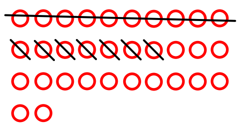
Progression of Subtraction Strategies

Direct Modeling

32 - 17

$$\begin{array}{r} 3\ 2 \\ -\ 1\ 7 \\ \hline 1\ 5 \end{array}$$



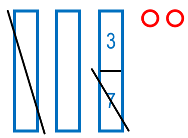
This strategy is used in grades K and 1 to provide a visual model for subtraction. Students model the original number (minuend) and then cross off the quantity indicated (subtrahend).

Note that most subtraction work in kindergarten is within 10; in grade 1, it is within 20. This example was provided to highlight the efficiency of drawing the minuend in rows of 10 ones and crossing off an entire row, when appropriate. Developmentally, most children cannot ‘unitize’ (see 10 ones as a ten) until grade 1.

Drawing Tens & Ones

32 - 17

$$\begin{array}{r} 3\ 2 \\ -\ 1\ 7 \\ \hline 1\ 5 \end{array}$$



Students should be able to use this strategy by the end of grade 2. It is still concrete/pictorial, but more efficient than the strategy shown to the left. This strategy helps develop place value understanding as students draw tens and ones and builds on students knowledge of pairs that make 10 (learned in kindergarten) as they decide how to break-up a 10 to do the subtraction.

U.S. Standard Algorithm in Expanded Notation

832 - 371

$$\begin{array}{rccccccc} & \ \ 700 & & 130 & & & \\ & (\cancel{800} & + & \cancel{30} & + & 2\ ) \\ - & (300 & + & 70 & + & 1\ ) \\ \hline & 400 & + & 60 & + & 1 \end{array}$$

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Students should be able to use this strategy by the end of grade 3. It uses expanded notation to build understanding of place value and regrouping (a.k.a., trading or borrowing) in a way that is easy to understand.

Students should be able to do this before they begin to transition to the *U.S. Standard Algorithm*.

U.S. Standard Algorithm

832 - 371

$$\begin{array}{rccc} & 7 & 13 & \\ & \cancel{8} & \cancel{3} & 2 \\ - & 3 & 7 & 1 \\ \hline & 4 & 6 & 1 \end{array}$$

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 regrouping, it is hard for students to see that we still have 832). 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.**