# Relating Single Blocks to Packed Blocks  2-4

**Focus** **Predicting how a group of single blocks will be represented when packed, and predicting the total number of single blocks in a packed representation**

**T**hrough their work with the Counter, children have seen that a given number of single blocks can be packed to show the base ten representation of that number. Eventually, children should be able to predict that a number such as 123 single blocks represents the same number as 1 block-of-100, 2 blocks-of-10, and 3 ones. Because this idea takes a long time to form, children need repeated opportunities to pack and unpack blocks, predicting outcomes before they do so. Initially, children make predictions with two-digit numbers and then extend the work to three-digit numbers.

## ➤ Predicting a Base Ten Representation

Give each small group of children a Counter, number lines for 0–100, single blocks, and some small holders. Have children identify a group of 75 blocks by counting them and placing them along the number line to check. Once they agree that there are 75, ask,

> **How would these blocks look on the Counter? How many blocks-of-10 and how many ones will there be?**

Have the children set the dials on the Counter to show their predicted answers and then cover the dials. (The reason for covering the dials is to avoid distractions during the next step.) Children then load the single blocks (or pack first and then load them) on the Counter. Make sure everyone agrees that there are 7 blocks–of–10 and 5 single blocks. Children then uncover the dials to check their predictions.

Give children many opportunities to predict how single blocks, in a group or placed on a number line, will be represented on the Counter. When their initial predictions are incorrect, the children can simply reset the dials to show the actual number of blocks on the Counter. Emphasize frequently that everyone makes mistakes when making predictions, that we get better with practice, and that the blocks allow us to self-correct.

Some children may be able to work with the unlabeled side of the number lines. Use of unlabeled lines encourages the children to notice the grouping by tens, indicated by the longer hash marks. It also ensures that children are doing more than matching numerals.

Begin by having children predict where 10 blocks will end on the unlabeled line. Once they make their predictions, they can place the blocks to check,

counting aloud as they do so. Repeat with a few more examples (15, 20, and 24) to help children discover the significance of the longer hash marks. Then have children place a random number of single blocks on the line and use the line to find the number of blocks. Ask,

**How would these blocks look on the Counter? How many blocks-of-10 and how many ones will there be?**

When appropriate, have children predict how 136 single blocks will look on the Counter. They can count the single blocks, or they might place two 0–100 number lines (unlabeled side) end to end and use these to identify the number.

As children are able to predict how a collection of single blocks will look on the Counter when it has been packed, they can use this information to represent numbers more quickly. For example, when asked to show 234 on the Counter, children might immediately place 2 blocks-of-100, 3 blocks-of-10, and 4 singles.

## ➤ Predicting How Many Ones

In the previous activity, children predicted the base ten representation for a group of single blocks. It is also important that they can predict the number of single blocks contained in a packed collection. Have children place 3 blocks-of-10 and 6 single blocks on the Counter. (Initially, you may want them to begin with singles and pack up this collection of blocks first.) Ask,

**If you unpacked the blocks, how many single blocks would there be in all?**

Provide time for children to unpack the blocks-of-10 and count all of the singles or place the blocks along the number line. Have children repeat this process several times for two-digit numbers. When appropriate, have children do the same for three-digit numbers.

Children need many opportunities to find the total number of single blocks in a packed group. Over time, they may develop a variety of approaches for doing so. Have children demonstrate and describe their techniques. For the number 134, for example, you may see the following techniques:
- Some children may unpack all the single blocks and count them.
- Some children may start with 100, and then uncover the blocks-of-10 and count them by tens, and then count on by ones ("100, 110, 120, 130, 131, 132, 133, 134").
- Some children may count the blocks of each size by ones, and then say the number name ("1 block-of-100, 1, 2, 3 blocks-of-10, and 1, 2, 3, 4 ones is 134").
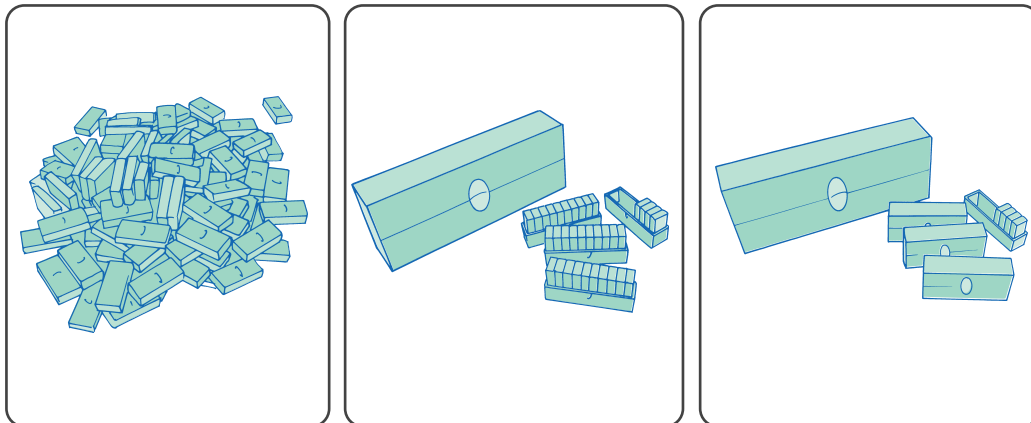
**Children use various techniques to count a set of 134 packed blocks. (a) They might unpack and count them by ones. (b) They might start with 100, uncover the blocks-of-10 and count on by tens, and then count on by ones. (c) They might count the blocks of each size by ones (1 hundred, 3 tens, and 4 ones is 134).**

When children have had plenty of experience with packing and unpacking, ask a question such as,

> **What do you notice about the number of blocks-of-100 (and blocks-of-10, and single blocks) and the way we write the number? What's the connection?**

With many repetitions, children realize that the number of single blocks does not change when they are arranged as hundreds, tens, and ones. They also begin to connect the number of blocks in each place with the digits of the written numeral. That is, they realize that 3 blocks–of–100, 4 blocks–of–10, and 5 singles contains 345 singles and that conversely, 256 singles will pack up to 2 blocks–of–100, 5 blocks–of–10, and 6 singles.

## Practicing Key Ideas

### Number Line Pack

Children work in teams of two. One team places some single blocks on the number line. The other team sets the dials on the Counter to predict how those blocks will look when they are packed, then covers the dials. The children load the blocks on the Counter, uncover the dials to check their predictions, and correct the dials if necessary.

Teams can repeat the activity many times, reversing roles.

### Counter Unpack

Children work in teams of two. One team places some blocks on the Counter. The other team places a marker on the number line to predict how those blocks will look when they are unpacked. The children take the blocks from the Counter, unpack, and place the single blocks along the line to check.

Teams can repeat the activity many times, reversing roles.

## 2-4

## Assessing Learning

1. Show a collection of blocks packed as much as possible. Ask,

   **If we unpack the blocks, how many single blocks will there be in all?**

   Does the child
   - identify the correct number?
   - unpack the blocks to answer or predict the number?

2. Provide a collection of blocks packed as much as possible and ask,

   **If you unpack to single blocks and place them on this number line, where will they end?**

   Does the child
   - identify the correct number?
   - unpack the blocks or predict the answer?

3. Show a collection of single blocks placed along a number line and say,

   **Set the dials to show how these blocks will look on the Counter.**

   Does the child
   - identify the correct number of each kind of block?
   - pack the blocks or predict the answer?

4. Show the number 217 and ask,

   **If I pack 217 single blocks, how many blocks of each size will I have?**

   Does the child
   - identify the correct number of blocks of each size?
   - predict or pack to tell?

5. Ask the child to show the number 348 with blocks. Does the child
   - count out single blocks, one at a time?
   - count out single blocks and then pack them?
   - directly count out 3 blocks-of-100, 4 blocks-of-10, and 8 singles?