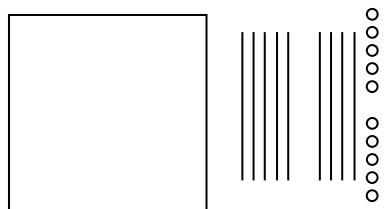# Math Background

Understanding Numbers to 1,000

In the first part of this unit, children are involved in meaningful exercises and activities that will help them truly understand numbers to 1,000. They will recognize the meaning of hundreds through counting exercises, and further their understanding of place value as they represent numbers using drawings.
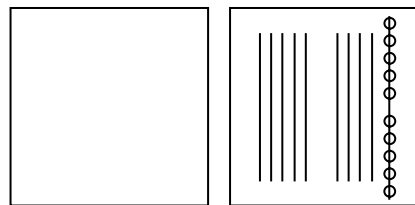
After drawing a box, sticks, and circles to represent 190, and then more circles as we count to 200, we discuss the new ten and new hundred.

- We just made a ten and now we have 9 tens (sticks) and 10 ones (circles).

190, 191, 192, 193, 194,195, 196, 197, 198, 199, **200**

- We draw a line through the 10 circles or ones to show that there are 10 ones. 9 tens and 10 ones means that we have made a new hundred. We draw a box around the 9 sticks and 10 circles.
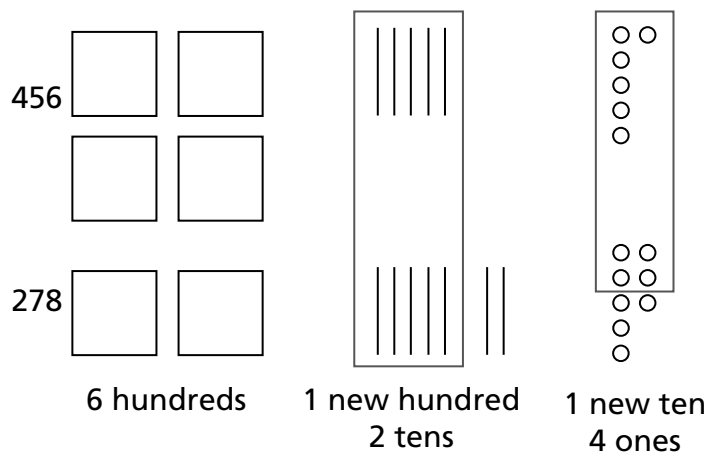
200

Strategies for Adding 3-Digit Numbers

Proof Drawings Children use Proof Drawings to help add. They record the final answer they find. Initially, each step in the drawing is related to a step in the numerical method (see next page) to give the numbers correct, quantitative meanings. Eventually, when children understand and can explain their numerical method, they do not make a drawing.

$$456 + 278 = \boxed{}$$

456

278

6 hundreds   1 new hundred   1 new ten
                  2 tens   4 ones

7 hundreds, 3 tens, 4 ones = 734

Methods for Adding 3-Digit Numbers Three numeric methods of addition, shown below, that we have used originally with 2-digit addition are reviewed in this unit. Children discuss these and their own methods to see how each method addresses what happens when there is a new ten or new hundred.

Show All Totals	New Groups Below	New Groups Above

$$
\begin{array}{r}
456 \\
+\ 278 \\
\hline
600 \\
120 \\
14 \\
\hline
734
\end{array}
$$

$$
\begin{array}{r}
456 \\
+\ 278 \\
\hline
^{1\ 1} \\
734
\end{array}
$$

$$
\begin{array}{r}
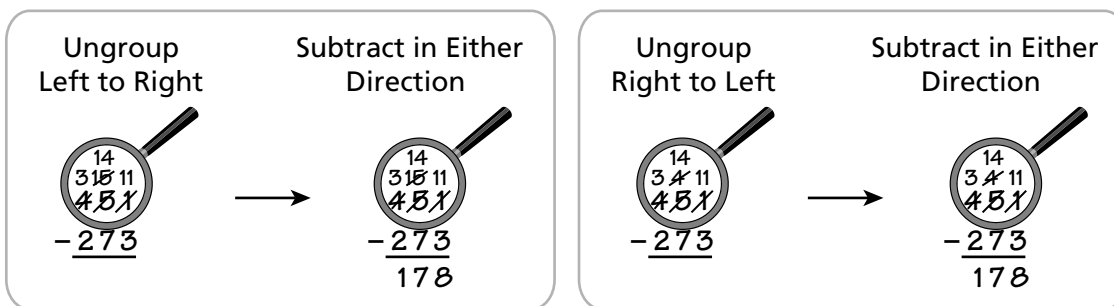^{1\ 1} \\
454 \\
+\ 278 \\
\hline
734
\end{array}
$$

More-advanced and on-level children may enjoy using and explaining different methods and less-advanced children will usually choose and use one method.

Strategies for Subtracting 3-Digit Numbers

Proof Drawings Children can also combine proof drawings with their numerical methods. See pages 808 and 809 for examples.

Methods for Subtracting 3-Digit Numbers Two numeric methods of subtraction, shown below, that we have used originally with 2-digit subtraction are reviewed in this unit.

Ungroup First Method Children will continue their understanding of a whole as they prepare a 3-digit number for subtraction by doing all necessary ungrouping first.

Ungroup Left to Right	Subtract in Either Direction		Ungroup Right to Left	Subtract in Either Direction

$$
\begin{array}{r}
^{14} \\
3\ 1\!\!\!/5\ 11 \\
4\!\!\!/\ 5\!\!\!/\ 1\!\!\!/ \\
-\ 2\ 7\ 3 \\
\hline
\end{array}
\longrightarrow
\begin{array}{r}
^{14} \\
3\ 1\!\!\!/5\ 11 \\
4\!\!\!/\ 5\!\!\!/\ 1\!\!\!/ \\
-\ 2\ 7\ 3 \\
\hline
1\ 7\ 8
\end{array}
\qquad
\begin{array}{r}
^{14} \\
3\ 4\!\!\!/\ 11 \\
4\!\!\!/\ 5\!\!\!/\ 1\!\!\!/ \\
-\ 2\ 7\ 3 \\
\hline
\end{array}
\longrightarrow
\begin{array}{r}
^{14} \\
3\ 4\!\!\!/\ 11 \\
4\!\!\!/\ 5\!\!\!/\ 1\!\!\!/ \\
-\ 2\ 7\ 3 \\
\hline
1\ 7\ 8
\end{array}
$$

Expanded Method Children break apart both of the 3-digit numbers into hundreds, tens, and ones, to begin. This helps them see the real value of each digit as they ungroup and subtract. They do all necessary ungrouping first, and then subtract.

$$
\begin{array}{rl}
& \overset{140}{} \\
& 300\ +\ \cancel{40}\ +\ 11 \\
451\ =\ & \cancel{400}\ +\ \cancel{50}\ +\ \cancel{1} \\
-\ 273\ =\ & 200\ +\ 70\ +\ 3 \\
\hline
& 100\ +\ 70\ +\ 8\ =\ 178
\end{array}
$$