

Progression for Subtraction

Written methods for subtraction of whole numbers

The aim is that children use mental methods when appropriate, but for calculations that they cannot do in their heads they use an efficient written method accurately and with confidence. Children are entitled to be taught and to acquire secure mental methods of calculation and one efficient written method of calculation for subtraction which they know they can rely on when mental methods are not appropriate.

To subtract efficiently, children need to be able to:

understand subtraction as either 'taking away' or 'finding the difference'

recall all addition and subtraction facts to 20

subtract multiples of 10, such as $160 - 70$, using the related subtraction fact $16 - 7$ and their knowledge of place value

partition two-digit and three-digit numbers into multiples of 100, 10 and 1 in different ways e.g. 74 into $70 + 4$ or $60 + 14$

Note: It is important that children's mental methods of calculation are practiced and secured alongside their learning and use of an efficient written method for subtraction. Mental methods may be supported by jottings. **These jottings are part of the calculating process and must not be erased or written in a different place to the calculation.**

Level 1

Counts, orders and subtracts numbers when solving problems involving up to 10 objects.

Level 2

Uses mental recall of subtraction facts to 10.

Uses mental calculation strategies for addition to solve problems involving money and measures.

Uses the knowledge that subtraction is the inverse of addition.

Level 3

Uses mental recall of subtraction facts to 20 in solving problems involving larger numbers.

Subtracts numbers with two digits mentally.

Subtracts numbers with three digits using written methods.

Level 4

In solving number problems, uses a range of mental methods of computation with the four operations.

Uses efficient written methods of subtraction.

Subtracts decimals to two decimal places.

Level 5

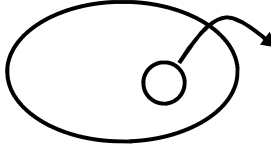
Orders and subtracts negative numbers in contexts.

Stage	Progression for Subtraction
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1

DEVELOPING UNDERSTANDING


- Understand subtraction as 'taking away.....'



...and 'finding the difference'



and



N.B. Use of Numicon to find the difference.

- Interpret situations as subtraction calculations and explain reasoning. For example, answer questions such as:
There are 18 bean bags. Kim takes 5. How many bean bags are left?
There are 9 people on a bus and 5 people in a car. How many more people are there on the bus than in the car?

FS/
Y1

2

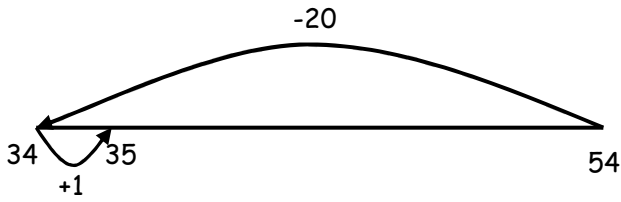
DEVELOPING MENTAL CALCULATION:

- Derive and recall subtraction facts including those for each number to 20

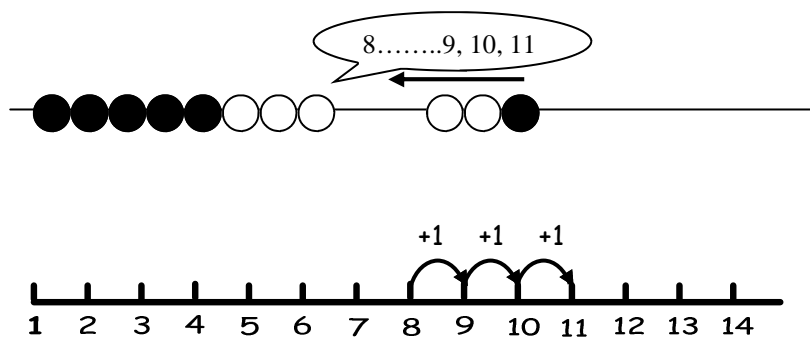
NB: Children should develop and use a 'toolbox' of mental calculation strategies from which they can choose the most efficient strategy to solve a calculation depending on the numbers involved in it.

SPECIAL CASE STRATEGIES

- Compensation** (subtracting nearest multiple of 10, 100 etc. and adjusting)
 $54 - 19$



- Finding a small difference by counting up** (when numbers are relatively close together)
 $11 - 8$



Y1—
Y6

GENERAL STRATEGY

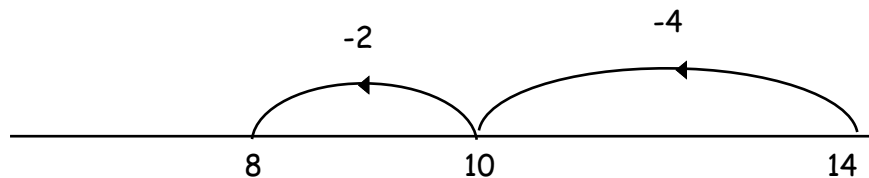
Y 1—
Y6

Partitioning:

Use counting and developing recall of number facts to subtract a pair of numbers mentally by...

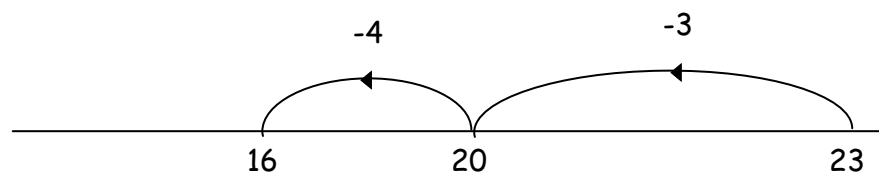
- **Partitioning** numbers to enable bridging through 10....

14-6



... progressing to bridging through 20

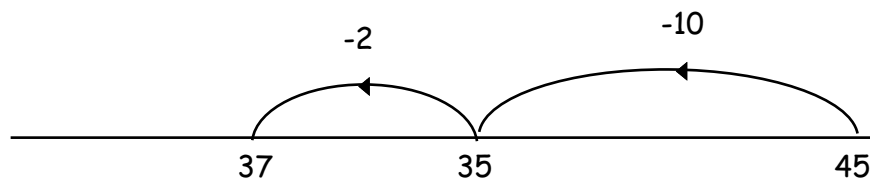
23-7



2

- **Partitioning** two digit numbers into their component parts

45-12



or

$$\begin{aligned} 45-12 &= 45-10-2 \\ &= 35-2 \\ &= 33 \end{aligned}$$

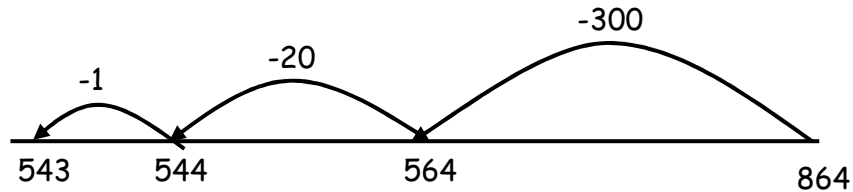


WRITTEN METHODS:

Children should be encouraged to select an appropriate calculation method, be it mental or written, depending on the numbers involved in the calculation. To develop this skill children should be taught to ask themselves 'Can I do this mentally?' Therefore, it is important that children's mental methods of calculation are practised and secured alongside their learning and development towards a compact written method.

USING THE NUMBER LINE AS A WRITTEN METHOD FOR LARGER NUMBERS

864 - 321



INFORMAL EXPANDED METHOD:

This leads children to the more compact written method developing an understanding of its structure and efficiency. Two and three digit subtraction: Start with subtracting the units, then the tens etc.

No adjustment

47 - 23

$$\begin{array}{r} 40 \quad 7 \\ - 20 \quad 3 \\ \hline 20 \quad 4 \end{array}$$

864 - 621

$$\begin{array}{r} 800 \quad 60 \quad 4 \\ - 600 \quad 20 \quad 1 \\ \hline 200 \quad 40 \quad 3 \end{array}$$

3

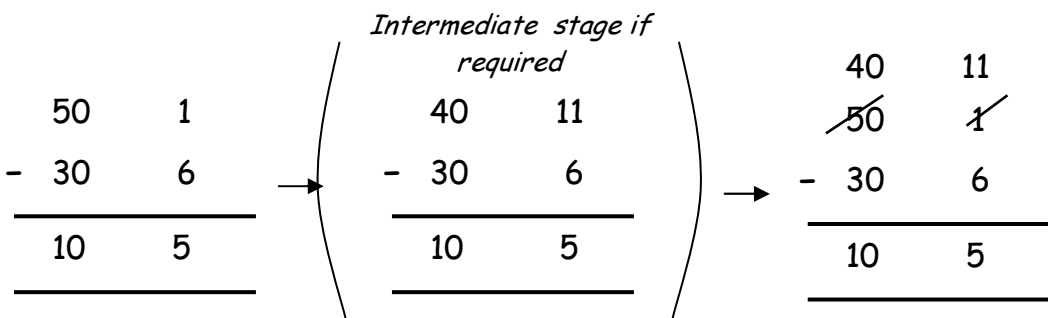
One adjustment

Encourage children to practise the skill of partitioning numbers in different ways e. g.

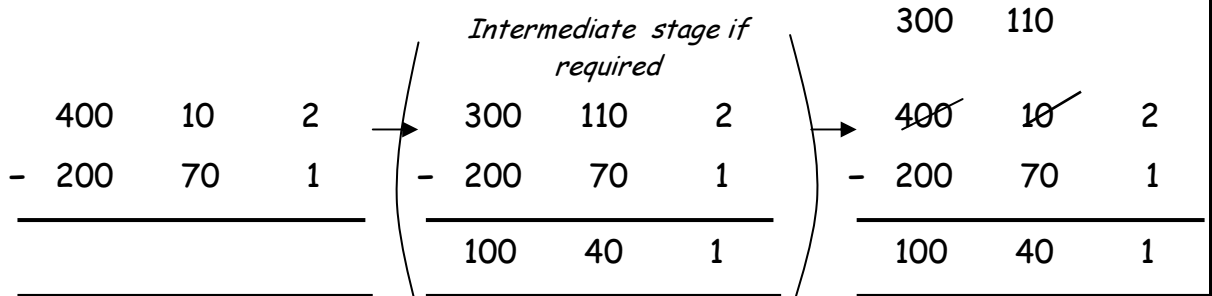
$$\begin{aligned} 437 &= 300 + 130 + 7 \\ &= 300 + 120 + 17 \\ &= 300 + 110 + 27 \end{aligned}$$

N.B. In mental/oral sessions practise partitioning numbers in different ways e.g. 51 = 40 + 11. Link the partitioning to this written method. Demonstrate the partitioning with Dienes Blocks.

Tens to ones: 51 - 36



...hundreds to tens 412 - 271



3

Two adjustments
643 - 385

$$\begin{array}{r}
 500 \quad 130 \\
 \quad \quad \quad \cancel{30} \quad 13 \\
 \quad \quad \quad \cancel{600} \quad \cancel{40} \quad \cancel{3} \\
 - \quad 300 \quad 80 \quad 5 \\
 \hline
 200 \quad 50 \quad 8
 \end{array}$$

NB: Remember to demonstrate intermediate steps if required to build understanding

4

COMPACT METHOD:

NB: For some children the number line will still be the most efficient and reliable calculation method.

The method doesn't change but the recording is reduced. Only children who can calculate independently and efficiently with the expanded method should be introduced to the compact method. For some children the number line will be the most efficient and accurate recording method.

No adjustment

$$\begin{array}{r}
 247 \\
 - 23 \\
 \hline
 224
 \end{array}$$

$$\begin{array}{r}
 864 \\
 - 621 \\
 \hline
 243
 \end{array}$$

One adjustment, tens to units

$$\begin{array}{r}
 \overset{4}{\cancel{25}}1 \quad (200 + 40 + 11) \\
 - 36 \\
 \hline
 224
 \end{array}$$

$$\begin{array}{r}
 \overset{2}{\cancel{43}}12 \quad (400 + 20 + 12) \\
 - 217 \\
 \hline
 215
 \end{array}$$

One adjustment, hundreds to tens

$$\begin{array}{r}
 \overset{3}{\cancel{3}}37 \quad (300 + 130 + 7) \\
 - 182 \\
 \hline
 255
 \end{array}$$

Two adjustments, tens to units then hundreds to tens,

$$\begin{array}{r}
 \overset{1}{\cancel{34}}\overset{2}{\cancel{3}}12 \quad (300 + 120 + 12) \\
 - 187 \\
 \hline
 245
 \end{array}$$

- Extend use of method to subtract sums of money or measures, with or without adjustments, and the same number of decimal places.

$$\begin{array}{r}
 3 \\
 14.24 \\
 - 8.70 \\
 \hline
 5.54 \\
 \hline
 \end{array}$$

NB: For children displaying a lack of understanding of recording at Stage 4, return to the expanded method of recording at Stage 3.

- Extend method to numbers with at least four digits.

$$\begin{array}{r}
 1587 \\
 - 475 \\
 \hline
 1112 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 21712 \\
 \cancel{2} \cancel{1} \cancel{7} \cancel{1} \cancel{2} \\
 - 1675 \\
 \hline
 1907 \\
 \hline
 \end{array}$$

4

- Use the compact method extending to numbers with any number of digits.
- Use the compact method to subtract decimal fractions with up to 4 digits and either 1 or 2 decimal places.

SPECIAL CASE— For use with round numbers

$$\begin{array}{r}
 199 + 1 \\
 \cancel{200} \\
 - 74 \\
 \hline
 125 + 1 \\
 \hline
 \end{array}$$

So $200 - 74 = 126$

$$\begin{array}{r}
 1999 + 1 \\
 \cancel{2000} \\
 - 437 \\
 \hline
 1562 + 1 \\
 \hline
 \end{array}$$

So $2000 - 437 = 1563$

Y4-
Y5
↓
Y5
↓
Y6
↓