

# NUMBER BUILDER

NUMBER • LOGIC

- Following directions
- Place value
- Counting
- Deductive reasoning

## Getting Ready

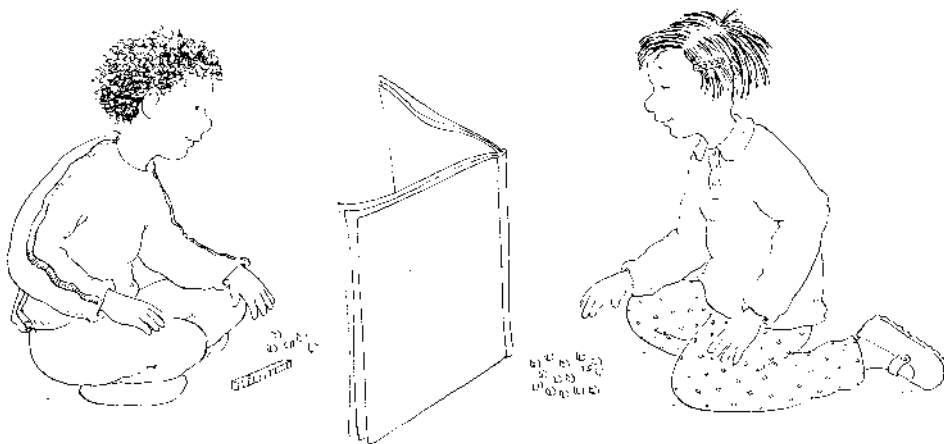
### What You'll Need

Base Ten Blocks, 1 set per pair  
Large books or boxes to use as barriers  
Overhead Base Ten Blocks (optional)

## Overview

Children use Base Ten Blocks to build secret numbers. Then they give clues about their secret numbers that their partners can use to try to build them. In this activity, children have the opportunity to:

- ◆ use place-value vocabulary
- ◆ identify two- and three-digit numbers
- ◆ communicate specific information



## The Activity

### Introducing

- ◆ Build any two-digit number with Base Ten Blocks and have children do the same.
- ◆ Tell children to think about what clues they could give to someone who can't see the blocks about the number or about the blocks used to build it.
- ◆ Call on volunteers to suggest clues. Record the clues on the chalkboard. For example, suppose you built the number 86 with 8 longs and 6 units. Children might give these clues.

*It has 8 tens and 6 ones.*

*It has 14 blocks.*

*It is less than 100.*

*It is greater than 50.*

*It is an even number.*

*It is between 80 and 90.*

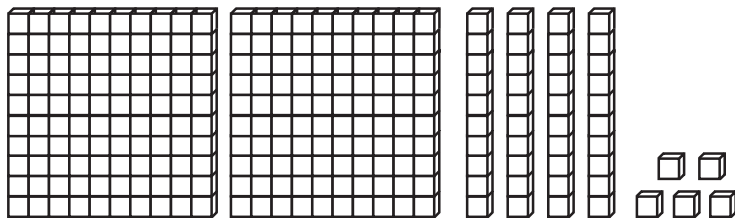
- ◆ Ask children to identify any clues that are too general or that might be confusing.
- ◆ Try to get a consensus about which clues best describe your number.

## On Their Own

*How can you build a secret number with Base 10 Blocks and then describe it so that your partner can build it too?*

- Work with a partner. Put up a big book or box between you.
- Decide who will be the first Number Builder.
- The Number Builder:
  - ◆ secretly chooses some flats, longs, and units.
  - ◆ uses these blocks to build a secret number.
  - ◆ gives clues to help the partner build the secret number.
- The partner follows the clues and builds a number. Then, both partners check to see if the numbers match.
- Take turns being the Number Builder.

- Here is an example. These blocks show a secret number. See how the clues tell about the number.



Clue 1 *The number is less than 250.*

Clue 2 *It has 11 blocks.*

Clue 3 *It is built with 2 flats.*

Clue 4 *It has more than 3 longs but fewer than 7.*

Clue 5 *Its number of units is the sum of 3 plus 2.*

## The Bigger Picture

### Thinking and Sharing

Invite pairs to discuss their experiences in giving clues and in following them. Have some pairs draw the blocks they used for one of their secret numbers on the chalkboard. They can draw ■ for flats, | for longs, and • for units.

Use prompts like these to promote class discussion:

- ◆ What were some of your best clues? What made them so good?
- ◆ Why were some of the numbers easier to build from clues than other numbers?
- ◆ Which of your secret numbers was the easiest to give clues for? Which was the hardest? Explain.
- ◆ What kinds of clues were the most helpful?

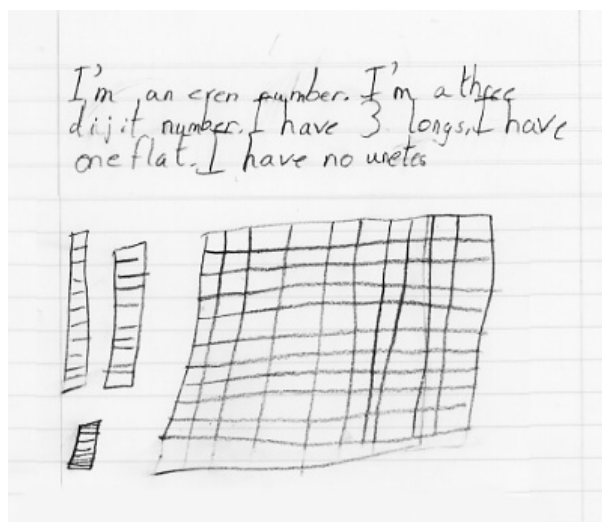
## Writing and Drawing

Have children use words, numbers, and pictures to record the clues they gave for one of their secret numbers.

## Teacher Talk

### Where's the Mathematics?

Logical thinking is closely related to language development. This activity gives children experience in listening to and creating mathematical language. Children use this language to apply deductive reasoning both in making up a good set of clues and in analyzing their partner's clues. *Number Builder* challenges children to interpret and combine bits of information toward a goal—that of discovering their partners' secret numbers. For example, if a child's first clue states that her secret number has no flats, her partner should be able to reason that the number is probably less than 100. If her second clue states that the number includes five longs, then her partner can be sure that the number falls anywhere from 50 to 59.



Formulating accurate clues may be too great a challenge for some young children. Such children will benefit from a whole-class version of the activity in which a designated Number Builder models a number with Base Ten Blocks on the overhead projector. The class can discuss which blocks and how many of each make up the number. You may wish to restate each bit of information a child offers in the form of a clue, identifying it as such.

For example, if a child points out that he counted 13 blocks in the secret number, you might say, "The first clue is 'It has 13 blocks'" as you record the clue on the board.

After observing several pairs' work, one teacher decided to provide children with bags of unspecified numbers of Base Ten Blocks from which to build their secret numbers. This was because she had noticed that a few children were able to immediately identify their partners' secret numbers even without hearing a single clue. These children had counted the blocks of each kind that remained in the bag that held the familiar set once their partners had removed some blocks. While this process showed children's ingenuity (as well their subtraction prowess), it did little to further their clue-writing and clue-solving abilities!

## Extending the Activity

Have children repeat the activity using the same secret numbers they used at first. But this time, they should build the numbers using different numbers of blocks. For example, someone who first built the number 329 with 3 flats, 2 longs, and 9 units might now build it with 2 flats, 11 longs, and 19 units.

After building their secret numbers, children will go about developing their own clues in different ways. At first, they may give one or two clues that tell too much, or even give away their numbers, leaving little to their partners' imaginations. With experience, though, children create clues that offer smaller bits of information. They realize that good clues are those which build upon one another, leading from the general to the specific.

One member of a pair reported that the most helpful clues were "...clues about two digits because they tell that the secret number is smaller than 100." The other partner said that clues about two digits were helpful because "...you know it means the number is 10 or higher."

Some children may deliberately offer misinformation to keep their partners from guessing their number too quickly. (If you become aware of children doing this, point out that a clue must give only true information about the secret number.)

Children enjoy the challenge of representing their secret numbers in different ways. A stamp pad and a set of Base Ten Blocks rubber stamps provided one child with an easy way to record two variations of her secret number, 121.

If it has 2 digits the number is between 10-99. If the number is 7 it is 1 digit if the number is 100 it is 3 digit.

