

IT'S IN THE BAG

NUMBER

- Division
- Multiplication

Getting Ready

What You'll Need

Base Ten Blocks, 1 set per group

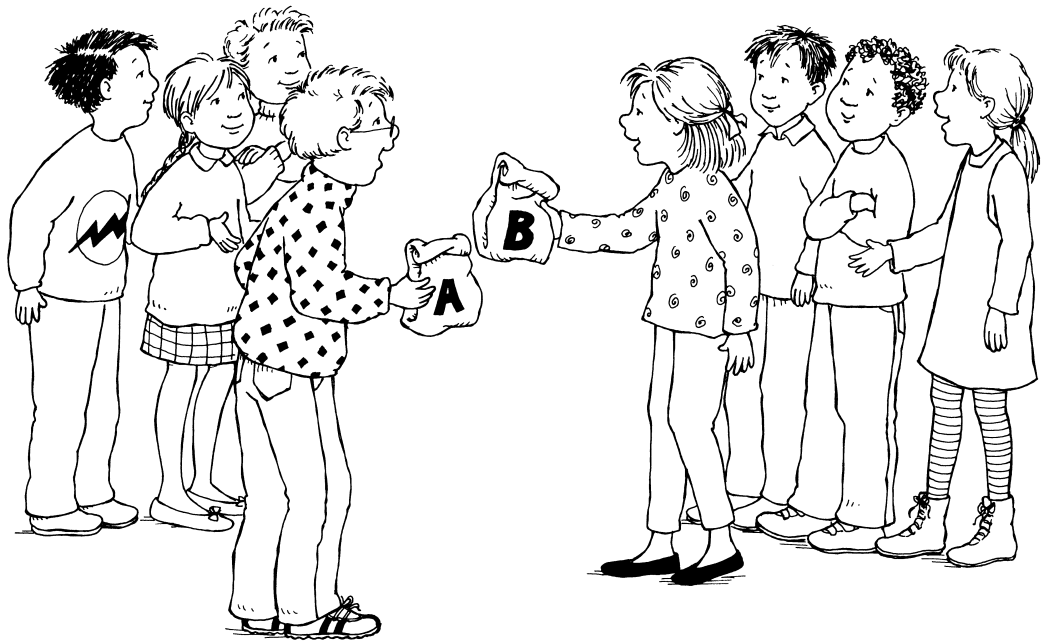
Small paper bags, each marked with a letter and filled with a collection of flats and longs representing an amount such as 15, 18, 20, 24, 25, 26, 27, 28, 30, and 36, 1 per group

Overhead Base Ten Blocks (optional)

Overview

Children work in a group to determine whether or not a collection of Base Ten Blocks can be shared equally among them with no remainders. In this activity, children have the opportunity to:

- ◆ view division as making equal shares
- ◆ predict outcomes
- ◆ look for patterns in division problems
- ◆ discover that multiplication is the inverse of division



The Activity

Introducing

- ◆ Display 1 long and 2 units. Establish that the value of these blocks is 12.
- ◆ Call on *two* volunteers. Ask them what they can do to share the blocks so that they each get blocks of equal value.
- ◆ After children show how to trade the long for 10 units, they should distribute the 12 units equally so that they each have 6.
- ◆ Take the 6 units back from each child and say that you are going to “trade the blocks back” for the long and 2 units.
- ◆ Now ask *five* volunteers to show how they can share one long and 2 units equally. After they make five shares of two, acknowledge that 2 extra units remain. These are the “leftovers.”

On Their Own

When you make equal shares of Base 10 Blocks, will there be any leftovers?

- Work with a group of 5. Get a bag of Base 10 Blocks. Spill the blocks from the bag.
- Find the value of the blocks. Record the letter of the bag and the total value of the blocks.
- Predict whether or not 2 of you can share the blocks equally with no leftovers.
- Two of you should share the blocks equally. Record how many blocks each of you gets. Record the number of leftovers, if any.
- Put all the blocks together again.
- Now share the same blocks equally among 3 of you, then among 4 of you, then among 5 of you. Each time, first predict whether or not there will be leftovers. Then share and record your findings.
- Return all the blocks to the bag. Close the bag.
- Trade bags with another group. Repeat the activity using your new bag.

The Bigger Picture

Thinking and Sharing

After children have worked with two or more bags of blocks, ask volunteers from different groups to share some of their discoveries. Set up a class chart with headings like these to accommodate children's data.

Letter on Bag	Value of Blocks in Bag	Number of Children Sharing	Will there be leftovers?	Number of Units in Each Share	Number of Blocks Left Over

Use prompts like these to promote class discussion:

- ◆ When were you able to predict whether you would be able to share the blocks equally with no leftovers? Explain.
- ◆ Which bags of blocks could be shared the greatest number of ways with no leftovers? Why do you think this is so?
- ◆ Which bags of blocks could be shared the least number of ways? Why do you think this is so?
- ◆ What patterns do you see in your data?

Writing

Have children choose one of the bags that they worked with and explain why they had leftovers after having made two or three equal shares.

Teacher Talk

Where's the Mathematics?

This activity gives children the opportunity to make equal shares of a collection of Base Ten Blocks by first trading, if necessary, making groups of equal value and then identifying any leftovers. This experience is important to building an understanding of the division process and the notion of "remainders." Children communicate their thinking and discuss the process of "sharing equally" as they decide how to regroup each set of blocks.

As children go about sharing the blocks in each bag, they determine that it is possible to share some quantities equally and have no leftovers but that it is impossible to share other quantities equally without having leftovers. Children may realize that after counting some groups of blocks, but before distributing them, they will be able to accurately predict whether or not they will have leftovers depending on the number of equal shares they are about to make. Some children will be able to explain their reasoning for determining whether or not there will be leftovers. They may say, for example, that when they share an odd number of blocks between two of them or among four of them they will always have some leftovers.

Looking for patterns in the completed class chart will help children to make the connection between the corresponding fact families for multiplication and division. Children will notice, for example, that a group of blocks shared by three children yields no leftovers if the numbers involved make up a number fact for 3.

$$15 \div 3 = 5 \text{ because } 5 \times 3 = 15$$

$$18 \div 3 = 6 \text{ because } 6 \times 3 = 18$$

$$24 \div 3 = 8 \text{ because } 8 \times 3 = 24$$

$$27 \div 3 = 9 \text{ because } 9 \times 3 = 27$$

$$30 \div 3 = 10 \text{ because } 10 \times 3 = 30$$

$$36 \div 3 = 12 \text{ because } 12 \times 3 = 36$$

Similar conclusions will be drawn for collections of blocks shared by 4 or 5 children.

Extending the Activity

1. Provide children with bags that contain flats as well as longs and units. Have them make two equal shares of the contents, first predicting whether or not there will be leftovers.
2. Allow children to create bags of blocks for others to work with. After filling a bag with blocks, each child must first record the results of making two, three, and four equal shares with those blocks.

As children analyze the division problem implicit in each sharing experience, they will be developing algebraic thinking. Encourage this by showing children how to write a number sentence for each sharing. This will help them to make the connection between the concrete activity and the written symbols that can be used to record it.

Letter on Bag	Value of Blocks in Bag	Number of Children Sharing	Will there be leftovers?	Number of Units in Each Share	Number of Blocks Left Over
E	25	2	yes	12	1
E	25	3	yes	8	1
E	25	4	yes	6	1
E	25	5	no	5	0

$$25 \div 2 = 12 \text{ R}1$$

$$25 \div 3 = 8 \text{ R}1$$

$$25 \div 4 = 6 \text{ R}1$$

$$25 \div 5 = 5$$

You can provide for the various ability levels in your classroom by filling the bags with different numbers of blocks. Including flats in some bags will be appropriately challenging for those children who are ready to work with three-place dividends.