

HINDLEY J AND I SCHOOL

Mental and Written Calculation Policy



September 2024

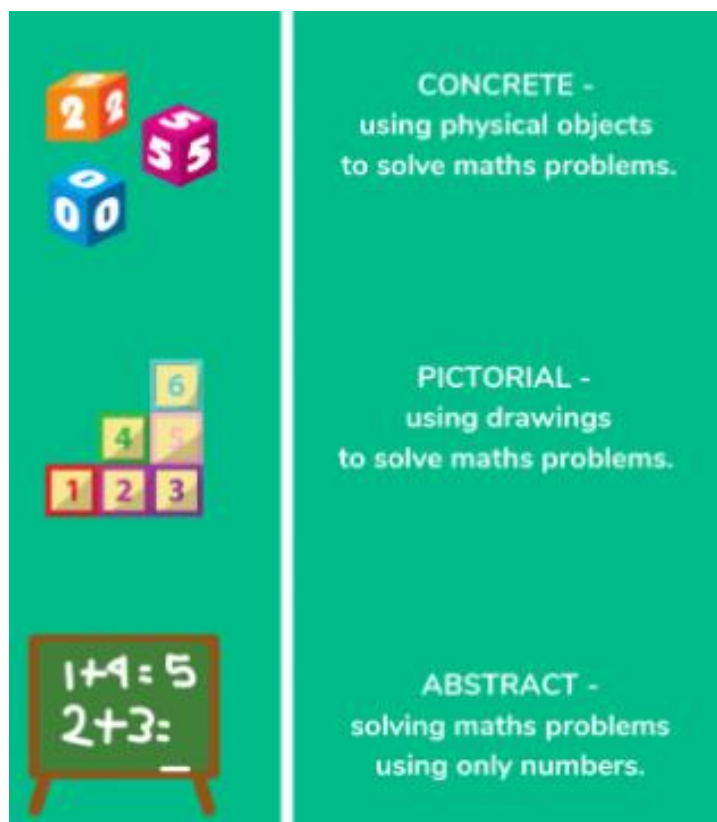


This document sets out the expectations for each year group in terms of calculation strategies which will be taught, explored and applied to a range of contexts.

This Policy is also supplemented by self-guide video tutorials on the school website
<https://hindley.wigan.sch.uk/maths.html>

Concrete, Pictorial, Abstract

The children's understanding of these calculation strategies will be underpinned by a secure understanding of place value. At Hindley Junior and Infant School, we teach through a CPA (concrete, pictorial, abstract) approach. Understanding in all areas of maths will be developed by children using concrete resources and interpreting and using pictorial representations before moving onto solving abstract calculations. The CPA process/approach will be clearly displayed on maths working walls for the current maths focus.



Mental Strategies

This document also contains essential information about the mental strategies that children will be taught. It is of vital importance that these are given high-priority during maths teaching and practised regularly, so that children have the skills which are required across all areas of maths.



Early Years

Representations/ models

Calculation

Written Strategy

How many dinosaurs are there?



What about if I give you two more? How many are there now?



There are 2 birds. Another bird flies in. How many are there altogether?



Count on from the larger number. A child will choose the larger number, even when it is not the first and count on from there; (5 in your head) 'six, seven, eight' using their fingers:

$3 + 5 = 8$



$5 + 2 = 7$



$5 + 1 = 6$

$$\begin{array}{r} \text{O O O O O} + \text{O} = \text{O O O O O O} \\ 5 \quad + \quad 1 = 6 \end{array}$$

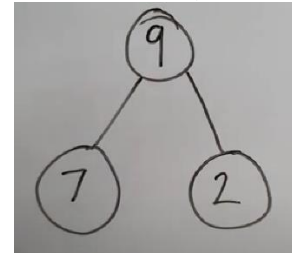
$4 + 3 = 7$

Children count on from the biggest number by drawing three objects/circles first

$$\begin{array}{r} 4 + 3 = 7 \\ \text{O O O} \end{array}$$

$7 + 2 = 9$

Children start at the biggest number and count on in their heads (using fingers if they need to).



Mental Methods

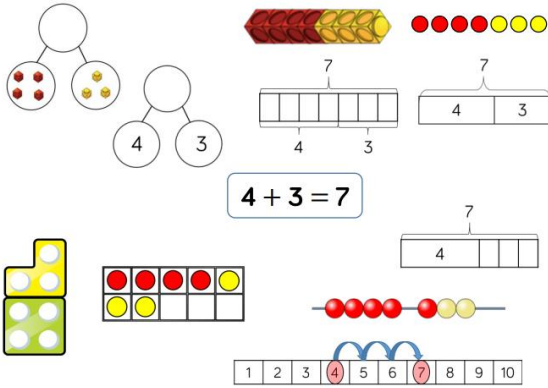
- Develop a mental image of the number system.
- Understand the value of a number
- Counting forwards and backwards
- Recall of number bonds to 5 and 10

Concrete/ representations

Calculation

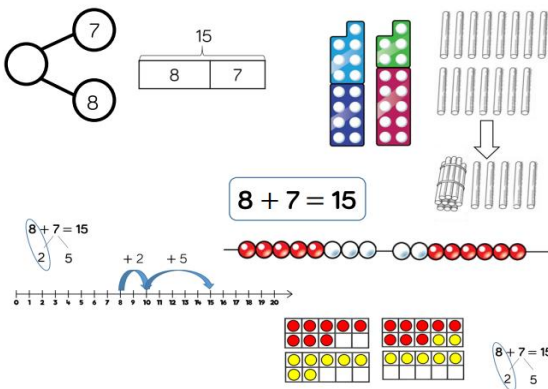
Written Strategy

Add numbers to 10-



$$4 + 3 = 7$$

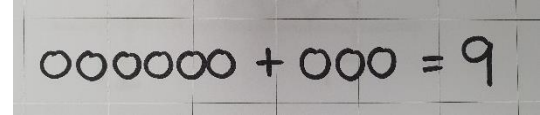
Add numbers to 20-



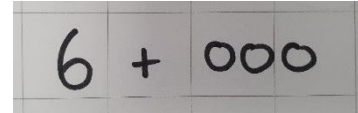
$$8 + 7 = 15$$

$$6 + 3 = 9$$

Children begin by drawing the amounts they are adding:



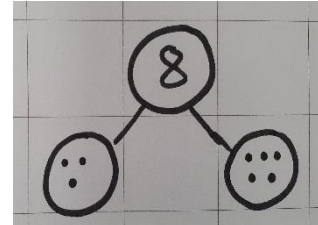
Moving to starting with largest number, counting on with the smaller number:



Similar to Reception but will work with a bigger number range.

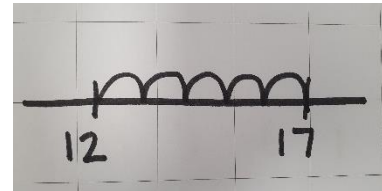
$$3 + 5 = 8$$

Combining to parts to make a whole in a part-whole model:



$$12 + 5 = 17$$

Children create their own blank number lines to calculate their answer.



Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:

- Re-ordering the numbers when adding e.g. put the larger number first
- Counting on and back in ones, twos, fives and tens from any given number.
- Composition of all numbers to 20.
- Looking for pairs of numbers that equal 10 and 20 e.g. all number bonds.
- Using number bonds within 10 - 20 in several different forms (e.g. $9+7 = 16$, $16-7=9$ and $7=16-9$)
- Partitioning small numbers to bridge tens e.g. $8+3 = 8+2+1$
- Partitioning using known facts e.g. double and adjust $5+6 = 5+5+1$
- Adding 9 to a number by adding 10 and then subtracting 1

Representations/ models

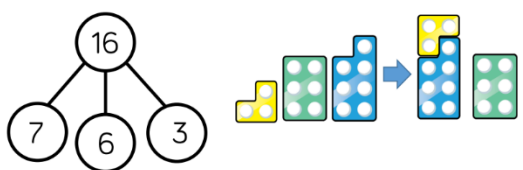


Year 2

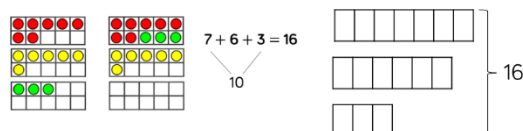
Calculation

Written Strategy

Add 3 1-digit numbers

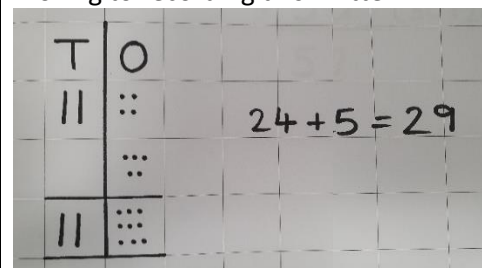


$$7 + 6 + 3 = 16$$

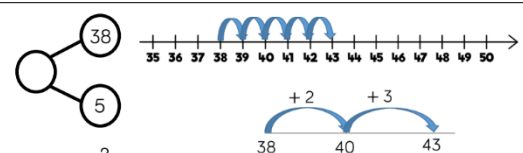


$$24 + 5 = 29$$

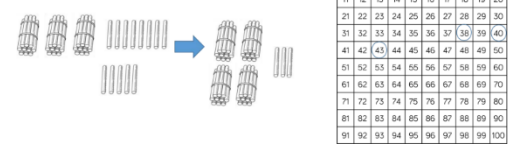
Children begin to use practical equipment in columns to calculate the answer, moving to recording this written:



Add 1-digit and 2-digit numbers to 100

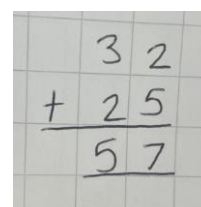


$$38 + 5 = 43$$



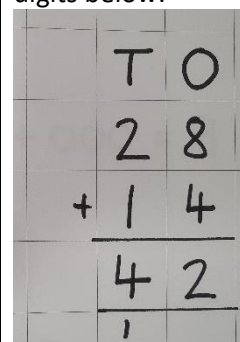
$$32 + 25 = 57$$

After becoming secure recording their answer pictorially (left), they begin to record their additions in expanded column addition (right):

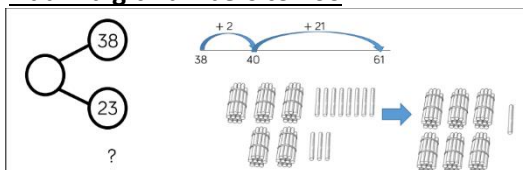


$$28 + 14 = 42$$

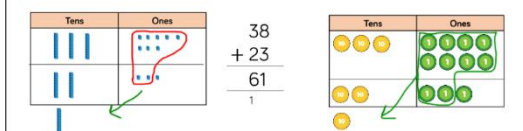
When the children become confident, they begin to record their answer as compact addition, noting carried-over digits below:



Add 2-digit numbers to 100



$$38 + 23 = 61$$



Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:

- Reordering numbers when adding – putting the largest number first.
- Counting on and back in ones, twos, fives and tens from any given number.
- Compensating: add 9, 19, 11 or 21 e.g. $24 - 9 = 14 + 1$, $24 - 10 = 14 + 1$
- Compensating: doubling and adjusting. $6 + 7 = 6$ doubled is $12 + 1 = 13$
- Partitioning: Bridge through 10 when adding. E.g. $7 + 4$, $7 + 3 = 10 + 1 = 11$

- Partition and combine multiples of tens and ones. (split into tens and ones)
- Looking for number bonds/known facts when adding 3 one-digit numbers.

Representations/ models	Year 3	
	Calculation	Written Strategy
<p>Add 1-digit and 2-digit numbers to 100</p>	$32 + 24 = 56$	<p>Children only record pictorially (left) at the very beginning of Year 3 to recap prior learning. Children to then only record abstract (right):</p>
<p>Add 2-digit numbers to 100</p>	$147 + 36 = 183$	<p>Children to use pictorial representation to become confident with compact column addition using 3-digit numbers including carrying:</p>
<p>Add numbers with up to 3-digits</p>	$226 + 115 = 341$	<p>Children to move to compact column addition without using pictorial representations:</p>

Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods, where appropriate:


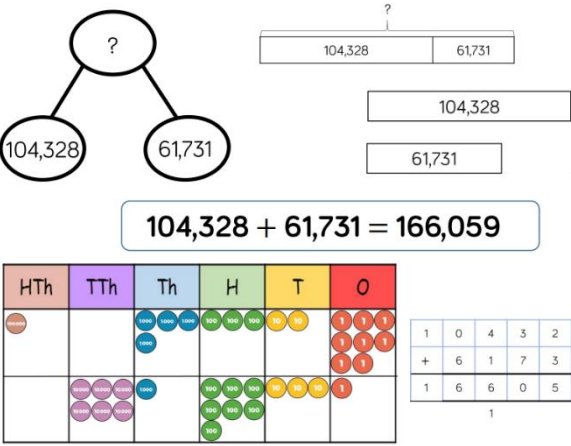
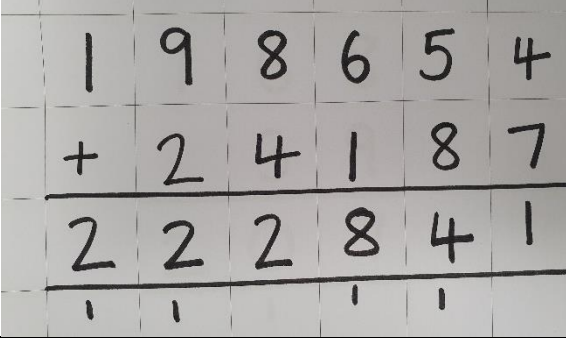
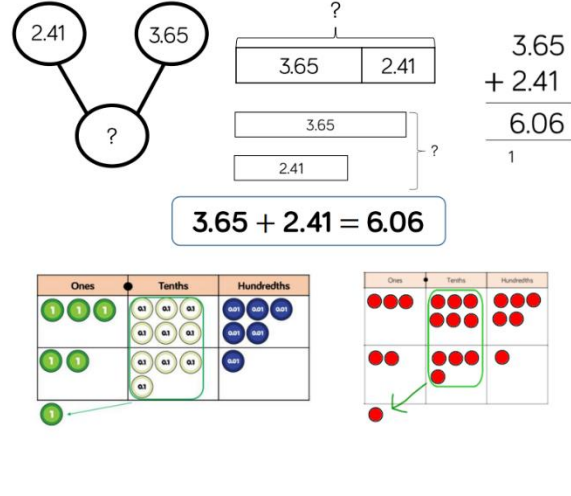
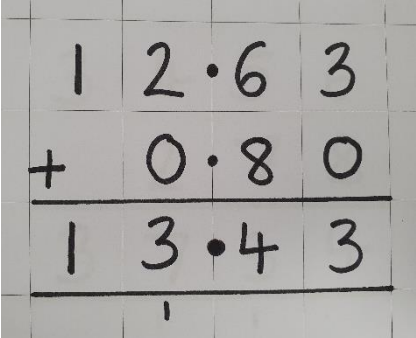
- Counting on in hundreds, tens and ones to find the total.
- Partitioning into hundreds, tens, and ones in different ways, then recombine ($824 = 800 + 20 + 4$, $824 = 700 + 110 + 14$).
- Reorder the numbers when adding. (largest first)
- Bridge through a multiple of 10, then adjust. E.g. $7 + 4$, $7 + 3 = 10 + 1 = 11$
- Use known facts and place value to add.
- Use patterns of similar calculations
- Compensating: add or subtract 10, 20 or 100 and adjust.

Representations/ models	Addition	
	Calculation	Year 4 Written Strategy
<p>Add numbers with up to 4-digits</p> <p>The representations show the addition of 1,378 and 2,148. A number line shows the sum as 3,526. A partitioning diagram shows 2,138 and 1,378. A grid model shows the numbers in a 10x10 grid. A place value chart shows the numbers in columns: Thousands, Hundreds, Tens, and Ones. A standard column addition grid shows the numbers aligned by place value, with a carry of 1 from the ones column to the tens column.</p>	$168 + 39 = 207$	<p>Children to record addition in columns, recording carrying over below:</p>
<p>The representations show the addition of 3,456 and 278. A place value chart shows the numbers in columns: Thousands, Hundreds, Tens, and Ones. A standard column addition grid shows the numbers aligned by place value, with a carry of 1 from the ones column to the tens column. A handwritten column addition grid shows the numbers in a grid, with a carry of 1 from the ones column to the tens column.</p>	$3,456 + 278 = 3,734$	<p>Children use column addition with up to 4-digit numbers:</p>

Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods, where appropriate:

- Count in steps of thousands, hundreds, tens and ones.
- Reorder numbers in a calculation
- Add 3 or 4 small numbers
- Partition: adding the most significant digit first
- Compensating: doubling and adjusting
- Compensating: Adding the nearest multiple of 10 or 100 and then adjust
- Using knowledge of place value and related calculations e.g. working out $150 + 140 = 290$ by using $15 + 14 = 29$.

Representations/ models	 Calculation	Year 5 Written Strategy
<p>Add numbers with more than 4-digits</p>  <p>$104,328 + 61,731 = 166,059$</p>	$ \begin{array}{r} 198,654 \\ + 24,187 \\ \hline = 222,841 \end{array} $	<p>Children use column addition as shown in Year 4, but also for numbers with more than 4-digits:</p> 
<p>Add with up to 3 decimal places</p>  <p>$3.65 + 2.41 = 6.06$</p>	$ \begin{array}{r} 12.63 \\ + 0.8 \\ \hline = 13.43 \end{array} $	<p>Children use column addition with decimals, using 0 place value holders:</p> 

Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods, where appropriate:

- Counting on in steps of 0.1, 1, 10, 100 or 1,000
- Reorder the numbers in a calculation
- Partitioning, adding the most significant digit first
- Compensating: Add a multiple of 10, 100 or 1,000 and adjust.
- Compensating: Double and adjust.
- Use knowledge of place value and related calculations e.g. $6.3 + 4.8$ using $63 + 48$

Representations/ models

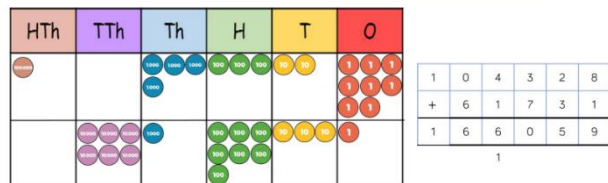
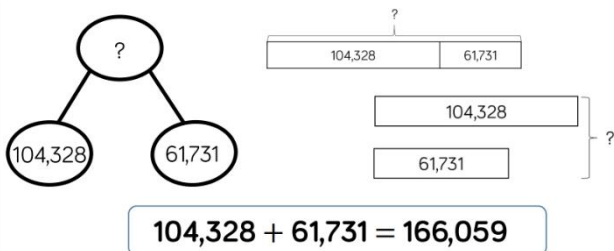


Year 6

Calculation

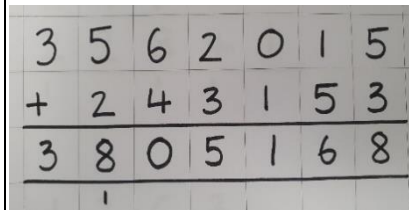
Written Strategy

Add numbers with more than 4-digits



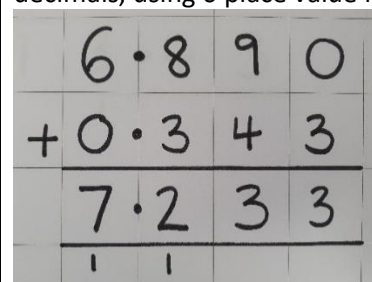
$$\begin{array}{r} 3,562,015 \\ + 243,153 \\ \hline = 3,805,168 \end{array}$$

Children use column addition as shown in Year 5:



$$\begin{array}{r} 6.89 + 0.343 \\ = 7.233 \end{array}$$

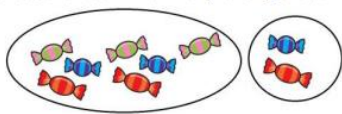



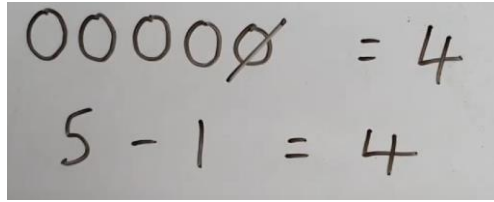
Children use column addition with decimals, using 0 place value holders:



Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods, where appropriate.

- Consolidate all strategies from previous years
- Partition, adding the most significant digit first
- Compensating: adding a whole number, multiple of 10 or double and adjust.
- Use knowledge of place value and related calculations e.g. $680 + 430$, $6.8 + 4.3$, $0.68 + 0.43$ can all be worked out using the related calculation $68 + 43$.

Representations/ models	Subtraction	Early Years
	Calculation	Written Strategy
<p>I had 9 sweets and I ate 2. How many have I got left?</p>  <p>(e.g. 6-3= 3)</p>   	$5 - 1 = 4$	<p>Children draw the number of objects and then cross out the amount subtracting.</p> 

Mental Methods

- Develop a mental image of the number system.
- Understand the value of a number
- Counting forwards and backwards
- Recall of number bonds to 10

Representations/ models	Year 1	
	Calculation	Written Strategy
<p>Subtract 1-digit numbers within 10</p>	$8 - 3 = 5$	<p>Children begin by drawing the amount to begin with, and cross out the amount they are subtracting:</p>
<p>Subtract 1- and 2-digit numbers within 20</p>	$5 - 2 = 3$	<p>Children to use part-whole model to show how subtracting creates two parts, helping to make link with addition.</p>
	$13 - 6 = 7$	<p>Children are taught how to use a blank number line for subtraction (counting backwards) and then encouraged to draw their own number line:</p>

Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:

- Count back in ones, twos, fives and tens from any given number.
- Find one less than a number
- Find 10 less than a multiple of 10
- Take away a small number by counting back
- Find a small difference by counting on E.g. 10-7, how many do we need to reach 10 starting at 7?
- Begin to bridge through 10 when subtracting a one-digit number
- Start to recall subtraction facts up to and within 10 and 20 and understand subtracting 0

Representations/ models

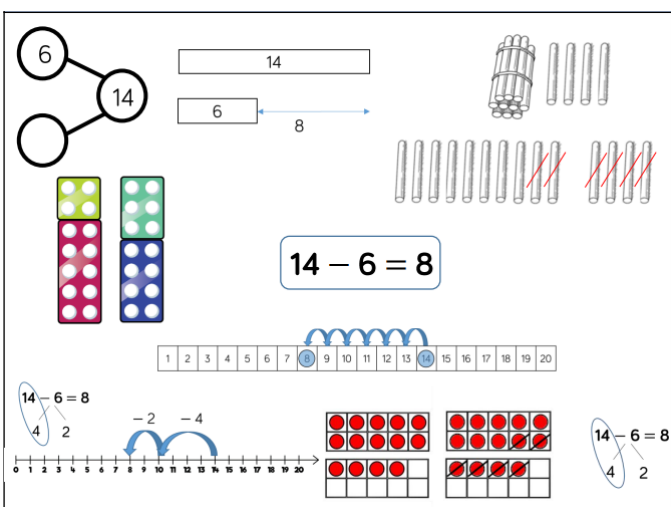


Year 2

Calculation

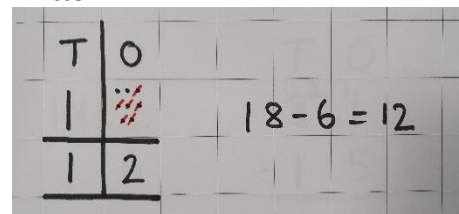
Written Strategy

Subtract 1- and 2-digit numbers within 20



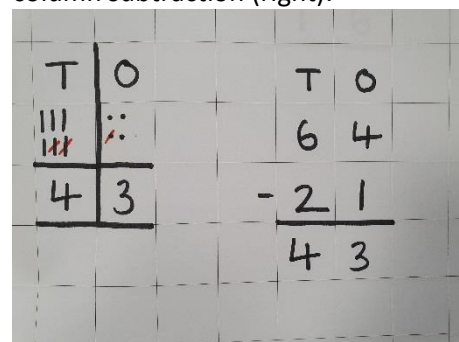
$$18 - 6 = 12$$

Children begin to use practical equipment in columns to calculate the answer, moving to recording this written:

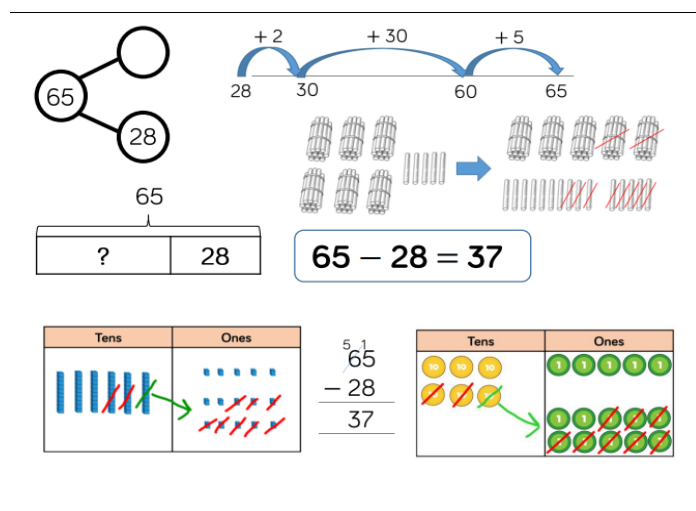


$$64 - 21 = 43$$

After becoming secure recording their answer pictorially (left), they begin to record their subtractions in column subtraction (right):

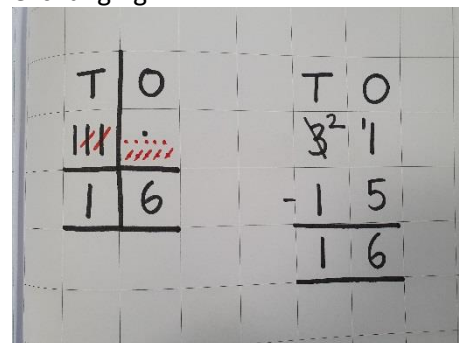


Subtract 1 and 2-digit numbers to 100



$$31 - 15 = 16$$

When the children become confident, they begin to use subtraction with exchanging:



Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:

- Counting back in ones, twos, fives and tens.
- Subtract mentally a 'near multiple of 10' by subtracting and adjusting.
- Subtract a small number by counting back.
- Find a small difference by counting up from the smaller to the larger number (on a number line)
- Recalling subtraction facts for numbers to 20 and using these to derive the related facts up to 100.
- Subtract by partitioning the second number and subtracting ones and then tens.
- Use patterns of similar calculations.

Representations/ models	Year 3	
	Calculation	Written Strategy
<p>Subtract numbers with up to 3-digits</p>	$68 - 35 = 33$	<p>Children only record pictorially (left) at the very beginning of Year 3 to recap prior learning. Children to then only record abstract (right):</p>
	$243 - 27 = 216$	<p>Children to use pictorial representation to become confident with column subtraction using 3-digit numbers including exchanging:</p>
	$421 - 289 =$	<p>Children to move to column subtraction without using pictorial representations:</p>

Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:

- Counting back in hundreds, tens and ones.
- Counting on as a mental strategy for subtraction when the numbers are close together (e.g. 131-129), and for finding a small difference.
- Compensating: subtract mentally a near multiple of 10 then adjust. E.g. $26-9$, $26-10= 16 + 1 = 17$
- Bridging through a multiple of 10 E.g. $43-8=$, $43-3= 40$, $40- 5= 35$
- Use knowledge of number facts and place value to subtract pairs of numbers
- Subtract a two-digit number by partitioning it then subtracting ones and then tens.
- Use patterns of similar calculations
- Use the relationship between addition and subtraction.
- Use known facts e.g. $4-2=2$, $400-200=200$

Representations/ models



Year 4

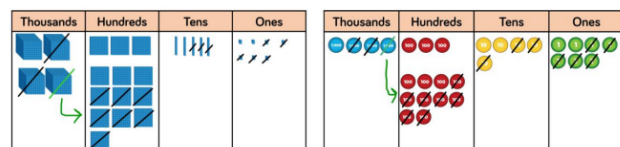
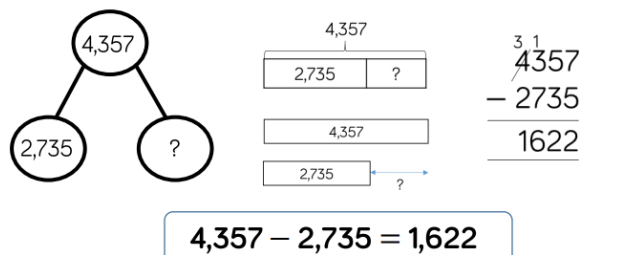
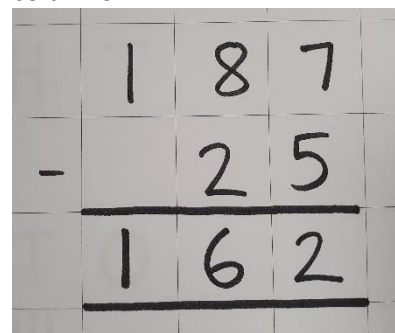
Calculation

Written Strategy

Subtract numbers with up to 4-digits

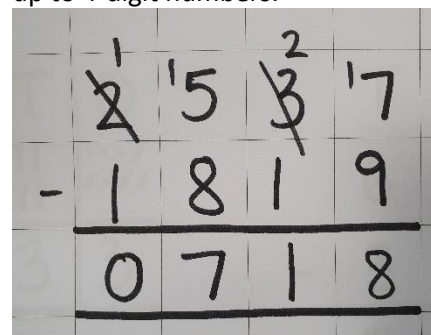
$$187 - 25 = 162$$

Children to record subtraction in columns:



$$2,537 - 1,819 = 718$$

Children use column subtraction with up to 4-digit numbers:



Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:

- Counting on and back in thousands, hundreds, tens, ones.
- Use known facts and place value to subtract
- Counting on to subtract when the numbers are close together.
- Find a difference by counting up through the next multiple of 10, 100 and 1,000
- Compensating: Subtracting the nearest multiple of 1, 10, 100 or 1,000 and adjust.

Representations/ models

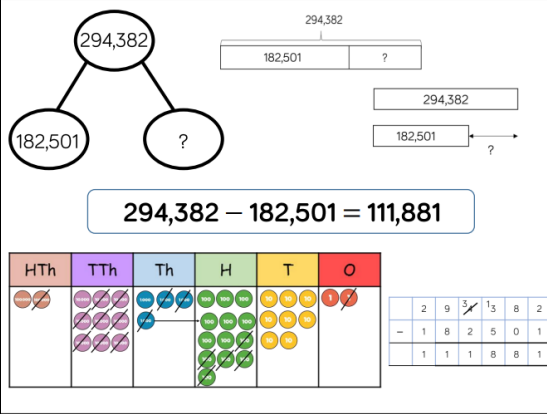


Year 5

Calculation

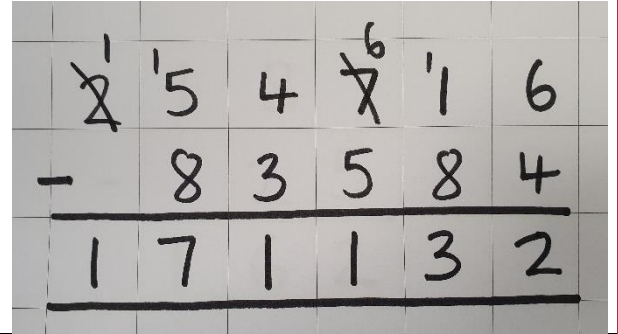
Written Strategy

Subtract numbers with more than 4-digits

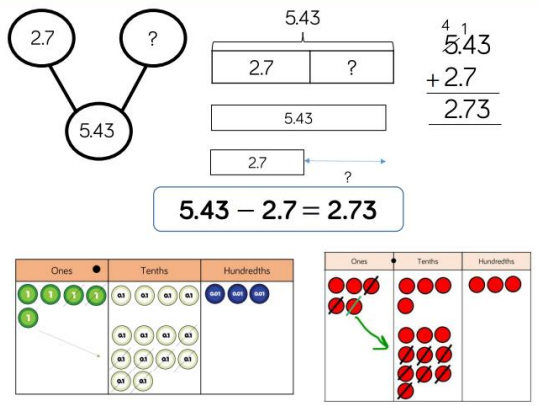


$$\begin{array}{r} 254,716 \\ - 83,584 \\ \hline = 171,132 \end{array}$$

Children use column subtraction as shown in Year 4, but also for numbers with more than 4-digits:

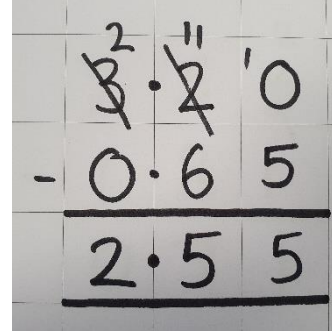


Subtract with up to 3 decimal places



$$\begin{array}{r} 3.2 - 0.65 \\ = 2.55 \end{array}$$

Children use column subtraction with decimals, using 0 place value holders:



Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:


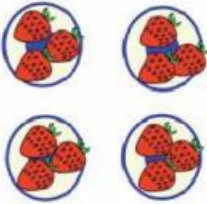
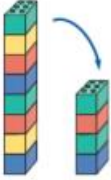
- Counting back steps of 0.1, 1, 10, 100 or 1000
- Use known facts and place value to subtract
- Find a difference by counting on through the next multiple of 10, 100 or 1,000
- Subtract by counting up from the smaller to the larger number where this is the most efficient method
- Subtract the nearest multiple of 1, 10 or 100 then adjust
- Use knowledge of place value and related calculations e.g. 4.5 - 3.6 using 45 - 36
- Use the relationship between addition and subtraction

Representations/ models	Year 6	
	Calculation	Written Strategy
<p>Subtract numbers with more than 4-digits</p> <p>$294,382 - 182,501 = 111,881$</p>	<p>Subtraction</p> $\begin{array}{r} 2,316,145 \\ - 592,037 \\ \hline = 1,724,108 \end{array}$	<p>Children use column subtraction as shown in Year 5:</p>
	$7 - 0.52 = 6.48$	<p>Children use column subtraction with decimals, using 0 place value holders:</p>

Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:

- Consolidate all mental strategies from previous year groups.
- Counting back in powers of tens, including tenths, hundredths and thousandths.
- Use knowledge of place value and related calculations
- Subtract a power of ten, or a whole number and adjust.
- Find the difference by counting up through the nearest multiple of 0,1, 10, 100 or 1,000 then adjust.
- Continue to use the relationship between addition and subtraction.

Representations/ models		Early Years
	Calculation	Written Strategy
 <hr/>  <p>at is half of 8? f of 8 is 4</p>	<p>Double 3</p>	<p>Children are taught that doubling means adding two groups of the same amount together.</p> <div style="background-color: #cccccc; padding: 5px; border: 1px solid #999;"> <p>Double 3</p> <p>000 000</p> <p>3 + 3 = 6</p> </div>
<p>Mental Methods</p> <ul style="list-style-type: none"> • Develop a mental image of the number system. • Understand the value of a number • Counting forwards and backwards • Knowing that groups need to be equal. 		

Representations/ models

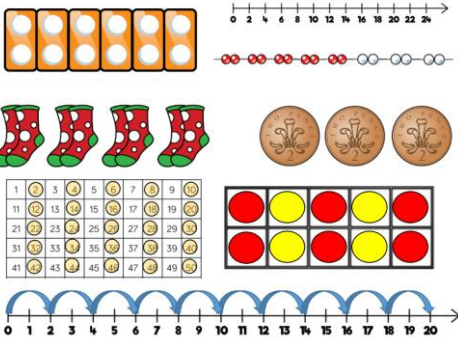


Year 1

Calculation

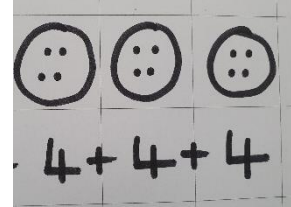
Written Strategy

2x table

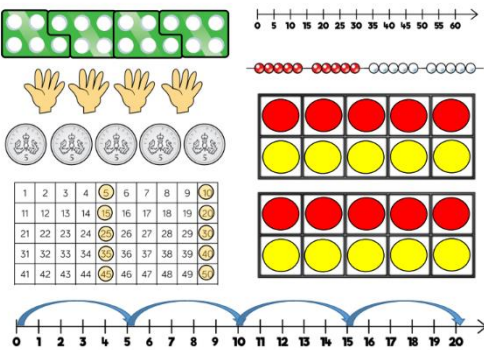


3 lots of 4

To help solve problems, children will use concrete objects and pictorial representations to support their ideas of multiplication:



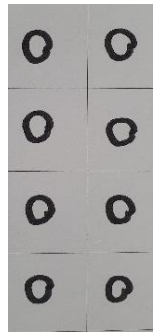
5x table



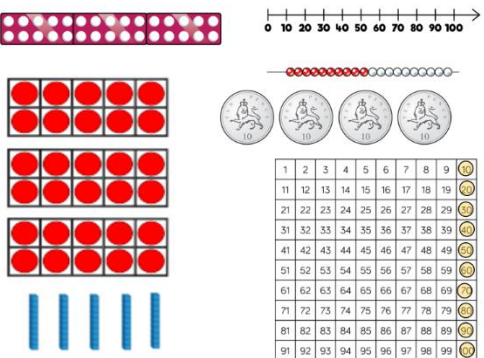
4 groups of 2

Children will be introduced to an array to support multiplication and to support the understanding that multiplication is repeated addition

$$2 + 2 + 2 + 2$$



10x table



1 step problems with multiplication

One bag holds 5 apples.
How many apples do 4 bags hold?

$$5 + 5 + 5 + 5 = 20$$

$$4 \times 5 = 20$$

$$5 \times 4 = 20$$

Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:

- Counting in multiples of 2, 5, and 10s.
- Spotting number patterns when counting in 2, 5 and 10s.
- Repeated addition
- Links to doubling
- Use of arrays

Representations/ models	Year 2	
	Calculation	Written Strategy
<p>2x table</p> <p>5x table</p> <p>10x table</p>	<p>$3 \times 5 = 15$</p>	<p>Children will be able to represent a multiplication calculation using an array and write the multiplication symbol within a number sentence.</p> <p>Children will also understand that multiplication can be carried out in any order (commutative)</p>
	<p>$5 \times 10 = 50$</p>	<p>Children will understand the operation of multiplication as repeated addition on a blank number line:</p>

1 step problems with multiplication

One bag holds 5 apples.
How many apples do 4 bags hold?

$$5 + 5 + 5 + 5 = 20$$
$$4 \times 5 = 20$$
$$5 \times 4 = 20$$

Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:

- Counting in twos, fives and tens
- Repeated addition
- Use of arrays
- Children should recall multiplication facts for the 2, 5- and 10-times tables through practising counting and understanding of the operation and number patterns.
- Using doubling and understanding that this is the same as multiplying by 2.
- Reordering a calculation, knowing that multiplication can be done in any order.

Representations/ models

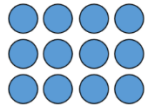
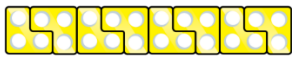


Year 3

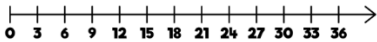
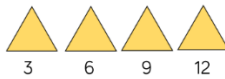
Calculation

Written Strategy

3x table



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

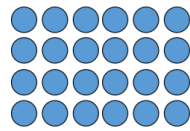


$$21 \times 3$$

Children will be taught to multiply numbers (TO x O) through partitioning and the formal written method of grid multiplication. This method will also help children to gain a solid understanding of multiplying a multiple of 10.

$$\begin{array}{r|rr|r} \times & 20 & 1 & \\ \hline 3 & 60 & 3 & \dots \\ \hline & 60 & + 3 & = 63 \end{array}$$

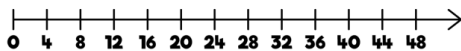
4x table



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50



4	8	12	16	20
24	28	32	36	40
44	48	52	56	60



$$83 \times 4 = 332$$

Children will be taught to multiply numbers (TO x O) using the formal written method of expanded column multiplication and make the link to grid method:

$$\begin{array}{r} 83 \\ \times 4 \\ \hline 320 \\ + 320 \\ \hline 332 \end{array}$$

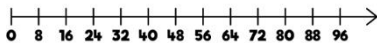
8x table



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



8	16	24	32	40
48	56	64	72	80



Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:

- Counting in 2s, 5s, 10s, 3s, 4s and 8s.
- Repeated addition
- Recall multiplication facts for 2, 5- and 10-times tables (from Year 2)
- Recall multiplication facts for 3, 4- and 8-times tables
- Use known facts and place value to multiply by 2,3,4,5,8 and 10.
- Use doubles to link to x2, x4 and x8.
- Reorder a calculation, understanding that multiplication can be done in any order.

Representations/ models



Year 4

Calculation

Written Strategy

$$138 \times 4 = 552$$

Children to record multiplication in expanded method, like Y3 for 2 and 3-digit numbers:

1	3	8
x		4
<hr/>		
	3	2
1	2	0
+ 4	0	0
<hr/>		
5	5	2

6x table

6	12	18	24	30
36	42	48	54	60
66	72	78	84	90

9x table

9	18	27	36	45
54	63	72	81	90

7x table

7	14	21	28	35
42	49	56	63	70

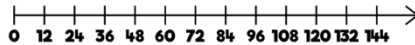
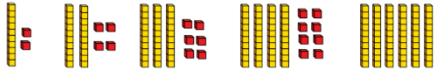
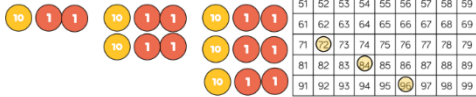
11x table

11	22	33	44	55	66
77	88	99	110	121	132

12x table

12	24	36	48	60
72	84	96	108	120
132	144			

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:

- Counting in 6s, 7s, 9s, 25s and 100s
- Recall previously learnt multiplication facts with increasing confidence (2, 5, 10, 3, 4- and 8-times tables).
- Recall multiplication facts for the 6, 7, 9, 11- and 12-times tables.
- Partitioning: multiplying hundreds, tens and ones separately and then recombining.
- Using understanding of when a number is multiplied by 10, 100 or 1,000.
- Using knowledge of number facts and place value e.g. $7 \times 8 = 56$ to find 70×8 , 7×80 etc.

Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:

- Counting in steps of powers of 10
- Use commutativity and tables to multiply e.g.- 7×8 is the same as 8×7 .
- Use known facts and place value to multiply
- Use related facts to multiply
- Scaling up using known facts to multiply E.g. $5 + 7 = 12$ so $500 + 700 = 1200$
- Recall of all times tables up to 12×12
- Using times table facts to recognise and use square and cube numbers.
- Use understanding of multiplying by 10, 100 or 1,00 and how the digits change in their place value.
- Use the relationship between multiplication and division.

Representations/ models



Year 6

Calculation

Written Strategy

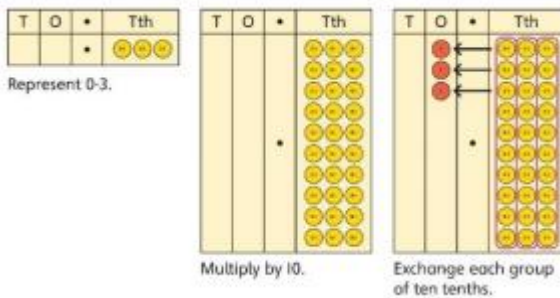
Multiply 4-digit numbers by 1-digit



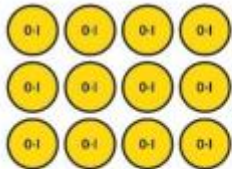
Squared and cubed numbers



Multiply by 10, 100 and 1000



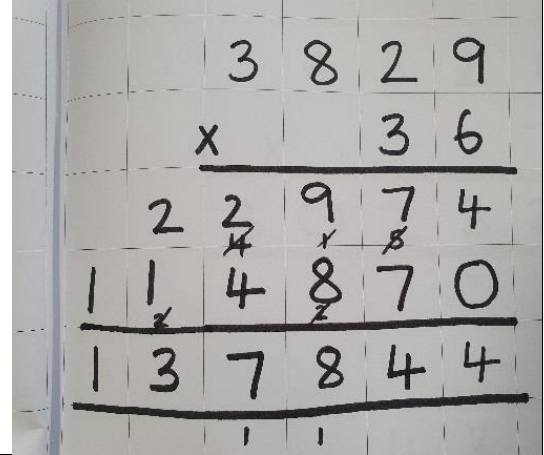
Multiply decimals



3 groups of 4 tenths is 12 tenths.
4 groups of 3 tenths is 12 tenths.

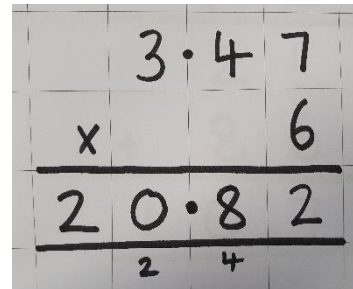
$$3,829 \times 36 = 137,844$$

Children use long multiplication as shown in Year 5:



$$3.47 \times 6 = 20.82$$


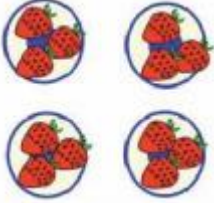
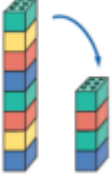
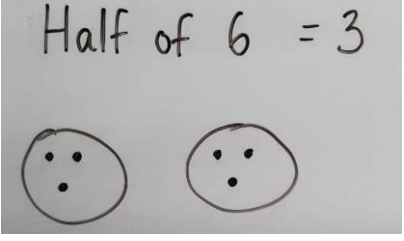
Children use short multiplication as shown in Year 5, also using the strategy for decimal numbers:



Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:

- Rapid recall of all times tables up to 12x12 - as in Year 4 and Year 5
- Recalling square and cubed numbers
- Use known facts and place value to multiply.
- Use related facts to multiply.
- Scaling up using known facts. E.g. $5 + 7 = 12$ so $500 + 700 = 1200$
- Use the relationship between multiplication and division.

Representations/ models		Early Years
	Calculation	Written Strategy
<p>Halving and sharing</p>  	Half of 3	

Mental Methods

- Develop a mental image of the number system.
- Understand the value of a number
- Know how to make equal groups.

Representations/ models

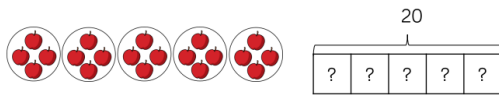


Year 1

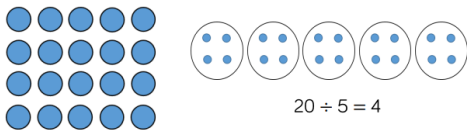
Calculation

Written Strategy

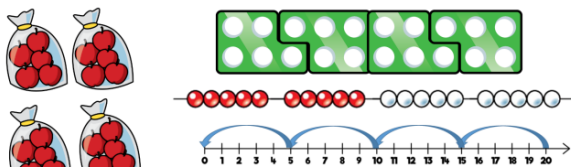
Sharing



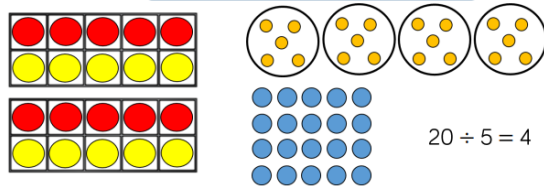
There are 20 apples altogether.
They are shared equally between 5 bags.
How many apples are in each bag?



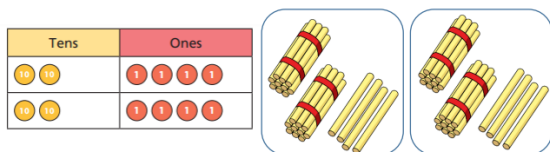
Grouping



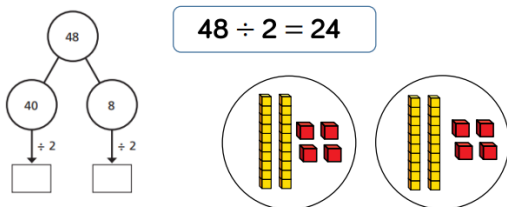
There are 20 apples altogether.
They are put in bags of 5.
How many bags are there?



Sharing with no exchange

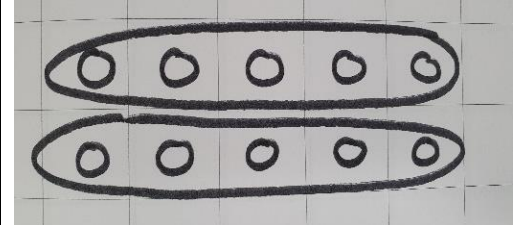


$$48 \div 2 = 24$$



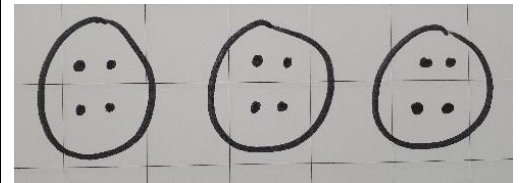
How many groups of 5 are in 10?

Children will be introduced to an array to support division:



Share 12 into 3 groups

Children will understand equal groups to divide:



Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:

- Counting in twos, fives and tens (including the use of a number line)
- Links to halving
- Use arrays
- Through grouping and sharing small quantities, children will begin to understand division and finding simple fractions of objects, numbers and quantities

Representations/ models



Year 2

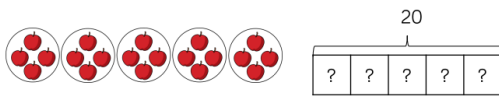
Calculation

Written Strategy

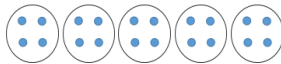
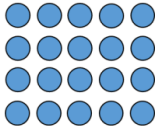
Sharing

$$15 \div 5 = 3$$

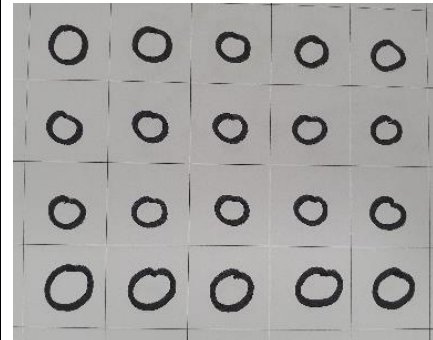
Children will be able to represent a division calculation using an array and write the division within a number sentence:



There are 20 apples altogether.
They are shared equally between 5 bags.
How many apples are in each bag?



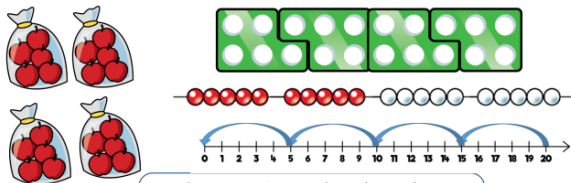
$$20 \div 5 = 4$$



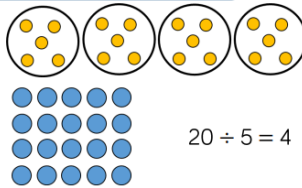
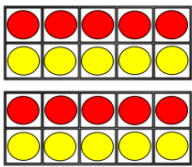
Grouping

$$20 \div 5 = 4$$

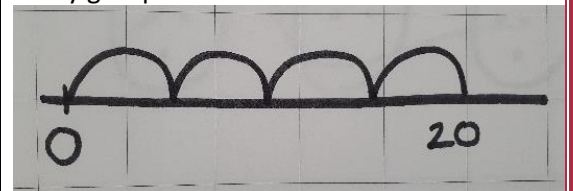
Children will use number lines to divide, to support formal short division in KS2 e.g. "how many groups of 5s in 20?":



There are 20 apples altogether.
They are put in bags of 5.
How many bags are there?



$$20 \div 5 = 4$$

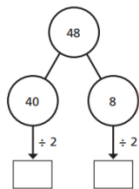
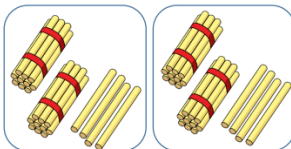


$$10 \div 2 = 5$$

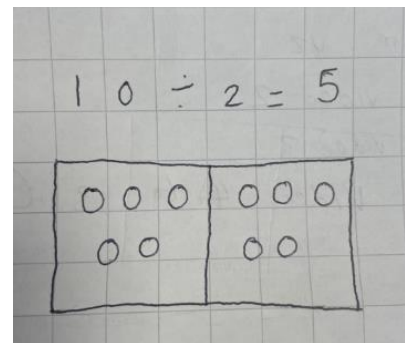
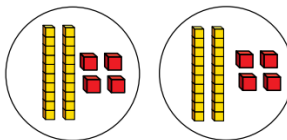
Children will use a written strategy to show how 10 is shared between 2.

Sharing with no exchange

Tens	Ones
10 10	1 1 1 1
10 10	1 1 1 1



$$48 \div 2 = 24$$



Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:

- Counting in 2s, 5s, 10s and 3s
- Links to arrays
- Recalling the division facts for the 2, 5 and 10 times tables
- Using knowledge that halving is the inverse of doubling and the same as dividing by 2.
- Use known facts and place value to divide.

Representations/ models



Year 3

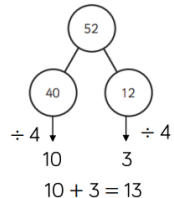
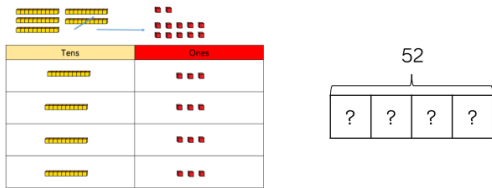
Calculation

Written Strategy

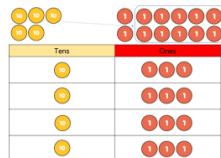
Divide 2-digits by 1-digit (sharing with exchange)

$$17 \div 4 = 4r1$$

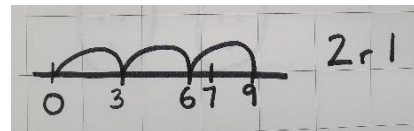
Before formal short division is used, children will develop a solid understanding of remainders. E.g. "how many groups of 4 are in 17":



$$52 \div 4 = 13$$



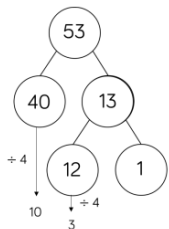
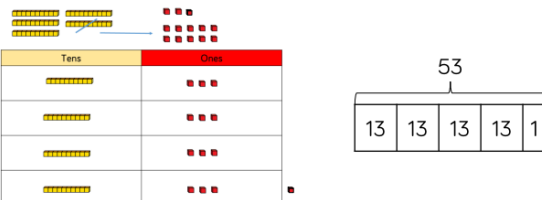
$$7 \div 3 = 2r1$$



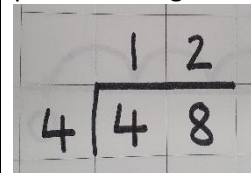
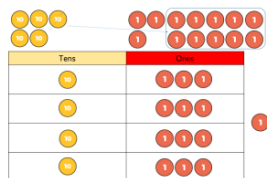
Divide 2-digits by 1-digit (with remainders)

$$48 \div 4 = 12$$

Children are first taught short division method where there are no remainders being passed through the calculation:

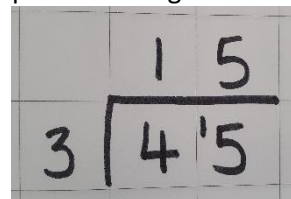


$$53 \div 4 = 13r1$$



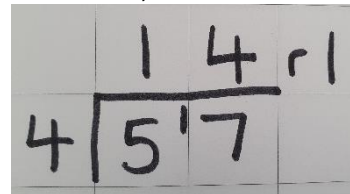
$$45 \div 3 = 15$$

When children are confident with the above 2 processes, they begin to use short division where there are remaining digits being passed through:



$$57 \div 4 = 14r1$$

Where there is a remainder at the end of the calculation, children note this as 'rX':


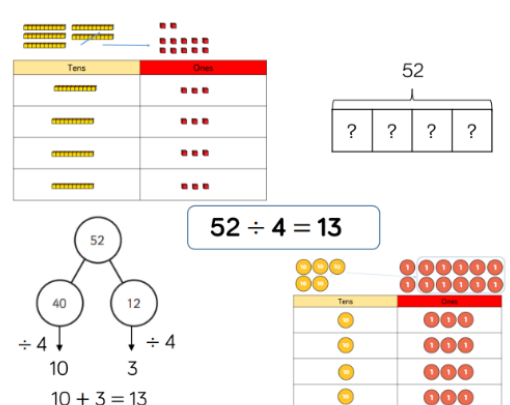
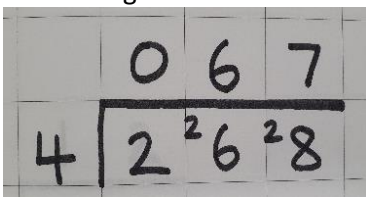
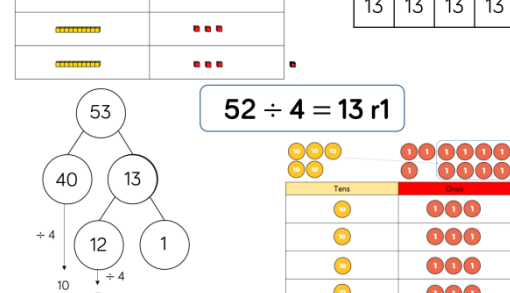
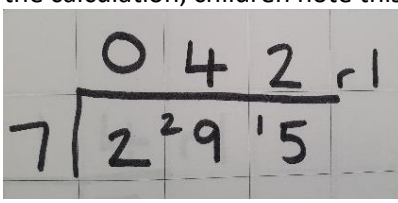
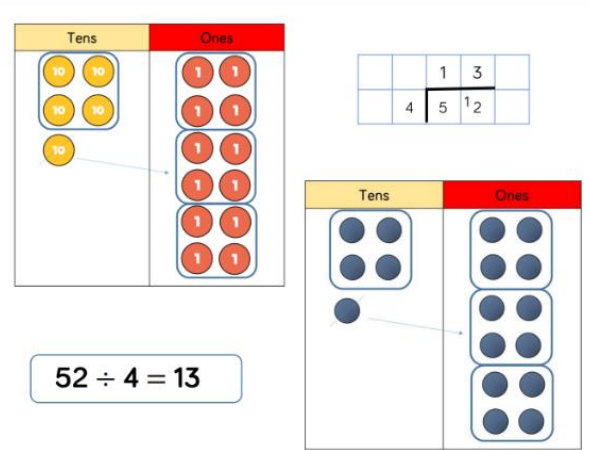


Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:

- Counting in 2s, 5s, 10s, 3s, 4s and 8s
- Recalling the division facts for the 2, 5- and 10-times tables- from Year 2
- Recalling the division facts for the 3, 4- and 8-times tables.
- Use known facts and place value to divide by 2, 3, 4, 5, 8 or 10
- Using knowledge that halving is the inverse of doubling and the same as dividing by 2. Use this to link to $\div 2$, $\div 4$ and $\div 8$.
- Using known facts/partition in different ways to become more efficient in mental calculations: e.g. $39 \div 3$ by taking 3 lots of 10 away mentally, then 3 lots of 3 to get 13 as the answer.

- Use the relationship between multiplication and division.
- Scaling down using known facts.

Representations/ models		Year 4
	Calculation	Written Strategy
<p>Divide 2-digits by 1-digit (sharing with exchange)</p>  <p>$52 \div 4 = 13$</p>	$268 \div 4 = 67$	<p>Children to use short division as in Y3, for 2 and 3-digit numbers:</p> 
<p>Divide 2-digits by 1-digit (with remainders)</p>  <p>$53 \div 4 = 13 \text{ r}1$</p>	$295 \div 7 = 42 \text{ r}1$	<p>Where there is a remainder at the end of the calculation, children note this as 'rX':</p> 
<p>Divide 2-digits by 1-digit (grouping)</p>  <p>$52 \div 4 = 13$</p>		

Representations/ models



Year 5

Calculation

Written Strategy

Divide 2-digits by 1-digit (grouping)

$$1,410 \div 6 = 235$$

Children to use short division as in Y3, for up to 4-digit numbers:

$52 \div 4 = 13$

$$\begin{array}{r} 0235 \\ 6 \overline{) 1410} \end{array}$$

Divide 3-digits by 1-digit (grouping)

$$9,270 \div 7 = 1,324 \frac{2}{7}$$

Children write remainders as 'rX', before moving to as fractions:

$856 \div 4 = 214$

$$\begin{array}{r} 1324 \text{ r}2 \\ 7 \overline{) 9270} \\ \underline{7} \\ 22 \\ \underline{21} \\ 70 \\ \underline{70} \\ 0 \end{array}$$

$$\begin{array}{r} 1324 \frac{2}{7} \\ 7 \overline{) 9270} \\ \underline{7} \\ 22 \\ \underline{21} \\ 70 \\ \underline{70} \\ 0 \end{array}$$

Divide 4-digits by 1-digit (grouping)

$8,532 \div 2 = 4,266$

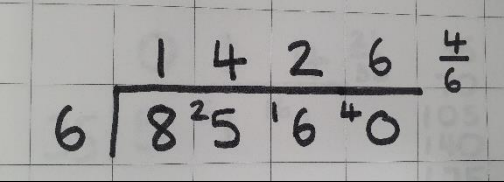
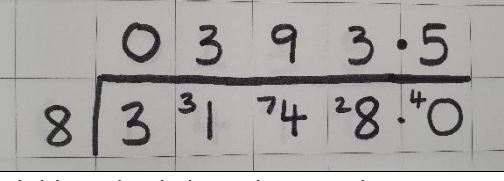
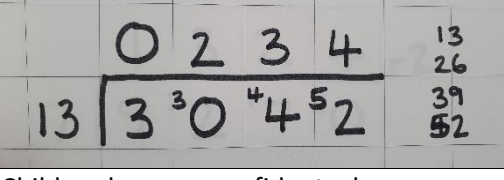
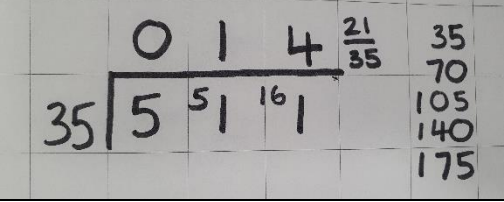
$$\begin{array}{r} 4266 \\ 2 \overline{) 8532} \end{array}$$

$$8,532 \div 2 = 4,266$$

Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:

- Counting in steps of powers of 10.
- Recall division facts for all the times tables, up to 12x12
- Use understanding of place value and what happens to the value of each digit when it is divided by 10, 100 or 1,000.
- Use known facts and place value to solve calculations.
- Use related facts to divide
- Use factor pairs to divide, including knowing that a prime number is a number with exactly 2 factors.
- Scaling down using known facts
- Use knowledge of division facts e.g. when carrying out a division to find a remainder.
- Use the relationship between multiplication and division.

Representations/ models	Division	
	Year 6	
<p>Written methods become the most accurate as concrete and pictorial representations become less effective.</p> <p>Children can write out multiples to support their calculations with larger remainders.</p>	$8,560 \div 6$ $= 1,426\frac{4}{6}$	<p>Children use short division as in Year 5:</p> 
	$3,148 \div 8$ $= 393.5$	<p>Children use short division as in Year 5 but using decimals to find remainders when appropriate:</p> 
	$3,042 \div 13$ $= 234$	<p>Children divide by 2-digit numbers using the above short division strategy, noting down their times tables to support:</p> 
	$511 \div 35$ $= 14\frac{21}{35}$	<p>Children become confident when remainders moving through the division are more than 1 digit:</p> 

Mental Methods

The children should be taught to use the following mental strategies, and to use jottings to support their methods:

- Counting in steps of powers of 10.
- Recall division facts for all the times tables, up to 12x12
- Use understanding of place value and what happens to the value of each digit when it is divided by 10, 100 or 1,000.
- Use known facts and place value to solve calculations.
- Use knowledge of division facts e.g. when carrying out a division to find a remainder.
- Use factor pairs to divide
- Use the relationship between multiplication and division
- Consolidate all previously taught strategies.