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# Calculation Policy

This document is designed to show the different strategies children will be taught at each stage of their maths teaching at the federation. It has been constructed to show what children are expected to be doing in each year group, demonstrating progression through the school; however, children should be able to use all the methods they have been taught previously and may do so if appropriate. Children who are achieving the year group expectations should have their knowledge deepened and challenged through different contexts and problems, rather than being moved on the strategies of a subsequent year.

**It is expected in all years that:**

- Problem-solving should be an embedded and regular part of the teaching process **for all children** within lessons.
- Arithmetic questions should be posed in a range of formats: using different measurements and contexts, moving the equals sign, creating missing number problems, and using the inverse operation.
- Children should have regular opportunities to vocalise their strategies and ask mathematical questions. Teachers could use 'stem sentence starters' to facilitate this (see Appendix B).
- Children should be taught mental and written methods, which should be regularly revisited. Children should become confident choosing and evaluating which strategies are most appropriate for the question they have been asked.
- Children should encounter a range of representations, some of which are included in this document, in their maths lessons. These will require them to draw on their prior learning and deepen their understanding.
- Children will be explicitly taught place value to ensure strong and secure foundations are in place to solve more complex calculation problems.
- Children should be encouraged to become increasingly independent using practical resources and concrete representations to support their mathematical understanding.

## Overview of calculation development across EYFS, KS1 and KS2 (2014 National Curriculum)

Year group	Calculation Development			
	+	-	x	÷
EYFS	Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer.		Children will begin to double, halve and share numbers.	
	Writing numbers Introduce the addition sign (+) and the equals sign (=) Reading and writing number sentences.	Writing numbers Introduce the subtraction sign (-) and the equals sign (=) Reading and writing number sentences.	Use concrete objects to share and double.	
Year 1	<ul style="list-style-type: none"> <li>• Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs</li> <li>• Represent and use number bonds and related subtraction facts within 20</li> <li>• Add and subtract one-digit and two-digit numbers to 20, including 0</li> <li>• Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as <math>7 = ? - 9</math></li> </ul>		<ul style="list-style-type: none"> <li>• Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher</li> <li>• Count in multiples of 2s, 5s, and 10s.</li> </ul>	

	Revising + and = signs Reading/ writing number sentences Part-part whole model Blank number lines Sticks and dots	Revising - and = signs Reading/ writing number sentences Part-part whole model Blank number lines Sticks and dots	Introduce as repeated addition  Introduce multiplication sign (x) - reading and then writing  Part-part whole models	Introduce division sign ( $\div$ )  Part-part whole models
	<b>A two-digit number and 1s</b> <b>A two-digit number and 10s</b> <b>2 two-digit numbers</b> <b>3 one-digit numbers</b>	<b>A two-digit number and 1s</b> <b>A two-digit number and 10s</b> <b>2 two-digit numbers</b> <b>3 one-digit numbers</b>	<b>Recall and use multiplication facts for the 2, 5 and 10 multiplication tables.</b>  <b>Calculate mathematical statements for X within the multiplication tables.</b>	<b>Recall and use division facts for the 2, 5 and 10 multiplication tables.</b>  <b>Calculate mathematical statements for <math>\div</math> within the multiplication tables.</b>
Year 2	<ul style="list-style-type: none"> <li>• Draw Part-part whole models</li> <li>• Use and draw number lines.</li> <li>• Draw sticks and dots, alongside the expanded column method</li> <li>• Draw the expanded column method with numbers</li> <li>• Draw the expanded column</li> </ul>	<ul style="list-style-type: none"> <li>• Draw Part-part whole models</li> <li>• Use number lines.</li> <li>• Draw sticks and dots, alongside the expanded column method</li> <li>• Draw the expanded column method with numbers</li> <li>• Draw the expanded column method with numbers (bridging 10)</li> </ul>	<ul style="list-style-type: none"> <li>• Write as repeated addition</li> <li>• Draw Part-part whole models</li> <li>• Draw arrays</li> </ul>	<ul style="list-style-type: none"> <li>• Draw Part-part whole models (cover sharing and grouping)</li> <li>• Draw arrays</li> </ul>

	method with numbers (bridging 10)			
Year 3	<b>Add numbers up to three digits, using formal written methods of columnar addition.</b>	<b>Subtract numbers up to three digits, using formal written methods of columnar subtraction.</b>	<b>Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.</b>	<b>Write and calculate mathematical statements for division using the multiplication tables that they know, using mental and progressing to formal written methods.</b>
	Children will begin by using and consolidating the expanded column method. By the end of the year, they may be moving on to a shortened column method.	Children will begin by using and consolidating the expanded column method. By the end of the year, they may be moving on to a shortened column method.	In Year 3, children will begin by using arrays to multiply, consolidating their understanding of commutativity. They will move on to the grid method of multiplication by the end of the year.	Children will consolidate sharing and use of arrays. They will begin to divide using number lines before moving on to the chunking methods of division.

Year 4	<p><b>Add numbers with up to 4 digits using the formal written methods of columnar addition where appropriate.</b></p>	<p><b>Subtract numbers with up to 4 digits using the formal written methods of columnar subtraction where appropriate.</b></p>	<p><b>Multiply two-digit and three-digit numbers by a one-digit number using a formal written layout.</b></p>	<p>Write mathematical statements for division using times table knowledge, moving to mental and written methods.</p>
	<p>Children will consolidate their shortened column method with numbers of increasing size.</p>	<p>Children will consolidate their shortened column method with numbers of increasing size.</p>	<p>Children will develop their use of the grid method to the larger numbers they are required to calculate. They will then begin to use the short column method of multiplication.</p> <p>Children must also have secured all times tables facts up to 12 x 12 by the end of the year.</p>	<p>Children will use chunking to divide increasingly large numbers.</p> <p>They will be secure finding the inverse of their times tables to divide simple numbers.</p>

	<p><b>Add whole numbers with more than 4 digits, including using formal written methods (columnar addition)</b></p>	<p><b>Subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction)</b></p>	<p><b>Multiply numbers up to 4 digits by a one- or two-digit number, using a formal written method, including long multiplication for 2-digit numbers.</b></p>	<p><b>Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.</b></p>
<p>Year 5</p>	<p>Children will consolidate their shortened column method with numbers of increasing size. They will calculate with whole numbers but also begin to work with decimal numbers.</p>	<p>Children will consolidate their shortened column method with numbers of increasing size. They will calculate with whole numbers but also begin to work with decimal numbers.</p>	<p>Children will use the short column of multiplication for increasingly large numbers. They will move to calculating 2-digit numbers using the long multiplication method.</p>	<p>Children will use the short, 'bus stop' method of division to calculate numbers.</p>
<p>Year 6</p>			<p><b>Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.</b></p>	<p><b>Divide numbers up to 4-digits by a two-digit whole number using the formal written method of short division where appropriate for the context.</b></p> <p><b>Divide numbers up to 4-digits by a two-digit whole number using the</b></p>

				<p><b>formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, appropriate to the context.</b></p>
	<p>Children will consolidate their columnar addition with whole and decimal numbers, ensuring they use methods efficiently, choosing a mental method where appropriate.</p>	<p>Children will consolidate their columnar subtraction with whole and decimal numbers, ensuring they use methods efficiently, choosing a mental method where appropriate.</p>	<p>Children will secure their long multiplication methods with numbers of increasing size and develop their multiplication of decimals.</p>	<p>Year 6 children will consolidate their short division methods, finding decimal remainders where appropriate.</p> <p>They will also learn and secure the long division method.</p>



## EYFS

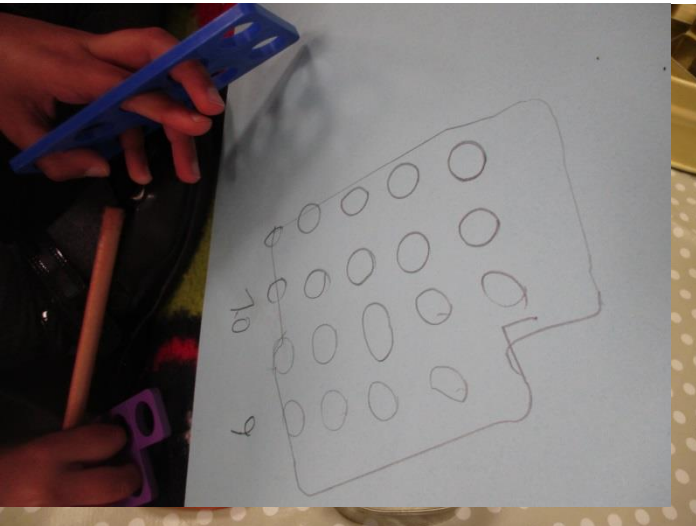
Early Learning Goal 11 requires children to count reliably with numbers from 1 to 20, place them in order and say which number is more or one less than a given number.

Children will use a range of concrete objects to count. They will progress to adding two groups of objects together to find the total.

Children could be asked to count actions and objects that cannot be moved - for example, jumps, claps and cars parked along the road. It is important that children realise that the number of objects in a set stays the same even if the objects are moved around.

Children will use a broad range of concrete objects to count and total.

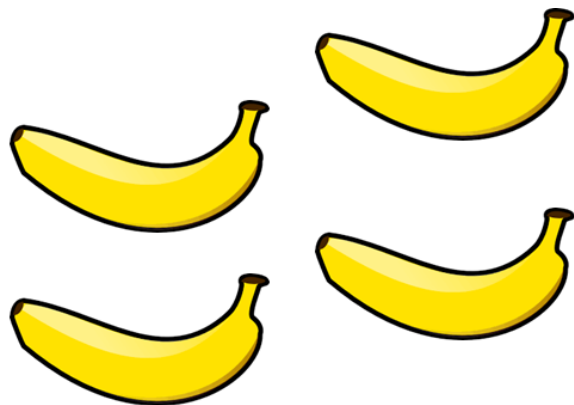
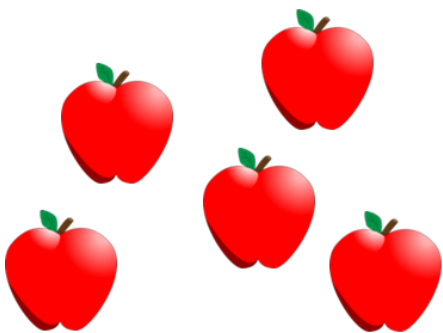




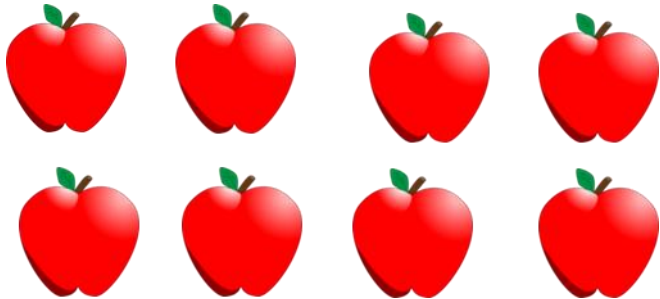
**Children should be able to add and subtract two single-digit numbers and count on or back to find the answer.**

Children need to be able to count a set of objects, know that there are 5 (for example), and count on from that number to find the total of 2 sets. They can do this by putting the bigger number in their head and counting on. Children will begin to use

pictures and symbols and will begin to be able to use +, - and = signs.



To subtract, from a group of objects, children need to understand that they don't need two groups of objects. Instead they need to move the number of objects they are taking away from the rest of the group. They could also cross out pictures, or use their fingers to count back.

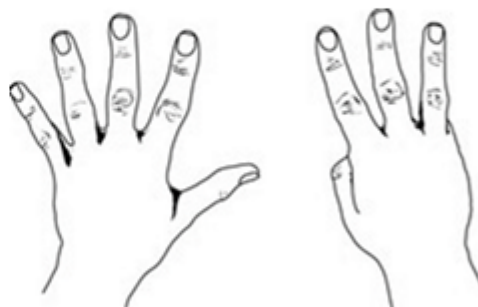


*There are 8 apples on a plate. Ned, George and Rita each eat an apple. How many apples are left?*



- Move one apple for each child and count the apples that are left.

- Cross out one apple for each child and count how many are left.



- Use their fingers

Children will begin to double, halve and share numbers, using concrete objects.



- Double the spots on the ladybird

- Ted and Poppy want to share the plums. They need half each. How many cherries will they each have?



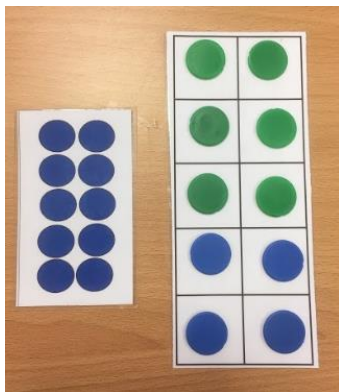
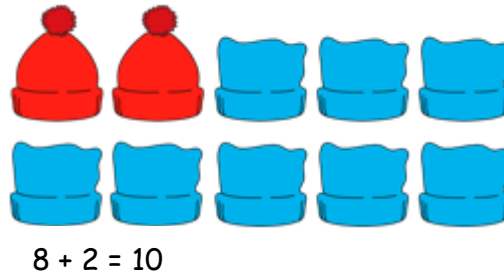
- What if James wants some too?

In EYFS a focus will be placed on key mathematical vocabulary, including the ideas of: more/less, first/then/next, add/plus. subtract/take away, biggest, fewest.



## Addition

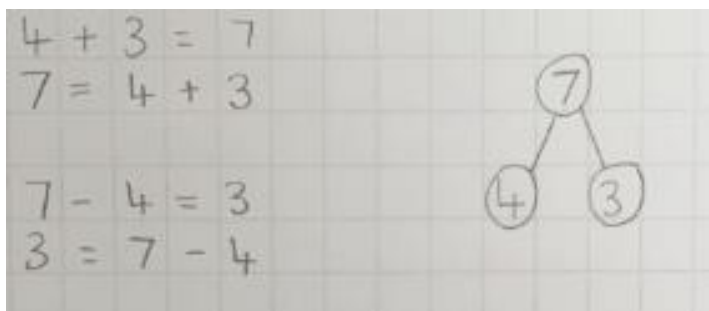
Year 1 children will represent and use number bonds within 20. They will add one-digit and two-digit numbers to 20, including zero and will represent these using a range of pictorial and concrete methods, culminating in a written addition number sentence. They will use this knowledge to solve simple missing number sentences. They may use part-part-whole models, blank number lines and sticks and dots to support these calculations.



$$14 + 6 = 20$$

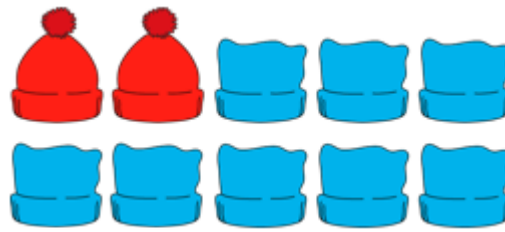


$$4 + 6 = 10$$

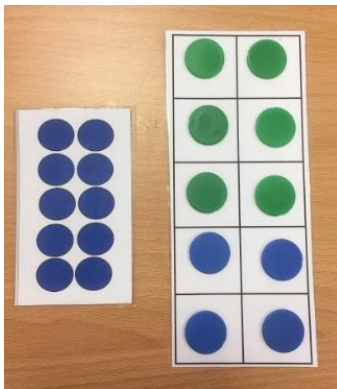


## Subtraction

Year 1 children will use their number bonds knowledge to learn subtraction facts within 20. They will be able to subtract one-digit and two-digit numbers to 20, including zero and will represent these using a range of pictorial and concrete methods. They will then be able to write number sentences using the subtraction symbol and relate these to simple one-step problems.



$$10 - 2 = 8$$



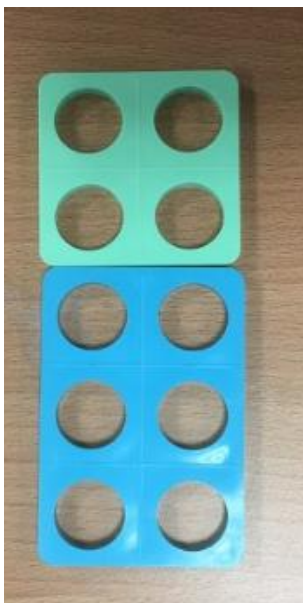
$$20 - 6 = 14$$



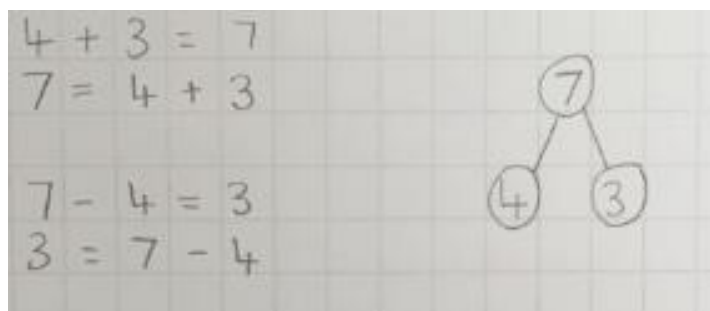
$$20 - 4 = 16$$



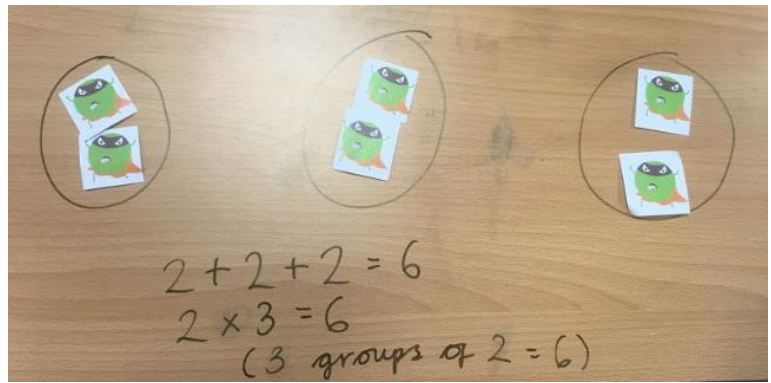
$$25 - 10 = 15$$



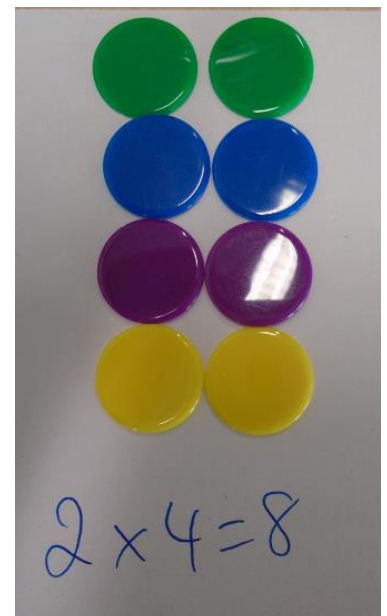
$$10 - 4 = 6$$



## Multiplication



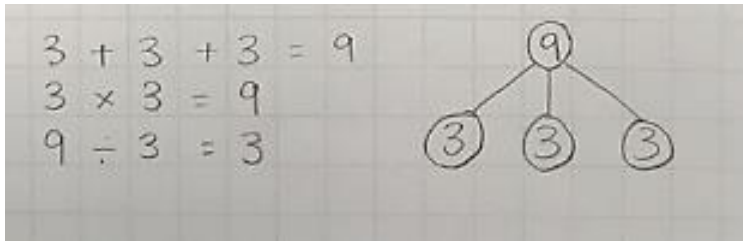
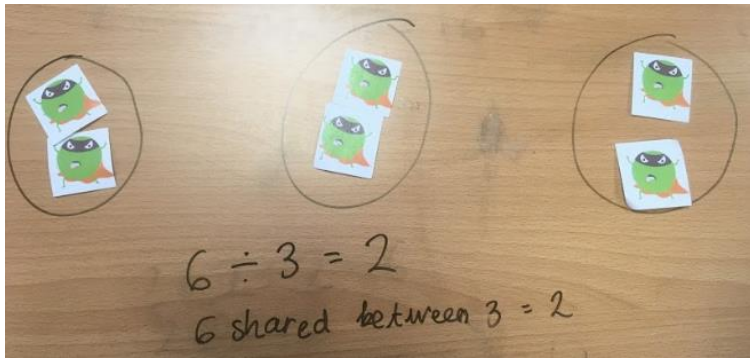
Children will develop their understanding of multiplication by counting in multiples of two, fives and tens. They will begin to understand the concept of multiplication through repeated addition, calculating answers using objects and pictorial representations, such as part-part-whole models and arrays.



## Division

Children will begin to use their multiplication tables facts to understand the concept of division. They will use sharing and grouping to solve one-step division problems.



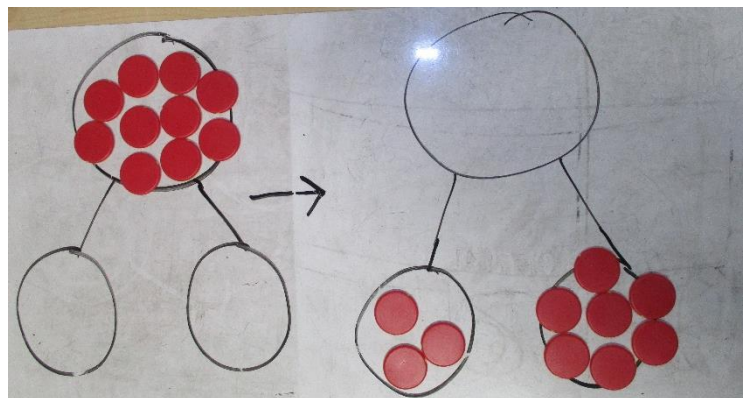
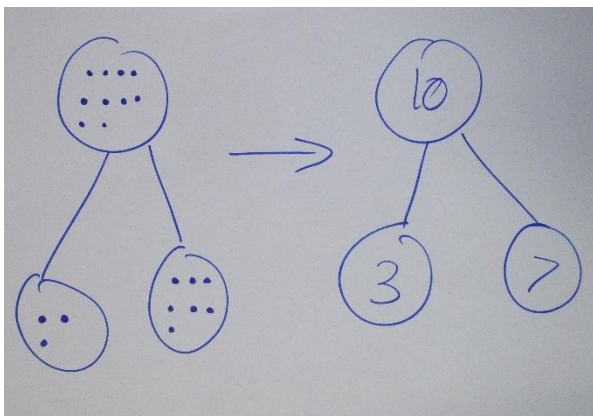


Year 2

Addition

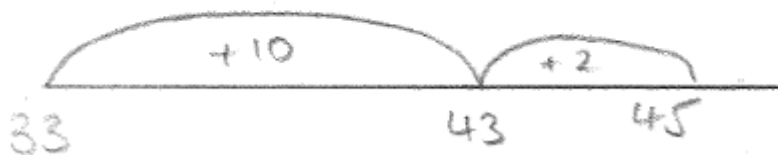
Children will use concrete objects, pictorial representations and written methods to add numbers - by the end of the year, they should be able to add a two-digit numbers and ones, a two-digit number and tens, two two-digit numbers and three one-digit numbers.

Children will need to consolidate their number facts and might use a part-part-whole diagram to represent this.



Children will then move on to using a number line to solve addition calculations.

$$33 + 12 = 45$$



Then, children will use sticks and dots to add one, and then ones, to a 2-digit number.



$| = 10 \quad \bullet = 1$

$23 = \text{II} \bullet \bullet$

$47 = \text{IIII} \bullet \bullet \bullet$



$23 + 1 =$

(+ one more)

10s	1s
II	••
+	•

2 tens + 4 ones = 24

↓

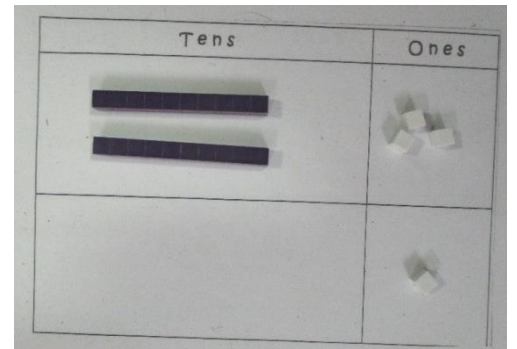
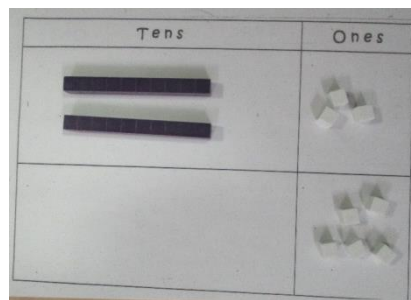
$23 + 5 =$

(+ ones)

10s	1s
II	••
+	•••

2 tens + 8 ones = 28

↓



Children can then use this method to add tens to a 2-digit number.

$23 + 10 =$

(+ ten)

10s	1s
II	••
+	I

3 tens + 3 ones = 33

↓

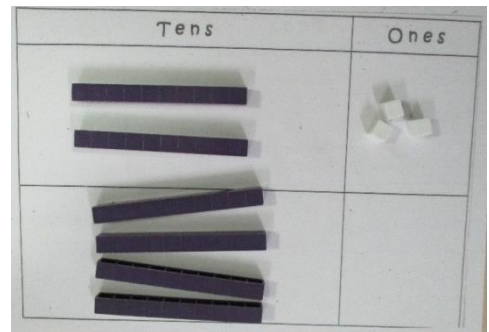
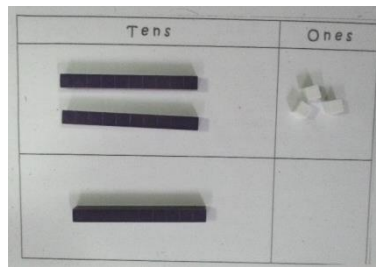
$23 + 40 =$

(+ tens)

10s	1s
II	••
+	IIII

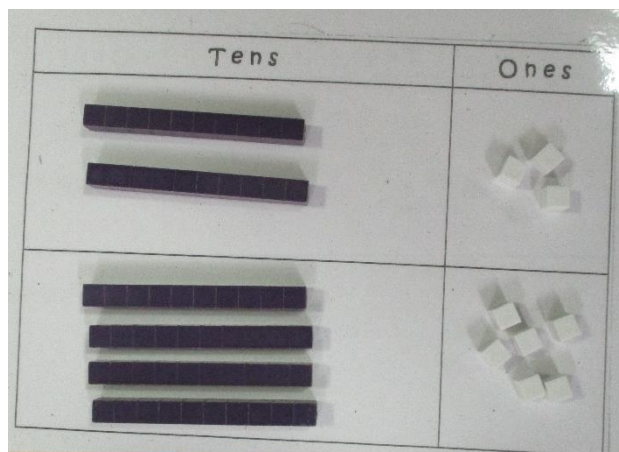
6 tens + 3 ones = 63

↓



They can then add 2-digit numbers and will use this knowledge to move to the expanded column method.

$$\begin{array}{r}
 23 + 46 = \\
 \text{(2-digit + 2-digit)} \quad \begin{array}{c|c}
 \text{10s} & \text{1s} \\
 \hline
 \text{||} & \text{:} \\
 \hline
 \text{+ ||||} & \text{:} \\
 \hline
 \text{6 tens + 9 ones} & = 69
 \end{array} \rightarrow \begin{array}{r}
 23 + 46 \\
 20 + 3 \\
 + 40 + 6 \\
 \hline
 60 + 9 = 69
 \end{array}
 \end{array}$$

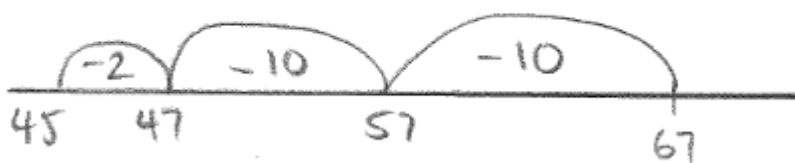


### Subtraction

Children will use concrete objects, pictorial representations and written methods to subtract numbers - by the end of the year, they should be able to subtract ones, tens or a two-digit number from another two-digit numbers or subtract three one-digit numbers.



Children will use a number line to solve written subtraction questions.

$$67 - 22 = 45$$



Children will use sticks and dots, representing the Dienes material, to subtract 2-digit numbers using the expanded column method and the concept of exchange.

$$56 - 22 = 34$$

 50 + 6 

$$\begin{array}{r} 20 + 2 \\ \hline 30 + 4 = 34 \end{array}$$

$$32 - 16 = 16$$

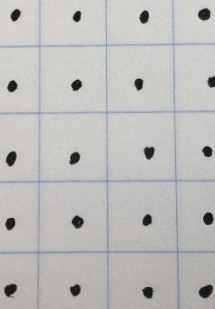
<sup>20</sup>  
~~30~~ + 2

$$\begin{array}{r} 10 + 6 \\ \hline 10 + 6 = 16 \end{array}$$

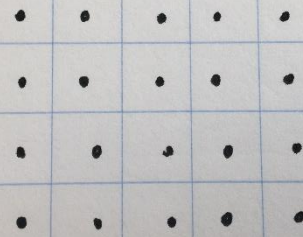
### Multiplication

Children will recall and use their 2, 5 and 10 times tables and calculate mathematical statements for these tables using the appropriate mathematical signs ( $\times$ ,  $=$ ). They will develop an understanding of multiplication, commutativity and the inverse by using grouping, before moving onto arrays and number lines.

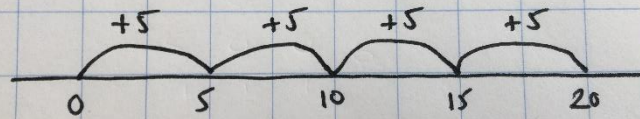
$$4 \times 5 = 20$$



$$5 \times 4 = 20$$



$$5 \times 4 = 20$$



## Division

Children will use their multiplication tables knowledge to recall division facts in the 2, 5 and 10 times tables. They will use sharing and grouping to calculate simple division facts, the inverse to link their multiplication and division and simple number line methods.

**Sharing**  
 $12 \div 4 = 3$  (in each group)

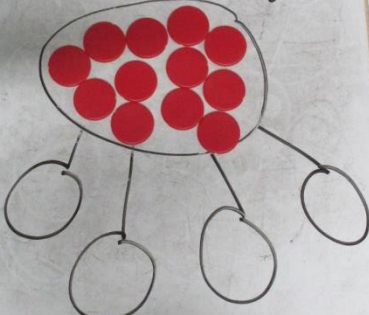
**Grouping**  
 $12 \div 4 = 3$  (groups)

**Sharing**  
 $12 \div 4 = 3$  (in each group)

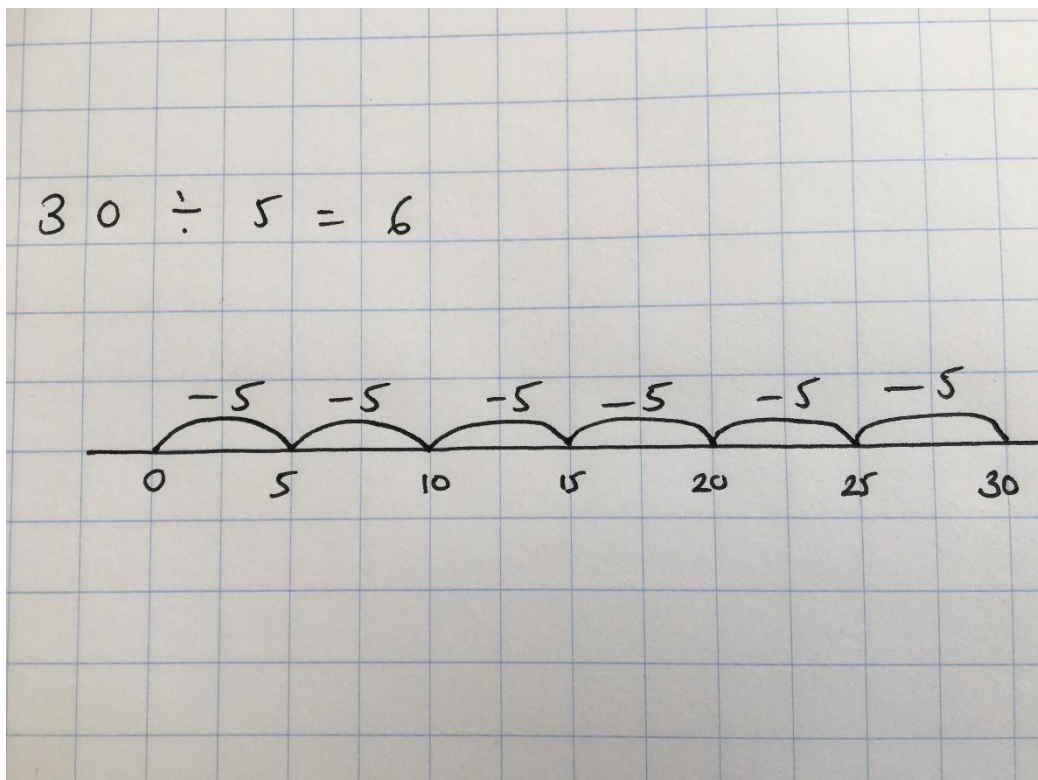
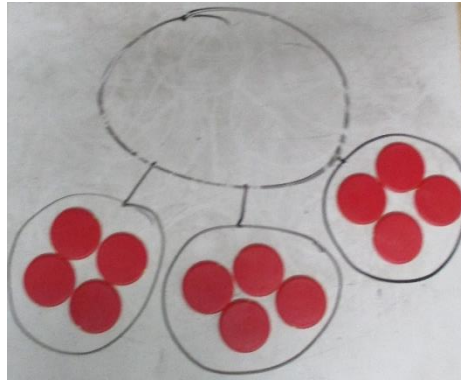
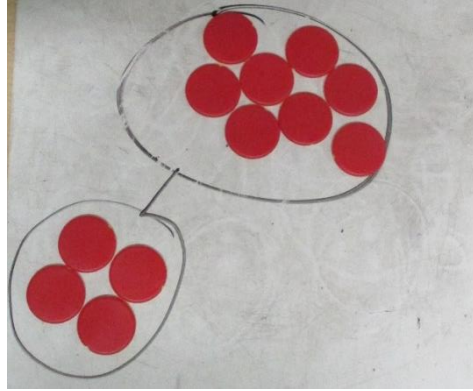
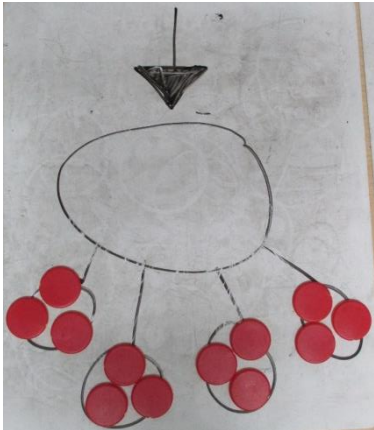
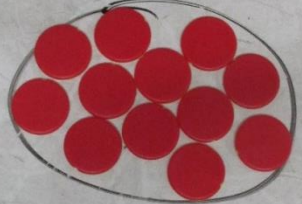
**Grouping**  
 $12 \div 4 = 3$  (groups)



Sharing

$$12 \div 4 = 3 \text{ (in each group)}$$


Grouping

$$12 \div 4 = 3 \text{ (groups)}$$


## Year 3

### Addition

Year 3 children should be able to use increasingly formal written methods to add 3-digit numbers - by the end of the year they should be able to use columnar addition, beginning with the expanded column method. Children should be mentally adding a three-digit number to ones, tens or hundreds and using these skills to solve missing number problems.

Handwritten addition on grid paper showing the expanded column method for  $68 + 53 = 121$ . The calculation is written as follows:

$$68 + 53 = 121$$
$$\begin{array}{r} 60 + 8 \\ 50 + 3 \\ \hline 110 + 11 = 121 \end{array}$$

Handwritten columnar addition for  $246 + 153 = 399$  on grid paper:

$$\begin{array}{r} 246 \\ + 153 \\ \hline 399 \end{array}$$

Handwritten columnar addition for  $296 + 173 = 469$  on grid paper:

$$\begin{array}{r} 296 \\ + 173 \\ \hline 469 \end{array}$$

### Subtraction

Year 3 children should be able to use increasingly formal written methods to subtract numbers up to 3-digit numbers - this should be columnar subtraction, beginning with the expanded method. Children should be mentally subtracting ones, tens and hundreds from a three-digit number and using these skills to solve missing number problems.

43-27

$$\begin{array}{r} \overset{30}{\cancel{40}} + \overset{10}{\cancel{3}} \\ - 20 + 7 \\ \hline 10 + 6 \end{array}$$

$$\begin{array}{r} \overset{3}{\cancel{4}} \overset{1}{3} \\ - 27 \\ \hline 16 \end{array}$$

### Multiplication

Year 3 children are expected to know at least their 3, 4 and 8 times tables - they should then be able to use this knowledge to multiply a 2-digit number by a 1-digit number. During the year, they will progress from using mental method to more formal written methods, beginning with the grid method. They should use this knowledge to solve problems, including correspondence problems in which  $n$  objects are connected to  $m$  objects.

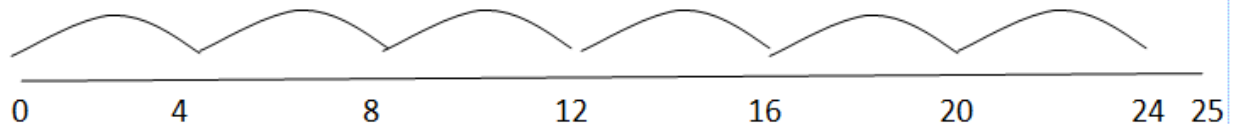
$$48 \times 3 = 144$$

x	40	8	
3	120	24	= 144

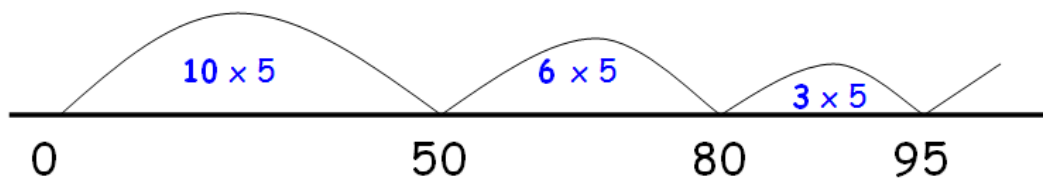
## Division

Children should use the inverses of the multiplication tables they know to divide simple numbers. They will then begin to use formal written methods, beginning with repeated subtraction on a number line. They should be able to use their written and mental methods to solve problems involving missing numbers. Children will move on from the sharing methods of KS1 into using a number line to divide, before beginning to use chunking methods.

Repeated subtraction using a number line  $24 \div 4 = 6$



$$96 \div 5 = 19 \text{ r } 1$$





## Year 4

### Addition

Year 4 children are expected to be able to add 4-digit numbers using formal written methods where appropriate. They should be able to estimate their answer before they produce an accurate solution and should be able to check their calculations using the inverse operation. Children should be able to use their written and mental methods to solve two-step problems, with an emphasis on selecting an appropriate operation and suitable method depending on the question.

$$\begin{array}{r} 3748 \\ + 1698 \\ \hline 5446 \\ \hline \end{array}$$

### Subtraction

Children should be able to subtract 4-digit numbers using formal written methods where appropriate, including exchanging digits. They should then solve problems using this knowledge and be able to use their subtraction calculations in a range of contexts.

$$\begin{array}{r} 56287 \\ - 1494 \\ \hline 4793 \\ \hline \end{array}$$

### Multiplication

Year 4 children must know all their multiplication times tables facts up to  $12 \times 12$ , and their associated division facts, confidently and efficiently. They will work on developing their mental multiplication, using the rule of commutativity ( $3 \times 6 = 6 \times 3$ ) and their understanding and knowledge of factor pairs. Children should be able to use this knowledge to multiply 3 numbers together. They will use formal written methods of multiplication to multiply 2 and 3-digit numbers by a one-digit number. They will begin this by developing their use of the grid method before moving on to the expanded, and then shortened, column method.

$$\begin{array}{r}
 253 \times 6 \\
 = 1518
 \end{array}
 \quad
 \begin{array}{r}
 \hline
 200 \quad 50 \quad 3 \\
 \hline
 \times 6 \quad | \quad 1200 \quad 300 \quad 18 \\
 \hline
 1200 + 300 + 18
 \end{array}$$

$$\begin{array}{r}
 253 \\
 \times \quad 6 \\
 \hline
 18 \quad (3 \times 6) \\
 300 \quad (50 \times 6) \\
 1200 \quad (200 \times 6) \\
 \hline
 1518
 \end{array}$$

$$\begin{array}{r}
 253 \\
 \times \quad 6 \\
 \hline
 1518 \\
 \quad 3 \quad 1
 \end{array}$$

### Division

$$96 \div 3 = 32$$

	96
(10 x 3)	66
(10 x 3)	36
(10 x 3)	6
(2 x 3)	0

Children should know all associated division facts up to  $12 \times 12$  confidently - using these inverse times tables to solve a range of problems mentally. They will also use their multiplication facts to multiply 2 and 3 digit numbers, using multiples of 10 and times table facts in their formal written methods. To develop their written methods of division, children should consolidate their number line strategies before moving onto vertical chunking.

## Year 5

### Addition

Year 5 children should be able to use formal methods (columnar addition) to add numbers with more than 4 digits. These numbers may be decimals and may include a different number of digits after the decimal place. They should be able to add increasingly large numbers mentally and use their addition skills to solve complex multi-step problems and use rounding to check answers to their calculations.

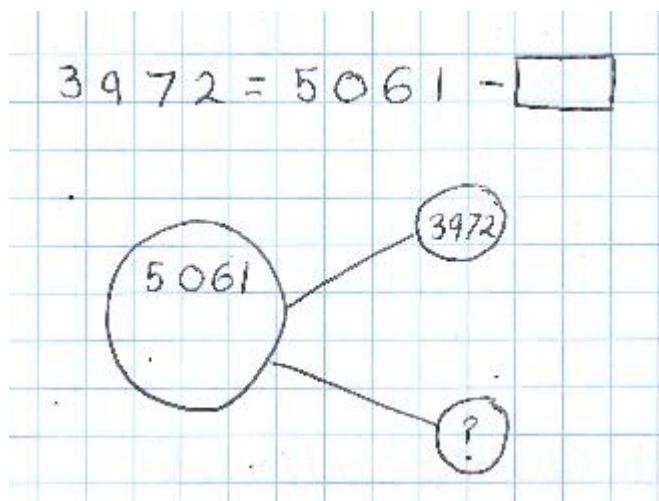
$$\begin{array}{r} 286.79 \\ + 2.347 \\ \hline 289.137 \\ \hline \end{array}$$

### Subtraction

Year 5 children should be able to use formal methods (columnar subtraction) to subtract numbers with more than 4 digits. These numbers may include decimals of differing sizes. They should be able to subtract increasingly large numbers mentally and use these skills to solve complex multi-step problems and use rounding to check answers to their calculations.

$$\begin{array}{r} 649.\overset{5}{8}6 \\ - 32.37 \\ \hline 617.29 \\ \hline \end{array}$$

Children should be increasingly confident using the inverse and rule of commutativity to solve missing number problems - for example, using part-part-whole models.



$5061 - 3972 =$

$$\begin{array}{r} 5061 \\ - 3972 \\ \hline 1089 \end{array}$$

So  $1089 + 3972 = 5061$   
 $3972 + 1089 = 5061$   
 $5061 - 3972 = 1089$   
 $5061 - 1089 = 3972$

### Multiplication

Year 5 children should be able to multiply numbers up to 4 digits by a one- or two-digit number using a formal written method. They will be introduced to using long multiplication for two-digit numbers. Children should be able to mentally multiply numbers drawing upon known facts.

$$\begin{array}{r} 382 \\ \times 4 \\ \hline 1528 \end{array}$$

$$\begin{array}{r} 234 \\ \times 23 \\ \hline 0702 \\ 4680 \\ \hline 5382 \end{array}$$

Children should be continuing to build on their learning in LKS2 to multiply and divide numbers by 10 and 100. They can use a place value grid to support them in these calculations.

$32.9 \times 100$

TH	H	T	U	t	h
		3	2	9	
3	2	9	0		

### Division

Year 5 children should be able to divide numbers up to 4 digits by a one-digit number using the formal written method of short division. They need to

be able to interpret remainders depending on the context, either rounding up, including the remainder, or rounding down depending on the problem. They should be able to divide mentally using known facts.

	0	9	4	8	
4					
	3	7	9	2	

	0	6	6	4	r 3
6					
	3	9	7	2	7

In Year 6, children will be consolidating their calculation methods from previous years - they will need to be able to use all four operations, with whole numbers and with fractions, quickly and accurately. They will also need a clear understanding of when a mental or written method is most appropriate, be able to interpret calculations in a range of challenging contexts, and show mathematical fluency in their approach to problems. Children in Year 6 are also introduced to the idea of the order of operations (commonly taught through 'BODMAS').

### Addition

Year 6 children are expected to apply their column addition methods to a range of contexts and problems. They should be confident calculating different size whole numbers and decimals and making efficient calculation choices.

$$\begin{array}{r}
 348.56 \\
 + 28.98 \\
 \hline
 377.54 \\
 \hline
 \end{array}$$

### Subtraction

Children in Year 6 should be able to subtract whole numbers and decimal numbers efficiently, using these skills confidently in a range of contexts.

$$\begin{array}{r}
 478.2 \\
 - 47.32 \\
 \hline
 435.68 \\
 \hline
 \end{array}$$

### Multiplication

Year 6 pupils will build upon their short and long multiplication skills they have encountered previously. They are expected to be able to multiply a 4-digit by a 2-digit number accurately; they should be able to use mental methods efficiently (for example, to multiply multiples of 10 or multiply a whole number by 10 or 100) and should use efficient methods to multiply decimals.

$$\begin{array}{r}
 328 \\
 \times 38 \\
 \hline
 2624 \\
 9840 \\
 \hline
 12464
 \end{array}$$

$$\begin{array}{r}
 128.3 \\
 \times 7 \\
 \hline
 898.1
 \end{array}$$

### Division

Year 6 children will consolidate their understanding of the short written method of division. They will be introduced to, and expected to use accurately, written long division, to divide a 4-digit number by 2-digits. They will continue to be encouraged to use mental methods, using times tables or place value, where appropriate. Children will also need to use division to find decimal remainders and to support them in finding a decimal equivalent for a fraction.

$$\begin{array}{r}
 07256.8 \\
 5 \overline{) 36'2834.40}
 \end{array}$$

$$\begin{array}{r}
 556 \\
 24 \overline{) 13344} \\
 \underline{120} \downarrow \\
 134 \\
 \underline{120} \downarrow \\
 144
 \end{array}$$

### Fractions, Decimals and Percentages

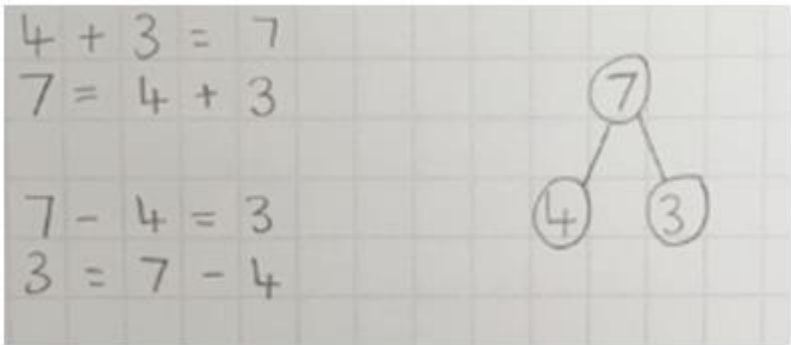
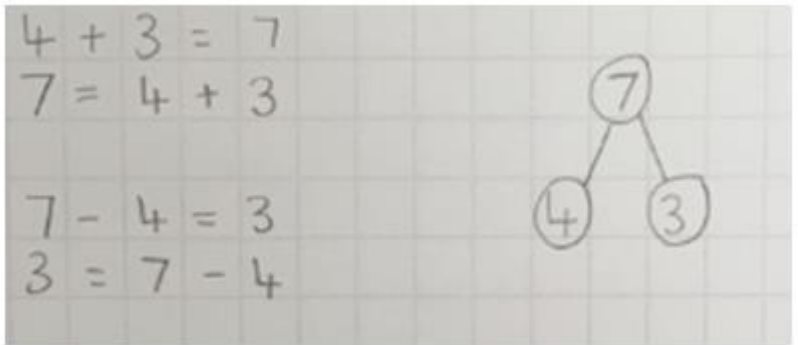
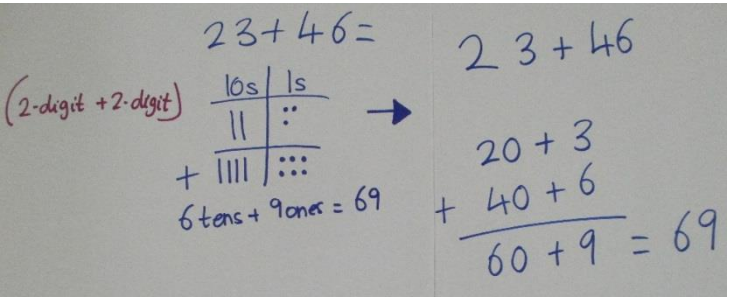
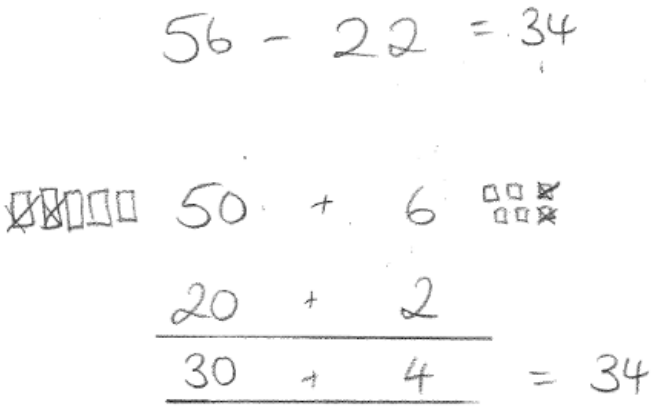
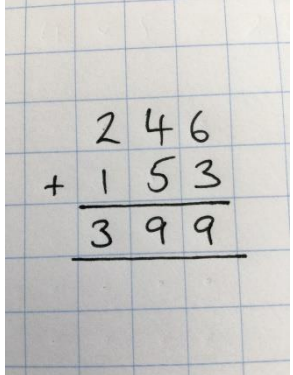
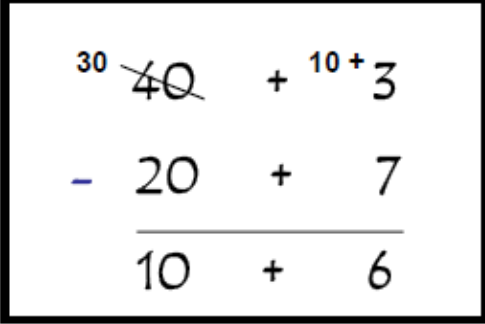
By the end of Year 6, children are expected to be able to add, subtract, multiply and divide fractions. They should be able to work confidently with mixed and improper fractions and solve calculation problems that involve both fractions and whole numbers. They should be

able to find percentages of a number, using efficient division and multiplication methods, and multiply whole numbers by decimals.

Children should be confident using and interpreting number lines, identifying whole and decimal numbers on them. Number sticks can be used to support the children's understanding of how these different numbers are equivalent.



## Appendix 1 - Written Strategies Overview

Year	Written Strategies for Addition	Written Strategies for Subtraction								
1	 <p> <math>4 + 3 = 7</math>  <math>7 = 4 + 3</math>  <math>7 - 4 = 3</math>  <math>3 = 7 - 4</math> </p> <p>A number bond diagram with 7 in a circle at the top, branching down to 4 and 3 in circles.</p>	 <p> <math>4 + 3 = 7</math>  <math>7 = 4 + 3</math>  <math>7 - 4 = 3</math>  <math>3 = 7 - 4</math> </p> <p>A number bond diagram with 7 in a circle at the top, branching down to 4 and 3 in circles.</p>								
2	 <p> <math>23 + 46 =</math> </p> <p>(2-digit + 2-digit)</p> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>10s</td> <td>1s</td> </tr> <tr> <td>  </td> <td>::</td> </tr> <tr> <td colspan="2" style="text-align: center;">→</td> </tr> <tr> <td>+     </td> <td>    </td> </tr> </table> <p>6 tens + 9 ones = 69</p> <p> <math>23 + 46</math>  <math>20 + 3</math>  <math>+ 40 + 6</math>  <math>60 + 9 = 69</math> </p>	10s	1s		::	→		+		 <p> <math>56 - 22 = 34</math> </p> <p> <del>50</del> + 6     </p> <p> <math>20 + 2</math>  <hr/> <math>30 + 4 = 34</math> </p>
10s	1s									
	::									
→										
+										
3	 <p> <math>246</math>  <math>+ 153</math>  <hr/> <math>399</math> </p>	 <p> <math>^{30} \cancel{40} + ^{10} 3</math>  <math>- 20 + 7</math>  <hr/> <math>10 + 6</math> </p>								

4

$$\begin{array}{r}
 3748 \\
 + 1698 \\
 \hline
 5446 \\
 \hline
 \begin{array}{ccc}
 1 & 1 & 1
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 56^{11}287 \\
 - 1494 \\
 \hline
 4793
 \end{array}$$

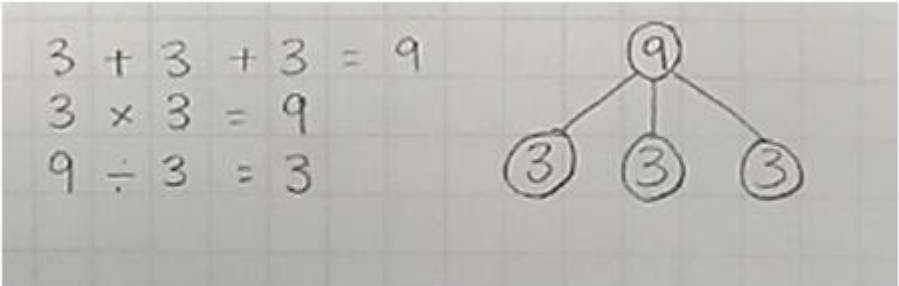
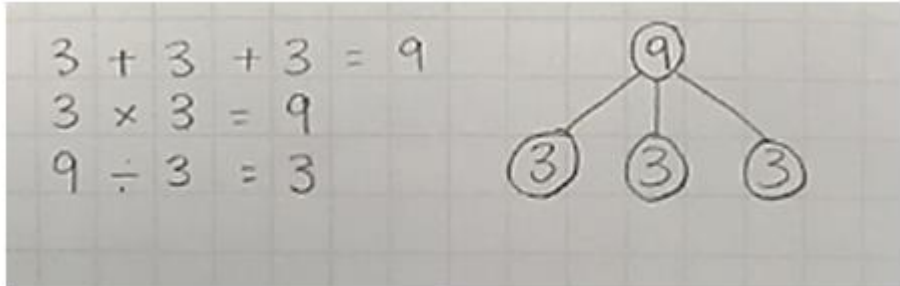
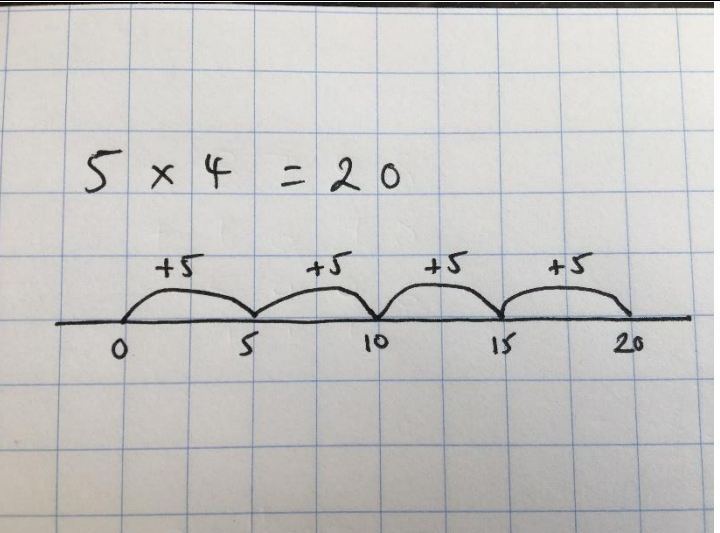
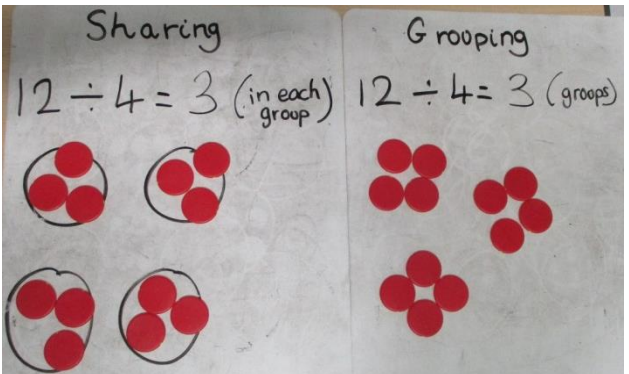
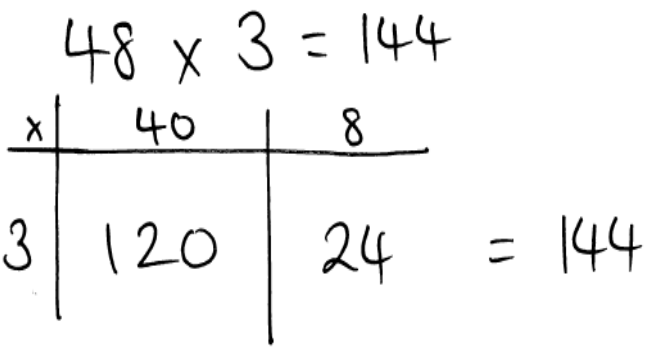
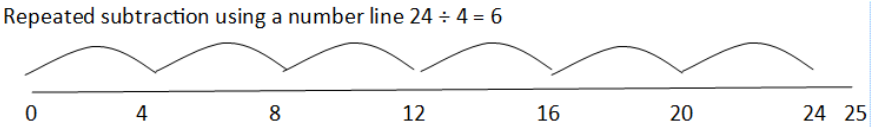
5

$$\begin{array}{r}
 286.79 \\
 + \quad 2.347 \\
 \hline
 289.137 \\
 \hline
 \begin{array}{cc}
 1 & 1
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 649.\overset{5}{\cancel{8}}6 \\
 - 32.37 \\
 \hline
 617.29
 \end{array}$$

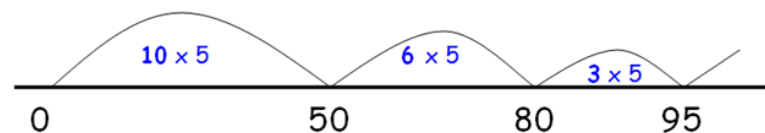
6

$$\begin{array}{r}
 47\overset{12}{\cancel{8}}\overset{9}{\cancel{8}}. \overset{9}{\cancel{10}}0 \\
 - 47.32 \\
 \hline
 435.68
 \end{array}$$

Year	Written methods for Multiplication	Written methods for Division
1	 <p> <math>3 + 3 + 3 = 9</math>  <math>3 \times 3 = 9</math>  <math>9 \div 3 = 3</math> </p>	 <p> <math>3 + 3 + 3 = 9</math>  <math>3 \times 3 = 9</math>  <math>9 \div 3 = 3</math> </p>
2	 <p> <math>5 \times 4 = 20</math> </p>	 <p> <b>Sharing</b>  <math>12 \div 4 = 3</math> (in each group)     </p> <p> <b>Grouping</b>  <math>12 \div 4 = 3</math> (groups)     </p>
3	 <p> <math>48 \times 3 = 144</math> </p> <p> <math>3 \times 40 = 120</math>  <math>3 \times 8 = 24</math>  <math>120 + 24 = 144</math> </p>	 <p>     Repeated subtraction using a number line <math>24 \div 4 = 6</math> </p>

$$\begin{array}{r}
 253 \times 6 \\
 = 1518
 \end{array}
 \quad
 \begin{array}{r}
 \hline
 200 \quad 50 \quad 3 \\
 \hline
 \times 6 \quad | \quad 1200 \quad 300 \quad 18 \\
 \hline
 1200 + 300 + 18
 \end{array}$$

$$96 \div 5 = 19 \text{ r } 1$$



4

$$\begin{array}{r}
 253 \\
 \times \quad 6 \\
 \hline
 18 \quad (3 \times 6) \\
 300 \quad (50 \times 6) \\
 1200 \quad (200 \times 6) \\
 \hline
 1518
 \end{array}$$

$$\begin{array}{r}
 253 \\
 \times \quad 6 \\
 \hline
 1518 \\
 \quad 3 \quad 1
 \end{array}$$

$$96 \div 3 = 32$$

			96
(	10	x 3)	66
(	10	x 3)	36
(	10	x 3)	6
(	2	x 3)	0

5

	2	3	4	
x		2	3	
	0	7	0	2
	4	6	8	0
	5	3	8	2
	1			

	0	9	4	8
4	3	7	9	2

6

$$\begin{array}{r}
 128.3 \\
 \times \quad 7 \\
 \hline
 898.1 \\
 \hline
 152
 \end{array}$$

$$\begin{array}{r}
 07256.8 \\
 5 \overline{) 336'22834.40}
 \end{array}$$

$$\begin{array}{r}
 556 \\
 24 \overline{) 13344} \\
 \underline{120} \downarrow \\
 134 \\
 \underline{120} \downarrow \\
 144
 \end{array}$$

$$\begin{array}{r}
 328 \\
 38 \\
 \hline
 2624 \\
 226 \\
 9840 \\
 2 \\
 \hline
 12464 \\
 \hline
 \end{array}$$

This is an overview of the progression of the written calculation methods within the calculation strategies. It should be used alongside the strategy, where a deeper explanation is given of each stage alongside supporting pictorial representations. The strategies show what children should be proficient at by the end of the year - children may need revision of previous methods at the beginning of the year. When children are able to use the method for their year group, their knowledge should be deepened using this method, rather than progressing through to the next stage.



## Appendix 2 - Stem Sentences

**A stem sentence is a short sentence using mathematical vocabulary to explain an idea.**

This can be useful for children to...

Remember key facts:

*"1 minute is the same as 60 seconds."*

*"Double means to add a number to itself"*

Remember methods:

*"The first number tells us how many parts we need."*

*"Divide by the denominator and multiply by the numerator."*

Explain their reasoning:

*"The whole is divided into \_\_\_\_\_ equal parts."*

*"The whole is not divided into equal parts."*