Year 3 Calculation Progression

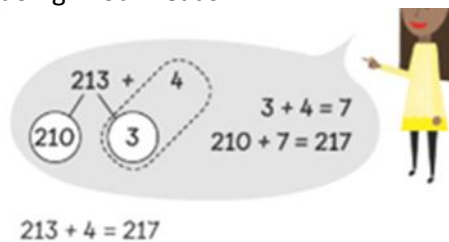| Addition |
| --- |
| All methods follow the Maths No Problem progression and these methods are cycled through for adding ones, then adding tens and hundreds. The target method is the end product. When renaming is introduced, this is taught using dienes first before moving onto formal methods. |

Method 1 – Counting on
Children use structured number lines to count on in ones, or multiples of 1's/10's/100's.   Note: Counting on is a simple method but importantly a pre-requisite for further methods.   Add 213 and 4.   Method 1   Count on from 213.   211 212 213 214 215 216 217 218 219 220   213 + 4 = 217
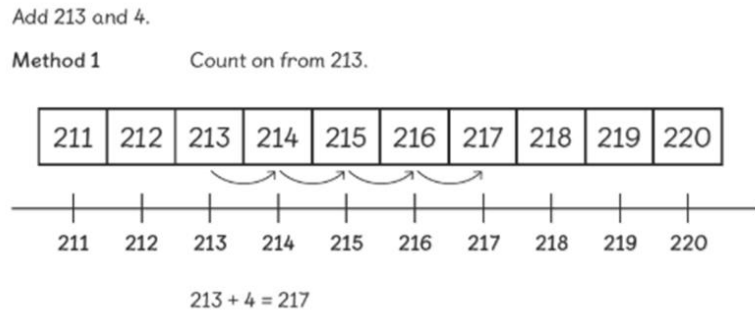
| Method 2 –Partitioning using cherry diagram |
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| Children need to use the cherry diagram alongside knowledge of tens and ones to be able to partition appropriately. Children circle the two numbers that are being added. This method creates a strong link with mental fluency and is a pictoral representation of what we are doing in our heads

 213 + 4
 (210) 3   3 + 4 = 7
          210 + 7 = 217

 213 + 4 = 217 |

Method 3 - Dienes
. Dienes should be used throughout all calculation to support the visual approaches needed for all children. Children will physically move the dienes 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).   Step 1   Add the ones.   2 ones + 1 one = 3 ones
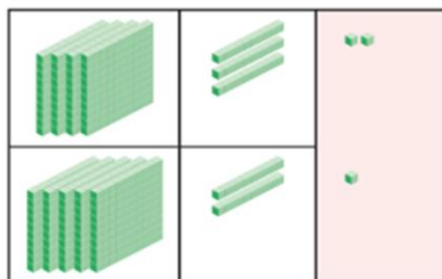
TARGET METHOD – COLUMN ADDITION

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 and hundreds place value.

```
        h    t    o

                  8
                1
   +    2    3    6
      ─────────────────
        2    4    4
      ─────────────────
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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.
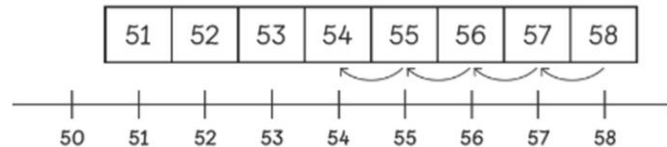
Subtraction
All methods follow the Maths No Problem progression and these methods are cycled through for subtracting ones, then subtracting tens and hundreds. The target method is the end product. When renaming is introduced, this is taught using dienes first before moving onto formal methods.

Method 1 – Counting back
Children use a combination of structured number lines and oral counting to count back from a given number. They can do this in 1's/10's/100's and then multiples of the same.
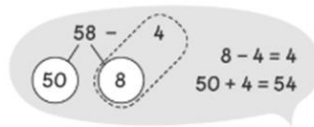
Subtract 4 from 58.

Method 1   Count back from 58.

| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 |

50 51 52 53 54 55 56 57 58

58 – 4 = 54 |

| Method 2 –Partitioning using cherry diagram |
|---|
| Children need to use the cherry diagram alongside knowledge of tens and ones to be able to partition appropriately. Children circle the two numbers that are being subtracted. This method creates a strong link with mental fluency and is a pictorial representation of what we are doing in our heads.

58 – 4
50   8
8 – 4 = 4
50 + 4 = 54 |

Method 3 - Dienes
Dienes should be used throughout all calculation to support the visual approaches needed for all children. Children will physically move the dienes 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).

Method 2   Subtract ones. |
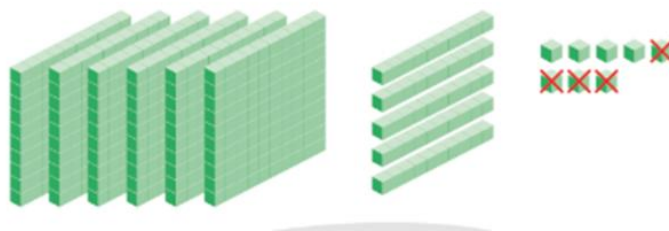
TARGET METHOD – COLUMN SUBTRACTION

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.

```
      h    t    o
           2    11
      8    3    1
  -        2    6
  _____
      8    0    5
```

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:

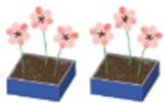- Times Tables Rockstars
- Hit the Button
- Squeebles

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.
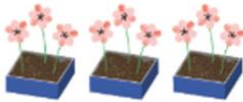

1 group of 3
$1 \times 3 = 3$

2 groups of 3
$2 \times 3 = 6$

3 groups of 3
$3 \times 3 = 9$

4 groups of 3
$4 \times 3 = 12$

There are 12 flowers altogether.

Method 2 – Dienes

Dienes should be used throughout all calculation to support the visual approaches needed for all children. Children will physically move the dienes 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).
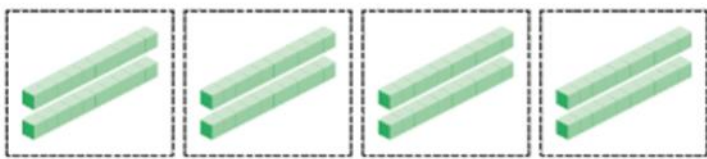

Multiply 2 ones by 4
$2 \times 4 = 8$

$$\begin{array}{r} 2 \\ \times\ 4 \\ \hline 8 \end{array}$$

Multiply 2 tens by 4
$20 \times 4 = 80$

$$\begin{array}{r} 2\ 0 \\ \times\ 4 \\ \hline 8\ 0 \end{array}$$

There are 80 oranges in the 4 boxes altogether.

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 x 2 would be discussed as "3 ones multiplied by 2 ones." Then, "2 tens multiplied by 2 ones."
The tens should never be referred as an individual digit, must always have a reference to the tens place value.

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 2x, 3x, 4x, 5x, 8x and 10x tables.
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 x 2"
Adult "What fact do you know which is close to 9x2?"
Child: "I know 10x2 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.
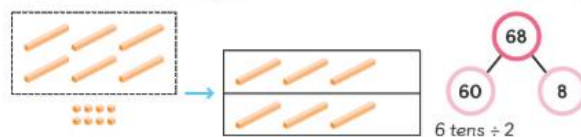
Method 1 – Simple partitioning

Children need to use the cherry diagram alongside knowledge of tens and ones (dienes) to be able to partition appropriately. Children 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.

To find the number of sweets each person gets, divide 68 by 2.

$68 \div 2 = $ ▢

Step 1   Divide 6 tens by 2.

6 tens ÷ 2 = 3 tens

68
60   8
6 tens ÷ 2

Step 2   Divide 8 ones by 2.

8 ones ÷ 2 = 4 ones

68
60   8
6 tens ÷ 2   8 ones ÷ 2

Step 3   Add the results.

$68 \div 2 = 30 + 4 = 34$
Each person gets 34 sweets.

Method 2 – Partitioning using times table facts.

Children need to use the cherry diagram alongside knowledge of times tables to be able to partition appropriately. Children the diagram to partition the dividend into suitable multiples of the divisor 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.
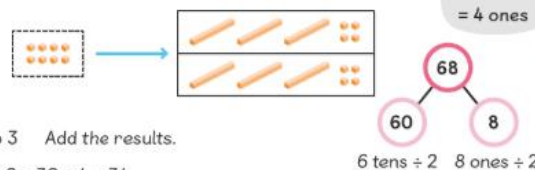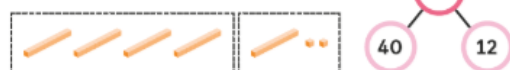
To find the number of ice creams in each box, divide 52 by 4.

$52 \div 4 = $ ▢

Step 1   Split 52 into 40 and 12.

52
40   12

Step 2   Divide the tens by 4.

4 tens ÷ 4 = 1 ten

Step 3   Regroup 1 ten into 10 ones.

TARGET METHOD – Using partitioning to support 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 as an individual digit, must always have a reference to the place value.

First, I take 80 from 96.
Then, I take 16 from
the remaining 16.

8 tens ÷ 8 = 1 ten

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 the 2x, 3x, 4x, 5x, 8x and 10x tables.
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.