Constructing Task: How Much Money?

In this task, students will use division or other basic operations to find the number of coins equal to a given dollar value.

STANDARDS FOR MATHEMATICAL CONTENT

Perform operations with multi-digit whole numbers and with decimals to the hundredths.

MCC5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

We want students to understand that when they are trying to determine the number of coins of specific values, they are indeed performing division (measurement division). Then, when they are solving 34.50 divided by 0.25, one way to do this is to think of everything in terms of cents and determine how many groups of 25 cents can be made with 3450 cents. In this process, we changed both decimal numbers into whole numbers. Dividing to find the number of dimes might lead to an idea with efficiency. For example, instead of thinking about 3450 divided by 10, students can find the same answer by dividing 345.0 by 1.0.

Answers to the chart are shown below.

Final Daily Balance	*# of Pennies ($0.01)*	*# of nickels ($0.05)*	*# of dimes ($0.10)*	*# of quarters ($0.25)*
Example $34.50	*3450*	*690*	*345*	*138*
Day 1 -- $21.00	***2100***	***420***	***210***	***84***
Day 2 -- $35.50	***3550***	***710***	***355***	***142***
Day 3 -- $69.00	***6900***	***1380***	***690***	***276***
Day 4 -- $121.00	***12100***	***2420***	***1210***	***484***
Day 5 -- $234.50	***23450***	***4690***	***2345***	***938***

COMMON MISCONCEPTIONS

- *Multiplication can increase or decrease a number*. From previous work with computing whole numbers, students understand that the product of multiplication is greater than the factors. However, multiplication can have a reducing effect when multiplying a positive number by a decimal less than one or multiplying two decimal numbers together. We need to put the term *multiplying* into a context with which we can identify and which will then make the situation meaningful. Also using the terms *times* and *groups of* interchangeably can assist with the contextual understanding.

ESSENTIAL QUESTIONS

- What happens when we divide a decimal by a decimal?
- How do the rules of multiplying whole numbers relate to multiplying decimals?

MATERIALS

- "How Much Money?" recording sheet

GROUPING

Individual/Partner task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION:

TASK

Students will follow the directions below from the "How Much Money?" recording sheet.

You have been asked by your school principal to help count the money at your school store. Your job is to determine how many pennies ($0.01), nickels ($0.05), dimes ($0.10), and quarters ($0.25) you have at the end of the day.

Complete the chart below and determine the maximum number of each type of coin that can be found in the final daily school store balance.

Final Daily Balance	# of Pennies ($0.01)	# of nickels ($0.05)	# of dimes ($0.10)	# of quarters ($0.25)
Example $34.50	3450	690	345	138
Day 1 -- $21.00				
Day 2 -- $35.50				
Day 3 -- $69.00				
Day 4 -- $121.00				
Day 5 -- $234.50				

After you have completed the chart, answer the questions below. Be prepared to share your answers with the class.

1. How can you be assured your answers are correct? *Students should be able to "prove" their solutions make sense and be able to show how they arrived at their solution.*
2. How did you find your individual solutions?
3. Can you think of another method to find the number of coins in your daily balance?
4. Do you see any patterns? If so, what are they? *Various responses may be noted here. One possible response could be that "dimes are half the number of nickels each time." Another response could be that the "number of nickels is five times the number if pennies."*

FORMATIVE ASSESSMENT QUESTIONS

- How did you think about this problem?
- What operation did you use to find the number of pennies? Nickels? Dimes? Quarters?
- Is there another way you could have found the number of pennies? Nickels? Dimes? Quarters? Which method is more efficient? Which method is easier to do in your head?
- Do you notice any patterns as you look down each column? As you look across each row?

DIFFERENTIATION

Extension

- Have the students determine how many ways they can create the final daily balance with different combinations of coins. (Example: $21.00 = 2100 pennies, or 80 quarters and 400 pennies, or…)

Intervention

- Use manipulatives and/or real coins to model smaller amounts of money before moving to the recording sheet.

Name _____Date _____

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