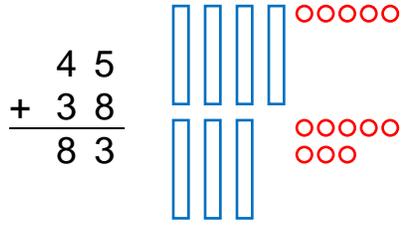


Progression of Addition Strategies

Drawing Tens & Ones	Adding in Expanded Notation	U.S. Standard Algorithm in Expanded Notation	U.S. Standard Algorithm
$45 + 38$ 	$456 + 167$ $\begin{array}{l} (400 + 50 + 6) \\ + (100 + 60 + 7) \\ \hline 500 + 110 + 13 \\ 623 \end{array}$	$456 + 167$ $\begin{array}{r} 100 \quad 10 \\ (400 + 50 + 6) \\ + (100 + 60 + 7) \\ \hline 600 + 20 + 3 \\ 623 \end{array}$	$456 + 167$ $\begin{array}{r} 1 \quad 1 \\ 4 \quad 5 \quad 6 \\ + 1 \quad 6 \quad 7 \\ \hline 6 \quad 2 \quad 3 \end{array}$
<p>This strategy is used in grades 1 and 2 to provide a visual model for both addition and subtraction. After drawing the tens and ones for each addend, some students will count on from 45, beginning 55, 65, 75, then counting on by ones. Other students will combine ones to make a 10, viewing 5 ones and 8 ones as 1 ten and 3 ones. This strategy helps build conceptual understanding of the operations, but it is not efficient for larger numbers.</p>	<p>Students should be able to use this strategy by the end of grade 2. Adding using expanded notation helps build understanding of place value and allows students to write all of their calculations without regrouping (a.k.a., ‘carrying’), which makes it easier for students to understand.</p>	<p>Students should be able to use this strategy by the end of grade 3. It still uses expanded notation to build place value understanding, but introduces regrouping (a.k.a., ‘carrying’) in a way that is easy to understand in order to prepare students to transition to the <i>U.S. Standard Algorithm</i>.</p> <p>Students should be able to do this before they begin to transition to the <i>U.S. Standard Algorithm</i>.</p>	<p>This strategy is required in grade 4 by standard 4.NBT.4. It follows a very similar set of steps as the strategy shown to the left, but uses a more compact notation to make it more efficient. This efficiency, however, also obscures the place value of the numbers and the logic of the steps (ex., after adding 5 tens + 6 tens, a student breaks apart the 11 tens, writing a ‘1’ at the bottom of the tens place and another ‘1’ (rather than ‘10’) at the top of the hundreds place). Students will come to understand the logic of each step and the meaning of the shorthand much better when they follow the progression of strategies depicted here. Therefore, this algorithm should not be introduced prematurely.</p>