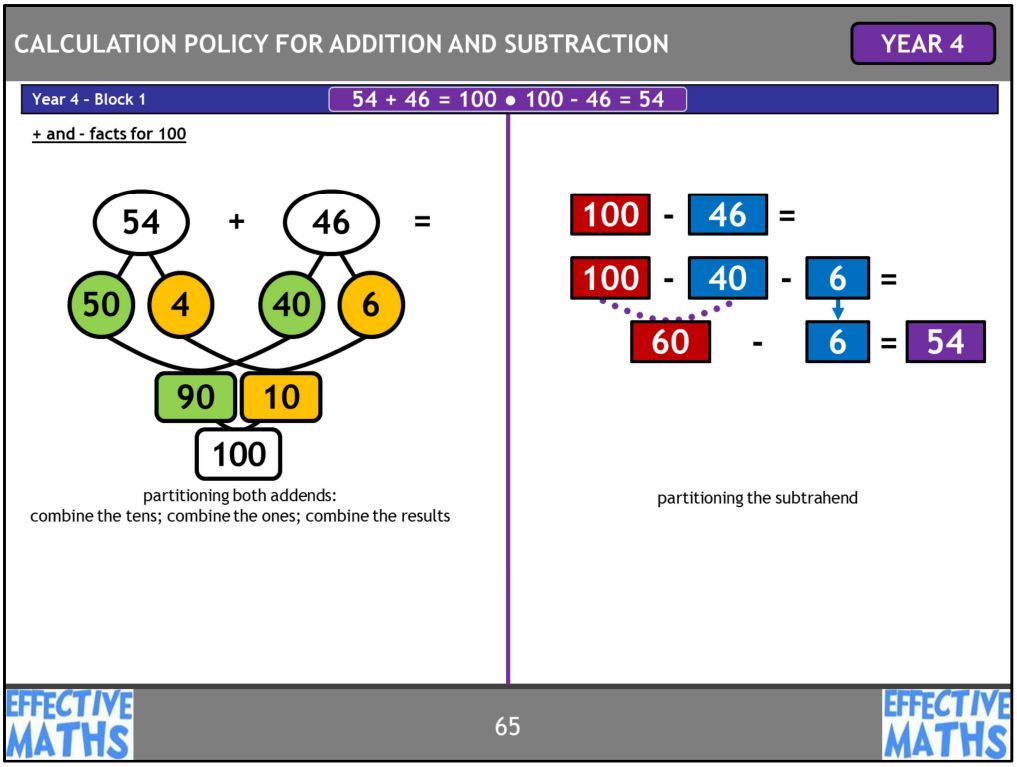


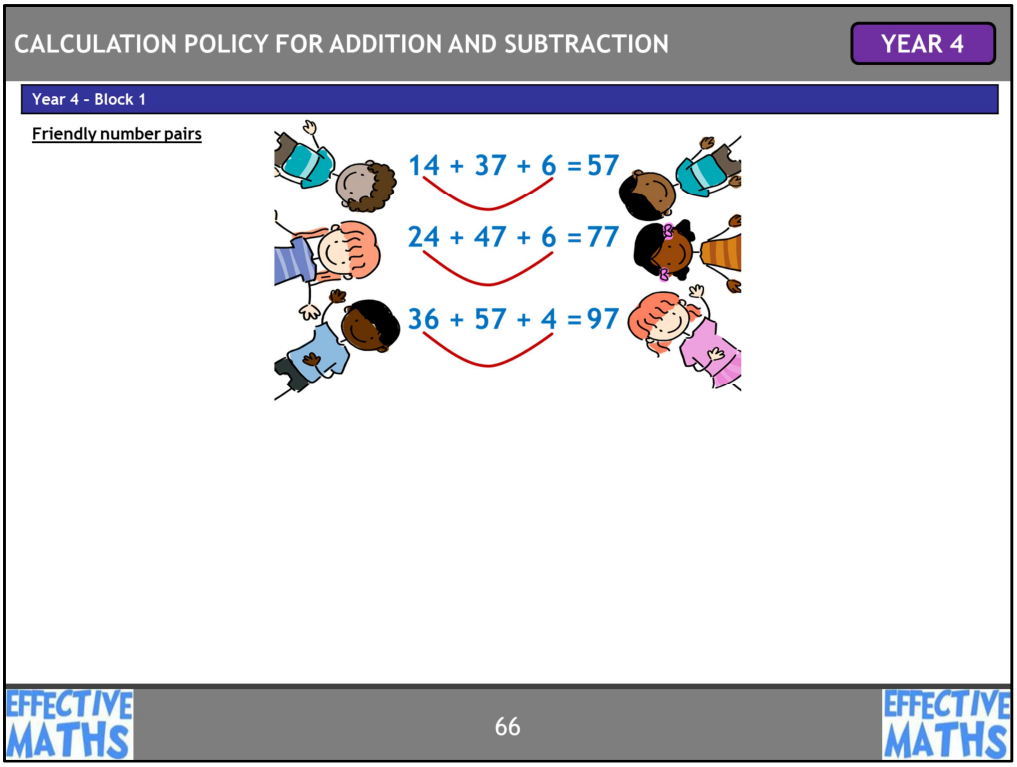
BLOCK 1

+ and - facts for 100 (r)
As in Year 3, teaching needs to stress how to avoid common errors when calculating complements to 100. (eg: 64 + 46 = 110 instead of 100.) See notes in lesson.

The core strategy for addition is to partition the addends in to tens and ones, combine the tens, combine the ones, combine the results.

For subtraction the strategy is to partition the subtrahend:
- partition the subtrahend into tens and ones;
- subtract the tens from the minuend;
- subtract the ones from the result.

Eg:
100 – 46 = 100 – 40 – 6.

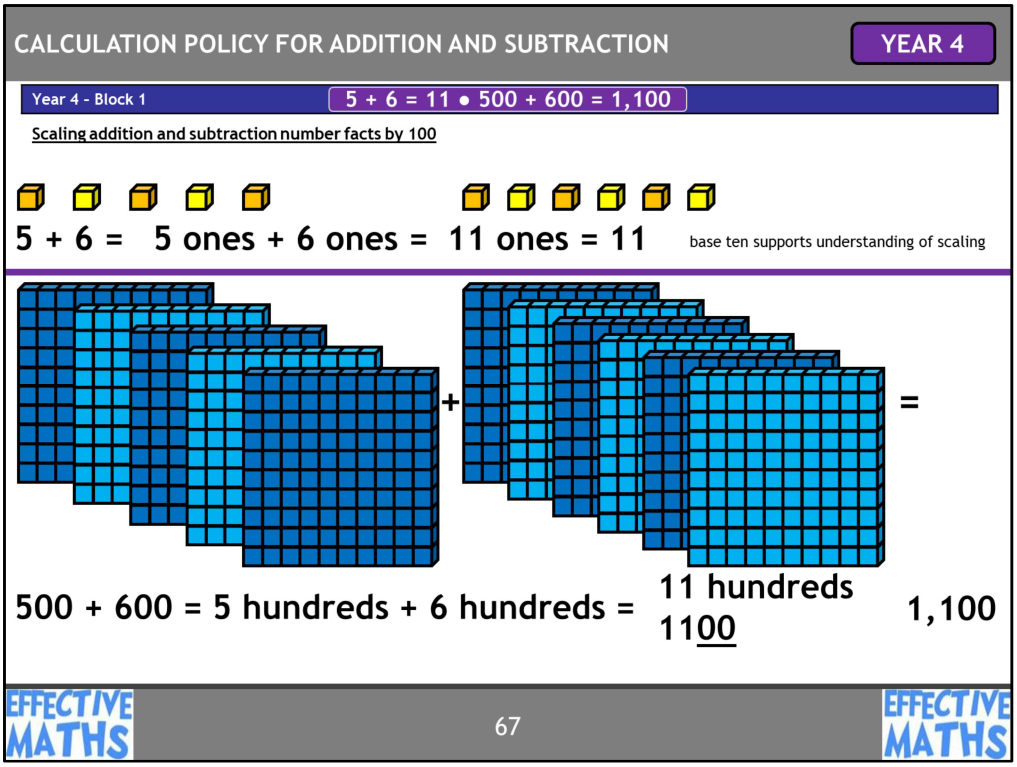


Friendly number pairs

Children first encountered friendly numbers in Year 2.

Friendly numbers fit together to make a number that is easy to work with. Re-ordering is often used to simplify calculations. Eg:

14 + 37 + 6 becomes 14 + 6 + 37 which becomes 20 + 37.



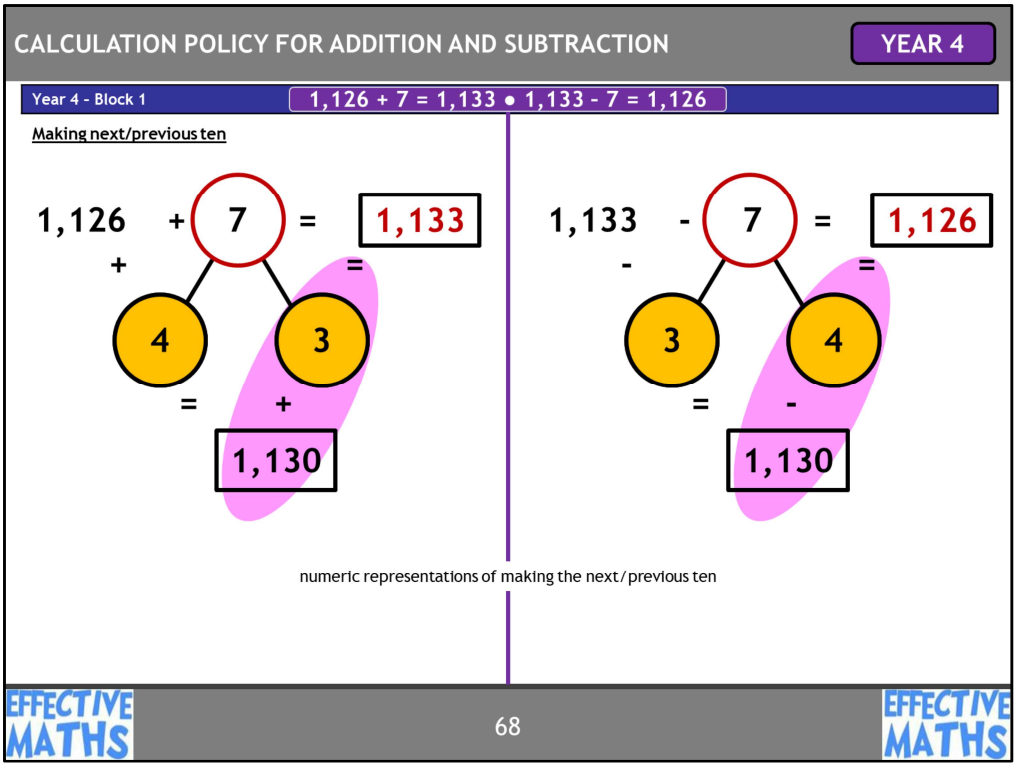
Scaling addition and subtraction number facts by 100

Use known facts, eg:

5 + 6 = 11 *so*

5 hundreds + 6 hundreds = 11 hundreds = 1 thousand and 1 hundred

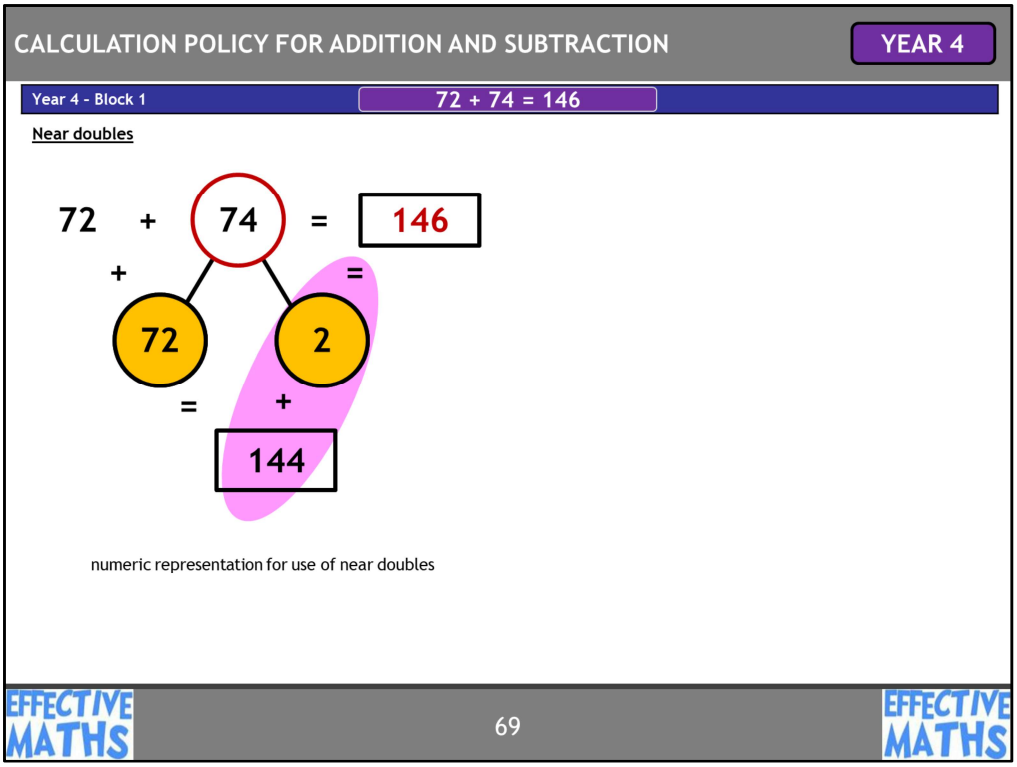
500+ 600 = 1100 = 1,100



Mental calculation

- Making next ten/previous ten

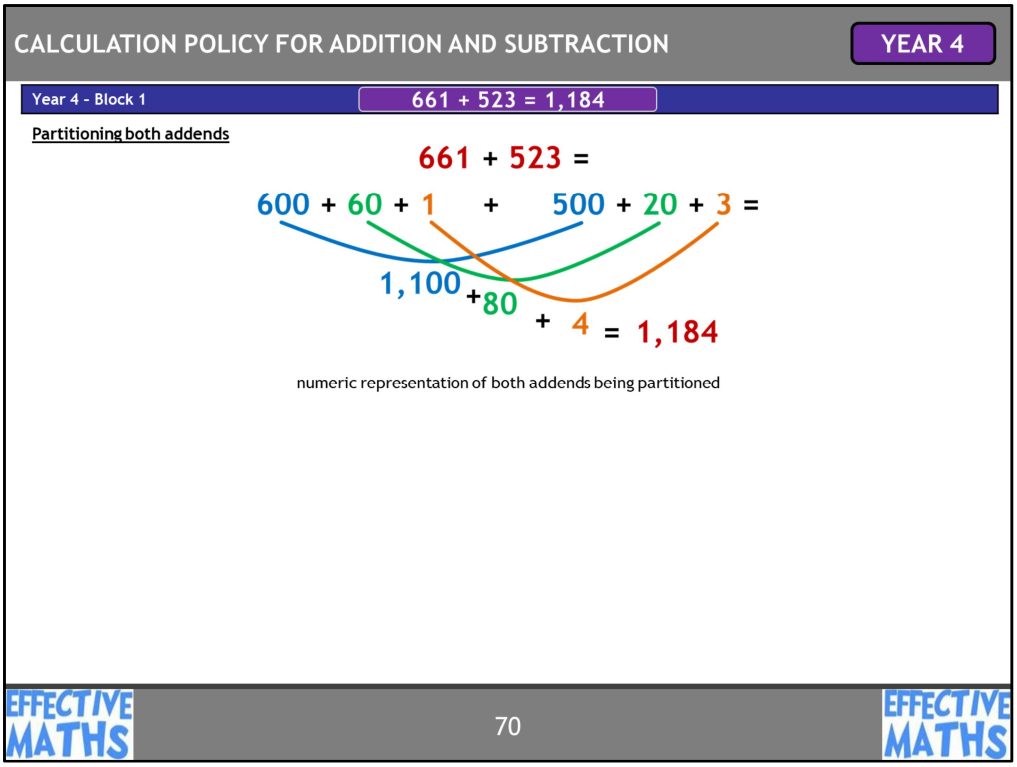
Children's knowledge of the making next/previous ten is extended to four-digit numbers plus/minus one digit numbers.



Mental calculation

- Near doubles

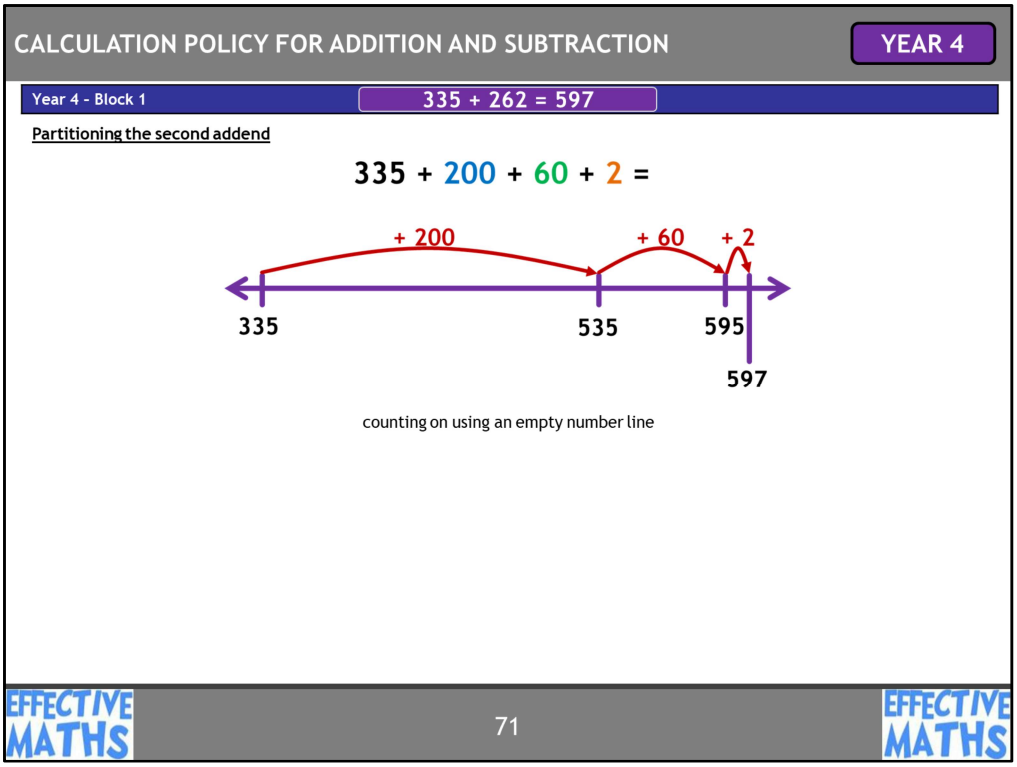
Application of near doubles is applied to examples such as 72 + 74 = 72 + 72 + 2.



Mental calculation

- Partitioning both addends - left to right addition

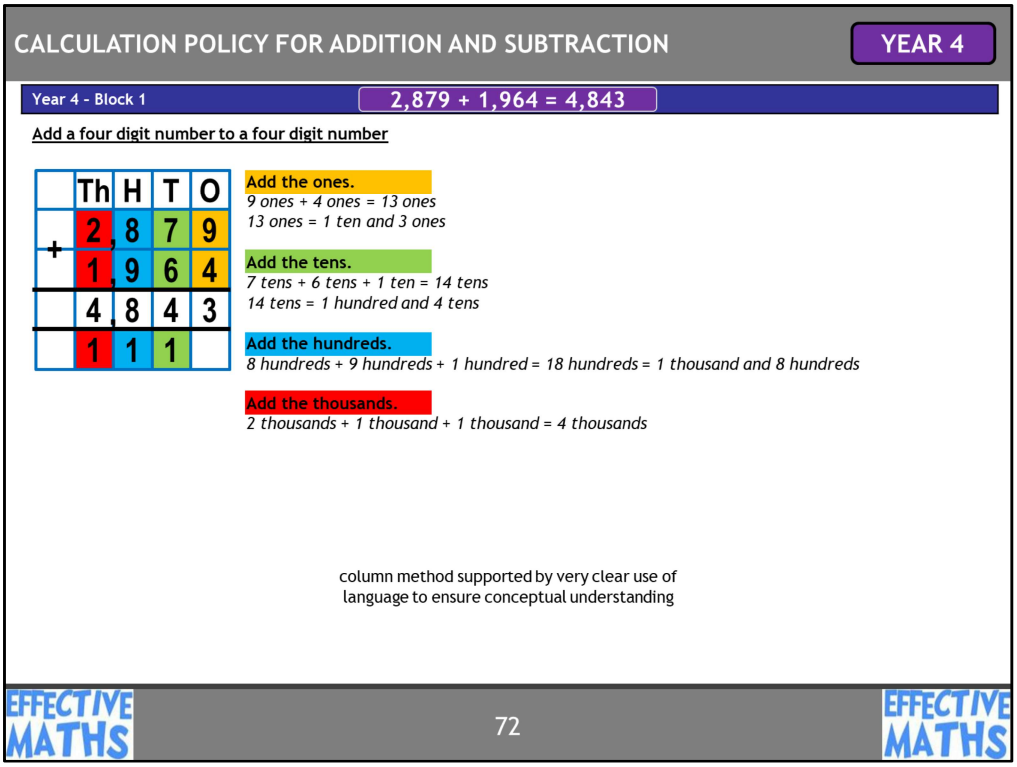
Children learn that when we calculate with column methods we work from the smallest units to the largest; when we calculate mentally we tend to work with the largest parts first.



Mental calculation

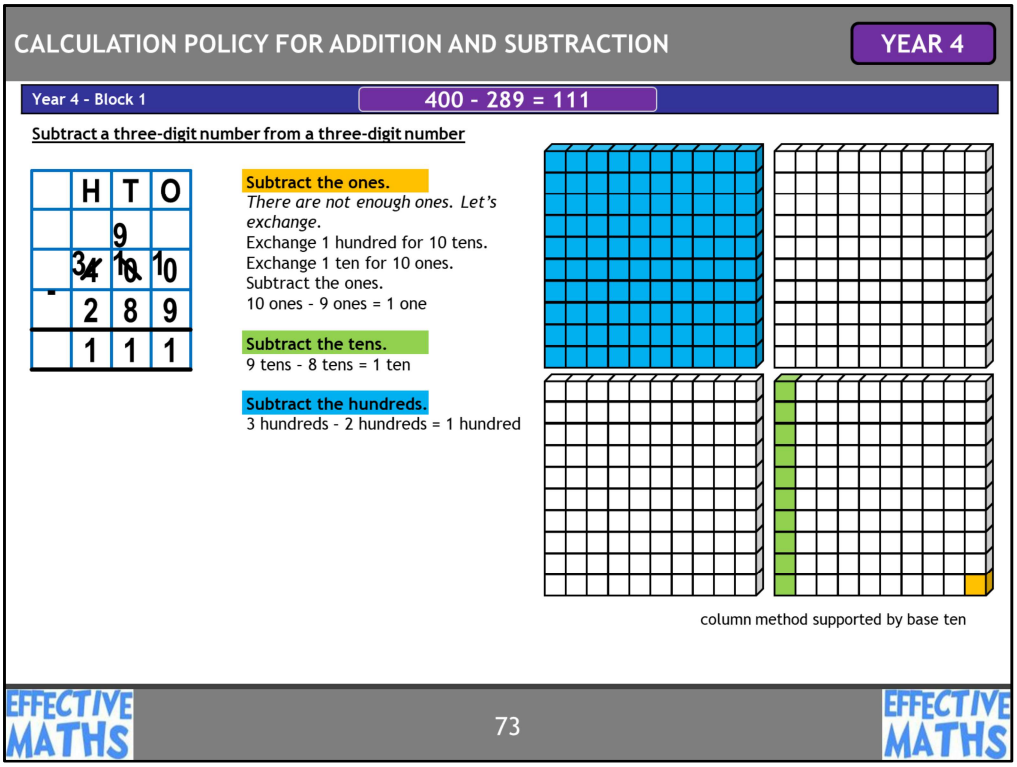
- Partitioning the second addend -empty number line representation

Empty number lines are used to support consolidation of adding by partitioning the second addend, eg:
335 + 226 = 335 + 200 + 20 + 6.



Add a four digit number to a four digit number
Column method (exchanging ones, tens and hundreds).

Language for the compact column method
The use of accurate language is essential to ensure conceptual understanding of the column method.
Avoid terms like ‘units’ and ‘carry’.



Subtract a three-digit number from a three-digit number
Column method (exchanging hundreds for tens and tens for ones).

Children move on to subtracting a four-digit number from a four-digit number in Block 2.

Language for the compact column method

As for addition, accurate use of language is essential to ensure conceptual understanding of the column method.
Do not use the term 'borrow'.
There are not enough ones in the situation *0 ones take away 9 ones*. So we need some more ones.
There are no tens. So let's exchange 1 hundred for 10 tens.
Now let's exchange/swap 1 ten for 10 ones. Now we have 10 ones.
10 ones take away 9 ones equals 1 one.

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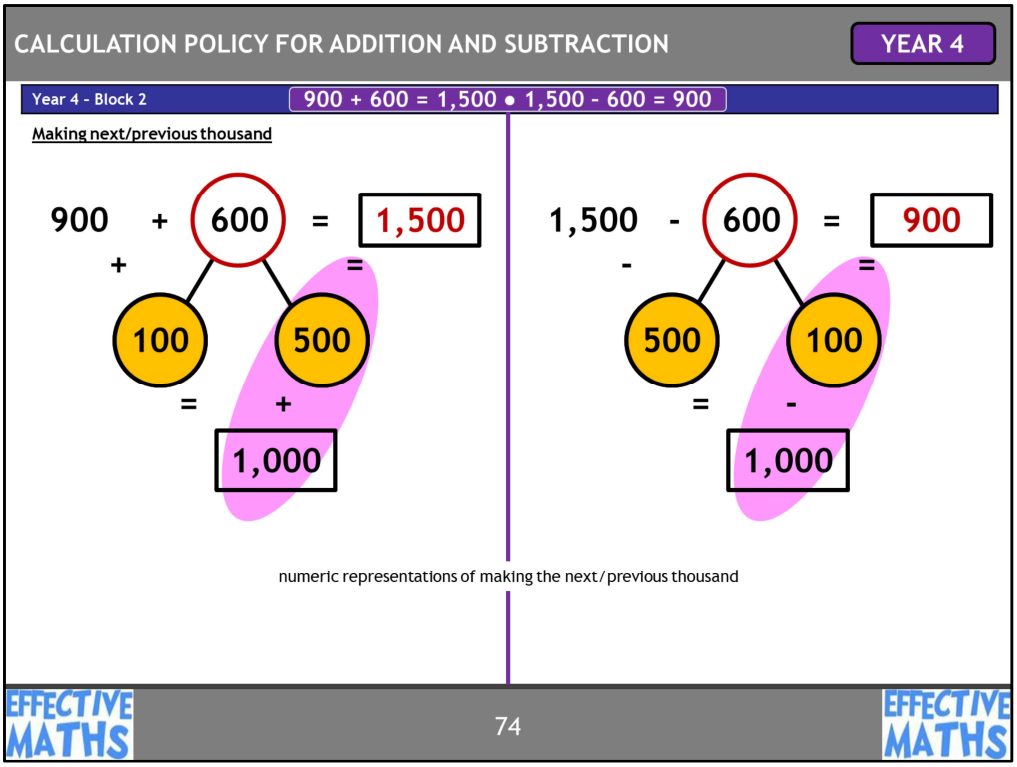
Children need to understand how to exchange across zeros. They also need to understand that using the column method for a calculation like 300 – 289 is not the most efficient strategy.



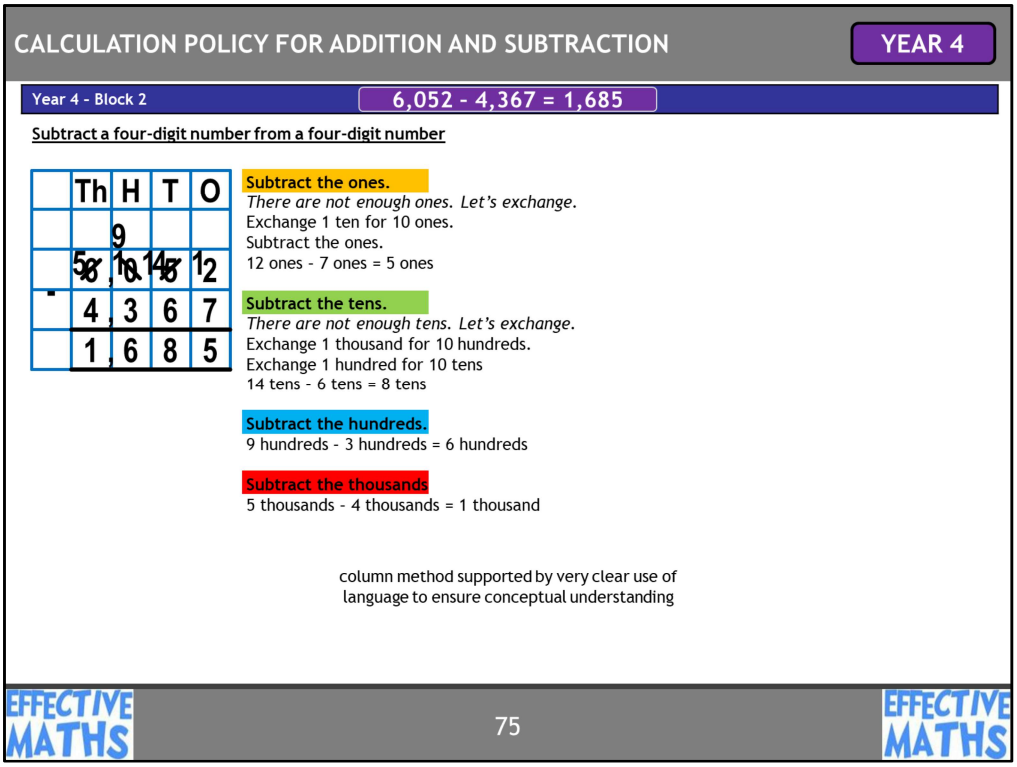
BLOCK 2

Making the next/previous thousand

Children's knowledge of making the next/previous is extended to examples where they make the next/previous thousand, eg:

900 + 600 = 900 + 100 + 500

1,500 – 600 = 1,500 – 500 – 100 = 900



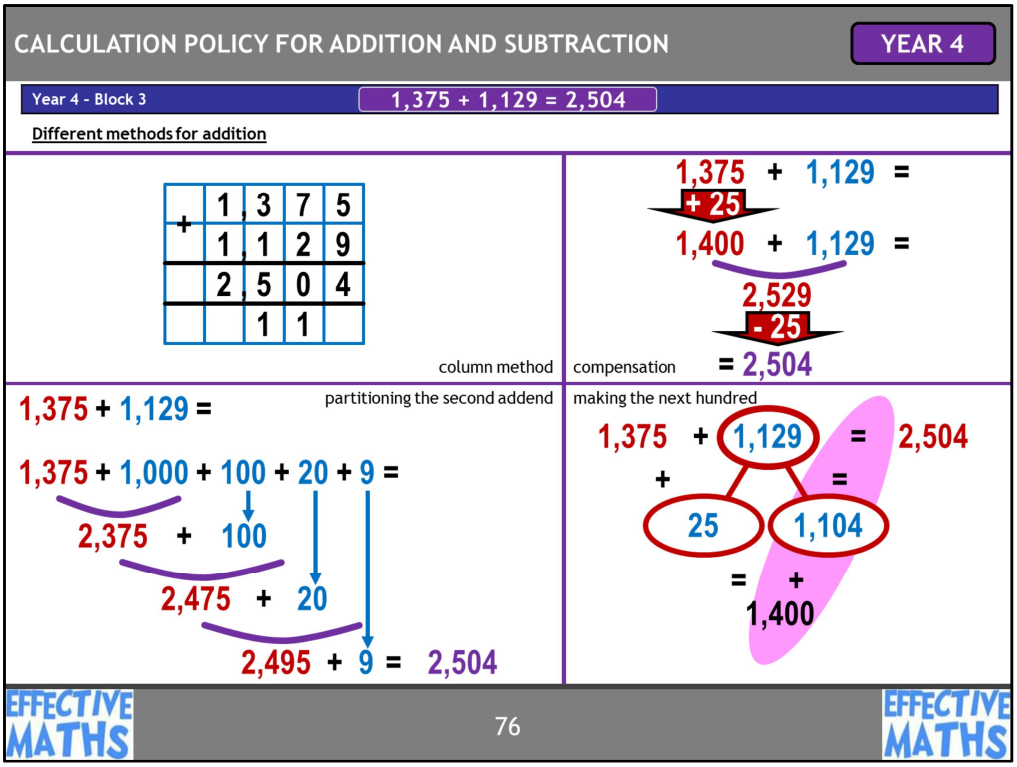
<u>Subtract a four-digit number from a four-digit number</u>
Column method (exchanging thousands for hundreds, hundreds for tens and tens for ones).

<u>Language for the compact column method</u>

Accurate use of language is essential to ensure <u>conceptual</u> understanding of the column method.
Do not use the term 'borrow'.
There are not enough ones in the situation *2 ones take away 7 ones*. So we need some more ones.
Let's exchange/swap 1 ten for 10 ones. Now we have 12 ones.
12 ones take away 7 ones equals 5 ones.

There are not enough tens in the situation *4 tens take away 6 tens*. So we need some more tens.
There are currently no hundreds, so we need to exchange 1 **thousand** for 10 **hundreds**:
1**<u>000</u>** = 10**<u>00</u>**
Now we can exchange 1 **hundred** for 10 **tens**:
1**<u>00</u>** = 10<u>0</u>
We now have 14 tens.
14 tens – 6 tens = 8 tens.

9 hundreds – 6 hundreds = 3 hundreds.
5 thousands – 4 thousands = 1 thousand.

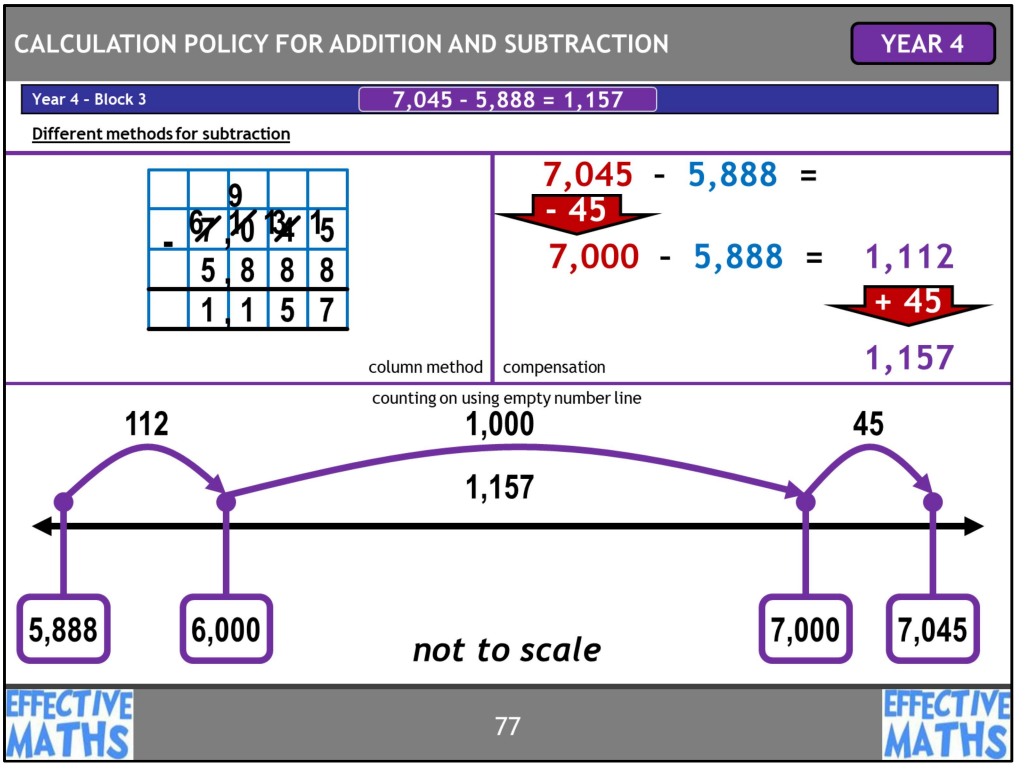


BLOCK 3

Different methods for addition

Working with four-digit numbers children explore the following methods:

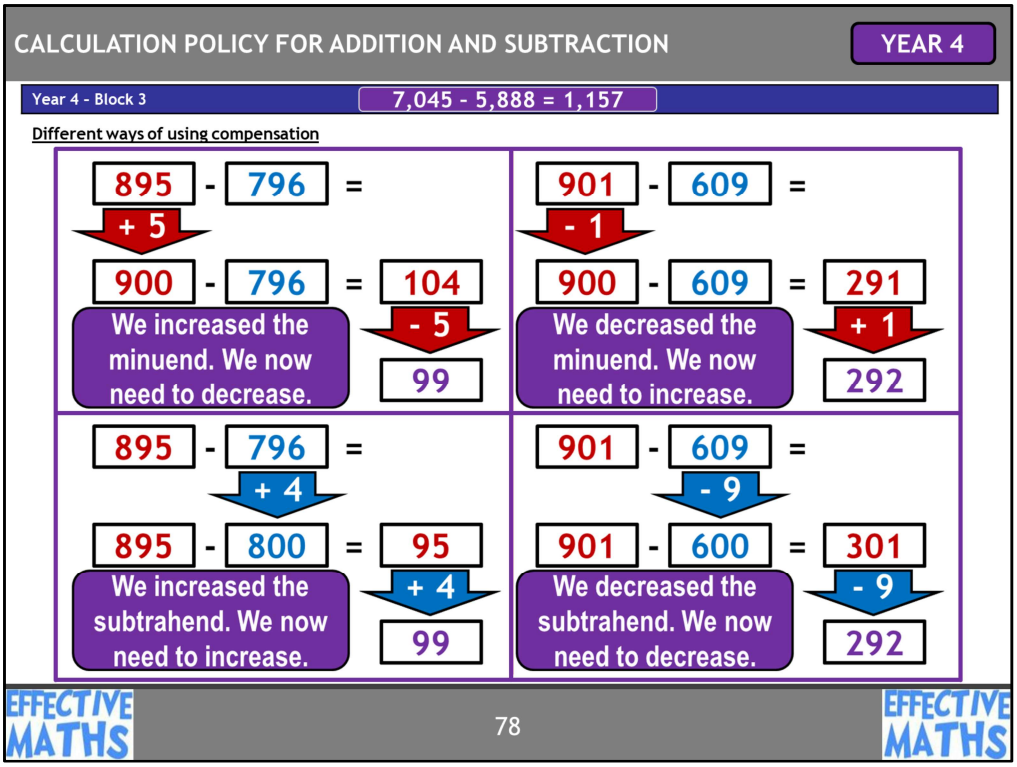
- column method;
- partitioning the second addend;
- making the next hundred;
- compensation.



Different methods for subtraction

Working with four-digit numbers children explore the following methods:

- column method;
- counting on using empty number line;
- compensation.



Compensation is a powerful strategy that children should be introduced to. It is a sophisticated strategy, and in subtraction children may over generalise and make errors.

Over time, teaching needs to help children see that:

- if the minuend is increased the difference will need to be decreased by the same amount;
- if the minuend is decreased the difference will need to be increased by the same amount;
- if the subtrahend is increased the difference will need to be increased by the same amount;
- if the subtrahend is decreased the difference will need to be decreased by the same amount.

These are not rules to be learnt by rote. Teaching needs to ensure children have the conceptual understanding to support why the rules work.

Take the case of 895 – 796.

In the first example above the minuend was **increased**. So the resulting difference is too big because we have subtracted 796 from a bigger minuend: 900 instead of 895. We need to **decrease** the difference by 5.

In the second example of 895 - 796, the subtrahend is **increased**. So we have taken away more than we need to: 800 instead of 796. The initial difference (95) is therefore too small and needs to be **increased**.

We want children to be fluent with most methods. All children should be exposed to using compensation for subtraction; some children may be usefully encouraged to focus on number line methods, partitioning the subtrahend, partitioning the minuend and column method.