Coin Combinations

If you needed to buy the following items, how many different combinations of coins can you make to equal the total amount? (5 price tags are shown with the following prices: 10 cents, 12 cents, 3 cents, 7 cents and 2 cents).

Grade Levels Pre-K-2

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Context

We are studying money. After students had done coin trading; identified amounts of mixed coins; and identified coins for given amounts, I assessed their knowledge with this problem.

What This Task Accomplishes

This task allows the teacher to assess students' understanding of whole number operations such as multiplication, addition and money concepts. The problem requires students to decide how to approach the problem (each price, total or both) to find multiple solutions.

What the Student Will Do

Some students will add up the five price tags and make combinations of coins that equal 34 cents. Some students will write different coin combinations for each price tag under each one. Some of these students will be able to identify the different solutions, while others just show the combinations. Some students will be able to find only one solution while others find up to 16. Some students will make combinations for the total as well as the price tags.

Time Required for Task

20 - 30 minutes

Interdisciplinary Links

We did a cooperative art activity of making a store by drawing and coloring different items. The prices had to be divisible by five and no higher than two dollars. There could be no more than 10 different kinds of items in the store and the names of the items had to be on the merchandise. After the stores were complete, kids made a shopping list from all the stores. This gave them practice reading names of items and writing prices correctly. When their list was complete, they added up their prices using a calculator with adult assistance.

Teaching Tips

Decide on a code for the names of coins: p = penny, n = nickel, d = dime and q = quarter.

Have coins available for them to use.

Suggested Materials

- Pencil
- Problem on paper
- $20 in coins

Possible Solutions

Any combination of the following:

10 cents
one dime
two nickels
10 pennies
one nickel, five pennies

12 cents
one dime, two pennies
two nickels, two pennies
one nickel, seven pennies
12 pennies

Three cents
three pennies

Seven cents
one nickel, two pennies
seven pennies

Two cents
two pennies

Or combinations that equal the total of 34 cents:

one quarter, one nickel, four pennies
one dime, one nickel, 19 pennies
one dime, two nickels, 14 pennies
two dimes, two nickels, four pennies
two dimes, one nickel, nine pennies
one dime, three nickels, nine pennies
one dime, four nickels, four pennies
two dimes, 14 pennies

one dime, 24 pennies
one quarter, nine pennies
three dimes, four pennies

Benchmark Descriptors

Novice
This student has limited awareness of the problem. Initially, s/he used random amounts that totaled 34 cents and neglected to use the amounts of coins. When asked what the numbers meant, s/he told us they added up to 34 cents, but s/he could not show or explain the connection between what was recorded and the task. This student's solution(s) was unrelated to the problem and/or unorganized. His/her strategy did not help to solve the problem and there were so many errors that the problem could not be solved.

Apprentice
This student understood some of the problem. S/he used a strategy to help him/her find two solutions by making coin combinations for each price, but this student did not think there were any more possible solutions. S/he was uncertain that his/her solutions were correct because s/he could only make three cents and two cents with pennies.

Practitioner
This student understood the problem and used a strategy that led to four correct solutions using the total of the five prices. This student was able to explain how s/he used trial and error to find one of his/her correct solutions. There is a clear explanation and there is appropriate use of accurate mathematical representation.

Expert
This student had a broad understanding of the problem including the ability to identify the appropriate mathematical concepts and the information necessary for its solution. S/he used effective strategies to find two correct solutions for both the total price and each of the five prices. This student's solutions reflect organization, knowledge of coin values and willingness to take risks. There is a clear, effective explanation detailing how the problem is solved. All the steps are included so that the reader does not need to infer how and why decisions were made.