Two Ways to Divide

Lesson Overview

This activity builds on the introduction of the two models of division - "sharing" division and "repeated subtraction" division. Students decide which model reflects a problem situation and solve it with blocks. Students discover - and explain why - both situations yield the same answer.

Objectives

Thinking Skills: Students explore two meanings for division by modeling different situations with blocks. They examine the relationship between the two models and decide which model best reflects a division situation as they solve it with blocks.

Mastery Skills: Students learn to model, solve, and write number sentences that match division story problems.

Materials

Each pair of students needs:
- 9 small paper plates
- 50 single blocks, packed or unpacked

Class Introduction   (25 minutes)

Provide small paper plates to pairs of students. Suggest that students use them to help organize blocks as they are solving problems.

Problem 1:
Display a repeated subtraction problem, such as:

> Tory has 24 stickers for her sticker book. She puts 6 stickers on
> a page. How many pages does she fill?

Have students work together to model the problem with blocks. Students will likely do the following:
- Put six blocks on a plate at a time until they run out of blocks.


- Count the number of plates they used. The answer is: 4 plates/4 pages of stickers.

While students are modeling the problem, ask questions such as:
- What do your blocks represent?
- What did you do first? Then what?
- Why did you put 6 blocks together?
- How many groups of 6 can you make, or how many "pages" can you fill?

Have students record how they organized the blocks by drawing a picture.

Picture 1
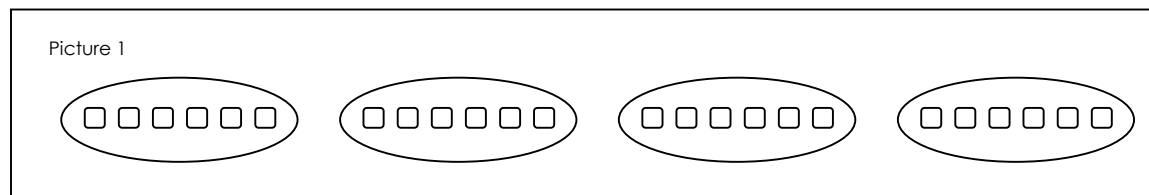
Ask, How can we show what we did with numbers?
- Students may suggest using subtraction to show removing 6 at a time:
$$24 - 6 - 6 - 6 - 6 = 0$$
- Help students understand that what they have really done is *separate* the stamps and that this process can be expressed with the division sign.
- Introduce/review the meaning of the numbers and symbols in the division equation:
$$24 \div 6 = 4$$

Problem 2:
Next, display a <u>sharing</u> problem, such as:

Shane has a box of 24 mints. He wants to distribute them evenly to 6 of his friends. How many should each of the 6 friends get?

Again, have students model the problem with blocks. This time, however, they will likely be "dealing out" mints, one to four blocks at a time to each of six piles or paper plates.
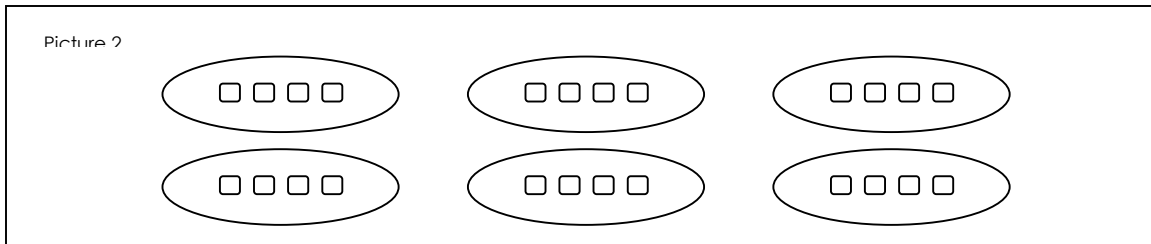- Set up 6 plates (one plate for each friend).
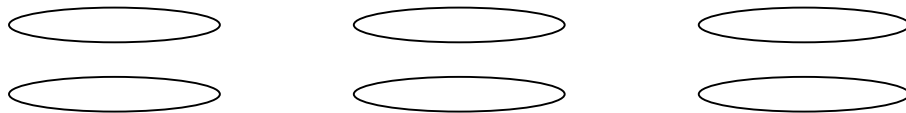
- Deal out one to four blocks/mints at a time to each plate until there are no more blocks.
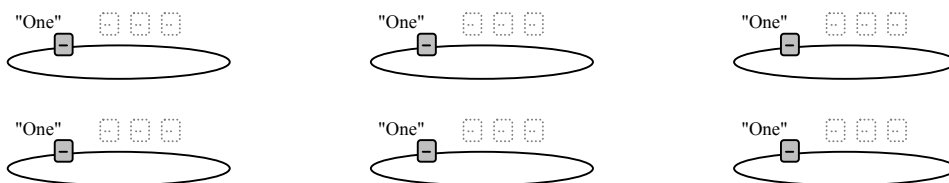
- Count the number of blocks/mints on each plate. The answer is: 4 mints for each friend.

Have students explain what they did and <u>draw a picture</u> to show how they arranged their blocks.

Picture 2

Again, help children express what they did with numbers. They will notice that, once again, the problem can be written as:

$$24 \div 6 = 4$$

Comparing Problem 1 and Problem 2:
Have students compare the pictures they drew for the 2 problems. Ask, How can it be that we solved two different problems and our pictures look very different, yet the number sentences and answers are the *same*?
- Some students may be completely baffled; others may be convinced that it is coincidental.
- Challenge students to explain the similarities and differences between the problems.

Help students articulate the following:
- The first problem specifies the group *size* (6) whereas the second specifies the *number of groups* (6 again).

- To solve the first problem, students need to figure out *how many groups they can make,* but in the second, they need to know *how many in each group*.
- It may be helpful to relate each drawing to a multiplication sentence (4 x 6 and 6 x 4) and remind students that although 4 groups of 6 and 6 groups of 4 "look" different, they both have the same product. (See Pack-It #316: "Let's Explore 6 x 4.")

Explain to students that they will continue to explore the types of division problems by modeling and solving additional problems.

Activity   (25 minutes)

Copy (2-sided) and distribute Activity Sheet 1, "Two Ways to Divide" to pairs of students sitting side by side. Explain the following:
- The student on the left reads and models the problem on the left side of the page, and the student on the right does the same for the problem on the right. Each student records his/her block arrangement.
- Students take turns explaining how they solved their problem to their partners.
- Both students agree on one division number sentence that represents both problems and write it in the space.
- They continue on the back.

As students are working, help them clarify whether they are finding the *number of groups*, or the *number in each group* as they model their problems with blocks.

Challenge early finishers with a pair of problems using larger numbers.

Closure   (10 - 15 minutes)

After students have completed their work, collect papers and select several to share and discuss.
- Have the "authors" of each paper describe how they solved each problem and invite classmates to respond.
- Again, help students distinguish between the two models of division. Ask, What did you know and what did you need to find out? for each problem.
- Discuss the number sentence for both problems. Ask, What does the 4 in problem A mean? What does the 4 in problem B mean?

 While students are discussing their solutions, ask questions such as:
- Is one model easier/harder for you to understand?
- Which model is easier/harder to show with blocks? Why?
- Which model do you use more in your everyday lives? Give examples.
- Is it a *coincidence* that both problems have the same answer? Explain why or why not.

Assessment

As students are working, observe and note:
Do they -
- Model the story problem situation with blocks?
- Answer the question correctly?
- Know how to write the division number sentence that relates to the problem?
- Describe the meaning of the numbers and symbols in a division number sentence?

Extensions

❑ Have students model 72 ÷ 3 *both* ways! Students will find that even though they get the same answer with both models, making 24 groups of 3 by repeated subtraction can be cumbersome. This is exactly what we want students to discover: when we divide large numbers, making equal groups is the model preferred and reflected in our traditional algorithm.