A Problem on the Prairie

Everyday Mary and Laura walk to Mrs. Peterson's house to visit her. She always gives them each a Swedish cookie. One day when Mary and Laura walked home, they decided they would share their cookies with Baby Carrie who was at home and too little to join them. Laura thought she and Mary should each eat 1/2 of their cookies and give their other cookie halves to Baby Carrie. Mary argued that would not be fair. They need your advice. How should the girls share their cookies with Baby Carrie so that each sister gets her fair share?

Grade Levels 3 - 5

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Context

This problem was built into a unit that focused on number sense, specifically fractions. The students had been introduced to fractions through the creation of fraction bars and then were engaged in numerous exploratory activities around fractions. This created the background knowledge that the students brought to this task.

What This Task Accomplishes

This task was challenging for most of my third and fourth grade students. It allowed students to use objects to determine how to divide a whole. Of course, the object being shared was relevant to their own lives - cookies! Specifically, the task gave me an opportunity to see who had a good level of understanding of fractions and how to draw fractions to show parts of a whole.

What the Student Will Do

The students who did this problem all tackled it a little bit differently. Some used fraction pies to manipulate the pieces. Others began by sketching and then working to divide their two cookies on paper. The students who were most successful did a combination of the two. They began with the manipulatives and then worked them into drawings in their own work.

Time Required for Task

60 minutes

Interdisciplinary Links

The task would obviously be timely if students were reading *Little House on the Prairie*, but could also be incorporated into a unit on Sweden or holidays around the world.

Teaching Tips

For students with special needs, the numbers in the task could be easily adapted, making the task more into a division problem. For more gifted students, again, the numbers could be changed to make manipulating the denominators more challenging.

Suggested Materials

Fraction pieces (preferably fraction pies)

Possible Solutions

Two cookies split among three people equals 2/3 each because 2/3 + 2/3 + 2/3 = 6/3 = 2 whole cookies. This solution best maintains the mathematical integrity of the task.

Benchmark Descriptors

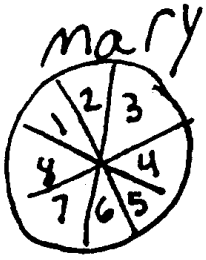
Novice
Novices will understand enough to draw two cookies, but will be unable to find a solution that divides them equally. The student's communication will be lacking so that we will be unable to follow the student's thought process. Little or no mathematical language will be used to communicate and the student will avoid the use of fractional notation.

Apprentice
Apprentices will divide the cookies, addressing fairness, but not in a way that preserves the mathematical integrity of the task. The Apprentice may use fractional notation and/or other mathematical language and will have diagrams that communicate an approach.

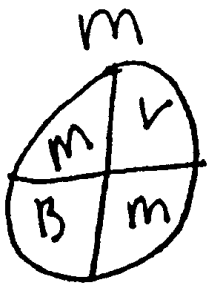
Practitioner
Practitioners will arrive at a solution that preserves the mathematical integrity of the task, finding a solution that truly divides the two cookies evenly among three people. The Practitioner will use language of fractions and other math language to communicate and diagrams will assist in communicating the solution.

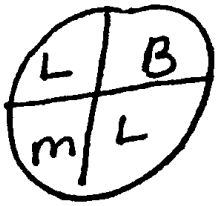
Expert
Experts will arrive at a correct solution and will go beyond the requirements of the task either by recreating the task and solving it again or by making mathematically relevant observations. The Expert will use precise math language and will have well labeled diagrams to communicate a solution.

Novice



16 piece

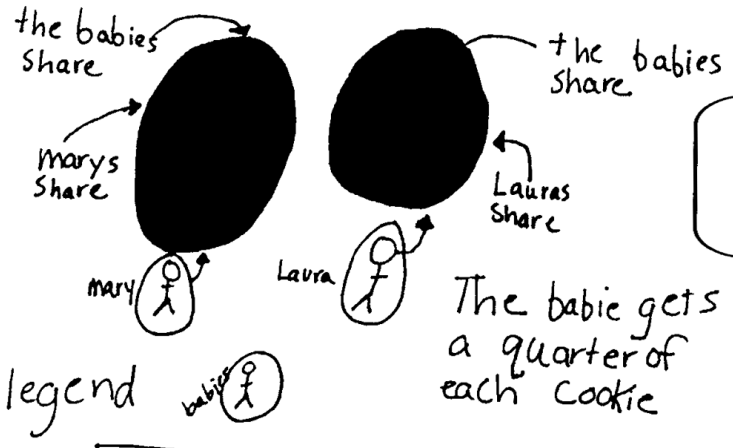




The student uses little or no math language to communicate.

The student is able to find a correct solution.

Apprentice



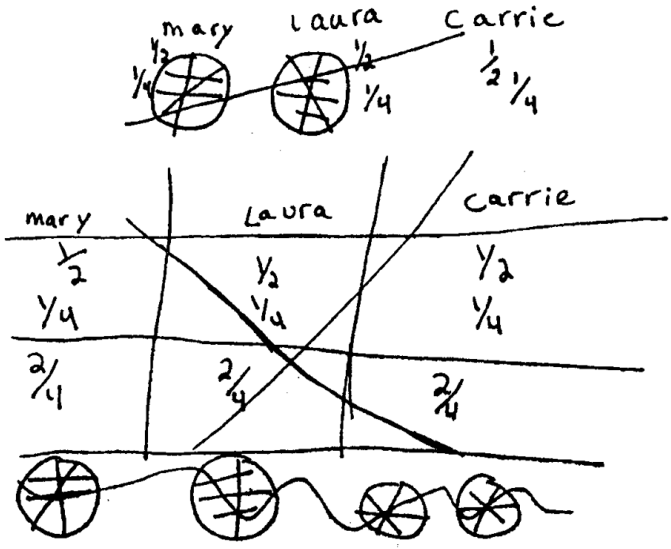
The student communicates the process used to solve the problem, although the final product is incorrect.

The student does create an accurate and appropriate diagram, which is labeled with a legend.

Well I started with 2 cookies so babie gets 1 quarter from each cookie if the babie got 1 hole then it wouldn't fair so I knew it had to be fair so I tried 1 quarter Then thats how I got 1 quarter from each cookie.

The student mistakes 1/3 for 1/4, leading to an incorrect answer.

Practitioner



The student accurately crossed out incorrect solutions showing good reasoning.

The student uses a diagram to solve the problem.

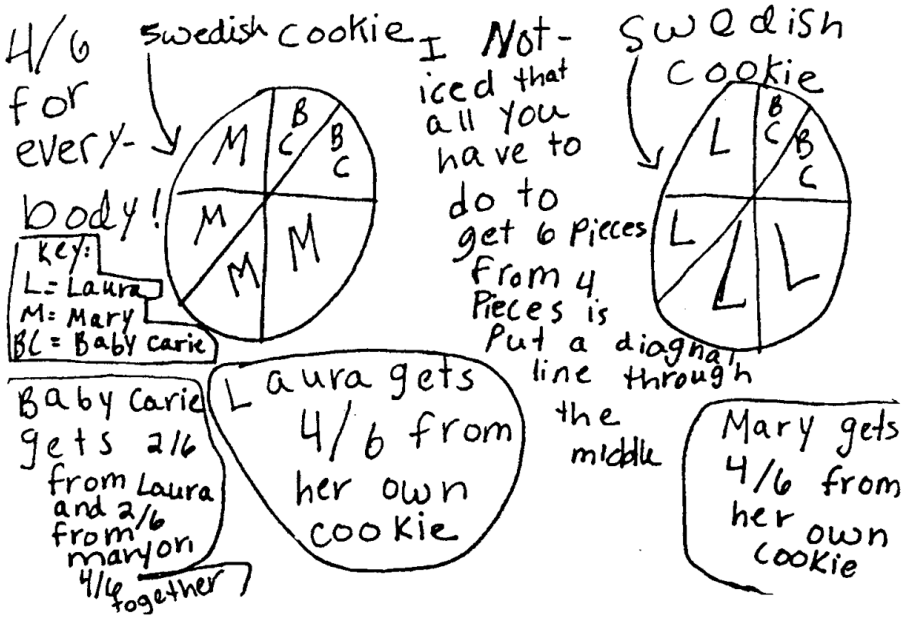
Teacher Scribe
I made two cookies and I split them in half because so d could make the cookies even. I could see that each person got ½ and it left me with ½ of cookie to split into thirds because there are 3 peeple. I split that ½ into 3 triangles. Each person got 1/6 mole. So that shows that each person well each 1/6 + ½ of the cookies
I nodes
* This picter help me exsplaned my work.
I nodesd that they each got 1/6.

The student demonstrates correct reasoning.

The student uses accurate and appropriate math language.

The student achieves a correct solution.

Expert



Explanation

I made 2 pie-charts, and split them in quarters. Then I made a diagnal line through each one. It turned out that was 6's so, if I gave L 4/6 from her cook and BC got 2/6. Then M would get 4/6 from her cookie and BC would get 2/6, now 2/6 + 2/6 = 4/6 for BC!

The student's work is accurate and well labeled. The student clearly communicates the process used to find a solution.

The student creates accurate and labeled math representations. The student is able to describe which parts of the 2 cookies each girl would get.