Name:

Interpreting Remainders

1. Work on the Interpreting Remainders activity below. This activity comes from *Math Matters* by S. H. Chapin & A. Johnson. After working on this individually, be sure to discuss your answers with your group members

How is the remainder interpreted in word problems? If we are dividing without a context, we tend to record the remainder as a fraction or decimal. But what happens to the remainder in real division situations? Is the remainder always used? Is the quotient ever rounded up or down? Can the remainder be the solution to a problem?

Interpreting Remainders

Objective: analyze word problems to determine how to interpret a remainder in context

Examine each of the following problem situations and decide what happens to the remainder. What factors affected your decisions?

1 You have a rope that is 25 feet long. How many 8-foot jump ropes can you make?

2 You have 30 toys to share fairly with 7 children. How many will each child receive?

3. The ferry can hold 8 cars. How many trips will it have to make to carry 42 cars across the river?

4 Six children are planning to share a bag of 50 large cookies. About how many will each get?

5. You have a 10-foot wooden board that you want to cut into 4 pieces. How long will each piece be?

6 Kinne picked 14 quarts of blueberries to make jam. Each batch of jam uses 3 quarts of berries. How many quarts of blueberries will Kinne have left for muffins?

7 At the local supermarket, 3 cans of tomatoes are advertised for $3 89. Jasmine buys only one can. How much does the can of tomatoes cost?

2.

When you are done with the Interpreting Remainders activity, do a table reading of “Things to Think About” on the other side of this sheet with your group.

Name:

Things to Think About

There are many different ways of interpreting the remainder in a division problem It depends primarily on the context of the problem The first problem illustrates a situation in which the remainder is not used. If the jump ropes are to be exactly eight feet long, then three jump ropes can be made and the extra one foot of rope will be tossed or saved for another project The second problem is similar; each child will receive four toys Perhaps the two extra toys will be given away or passed along between the seven children at periodic intervals. At any rate, cutting the extra toys into fractional parts makes no sense. These two problems illustrate that a remainder can occur whether the number of groups or the number within one group is being determined.

In Problem 3, the quotient, 5.25, must be rounded up Five trips of the ferry will not get all of the cars across the river and a portion of a trip is impossible Thus, six ferry trips are required. A great deal of research has been conducted on students' interpretation of problem situations in which the quotient must be rounded up to the next whole number because of the remainder. Do students really believe that an answer such as 5 25 trips is reasonable and possible? Investigation has revealed that students understand you cannot have a part of certain situations such as ferry crossings but that they are so accustomed to doing computations without a context they simply don't bother to check whether their answer makes sense The implication for us as teachers is that we must focus more instruction on interpretation of answers (perhaps using estimation) so that students apply common sense in determining what to do with remainders. (For example, students might be asked to suggest the kind of answer that would make sense in the situation in Problem 3 rather than to find the solution.)

Sometimes a remainder is expressed as a fraction or as a decimal Problems 4, 5, and 7 illustrate contexts in which this makes sense. Since the cookies in problem 4 are large, it might be possible to divide the last two cookies into thirds so that each child receives $8\frac{1}{3}$ cookies. However, if a bag of hard candies were being divided, the remainder would be dealt with differently In Problem 5 the plank of wood is divided into four pieces, each $2\frac{1}{2}$ feet long In the case of measurements such as lengths and weights, it usually makes sense to record the remainder as a fraction or as a decimal In Problem 7, 3 cans of tomatoes cost $3.89, and 1 can costs $\$1\ 29\overline{6}$ Money is always recorded using decimals and if the decimal expansion is beyond the hundredths place, the amount is rounded to the nearest hundredth. Since Jasmine is only buying 1 can of tomatoes, it will cost her $1 30.

In Problem 6, division is used to find the solution but the remainder is the answer. Situations such as these take students by surprise simply because they don't expect the remainder to be the solution This example again points to the need to provide students with experiences interpreting different types of remainders As teachers we must help students understand how the context of a problem affects the interpretation of remainders and lead discussions about the various roles of the remainder based on the types of numbers and labels. ▲