

WHAT AMOUNTS?

NUMBER

- Place value
- Number sense

Getting Ready

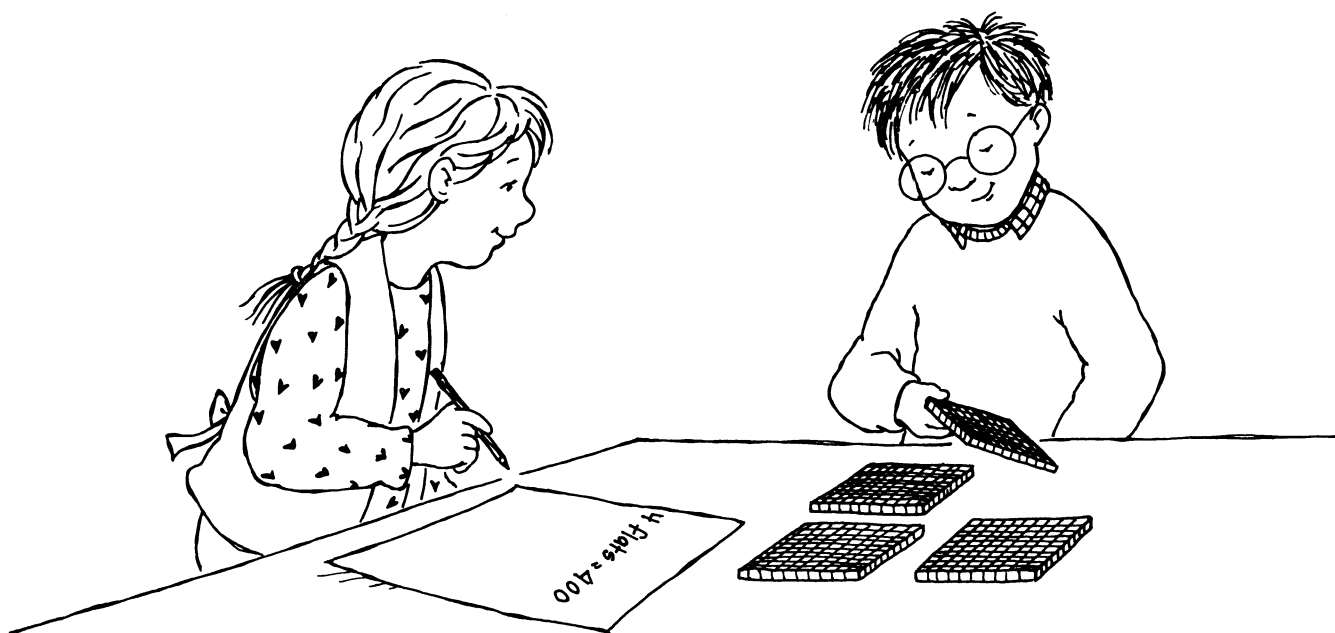
What You'll Need

Base Ten Blocks, 1 set per pair
Overhead Base Ten Blocks (optional)

Overview

Children look for ways to use a combination of four Base Ten Blocks to model as many different numbers as possible. In this activity, children have the opportunity to:

- ◆ develop understanding of place value
- ◆ build number sense
- ◆ organize information
- ◆ look for patterns



The Activity

Introducing

- ◆ Have each child take two flats, two longs, and two units.
- ◆ Ask children to choose any two of these blocks and put them together to model a number.
- ◆ Call on a volunteer to suggest one combination of blocks and the number it represents. Record the amount on the chalkboard.
- ◆ Have volunteers suggest other numbers that they can model with just two of the six blocks.
- ◆ Record and discuss each of the possible solutions.

On Their Own

How many different numbers can you model with 4 Base 10 Blocks?

- With a partner take any combination of 4 Base 10 Blocks. Choose from flats, longs, and units.
- Use all of your blocks to model any amount.
- Decide on a way to record the number of each kind of block and the amount you modeled.
- Now take a *different* combination of 4 blocks. Arrange these blocks to model an amount. Record the blocks you use and the amount you modeled.
- Keep on taking 4 blocks and recording the data until you have found all possible combinations.
- Look for patterns in your data.

The Bigger Picture

Thinking and Sharing

Have children suggest how to generate a class chart to record the different amounts that can be modeled with various combinations of four Base Ten Blocks. Then set up headings for the chart and invite children to fill it in with their data.

Use prompts like these to promote class discussion:

- ◆ How did you record your findings?
- ◆ What was the greatest amount you modeled? the least amount?
- ◆ Were you able to model more 2-digit numbers or more 3-digit numbers? Explain.
- ◆ What made you think that you had found all the possible amounts?
- ◆ Did you notice any patterns? What were they?

Extending the Activity

1. Have children repeat the activity, but this time have them choose combinations of *five* blocks choosing from flats, longs, and units.
2. Challenge children to find all the combinations of four blocks, but allow them to choose from thousands cubes as well as from flats, longs, and units.

Where's the Mathematics?

Children will approach the task of choosing Base Ten Blocks in a variety of ways. Some may start by picking blocks at random. Others may develop a system for finding all the possible combinations. These children may, for example, begin with the group of blocks that models the greatest amount possible and progress to the one that models the least amount. Alternatively, children may begin by choosing four blocks of a kind and then systematically replace one of that kind with one of each of the other kinds.

The recording systems that children use are likely to reflect the ways in which they work. Some pairs may record only the numerical amounts. Others may record the number of each kind of block in a particular combination along with the amount that the combination represents. Still others may draw each combination of blocks.

Children will find that they can model more 3-digit numbers than either 1- or 2-digit numbers. They may explain this by saying that there are more combinations of four blocks for 3-digit numbers than for 1- or 2-digit numbers.

It will be exciting for children to discover that the numbers that make up the addition facts for the number 4 suggest all the possible combinations for the three kinds of blocks. That is, for the 1- and 2-digit numbers: $2 + 2$ suggests 22, $3 + 1$ suggests 31 and 13, and $4 + 0$ suggests 4 and 40. For the 3-digit numbers: $1 + 1 + 2$ suggests 112, 121, and 211; $2 + 2 + 0$ suggests 220 and 202; $3 + 1 + 0$ suggests 310, 301, 130, and 103; and $4 + 0 + 0$ suggests 400.

Depending on how they organized their work, children may notice still other patterns. After analyzing the 15 possible number combinations shown in the chart that follows they may point out that as the number of flats decreases, the number of possible combinations increases. That is, with 4 flats only one number is possible, with 3 flats two numbers are possible, with 2 flats three numbers are possible, and so on.

Flats	Longs	Units	Amount
4	0	0	400
3	1	0	310
3	0	1	301
2	2	0	220
2	0	2	202
2	1	1	211
1	1	2	112
1	2	1	121
1	3	0	130
1	0	3	103
0	4	0	40
0	0	4	4
0	3	1	31
0	1	3	13
0	2	2	22

Children who choose to work methodically in yet a different way may start with four of one kind of block and then progress to three of one kind of block and one of another kind, then two of two kinds of blocks, and so on. Such a method is reflected in the chart below.

Flats	Longs	Units	Amount
4	0	0	400
0	4	0	40
0	0	4	4
3	1	0	310
3	0	1	301
0	3	1	31
0	1	3	13
1	0	3	103
1	3	0	130
2	2	0	220
2	0	2	202
0	2	2	22
2	1	1	211
1	1	2	112
1	2	1	121