

Subtraction Appendix

Stage 3: Expanded layout, leading to column method

Partitioning the numbers into tens and ones and writing one under the other mirrors the column method, where ones are placed under ones and tens under tens.

This does not link directly to mental methods of counting back or up but parallels the partitioning method for addition. It also relies on secure mental skills.

The expanded method leads children to the more compact method so that they understand its structure and efficiency. The amount of time that should be spent teaching and practising the expanded method will depend on how secure the children are in their recall of number facts and in partitioning.

Stage 3

Partitioned numbers are then written under one another:

Example: $74 - 27$

$$\begin{array}{r} 70 + 4 \\ - 20 + 7 \\ \hline \end{array}$$

$$\begin{array}{r} \overset{60}{70} + \overset{14}{4} \\ - 20 + 7 \\ \hline 40 + 7 \end{array}$$

$$\begin{array}{r} \overset{6}{7} \overset{14}{4} \\ - 27 \\ \hline 47 \end{array}$$

Example: $741 - 367$

$$\begin{array}{r} 700 + 40 + 1 \\ - 300 + 60 + 7 \\ \hline \end{array}$$

$$\begin{array}{r} \overset{600}{700} + \overset{130}{40} + \overset{11}{1} \\ - 300 + 60 + 7 \\ \hline 300 + 70 + 4 \end{array}$$

$$\begin{array}{r} \overset{6}{7} \overset{13}{4} \overset{11}{1} \\ - 367 \\ \hline 374 \end{array}$$

The expanded method for three-digit numbers

Example: $563 - 241$, no adjustment or decomposition needed

Expanded method

$$\begin{array}{r} 500 + 60 + 3 \\ - 200 + 40 + 1 \\ \hline 300 + 20 + 2 \end{array}$$

leading to

$$\begin{array}{r} 563 \\ - 241 \\ \hline 322 \end{array}$$

(from previous column)

Start by subtracting the ones, then the tens, then the hundreds.

Refer to subtracting the tens, for example, by saying 'sixty take away forty', not 'six take away four'.

Example: $563 - 271$, adjustment from the hundreds to the tens, or partitioning the hundreds

$$\begin{array}{r} 500 + 60 + 3 \\ - 200 + 70 + 1 \\ \hline \end{array} \quad \begin{array}{r} 400 + 160 + 3 \\ - 200 + 70 + 1 \\ \hline 200 + 90 + 2 \end{array} \quad \begin{array}{r} \overset{400}{500} + \overset{160}{60} + 3 \\ - 200 + 70 + 1 \\ \hline 200 + 90 + 2 \end{array} \quad \begin{array}{r} \overset{4}{5} \overset{16}{6} \overset{13}{3} \\ - 271 \\ \hline 292 \end{array}$$

Begin by reading aloud the number from which we are subtracting: 'five hundred and sixty-three'. Then discuss the hundreds, tens and ones components of the number, and how $500 + 60$ can be partitioned into $400 + 160$. The subtraction of the tens becomes '160 minus 70', an application of subtraction of multiples of ten.

Example: $563 - 278$, adjustment from the hundreds to the tens and the tens to the ones

$$\begin{array}{r} 500 + 60 + 3 \\ - 200 + 70 + 8 \\ \hline \end{array} \quad \begin{array}{r} 400 + 150 + 13 \\ - 200 + 70 + 8 \\ \hline 200 + 80 + 5 \end{array} \quad \begin{array}{r} \overset{400}{500} + \overset{150}{60} + \overset{13}{3} \\ - 200 + 70 + 8 \\ \hline 200 + 80 + 5 \end{array} \quad \begin{array}{r} \overset{4}{5} \overset{15}{6} \overset{13}{3} \\ - 278 \\ \hline 285 \end{array}$$

Here both the tens and the ones digits to be subtracted are bigger than both the tens and the ones digits you are subtracting from. Discuss how $60 + 3$ is partitioned into $50 + 13$, and then how $500 + 50$ can be partitioned into $400 + 150$, and how this helps when subtracting.

Example: $503 - 278$, dealing with zeros when adjusting

$$\begin{array}{r} 500 + 0 + 3 \\ - 200 + 70 + 8 \\ \hline \end{array} \quad \begin{array}{r} 400 + 90 + 13 \\ - 200 + 70 + 8 \\ \hline 200 + 20 + 5 \end{array} \quad \begin{array}{r} \overset{400}{500} + \overset{90}{0} + \overset{13}{3} \\ - 200 + 70 + 8 \\ \hline 200 + 20 + 5 \end{array} \quad \begin{array}{r} \overset{4}{5} \overset{9}{0} \overset{13}{3} \\ - 278 \\ \hline 225 \end{array}$$

Here 0 acts as a place holder for the tens. The adjustment has to be done in two stages. First the $500 + 0$ is partitioned into $400 + 100$ and then the $100 + 3$ is partitioned into $90 + 13$.