they solved other problems.

Suggested Materials

- Paper
- Pencil
- Manipulatives

Possible Solutions

The answer is 13 quarters, 26 dimes and 13 pennies.

The student can arrive at a solution in a variety of ways. Some students will use tables to arrive at the appropriate number and value of coins. Students might also use manipulatives to represent different valued coins. Some students will immediately see that a key to a solution lies in the idea "twice as many" and "equal piles" and will divide and then manipulate the numbers in a table.

More Accessible Version Solution:

There are many possible solutions. Look for correctness in reasoning and computation when assessing the solution.

Exemplars

More Challenging Version Solution:

The answer is 13 quarters, 26 dimes and 13 pennies. The student can arrive at a solution in a variety of ways.

If 1/2 of the dimes are turned into nickels, there would be 13 quarters, 13 dimes, 13 pennies, and 26 nickels. There would be twice as many nickels as each of the other type coins.

Task Specific Assessment Notes

Novice

The student constructed a chart and began to randomly plug in numbers. There is no answer or explanation.

Apprentice

There is a partial strategy and a partial solution. The student set up a chart and began to plug in numbers at first seemingly at random. Regard is given to one stack equally half of the other two in their number selections and the student found 13, 13 and 26. It is not clear how s/he found these numbers. Three value possibilities with one set of numbers is not explored. The explanation is weak.

Practitioner

The student devised a chart and selected numbers with respect to the idea that two stacks are the same and one is twice as many. The student worked in an organized manner - the numbers were adjusted with each attempt. Different coin possibilities were tried for the numbers 13, 13 and 26. A correct answer and an explanation were included.

Expert

The student started working with the mathematical idea of "twice as many" and determined that 13, 13 and 26 were the number of coins in the pile. A chart was constructed to determine which amount went with which coin. The answer is correct and a logical explanation was included.