

Playing with Remainders

Summary

This activity will teach students how to deal with remainders in real life by either rounding, splitting them evenly, or simply ignoring them.

Materials

Invitation to Learn

- 12 manipulatives
- Math journals

Instructional Procedures

- Math journals
- [Round-up!](#) (pdf)
- [You Just Drop It!](#) (pdf)
- [Sharing is Very Important!](#) (pdf)
- [Playing with Remainders](#) (pdf)
- [Remainder Stories](#) (pdf)

- Paper
- Scissors
- Tape
- Markers

Additional Resources

Books

Teaching with the Brain in Mind, by Eric Jensen; ISBN 1-4166-0030-2

Background for Teachers

It often takes a leap of understanding for students to apply the procedural algorithm of division with remainders to real-world situations where remainders are encountered. A child who can easily calculate $40 \div 6 = 6R4$ will too often state $6R4$ as the answer to the number of cars necessary to transport 40 children to a baseball game if 6 children can fit in each car. The activities in this section will first review the concept of division as proportional reasoning involving equal shares and then they will lead children to discover the three usual ways of dealing with remainders in real life: they are either used to round up to the next whole number, they are dropped and discarded, or they are split evenly among the participants.

Before beginning this lesson, students must be able to express remainders as fractions and decimals.

Instructional Procedures

Invitation to Learn

Distribute a set of 12 counting objects to each child. (They may be cubes, blocks, chips, etc.) Tell the students that they each have a set of 12 objects. Then ask the students to divide their sets into four fair shares. Guide them to create four sets with three objects in each set. Discuss the term "fair shares" if it is not part of your usual vocabulary. It means every set has the same number of objects, the dividend is divided equally by the divisor. Then write the following equation on the board and ask the children to copy it into their math journals.

Ask what is different from the usual way of writing a division problem. They should notice that the number 1 is written above the divisor. What is significant about the number 1? Take several ideas from students. Lead them to discover that the 1 is implied in every division problem, because the quotient is how many items are in 1 fair share. Then have the children write the following two

statements in their journals:

1 fair share contains 3 objects.

4 fair shares contain 12 objects.

Explore with the children the relationships between the numbers as they discover the proportions: $1/4 = 3/12$; $1/3 = 4/12$ and $1 \times 12 = 3 \times 4$. Write all the true statements on the board and have the children list them in their journals.

Next, copy these three equations on the board:

Ask what is the question in the first equation. (The students are asked to form 4 fair shares from 12 objects.) What is the question in the second equation? (The students are asked to find how many fair shares of 3 each can be made with 12 objects.) What is the question in the third equation? (Students are asked to find how many objects must be used to make 4 fair shares containing 3 objects each. This case involves multiplication rather than division.) Have the children build each situation with their manipulatives, knowing that even though the problem looks the same each time, in the first instance the question is the number of fair shares in each set. In the second instance, the question is the number of sets, and in the third instance, the question is the total number of objects.

Introducing division as proportional reasoning prepares children for equivalency in fractions; proportionality in ratios, proportions and percents; and provides a more concrete understanding of division as the process of creating fair shares.

Instructional Procedures

Divide the class into three groups. Each script has enough parts for eight actors. Additional class members could be used to direct, create, and manage props, etc. If you have a really large class, you may wish to double one or more of the scripts and perform the same play(s) twice. The plays also work well in a readers' theater format, shortening preparation time.

Practice the plays: "*Round-up!*," "*Sharing is Very Important!*" and "*You Just Drop It!*"

Present each play to the whole class. During and after the presentations, the class completes the graphic organizer *Playing with Remainders*.

As a class, discuss the different applications of remainders in the three plays using the graphic organizer to illustrate the different ways each play uses remainders in real life. You may wish to have the children trim the edges of the graphic organizer and glue it into their journals as a reference.

As a whole class or in partners complete the worksheet *Remainder Stories*.

Note: Another option for these plays is to use them as center activities, with each child participating in each play, using no audience but discussing each play separately as a whole class. This option may increase student engagement.

Extensions

After reading or acting out these plays, children could write their own stories or plays where the characters must interpret remainders correctly in real-life situations.

Children new to the United States could be encouraged to set new plays in their homeland countries with names, food, and problem-solving situations common to their life experiences.

Family Connections

Assign students to create two to five word problems at home using members of their families and either real or made up situations that require the correct use of remainders.

Which use of a remainder is most common? Give students a few days to collect data at home about which scenario is most common--dropping, rounding or sharing. They might be allowed situations on TV in addition to real-life occurrences. After collecting data, a bar graph could be constructed comparing the three types of remainders' frequency.

Assessment Plan

Formative assessment: Check for accuracy as students complete their graphic organizers, participate in the discussion following the presentation of the plays, and solve the word problem worksheet.

Final assessment: In a word-problem test, students should be able to supply the correct answer and explain in words what they did with their remainders (dropped, shared, or rounded up).

Bibliography

Wiebe, A., (1989). Proportionality: A major concept in mathematics--part II: Remainders--what are we to do with them? *Aims newsletter, volume iii*, No. 7, 6-7.

Dr. Wiebe explores the gap between abstract answers to division problems with remainders and real-life situations where students encounter remainders. Expressing remainders as fractions and decimals are explored and applied, and the choices of rounding up, dropping, and sharing remainders are introduced.

Martinez, J.G.R., (2000). Look smart. *Early years*, January 2000. Retrieved January 12, 2007 from <http://www.findarticles.com>.

Engaging children in math story problems is easier when the stories have real plots and good endings. By engaging students in the plot, they become interested in solving the math situations, rather than routinely solving a page of "word problems." Additionally, the enthusiasm generated motivates students to write their own stories, developing new problems within the story context, and acting out the story line.

Authors

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