1,000, MORE OR LESS

- Addition
- Place value
- Estimation
- Mental math

Getting Ready

What You'll Need

Base Ten Blocks, 1 set per group

Base Ten Blocks Place-Value Mat (optional), 1 per pair

Number cubes marked 1 to 6, 3 per group

Overhead Base Ten Blocks (optional)

Overview

Children model a 3-digit starting number with Base Ten Blocks. They roll number cubes to help them determine another 3-digit number that, when added to the starting number, will result in a sum that is close to 1,000. In this activity, children have the opportunity to:

- ◆ find missing addends
- ◆ develop strategies for adding 3-digit numbers
- ◆ use logical reasoning
- ◆ build mental math skills
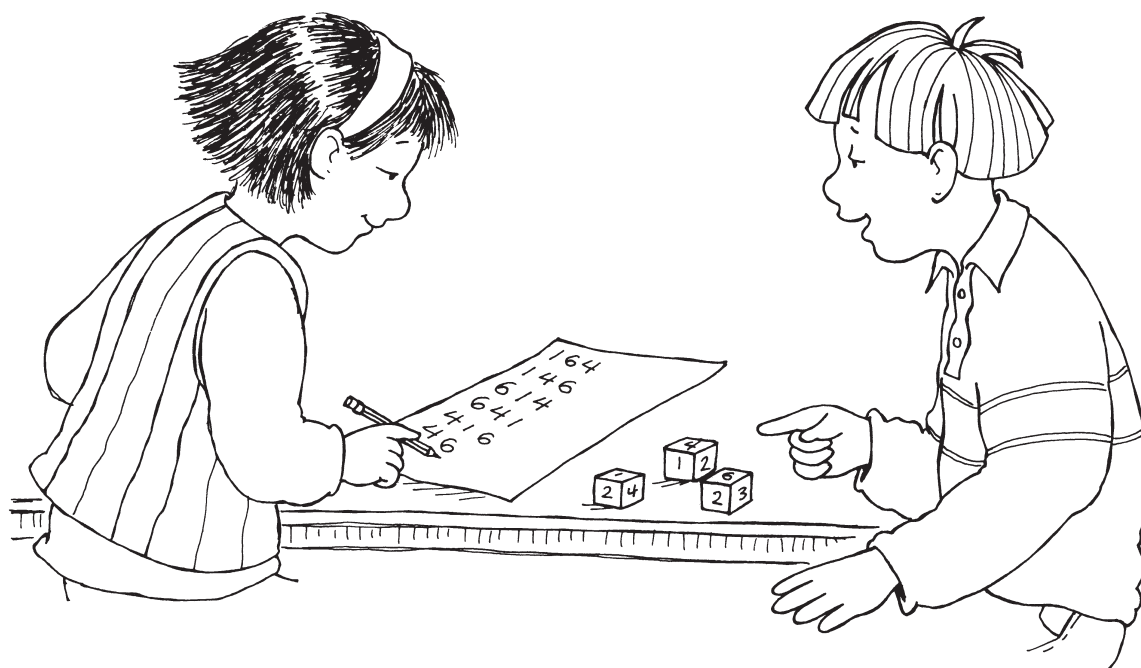
The Activity

You can further evaluate children's understanding of place value if you have them work with a 3-digit house number that has a zero in either the tens or ones place. Look for children's responses to being asked to suggest other 3-digit numbers that can be made from the digits in this kind of number.

Introducing

- ◆ Call on volunteers to name their house numbers. Write the numbers on the board as children say them.
- ◆ Continue asking for house numbers until you have recorded at least one 3-digit number.
- ◆ Circle a 3-digit house number and ask children to model it with Base Ten Blocks.
- ◆ Ask volunteers to identify other 3-digit numbers that can be formed from the same 3 digits in the number you circled. Record these numbers on the board and have children model them.

On Their Own

> **What 3-digit number can you add to a starting number modeled with Base 10 Blocks to get a sum that is close to 1,000?**
>
> - Work with a partner. Make up a 3-digit number between 300 and 700. This is your starting number.
> - Record your starting number. Then use Base 10 Blocks to model it. Keep this model.
> - Roll 3 number cubes and record the digits that come up.
> - What 3-digit numbers can you make from the digits you rolled? Record them.
> - Decide which of the 3-digit numbers to add to your starting number to get a sum close to 1,000.
> - Try it! First use blocks to model the 3-digit number of your choice. Then put these blocks together with the blocks that model your starting number. Trade, if necessary. What is the sum of all the blocks?
> - Is the sum close to 1,000? Could you have gotten closer if you had added a number made up of a different arrangement of your 3 digits? If you think you could, try it. Record your findings.
> - Now make up a different starting number. Roll the 3 number cubes again and repeat the activity.
> - Be ready to share your strategies for getting a sum close to 1,000.

The Bigger Picture

Thinking and Sharing

Once each pair has done the activity twice, have children discuss which sets of sums were closest to 1,000. Call children together to discuss what they noticed.

Use prompts like these to promote class discussion:

- How did you decide on a starting number?
- What is the least possible sum of your starting number and one of the 3-digit numbers you rolled? What is the greatest possible sum?
- With what kind of starting numbers could you be sure to get a sum that is less than 1,000?
- After rolling the number cubes, how did you decide on which 3-digit number to add to your starting number?
- How could you prove that the number you added to your starting number was the one that brought the sum closest to 1,000?
- If you did the activity again, what would you choose as a starting number? Explain.

Extending the Activity

Have two to four children use this activity as a game. Each child selects a starting number between 300 and 700, records it, and models it with blocks. Someone rolls the three number cubes. Players all list the possible 3-digit numbers for the digits that come up. Children decide which of the 3-digit

Where's the Mathematics?

By estimating sums as called for in *1,000, More or Less,* children strengthen their number and operational senses. They may approach this activity in a variety of ways. Some children will begin by randomly selecting a starting number. Others will begin by considering all the possible outcomes of rolling three number cubes and then use this data as a determinant in making up a starting number. These children will notice that the highest roll possible, 666, results from rolling all sixes and that the lowest roll possible, 111, results from rolling all ones. Based on this, they may see why the activity gives 300 as the minimum starting number. Children who realize how unlikely it is to roll either 3 sixes or 3 ones will come to see why the activity tells them to choose a starting number that falls somewhere between 300 and 700. Most children will reach this understanding only after completing the activity several times.

In order to determine which 3-digit number is the best to model, some children will round the starting number and each of the 3-digit numbers to the hundreds place, model each with flats, and then estimate the sum by counting each group of flats. Other children will round each number to the nearest ten, using flats and longs to come up with even closer estimates. Estimating in this way builds on children's understanding of place value. The chart that follows shows the work of one pair of children that rounded to estimate the sum of their starting number and each of the possible 3-digit numbers. They chose a starting number of 520; rolled the digits 1, 4, and 6; and then estimated by rounding to the nearest ten:

numbers to model based on their starting numbers. Players each combine the blocks for the number of their choice with the blocks for their own starting number. Together children determine how close each sum is to 1,000. The *difference* between a player's sum and 1,000 becomes his or her score for the round. After playing several rounds, whoever has the *lowest* total score wins.

Starting Number ⟶ 520

Digits Rolled ⟶ 1, 4, 6
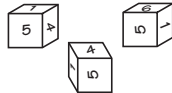
3-Digit Number	Estimated Sum
146	520 + 150 = 670
164	520 + 160 = 680
416	520 + 420 = 940
461	520 + 460 = 980
614	520 + 610 = 1,130
641	520 + 640 = 1,160

By charting and reviewing their data in this way, the pair could easily see that 461 would be the best choice of 3-digit numbers, as adding it to 520 would bring them closest to 1,000.

Children will find some shortcuts as they work. Even before they roll the number cubes they may subtract their starting number from 1,000 to get an idea of the magnitude of the digits they would need to roll. Using Base Ten Blocks to model this kind of subtraction is easier and more satisfying for children than paper-and-pencil subtraction would be.

Although most children will not begin the activity with a strategy in mind, trial and error will lead them to notice whether or not their choice of 3-digit numbers brought them as close to 1,000 as possible. After they have done the activity at least twice, children should be encouraged to stop and assess what seems to work and what does not. They will learn from one another as they discuss and share their thinking. The most important lesson that children learn from this activity is that there are many different—legitimate— ways to solve a problem.