

## Year 4 Calculation Progression

### Addition

All methods follow the Maths No Problem progression and these methods are cycled through for adding ones, then adding tens and hundreds. The target method is the end product. When renaming is introduced, this is taught using dienes first before moving onto formal methods.

#### Method 1 – Dienes and place value counters.

Dienes and place value counters should be used throughout all calculation to support the visual approaches needed for all children. Children will physically move the dienes and counters and need time to consolidate this in 'Guided Practice' before moving on to drawn dienes and mental methods. The step from drawn to mental methods will come through practice but once confident drawing, begin to move the children on as this will become an inefficient method (takes too long).

**1** Use base-ten blocks

136 + 245 = 381  
The sum of 136 and 245 is 381.

**2** Use number discs

Add ones.  
Add tens.  
Add hundreds.

#### Method 2 – Adding without renaming using place value counters to support.

Children begin with calculations that involve no renaming and use place value counters alongside the column addition method to support their understanding.

**2** Find the sum of 2314 and 4240.

|       |   |   |   |   |
|-------|---|---|---|---|
| 2     | 3 | 1 | 4 |   |
| +     | 4 | 2 | 4 | 0 |
| <hr/> |   |   |   |   |
| 6     | 5 | 5 | 4 |   |

**Step 1** Add the ones.  
4 ones + 0 ones = 4 ones

**Step 2** Add the tens.  
1 ten + 4 tens = 5 tens

**Step 3** Add the hundreds.  
3 hundreds + 2 hundreds = 5 hundreds

**Step 4** Add the thousands.  
2 thousands + 4 thousands = 6 thousands

2314 + 4240 = 6554

#### Method 3 – Adding with renaming using place value counters to support.

Children will move onto calculation that involve renaming and use place value counters alongside column addition to support their understanding. They will need to apply their place value knowledge to this to help them see that they can rename smaller counters into a larger counter to help with the addition.

**1** Find the sum of 5608 and 1235.

**Step 1** Add the ones. 8 ones + 5 ones = 13 ones  
Rename the ones. 13 ones = 1 ten and 3 ones

|       |   |   |   |   |
|-------|---|---|---|---|
| 5     | 6 | 0 | 8 |   |
| +     | 1 | 2 | 3 | 5 |
| <hr/> |   |   |   |   |
|       |   |   | 3 |   |

## TARGET METHOD – COLUMN ADDITION

All children need to have secured learning in the previous methods to be able to access formal column addition with understanding. **This is not to be taught without understanding e.g. as a process only.**

All children must have secured the place value understanding and able to use the previous methods to support column.

Throughout teaching it is vital to refer to the column name/value. For example  $57 + 23$  would be discussed as “7 ones add 3 ones.” Then, “5 tens add 2 tens.” Or “fifty add thirty.”

The tens and hundreds should never be referred as an individual digit; they must always have a reference to the tens, hundreds and thousands place value.

$$\begin{array}{r} \phantom{+} \overset{1}{4} \phantom{00} \overset{1}{2} \overset{1}{5} 6 \\ + 1987 \\ \hline 6243 \end{array}$$

If children are struggling take them back to earlier methods. Use dienes alongside the column method so children can visually see the relationship – this is key for renaming.

## Subtraction

All methods follow the Maths No Problem progression and these methods are cycled through for subtracting ones, then subtracting tens and hundreds. The target method is the end product. When renaming is introduced, this is taught using dienes first before moving onto formal methods.

### Method 1 – Dienes and place value counters.

Dienes and counters should be used throughout all calculation to support the visual approaches needed for all children. Children will physically move the equipment and need time to consolidate this in 'Guided Practice' before moving on to drawn dienes and mental methods. The step from drawn to mental methods will come through practice but once confident drawing, begin to move the children on as this will become an inefficient method (takes too long).

2 Find the difference between 358 and 129.

Use base-ten blocks

358

subtract 128

The difference between 358 and 128 is 230.

|   |   |   |   |
|---|---|---|---|
| 3 | 5 | 8 |   |
| - | 1 | 2 | 8 |
| 2 | 3 | 0 |   |

358

subtract 129

358 - 129 = 229

The difference between 358 and 129 is 229.

There are not enough ones.

|           |
|-----------|
| 358       |
| 300 40 18 |

|                |
|----------------|
| 358            |
| - 100 - 20 - 9 |
| 200 20 9       |

|         |
|---------|
| 3 4 18  |
| - 1 2 9 |
| 2 2 9   |

### Method 2 – Subtraction without renaming.

Children begin with calculations that involve no renaming and use place value counters alongside the column subtraction method to support their understanding.

3437 - 2016 =

3437

subtract 2016

3437 - 2016 = 1421

|   |   |   |   |   |
|---|---|---|---|---|
| 3 | 4 | 3 | 7 |   |
| - | 2 | 0 | 1 | 6 |
| 1 | 4 | 2 | 1 |   |

Step 1 Subtract the ones.  
7 ones - 6 ones = 1 one

Step 2 Subtract the tens.  
3 tens - 1 ten = 2 tens

Step 3 Subtract the hundreds.  
4 hundreds - 0 hundreds = 4 hundreds

Step 4 Subtract the thousands.  
3 thousands - 2 thousands = 1 thousand

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 4 | 2 | 1 |   |
| + | 2 | 0 | 1 | 6 |
| 3 | 4 | 3 | 7 |   |

### Method 3 – Subtraction with renaming.

Children will move onto calculation that involve renaming and use place value counters alongside column subtraction to support their understanding. They will need to apply their place value knowledge to this to help them see that they can rename a larger counter into smaller counters to help with the subtraction.

There aren't enough ones.

$$\begin{array}{r} 5280 \\ - 3169 \\ \hline \end{array}$$

subtract 3169

$$\begin{array}{r} 5280 \\ - 3169 \\ \hline 2111 \end{array}$$

### TARGET METHOD – COLUMN SUBTRACTION

All children need to have secured learning in the previous methods to be able to access formal column subtraction with understanding. **This is not to be taught without understanding e.g. as a process only.**

All children must have secured the place value understanding and able to use the previous methods to support column.

Throughout teaching it is vital to refer to the column name/value. For example 57-23 would be discussed as “7 ones take away 3 ones.” Then, “5 tens take away 2 tens.” Or “fifty subtract thirty.”

The tens and hundreds should never be referred as an individual digit, must always have a reference to the tens and hundreds place value.

$$\begin{array}{r} 6412 \\ - 2385 \\ \hline 4146 \end{array}$$

If children are struggling take them back to earlier methods. Use dienes alongside the column method so children can visually see the relationship – this is key for renaming.

## Multiplication

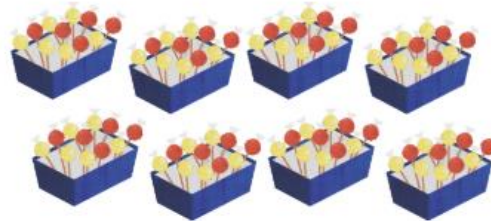
All methods follow the Maths No Problem progression within the textbooks and link to the National Curriculum. The understanding of equal groups is crucial for successful learning in multiplication and then division chapters.

Throughout this chapter, it is well worth supporting learning with:

- Times Tables Rockstars
- Hit the Button
- Squeebles

### Method 1: Multiplication as equal groups

Children need to understand that multiplication is the notion of equal groups, however many times. Maths No Problem begins learning with a lesson on equal groups to establish this understanding. Additional time is well spent here to secure understanding. Children are expected to discuss and generate multiple representations of equal groups.



How many are there in 8 boxes?

### Method 2 – Partitioning to support the ladder model.

Children will use partitioning to help them with their multiplication. They will partition the number they are multiplying into its hundreds, tens and ones and multiply each part in turn. They then add up each result to get an overall example. This process is also represented on a ladder model alongside to start getting the children used to the appropriate layout. Children will need a good understanding of place value to help them with this method.

**2**  $304 \times 2 = \square$

$300 \times 2 = 600$

**3**  $3 \times 123 = \square$

|     |    |   |
|-----|----|---|
| 100 | 20 | 3 |
| 100 | 20 | 3 |
| 100 | 20 | 3 |

$3 \times 100 = 300$     $3 \times 20 = 60$     $3 \times 3 = 9$

$3 \times 123 = 300 + 60 + 9$

$= \square$

|   |   |   |   |   |
|---|---|---|---|---|
| x | 1 | 2 | 3 |   |
|   |   |   |   | 9 |
|   |   |   | 6 | 0 |
|   | + | 3 | 0 | 0 |
|   |   |   |   | 3 |
|   |   |   |   | 6 |
|   |   |   |   | 9 |

multiply the ones  
multiply the tens  
multiply the hundreds

### TARGET METHOD – COLUMN MULTIPLICATION

All children need to have secured learning in the previous methods to be able to access formal column multiplication with understanding. **This is not to be taught without understanding e.g. as a process only.**

All children must have secured the place value understanding and able to use the previous methods to support column.

Throughout teaching it is vital to refer to the column name/value. For example  $23 \times 2$  would be discussed as “3 ones multiplied by 2 ones.” Then, “7 tens multiplied by 2 ones” etc.

The tens should never be referred as an individual digit, must always have a reference to the tens place value.

$$\begin{array}{r}
 \overset{1}{4} \quad 7 \quad 3 \\
 \times \quad \quad \quad 2 \\
 \hline
 9 \quad 4 \quad 6
 \end{array}$$

If children are struggling, take them back to earlier methods. Use dienes alongside the column method so children can visually see the relationship.

## Mental fluency

All children must learn and have instant recall of the all times tables up to  $12 \times 12$ .

**This is NOT counting in multiples of that number.**

To solve questions efficiently, mental methods are the quickest. However children must have an alternative method to fall back on (arrays). Arrays should NOT be the first method.

To support the answering of unknown times tables, children need to be taught to use known facts to find the answer. For example:

**Child:** "I don't know the answer to  $9 \times 2$ "

**Adult:** "What fact do you know which is close to  $9 \times 2$ ?"

**Child:** "I know  $10 \times 2$  is 20"

**Adult:** "Good, you can then take one group of 2 away."

At this point, a practical or drawn representation is likely to be needed followed by individual practise to consolidate new learning.

## Division

All methods follow the Maths No Problem progression within the textbooks and link to the National Curriculum. The understanding of equal groups is crucial for successful learning in multiplication and then division chapters.

Throughout this chapter, it is well worth supporting learning with:

- Times Tables Rockstars (automatically includes division questions)
- Hit the Button (doubles and halves)
- Squeebles (division option)

### Key concept: Division as equal groups

Children need to understand that division is the principle of a whole amount being shared / grouped into smaller, equal groups.

### Method 1 – Simple partitioning

Children need to use the cherry diagram alongside knowledge of tens and ones (dienes) to be able to partition appropriately. Children use the diagram to partition the dividend into tens and ones and then divide each part by the divisor. This method creates a strong link with mental fluency and is a pictorial representation of what we are doing in our heads.

Method 1

$75 \div 6 = \square$

Method 1

### TARGET METHOD – Short division method.

All children need to have secured learning in the previous methods to be able to access formal division method with understanding. **This is not to be taught without understanding e.g. as a process only.**

All children must have secured the place value understanding and able to use the previous methods to support this method.

Throughout teaching it is vital to refer to the column name/value. The tens should never be referred to as an individual digit, must always have a reference to the place value.

$186 \div 6 =$

$5 \overline{) 75} \text{ remainder } 1$

$5 \overline{) 37} \text{ remainder } 2$

If children are struggling, take them back to earlier methods. Use dienes alongside the division method so children can visually see the relationship.

### Mental fluency.

All children must learn and have instant recall of all times tables up to 12x12.

**This is NOT counting in multiples of that number.**

To solve division questions the children need to have a good understanding of the fact families that relate to their known times tables. With this knowledge, they can quickly put together the four related facts and identify the division fact.

If children are still unsure, they should use a drawn representation however be aware these are often inefficient and will take time to draw and complete.