Finding Differences

Focus | **Predicting the outcome of separating groups of blocks, and finding differences without the blocks**

In the previous section, children learned to model subtraction with the blocks. Through your questions and their representations, they began to reflect on this process. In this section, they start to predict what will happen when they separate the blocks. Children should repeatedly separate collections of blocks of varying amounts. The goal is to consistently predict the result of any separation before they physically perform the task. This focus on prediction will lead to successful work without the blocks. When the representations and expectations are internalized, the actual blocks become unnecessary.

➤ Predicting the Difference

With children working at the Counter, present an example such as 64 − 32. Have the children stop once they have represented 64 and have recorded both numbers on the whiteboard. Say,

> **Set the dials to tell how many blocks will be on the Counter after you take away that amount.**

As with addition, children set and then cover the dials so as not to confuse their thinking while they separate the blocks. Once children have removed the blocks indicated, they uncover the dials to check their predictions.

Repeat with an example that requires regrouping. Note that during the process of separating, children may self-correct. When predicting the difference of 52 − 38, for example, a child might first set the dial for blocks-of-10 to 2. Then, after looking at the numbers in the ones holders more closely, the child may change the tens dial to 1. Children can also make predictions while working on the Place mats, using the Digit Flip Cards in the same way as the dials.

The image of blocks in a holder often makes it easier to predict the number of blocks that remain in a column. For example, when trying to predict the number of single blocks that remain when taking 9 blocks from 12, the children can first imagine taking the 9 blocks from the regrouped 10, and then adding the 1 extra block to the 2 that are in the original holder.

➤ Developing Recording Schemes

As when learning addition, children need to connect their physical work of separating the blocks to conventional recording techniques or to their own ways of recording their actions. Again, you can develop meaning for conven-

tional approaches by asking questions such as,

How can you show that you have taken a block-of-10?

How can you show where the 10 ones are placed?

Some children find it more meaningful to create their own recording technique first. Children who approach the problem in different ways with the blocks will likely create different recording schemes. Following are two examples. The first is from a child who works left to right, self-correcting as the need to regroup becomes apparent. The second is from a child who takes away the ones from the regrouped ten and combines the remaining blocks with the original ones.

$$
\begin{array}{r}
35 \\
-\ 17 \\
\hline
28 \\
10
\end{array}
$$

$$
\begin{array}{r}
2 \quad \cancel{10} \quad ③ \\
\cancel{3}⑤ \ + \\
-\ 17 \\
\hline
18
\end{array}
$$

Activity Sheets 6 – 9 are recording sheets that indicate the columns by showing pictures of the blocks or the names *hundreds*, *tens*, and *ones*. Such formats may be used to help children keep track of the places for the digits while they are working. Whatever format children are using, provide time for them to show their recordings and explain their thinking to one another.

When children are comfortable with their invented representations, you can present a traditional approach and ask,

Who can figure out what this person was thinking?

➤ Working Without the Blocks

When children are able to consistently predict outcomes when separating blocks and are able to record their work, they can begin to subtract *without* the blocks. Present a written example in vertical form and ask children to find the difference using pencil and paper or mental computation.

As with addition, it is important that children continue to use their number sense and mental image of the blocks to judge the reasonableness of their results. For example, you might present 368 − 121 and ask,

Do you think the difference will be more or less than 200? more or less than 100? Why do you think so?

You can introduce estimation of differences as the process of reporting only the biggest blocks to tell "about how many" are left. You might also present an example such as 51 − 39, which will likely prompt a few children to

consider rounding before estimating. Other children may reason, "50 minus 30 is about 20, but there are almost 10 ones to take away, so I'll estimate 10." Again, encourage children to explore a variety of techniques and to maintain their ability to work flexibly with numbers.

Practicing Key Ideas

Predict on a Counter

Children work in pairs with one Counter. The first child takes a collection of blocks, loads them on the Counter, and records the number on the whiteboard. The second child writes an amount below these digits to show the number of blocks in each place to take away.

Children work together to predict the number of blocks that will be left once that amount is removed. They set the dials to show their prediction. They then cover the dials, remove the blocks (unpacking when necessary), and uncover the dials to check their predicted answer.

Predict on a Mat

Children work in pairs with one Place mat. The first child writes a subtraction example, and the second child places blocks to represent the first number on the mat. Children then work together to predict the number of blocks that will be left once the designated amount is removed. They set the Digit Flip Cards to show their prediction. Then they turn the cards face down, remove the blocks (unpacking when necessary), and turn over the cards again to check their work.

The activity is then repeated with the other child creating the subtraction example.
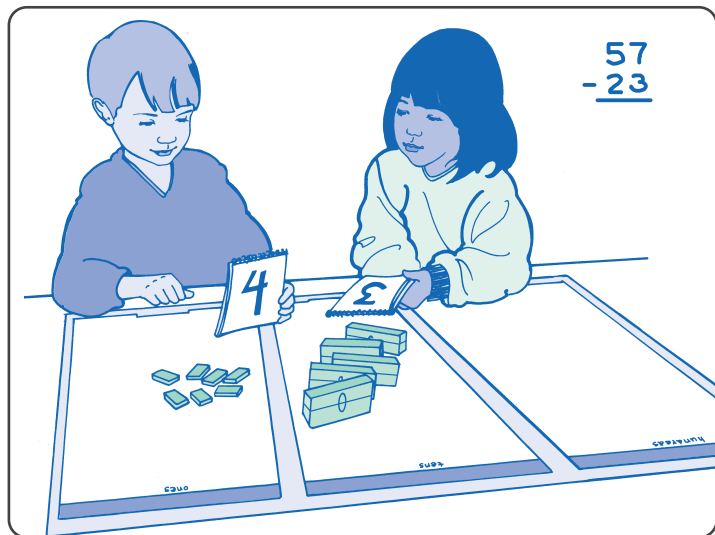
For "Predict on a Mat," children set the Digit Flip Cards to show the difference they predict.

What's Missing?

Present a vertical subtraction example with the difference shown, but with the number to be taken away missing. Children first predict the missing number and then use the blocks to check.

$$\begin{array}{r} 145 \\ -\boxed{}28 \\ \hline 23 \end{array}$$

Assessing Learning

1. Ask the child to show 64 on the Counter and record the number on the whiteboard. Then ask the child to record 36 on the whiteboard to show the number of blocks that will be removed. Say,

   Before you move these blocks to the Counter mat, set the dials to show how many you think will be left on the Counter. Tell me how you decide.

   After setting the dials, the child should perform the physical task to check. Does the child
   - predict the correct total?
   - self-correct, if necessary?
   - explain his or her thinking clearly?

2. Present a written example such as $316 - 142$ in vertical form. Ask the child to find the difference without using the blocks. Have the child explain his or her technique.
   Does the child
   - find the correct difference?
   - explain his or her thinking clearly?

3. Present $387 - 193$ in vertical form and ask,

   Do you think the difference will be more or less than 300? more or less than 200? Why do you think so?

   Does the child
   - answer correctly?
   - reason correctly?
   - explain his or her thinking clearly?