



How we teach it.

Written and mental calculation in Year 3.



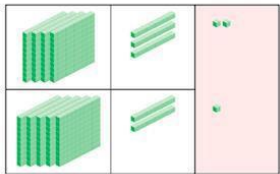
Written Addition in Year 3

Method:

Column addition with dienes and mats alongside the expanded method.

In Year 3, the children add two and three digit numbers. The Children use dienes to support their understanding of place value. Children start adding without regrouping and gradually moving towards regrouping questions. Dienes are used alongside the expanded method.

Step 1 Add the ones.
2 ones + 1 one = 3 ones



Partition both numbers

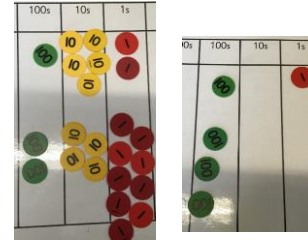
$$\begin{array}{r} 36 = 30 + 6 \\ 43 = 40 + 3 \\ \hline 79 = 70 + 9 \end{array}$$

Recombine to get the answer.

30 + 40
6 + 3

Leading to:

The Expanded Method of Addition.

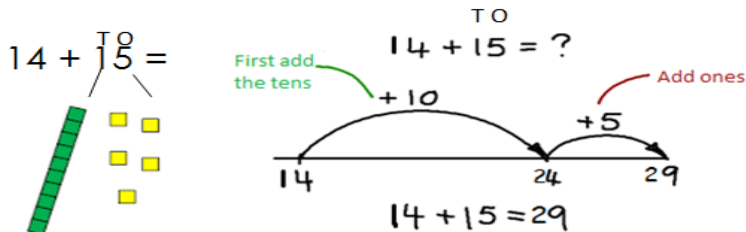


$$\begin{array}{r} 100 \quad 10 \\ 152 = 100 + 50 + 2 \\ 249 = 200 + 40 + 9 \\ \hline 400 + 0 + 1 \end{array}$$

An emphasis will be placed on carrying tens to the next column using dienes or place value counters so that children gain an understanding of the concept.

Strategy to support:

Children will use 'blank number lines' to add numbers. First counting on in jumps of tens and then ones. Children will use dienes to support their understanding.



Next Steps:

The children add **3 digit numbers** using the column method. They begin to use place value counters and mats for support.

$$\begin{array}{r} 123 = 100 + 20 + 3 \\ + 45 = \quad 40 + 5 \\ \hline 168 = 100 + 60 + 8 \end{array}$$

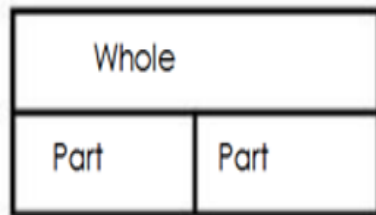
Is the same as: +

$$\begin{array}{r} 123 \\ + 45 \\ \hline 168 \end{array}$$

A Deeper Look:

Bar modelling:

It is important for children to use a bar to aid in problem solving. When reading questions, children look for the part- whole relationship to determine if they need to add or subtract.



Children understand that addition and subtraction are a whole part relationship. They look for wholes and parts in the question and use the information they have to determine what operation to use.

Ex) $\text{Whole} - \text{Part} = \text{Part}$

$\text{Part} + \text{Part} = \text{Whole}$

Bar Model to support understanding of problem solving:



A man sold 230 balloons at a carnival in the morning. He sold another 86 balloons in the evening . How many balloons did he sell in all?





Mental Addition in Year 3

Children should be able to recall:

- Addition facts for all numbers to 20 drawing on knowledge of inverse relationship.
E.g. $9 + 8$, $13 + 6$

- Sums of multiples of 10.
E.g. $50 + 80$
- Pairs of two-digit numbers with a total of 100.
E.g. $32 + 68$

- Addition doubles for multiples of 10 to 100.
E.g. $90 + 90$

Working mentally, children should be able to:

- Add and subtract groups of small numbers.
E.g. $6 + 3 - 2$

- Add two-digit numbers.
E.g. $34 + 65$
- Add a two-digit number from a multiple of 10.
E.g. $50 + 38$

- Add near doubles.
E.g. $16 + 18 = 16 + 16 + 2$

Children should know when to:

- Reorder numbers when adding.
- Identify pairs totalling 10 or multiples of 10.

- Partition: Add tens and ones separately then recombine.
- Partition: Count on in tens and ones to find the total.
- Partition: Add 10 or 20 and adjust.

- Partition: Double and adjust when adding near doubles.
- Count on in minutes and hours bridging through 60.



Written Subtraction in Year 3

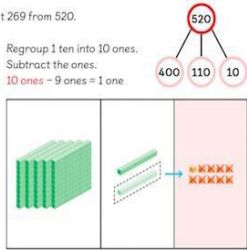
Method:

Column subtraction with dienes or place value counters and mats, alongside the Expanded Method of Subtraction.

Children will subtract up to 3 digits, from a 3 digit number. The children use dienes along with place value charts to support their learning. When secure with the method, exchanging is introduced. The children then partition numbers and use the expanded method.

Subtract 269 from 520.

Step 1 Regroup 1 ten into 10 ones.
Subtract the ones.
10 ones - 9 ones = 1 one.



$$\begin{array}{r} 67 - 32 = 35 \\ 67 = 60 + 7 \\ - 32 = 30 + 2 \\ \hline 35 = 30 + 5 \end{array}$$

Partition both numbers.
line up the tens and units.
Recombine to get the answer.
60 - 30
7 - 2

Leading to:

The Expanded Method of Subtraction with exchanging.

Children partitioning both numbers and use the expanded method of subtraction. This is supported with dienes or place value counters and place value mats.

$$\begin{array}{r} 62 = 50 + 12 \\ - 35 = 30 + 5 \\ \hline 27 = 20 + 7 \end{array}$$

We exchange 1 ten for 10 units.
Write these numbers above.

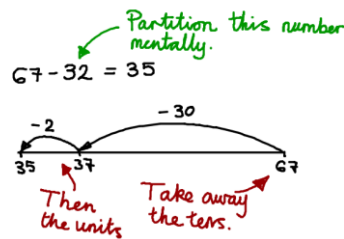


Strategies to support:

Counting back using a number line.

Children subtract using a number line and partitioning.

Note: Counting back is not always the most efficient method when the numbers are closer together.



Next Steps:

The Expanded method is taught alongside column subtraction.

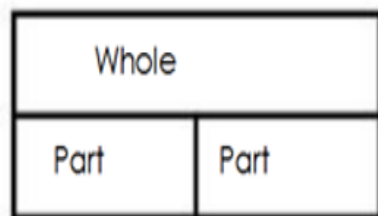
$$\begin{array}{r} 512 \\ - 245 \\ \hline 267 \end{array}$$

Exchange with the next digit.
50 - 40
12 - 5

A Deeper Look:

Bar modelling:

It is important for children to use a bar to aid with problem solving. When reading questions, children look for the part- whole relationship to determine if they need to add or subtract. Children use the bar model to solve missing number problems.



Children understand that addition and subtraction are a whole- part relationship. They look for wholes and parts in the question and use the information they have to determine what operation to use.

Ex) $\text{Whole} - \text{Part} = \text{Part}$

$\text{Part} + \text{Part} = \text{Whole}$

315	
185	?

$$315 - 185 = ?$$

$$185 + ? = 315$$



Mental Subtraction in Year 3

Children should be able to recall:

- Subtraction facts for all numbers to 20 drawing on knowledge of inverse relationship.
E.g. $17 - 9$

- Differences of multiples of 10.
E.g. $120 - 90$

- Pairs of two-digit numbers with a total of 100.
E.g. $32 + n = 100$

Working mentally, children should be able to:

- Add and subtract groups of small numbers.
E.g. $5 - 3 + 2$

- Subtract a two-digit number from a multiple of 10.
E.g. $90 - 27$

- Subtract two-digit numbers.
E.g. $68 - 35$

Children should know when to:

- Partition: Count back in tens and ones to find the difference.

- Partition: Subtract 10 or 20 and adjust.

- Count back in minutes and hours bridging through 60.



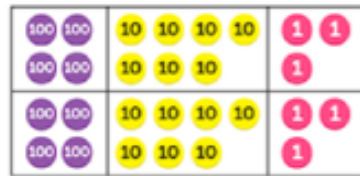
Written Multiplication in Year 3

Method:

Partitioning

Children should be supported using real life examples and manipulatives (dienes, place value counters, place value mats).

$$\begin{array}{r}
 473 \times 2 = \\
 400 \times 2 = 800 \\
 70 \times 2 = 140 \\
 3 \times 2 = 6 \\
 \hline
 946
 \end{array}$$

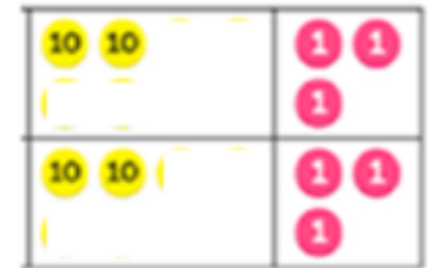


Leading to:

Grid Method and Partitioning with Place Value counters

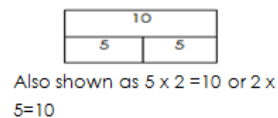
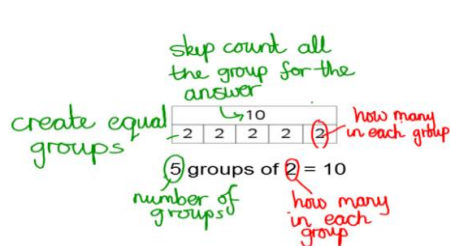
The Grid method resembles column multiplication. Children use place value counters and real life to support their learning.

$$\begin{array}{r|l}
 \times & 2 \\
 \hline
 20 & 40 \\
 3 & 6 \\
 \hline
 & 46
 \end{array}$$



Strategies to support:

Children will use a bar model to support their calculations. This will allow them to understand that the order of multiplication does not matter and the relationship between multiplication and division.



Next Steps:

Grid Method with 3 digit numbers

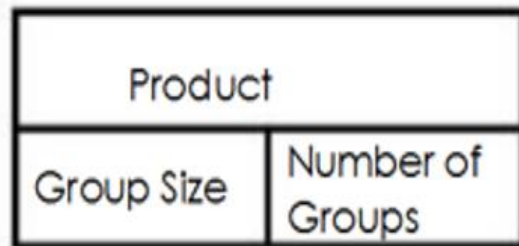
The Grid method should be set up to resemble column multiplication. Children will discuss their calculations using appropriate vocabulary.

$$\begin{array}{r|l}
 \times & 4 \\
 \hline
 100 & 400 \\
 20 & 80 \\
 3 & 12 \\
 \hline
 & 492
 \end{array}$$

A Deeper Look:

Bar modelling:

In Year 3, children use a bar to solve multiplication problems.



Children look for the information given (Product, Number of Groups and Size of Groups Model). They use the information provided to determine what operation to use.

Ex)

Product divided by Group Size = Number of Groups

Group Size X Number of Groups = Product

4 children go to the cinema.
They each pay £15. How much
do they spend altogether?

Whole unknown





Mental Multiplication in Year 3

Children should be able to recall:

- Multiplication facts for the 2, 5 and 10 times table

- Multiplication facts for the 3, 4 and 6 times tables

- Doubles of multiples of 10 to 100.
E.g. Double 90

Working mentally, children should be able to:

- Double any multiple of 5 up to 100.

- Multiply one-digit or two-digit numbers by 10
E.g. 7×10 , 46×10

- Multiply one-digit or two-digit numbers by 100
E.g. 7×100 , 46×100

Children should know when to:

- Partition: when doubling, double the tens and units separately then recombine.

- Use knowledge that halving and doubling are inverse operations.

- Recognise that when multiplying by 10 or 100 the digits move one or two places to the left and zero can be used as a place holder.

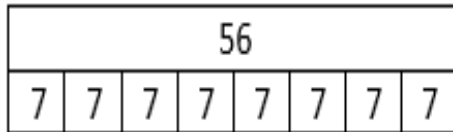


Written Division in Year 3

Method:

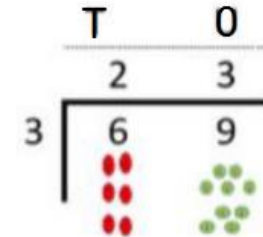
The Bar Model

Children will use a bar model to divide with and without remainders.



Leading to:

Dividing using short division. This is supported using place value counters.



Remind children of correct place value, that 69 is equal to 60 and 9 but in short division, pose:

How many 3s in 6? 2, and record it above the 6 tens

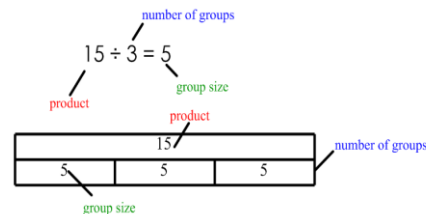
How many 3s in 9? 3 and record it above the 9 ones

Strategies to support:

Children will use the language of product, number of groups and group size. They will use a numerical bar model when they know the product and the number of groups.

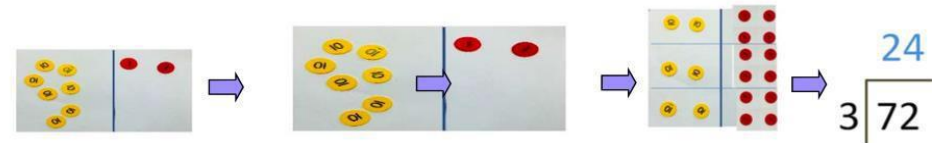
To work out the group size children will use their multiplication facts.

3 3 3 3 3



Next Steps:

Once the children demonstrate a full understanding of remainders, and short division, they can be taught how to use the method when remainders occur within the calculation (e.g. $72 \div 3$), and be taught to 'carry' the remainder onto the next digit.



A Deeper Look:

Bar modelling:

In Year 3, children use a bar to solve division problems.

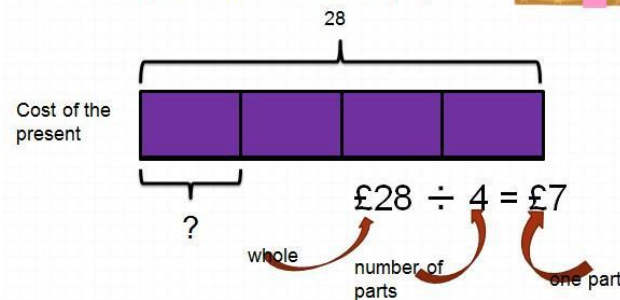
Product	
Group Size	Number of Groups

4 children go to the cinema.
They each pay £15. How much
do they spend altogether?

Whole unknown

?			
15	15	15	15

Four children bought a present for
£28. They shared the costs equally.
How much did each child pay?





Mental Division in Year 3

Children should be able to recall:

- Corresponding division facts for the 2, 5 and 10 times tables.
- Corresponding division facts for the 3, 4 and 6 times tables.
- Halves of multiples of 10 and 100.
E.g. Half of 90

Working mentally, children should be able to:

- Halve any multiple of 10 up to 200.
E.g. Halve 170
- Find unit fractions of numbers and quantities involving halves, thirds, quarters, fifths and tenths,

Children should know when to:

- Partition: when halving, halve the tens and units separately, then recombine.
- Use knowledge that halving and doubling are inverse operations.
- Recognise that finding a unit fraction is equivalent to dividing by the denominator and use of division facts.

Year 3 Problems

- 1. There are 334 children at Springfield School and 75 at Holy Trinity Nursery. How many children are there altogether?
- 2. Gemma collected 293 badges but she gave 45 of them to her friend, Rebecca. How many badges did she have left?
- 3. Aiden has seven marbles and Harvey has fifteen. They decide to share them equally between them. How many do they get each?
- 4. Seven people each put five pens into a pot. Carmen then takes out fifteen pens. How many pens are left?
- 5. If you spend 61p at the corner shop, how much change do you get from £1.00?
- 6. If five apples cost fifty pence, how much would two apples cost?
- 7. Emma buys seven markers for 30p each. How much change does she get from £3.00?
- 8. A bookcase in the library holds 5 shelves with 46 books on each shelf. How many books are there in the bookcase altogether?
- 9. How many 5p stickers can Alexis buy with his 55p pocket money?
- 10. Which is the larger amount, one third of £60 or one quarter of £88?
- 11. A computer game is £24 in the sale. This is one quarter of its original price. How much did it cost before the sale?