Math 4 - Act. 04: Long Division

Summary

The goal of this lesson is to further develop the sharing concept of division by using objects. Students will have one and two digit quotients with and without remainders.

Materials

base 10 blocks
- *Remainder of One*
, Pinczes, Elinor J.
centimeter cubes
2 sheets of paper per student (for book)
bugs in an array handout
hundreds board
calculator (optional)
glue, crayons, and scissors
die (one for each pair of students)

Additional Resources
Lessons for Introducing Division, by Maryann Wickett, Susan Ohanian, and Marilyn Burns (Math Solutions Publications)

Background for Teachers

Students use division informally long before they receive any classroom instruction. One type of division strategy is known as sharing or partitioning. Students divide objects by sharing them one by one until there aren't any more or there aren't enough to go around. For example, if they want to share 20 cubes in 4 rows, they place one cube in each row until each row has five cubes. The goal of this lesson is to further develop the sharing concept of division by using objects. Students will have one and two digit quotients with and without remainders. These concepts will take several days to develop.
Prior to this lesson, the students should already know that multiplication and division are inverse operations. They should have some experience with building arrays by dividing individual cubes into equal rows with a "0" remainder. (For example, if 15 cubes are divided equally into 3 rows, there will be 5 in each row. I can check this answer because an array with 3 rows of 5 cubes have a total of 15 cubes.) The students would also be able to interpret this information in a simple story problem (e.g., if 15 pencils are divided equally among 3 students, how many will each student get?).

Intended Learning Outcomes

1. Demonstrate a positive learning attitude toward mathematics.
3. Reason mathematically.
4. Communicate mathematically.
5. Make mathematical connections.
6. Represent mathematical situations.

Instructional Procedures

Invitation to Learn
Read the book *Remainder of One*. Have students use 25 cubes to make the rectangular arrays discussed in the story (e.g., 2 rows of 12, 3 rows of 8, 4 rows of 6, and 5 rows of 5).

Instructional Procedures:

Record the various arrays from Remainder of One by creating an array book. Use the bugs in an array handout. Have the students cut out the various arrays, glue them into their book, and connect each array to the symbolic algorithm.

Give the students a hundreds board. Ask, "If you were marching 5 bugs in each row, how many leftover bugs would there be if there were only 16 bugs altogether?" (1). Try building various numbers. Color the numbers on the hundreds chart with one color for a remainder of 1, a second color for a remainder of 2, and so on. Are there any patterns? Do you think the pattern will change if the bugs marched in a row of six instead of five?

Play the game of Leftovers in partners. Players start with 20 counters. The first player rolls a number cube, divides the current number of counters by that number, and states the division problem (e.g., if I take 20 counters and divide them equally into 3 rows, there will be 6 in each row with 2 left over). The player takes the remainder counters and tells the other player how many counters to start with. The game continues until no counters remain. To determine the winner, roll a number cube. If you get an odd number, the player with the most counters wins. If you get an even number, the player with the least counters wins.

Remainder of One Riddles. Have students choose a number between 1 and 25. Write Remainder of One Riddles (see handout).

Have the students use base ten blocks to explore the following problem: 47 ÷ 3 = ?

The student can show the dividend as 4 tens and 5 singles. The divisor is the number of equivalent rows to be formed (e.g., 47 ÷ 3 = ? Divide the blocks equally among 3 rows). Distribute 1 ten to each of the 3 rows.

A record should also show that a total of 3 tens has been removed from the dividend. The remaining ten cannot be distributed among three rows. They are traded for 10 singles, and the other seven singles are joined with them. This is shown by "bringing down" the 7. The 17 singles are then distributed equally among the three rows. Distribute 2 singles to each of the 3 row.

A record should show that only 15 singles could be distributed in equal rows. A remainder of 2 singles is left.

Answer: 15 R 2

Extensions

Possible Extensions/Adaptations

Play Leftovers Game using larger numbers and a 4 - 9 number cube.

Homework & Family Connections

Play Leftover game. Teach a member of your family how to do long division. Return a note indicting the shared mathematical experience between the family member and the student.

Authors

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