Coins

You and your friend are on your way to the store to buy some milk. When you get there your friend realizes that she is 40 cents short of what she needs and asks if she can borrow some money from you. You have 5 pennies, 3 nickels, 3 dimes and 1 quarter.

What are the different ways you can combine these coins to loan your friend 40 cents?

Show as many ways as you can.

Grade Levels Pre-K-2

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Context

This problem demonstrates students' number sense and problem-solving ability, while showing that they can use different ways to make a sum.

What This Task Accomplishes

In addition to allowing students to demonstrate their understanding of money, they are given the opportunity to manipulate numbers demonstrating their number sense and computational abilities.

What the Student Will Do

Most students will begin with diagrams or will use manipulatives to show different possible combinations. They will record their results using drawings, writings or in some cases equations. Some students will find only one solution, while others will find numerous solutions. The number of correct solutions and the explanation will be important in determining the level of performance.

Time Required for Task

Less than one hour

The time needed to solve this problem will vary depending on the student. Some students will take longer to get started while others will pursue multiple solutions.

Interdisciplinary Links

This problem can be related to discussions of the value and meaning of money.

Teaching Tips

Unless you are using this task to do an initial assessment of your students' abilities to solve multiple-answer problems, they should have been given numerous opportunities to work on and share multiple solutions. Students often like to stop after one solution. Encourage them to press for more solutions.

Suggested Materials

- Paper
- Pencil
- Manipulatives

Possible Solutions

This problem has multiple solutions.

1 quarter, 1 dime, 1 nickel

1 quarter, 1 dime, 5 pennies

1 quarter, 2 nickels, 5 pennies

3 dimes, 1 nickel, 5 pennies

2 dimes, 3 nickels, 5 pennies

1 quarter, 3 nickels

3 dimes, 2 nickels

A student's level of performance is determined by a demonstrated understanding of the problem, the application of strategies and procedures to successfully solve the problem, and the ability to communicate results. Higher levels of performance will show extensions, multiple solutions and more appropriate communication.

Benchmark Descriptors

Novice
Some Novices will not demonstrate enough understanding to begin the problem. Others might make an attempt that has no relation to the problem at all. The Novice piece shown here is from a student who shows enough understanding to be able to begin the problem, and has a basic strategy that will work to solve the problem. But the student does not understand mathematics procedures well enough to arrive at any solutions. This is a fairly sophisticated piece for this level and may fall between a Novice and an Apprentice.

Apprentice
An Apprentice has a partial understanding of the problem, but not enough so that s/he can work through to a correct solution. This Apprentice understands the problem well enough to begin and has an approach to laying out the problem that could work nicely (4:5 and 10:1 1:10). However, s/he cannot keep the constraints of the problem straight (uses four nickels, 10 pennies) and is not able to apply the basic mathematical procedures consistently. The communication does not convey the student's thinking.

Practitioner
The Practitioner has several solutions to the problem indicating a broad understanding, appropriate strategies and procedures and adequate mathematical representation. If there were more communication and mathematical representation, this solution would have fallen between Practitioner and Expert.

Expert
The Expert has a deep understanding of the problem made evident by the way it is laid out. S/he began with the larger coins and worked through multiple solutions to the problem. "I started with the big coins first and then used the littler ones." The mathematical representation, laying the coins out in order of their value, communicates ideas related to the solution of the problem nicely.