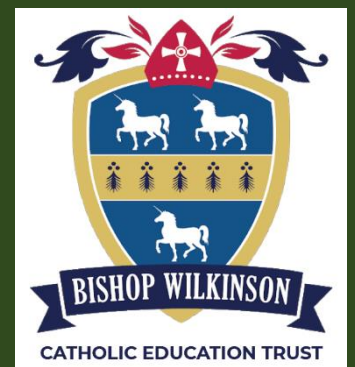





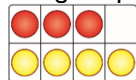


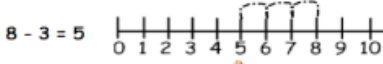

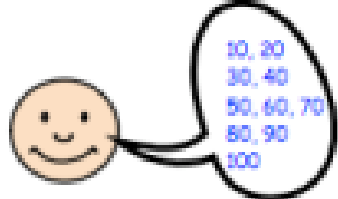
**St. Joseph's Catholic
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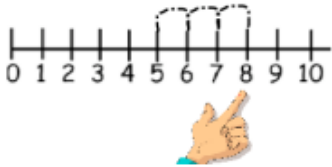
Calculation Policy

February 2024



Foundation Stage

Addition	Subtraction	Multiplication	Division
<p>Begin to relate addition to combining two groups of objects</p> <ul style="list-style-type: none"> - Make a record in pictures, words or symbols of addition activities already carried out. - Construct number sentences to go with practical activities - Use of games, songs and practical activities to begin using vocabulary. - Solve simple word problems using their fingers  <p>$5 + 1 = 6$</p> <p>Can find one more to ten.</p> <p>Can use a part whole model to recognise parts.</p> <p>Can use counters in a tens frame to recognise parts.</p>  <p>Higher Ability/ Gifted and Talented children progress to using a number line. They jump</p>	<p>Begin to relate subtraction to 'taking away'</p> <ul style="list-style-type: none"> - Make a record in pictures, words or symbols of subtraction activities already carried out. - Use of games, songs and practical activities to begin using vocabulary. - Construct number sentences to go with practical activities - Relate subtraction to taking away and counting how many objects are left.  <p>$5 - 1 = 4$</p>  <p>$5 - 1 = 4$</p> <p>Can find one less than up to ten.</p> <p>Higher Ability/ Gifted and Talented Progression:</p>   <p>Counting backwards along a number line using finger.</p>	<p>Real life contexts and use of practical equipment to count in repeated groups of the same size:</p> <ul style="list-style-type: none"> • Count in twos, fives and tens <p>Also chanting in 2s, 5s and 10s.</p> 	<p>Share objects into equal groups Use related vocabulary Activities might include:</p> <ul style="list-style-type: none"> - Sharing of milk at break time - Sharing sweets on a child's birthday - Sharing activities in the home corner - Count in tens/twos - Separate a given number of objects into two groups (addition and subtraction objective in reception being preliminary to multiplication and division) <p>Count in twos, tens How many times? How many are left/left over? Group Answer Right, wrong What could we try next? How did you work it out? Share out Half, halve</p>

<p>forwards along the number line using finger.</p> <p>$5 + 3 = 8$</p> 			
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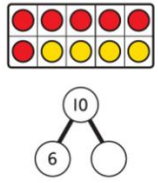
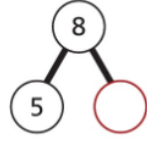
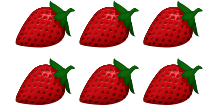

Year 1

Addition and Subtraction - Pupils should be taught to:

- read, write and interpret mathematical statements involving addition (+), subtraction(-) and equals (=) signs;
- represent and use number bonds and related subtraction facts within 20;
- add and subtract one-digit and two-digit numbers to 20, including zero and
- solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square - 9$.

Multiplication and Division - Pupils should be taught to:

- 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.

Addition	Subtraction	Multiplication	Division
<p>Use a part-whole model alongside other representations to find number bonds.</p> 	<p>Children use a part-whole model to support the subtraction to find a missing part.</p>  <p>$8 - 5 = ?$</p>	<p>Multiplication is related to doubling and counting groups of the same size.</p>  <p>Looking at columns $2 + 2 + 2$ 3 groups of 2</p> <p>Looking at rows $3 + 3$ 2 groups of 3</p>	<p>Sharing – 6 sweets are shared between 2 people. How many do they have each?</p>  <p>$6 \div 2 = 3$</p> <p>Practical activities involving sharing, distributing cards when playing a game,</p>

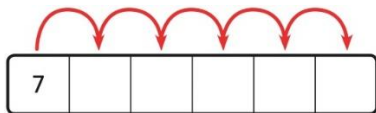
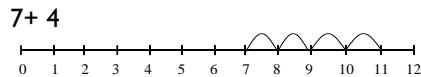
Make sure to include examples where one of the parts is zero

Missing numbers need to be placed in all possible places. Use of part whole model to scaffold this.

$$\begin{array}{l} 3 + 4 = \square \qquad \square = 3 + 4 \\ 3 + \square = 7 \qquad 7 = \square + 4 \\ \square + 4 = 7 \qquad 7 = 3 + \square \\ \square + \nabla = 7 \qquad 7 = \square + \nabla \end{array}$$

Written Method: **The Number Line**

Children use a numbered line to count on in ones. Children use number lines and practical resources to support calculation and teachers *model* the use of the number line.



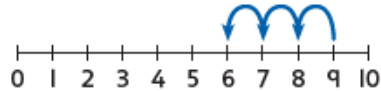
7 + 5 =

Children develop an understanding of the relationship between addition and subtraction facts in a part-whole model.

$$\begin{array}{l} 7 - 3 = \square \qquad \square = 7 - 3 \\ 7 - \square = 4 \qquad 4 = 7 - \square \\ \square - 3 = 4 \qquad 4 = 7 - \square \\ \square - \nabla = 4 \qquad 4 = \square - \nabla \end{array}$$

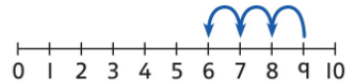
-Understand subtraction as 'take away'

Children count back to take away and use a number line or number track to support the method.



9 - 3 = 6

Children understand 'find the difference' as subtraction.



10 - 4 = 6

The difference between 10 and 6 is 4.

Find a 'difference' by counting up;

I have 6p. I want to buy a toy for 10p. How much more do I need to save?

Counting using a variety of practical resources

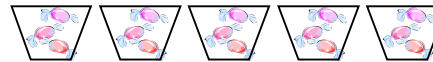
Counting in 2s e.g. counting socks, shoes, animal's legs...

Counting in 5s e.g. counting fingers, fingers in gloves, toes...

Counting in 10s e.g. fingers, toes...

Pictures / marks

There are 3 sweets in one bag. How many sweets are there in 5 bags?



3 x 5 = 15

3+3+3+3+3 = 15

putting objects onto plates, into cups, hoops etc.

Grouping

Sorting objects into 2s / 3s / 4s etc

How many pairs of socks are there?



8 ÷ 2 = 4

	<p>Use the vocabulary related to addition and subtraction and symbols to describe and record addition and subtraction number sentences.</p> <p>Recording by</p> <ul style="list-style-type: none">- drawing jumps on prepared lines- constructing own lines		
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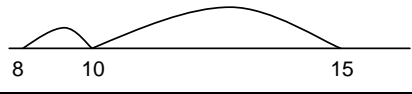
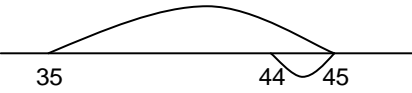
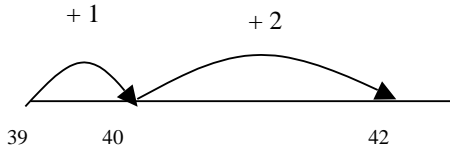
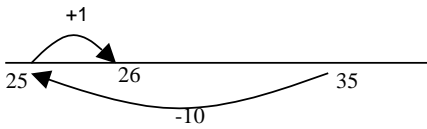

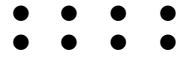
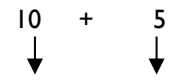
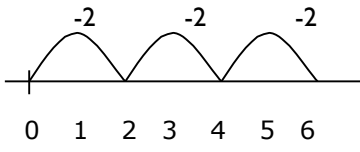
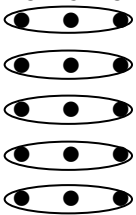
Year 2

Addition and Subtraction - Pupils should be taught to:

- solve problems with addition and subtraction:
 - o using concrete objects and pictorial representations, including those involving numbers, quantities and measures;
 - o applying their increasing knowledge of mental and written methods
- recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100;
- add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
 - o a two-digit number and ones
 - o a two-digit number and tens
 - o two two-digit numbers
 - o adding three one-digit numbers
- show that addition of two numbers can be done in any order (commutative) and that subtraction of one number from another cannot and
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Multiplication and Division – Pupils should be taught to:

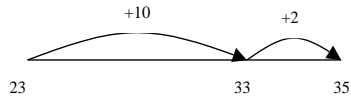
- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers;
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (\times), division (\div) and equals ($=$) signs;
- show that multiplication of two numbers can be done in any order (commutative) and that division of one number by another cannot and
- solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Addition	Subtraction	Multiplication	Division
<p>Continue using a range of equations as in Year 1 but with appropriate, larger numbers. Extend to $14 + 5 = 10 + \square$ and $32 + \square + \square = 100 \quad 35 = 1 + \square + 5$</p> <p>The Empty Number Line Partitioning and bridging through 10.</p> <p>The steps in addition often bridge through a multiple of 10 e.g. Children should be able to partition the 7 to relate adding the 2 and then the 5.</p> <p>$8 + 7 = 15$</p>  <p>Add 9 by adding 10 and adjusting by 1 $35 + 9 = 44$</p>  <p>Partition into tens and ones and recombine e.g. $12 + 23 = 10 + 2 + 20 + 3$</p>	<p>Continue using a range of equations as in Year 1 but with appropriate numbers. Extend to $14 + 5 = 20 - \square$</p> <p>Find a small difference by counting up $42 - 39 = 3$</p>  <p>Subtract 9 or 11. Begin to add/subtract 19 or 21 $35 - 9 = 26$</p>  <p>Use known number facts and place value to subtract (partition second number only) $37 - 12 = 37 - 10 - 2$ $= 27 - 2$ $= 25$</p> 	<p>Arrays</p>  <p>Looking at columns $2 + 2 + 2 + 2 = 8$ Looking at rows $4 + 4 = 8$</p> <p>4 groups of 2 $4 \times 2 = 8$ 2 groups of 4 $2 \times 4 = 8$</p> <p>Doubling by partitioning Children need to be secure with partitioning numbers into 10s and 1s and partitioning in different ways: $6 = 5 + 1$ so e.g. Double 6 is the same as double five add double one.</p> <p>Double 5 = 10 Double 1 = 2 meaning Double 6 = $10 + 2 = 12$</p> <p>Double multiples of 5 up to and including 50 e.g.</p> <p>Double 15</p>  <p>$20 + 10 = 30$</p>	<p>Repeated subtraction on a number line There are 6 strawberries. How many people can have 2 each? How many 2s make 6?</p> <p>$6 \div 2$ can be modelled as:</p>  <p>$6 \div 2 = 3$</p> <p>Grouping/sharing: $15 \div 3 = 5$</p>  <p>How many 3s can you make?</p>

$$= 30 + 5$$

$$= 35$$

Count on in tens and ones e.g.
 $23 + 12 = 23 + 10 + 2$
 $= 33 + 2$
 $= 35$



Children will begin to use formal methods alongside apparatus.

Expanded column method

There are two options for expanded column method. The preferred method is Option 1. However, if a child is having difficulty with understanding this, attempt to explain using Option 2.

1. Vertical

$$\begin{array}{r} \text{TO} \\ 25 \\ + 34 \\ \hline 9 \\ \hline 50 \\ \hline 59 \end{array}$$

2. Horizontal

$$20 + 5$$

$$+ 30 + 4$$

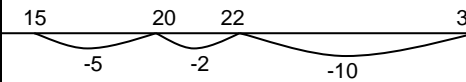
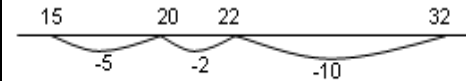
$$50 + 9 = 59$$

Contracted column method

$$\begin{array}{r} \text{HTO} \\ 125 \\ +95 \\ \hline 220 \\ \hline 11 \end{array}$$

Bridge through 10 where necessary

$$32 - 17 = 15$$



Children will begin to use formal methods of subtraction alongside apparatus.

Column method

$$\begin{array}{r} \text{TO} \\ 67 \\ -24 \\ \hline 43 \end{array}$$

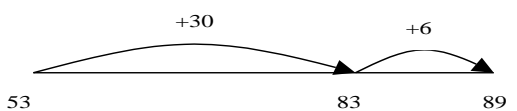
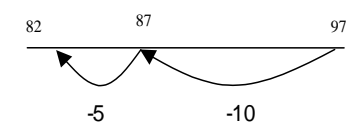
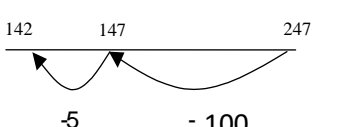
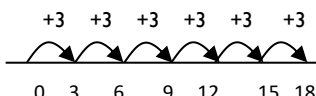
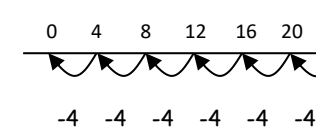
Children must learn their 2, 5 and 10 times tables.

Addition and Subtraction – Pupils should be taught to:

- add and subtract numbers mentally, including:
 - o a three-digit number and ones
 - o a three-digit number and tens
 - o a three-digit number and hundreds
- add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction;
- estimate the answer to a calculation and use inverse operations to check answers and
- solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

Multiplication and Division – Pupils should be taught to:

- recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables;
- write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods;
- solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

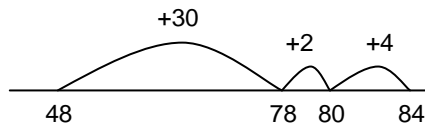
Addition	Subtraction	Multiplication	Division
<p>Continue using a range of equations as in Year 1 and 2 but with appropriate, larger numbers.</p> <p>Partition into tens and ones</p> <ul style="list-style-type: none"> • Partition both numbers and recombine. • Count on by partitioning the second number only e.g. $36 + 53 = 53 + 30 + 6$ $= 83 + 6$ $= 89$  <p>Add a near multiple of 10 to a two-digit number</p>	<p>Continue number lines with larger numbers.</p> $97 - 15 = 82$  <p>Number lines for three digit numbers, counting back.</p> $247 - 105 = 142$ 	<p>Number line (repeated addition)</p> $6 \times 7 = 42$ $+7 \quad +7 \quad +7 \quad +7 \quad +7 \quad +7$ <p>Number line (chunking)</p> $5 \times 17 = 85$	<p>Grouping using a number line (repeated addition)</p> $18 \div 3 = 6$  <p>Grouping using a number line (repeated subtraction)</p> $24 \div 4 = 6$ 

Secure mental methods by using a number line to model the method. Continue as in Year 2 but with appropriate numbers

e.g. $35 + 19$ is the same as $35 + 20 - 1$.

Children need to be secure adding multiples of 10 to any two-digit number including those that are not multiples of 10.

$$48 + 36 = 84$$



Expanded column method

Both options for expanded column method can still be used if the child is having difficulty with option 1.

1. Vertical

$$\begin{array}{r} 83 \\ + 42 \\ \hline 5 \\ \hline 120 \\ 125 \end{array}$$

2. Horizontal

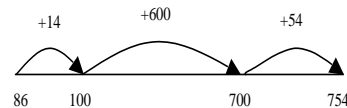
$$\begin{array}{r} 80 + 3 \\ + 40 + 2 \\ \hline 120 + 5 = 125 \end{array}$$

Contracted column method

$$\begin{array}{r} 358 \\ + 73 \\ \hline 431 \\ 11 \end{array}$$

Introduce complimentary addition:

$$754 - 86 = 668$$

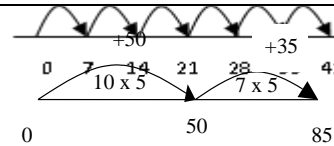


When secure with this, children should progress towards the column subtraction method. Introduce this method using the appropriate column headings.

$$\begin{array}{r} \text{TO} \quad \text{HTO} \\ 95 \quad 239 \\ -54 \quad -125 \\ \hline 41 \quad 114 \end{array}$$

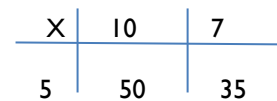
Only when they are secure with their understanding of place value in the column subtraction method should they move onto problems where 'exchanging' from another column is necessary.

$$\begin{array}{r} \text{TO} \quad \text{HTO} \\ 71 \quad 31 \\ \cancel{8}2 \quad \cancel{3}43 \\ -56 \quad -125 \\ \hline 26 \quad 218 \end{array}$$



Grid Multiplication

$$5 \times 17 = 85$$



Either mentally or using column addition calculate $50 + 35 = 85$.

Use inverse of times tables knowledge

Children should use their knowledge of the times tables to calculate the inverse of division problems that have no remainder e.g. $27 \div 3 = 9$ comes from knowing $3 \times 9 = 27$.

Column chunking method

$$84 \div 6 = 14$$

$$\begin{array}{r} 84 \\ - 60 \quad (10 \times 6) \\ \hline 24 \\ - 24 \quad (4 \times 6) \\ \hline 0 \end{array}$$

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Year 4

Addition and Subtraction – Pupils should be taught to:

- add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- estimate and use inverse operations to check answers to a calculation and
- solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Multiplication and Division – Pupils should be taught to:

- recall multiplication and division facts for multiplication tables up to 12×12 ;
- use place value, known and derived facts to multiply and divide mentally, including:
 - o multiplying by 0 and 1; dividing by 1; multiplying together three numbers;
 - o recognise and use factor pairs and commutativity in mental calculations;
 - o multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

Addition	Subtraction	Multiplication	Division																
<p><u>Expanded column method</u></p> $\begin{array}{r} \text{HTO} \\ 474 \\ +325 \\ \hline 9 \\ 90 \\ \underline{700} \\ 799 \end{array}$ <p><u>Contracted column method</u></p> $\begin{array}{r} \text{T}_h\text{HTO} \\ 4\ 347 \\ +2\ 452 \\ \hline 6\ 799 \end{array}$	<p>If necessary, recap on the use of a number line for partitioned subtraction and subtraction by repeated addition.</p> <p><u>Column method</u></p> <table style="width: 100%; border: none;"> <tr> <td style="text-align: right;">HTO</td> <td style="text-align: right;">T_h,HTO</td> </tr> <tr> <td style="text-align: right;">876</td> <td style="text-align: right;">4, 968</td> </tr> <tr> <td style="text-align: right;"><u>- 432</u></td> <td style="text-align: right;"><u>- 2, 713</u></td> </tr> <tr> <td style="text-align: right;">444</td> <td style="text-align: right;">2, 255</td> </tr> </table> <p><u>Column method with exchanging</u></p> <p>Children should be taught that when they 'borrow' 1 from the ten column to bring into their units column, they are not just 'taking 1', they are actually exchanging 1 ten for 10 units. Likewise</p>	HTO	T _h ,HTO	876	4, 968	<u>- 432</u>	<u>- 2, 713</u>	444	2, 255	<p>Children should be secure in their knowledge of times tables for recall up to and including 12×12.</p> <p><u>Short Multiplication</u></p> <table style="width: 100%; border: none;"> <tr> <td style="text-align: right;">24</td> <td style="text-align: right;">376</td> </tr> <tr> <td style="text-align: right;"><u>x 6</u></td> <td style="text-align: right;"><u>x 4</u></td> </tr> <tr> <td style="text-align: right;">144</td> <td style="text-align: right;">1504</td> </tr> <tr> <td style="text-align: right;">2</td> <td style="text-align: right;">32</td> </tr> </table> <p>Understand how the expanded column method is related to the formal column method and understand how any exchanges are related to place value at each stage of the calculation.</p>	24	376	<u>x 6</u>	<u>x 4</u>	144	1504	2	32	<p><u>Column chunking method</u></p> $172 \div 5 = 34 \text{ r } 2$ $\begin{array}{r} 172 \\ - \underline{50} \quad (10 \times 5) \\ 122 \\ - \underline{50} \quad (10 \times 5) \\ 72 \\ - \underline{50} \quad (10 \times 5) \\ 22 \\ - \underline{20} \quad (4 \times 5) \\ 2 \end{array}$ <p>Add together how many multiples of the divisor that have been subtracted ($10 + 10 + 10 + 4 = 34$) and state the remainder.</p>
HTO	T _h ,HTO																		
876	4, 968																		
<u>- 432</u>	<u>- 2, 713</u>																		
444	2, 255																		
24	376																		
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2	32																		

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<p><u>Contracted column method when carrying digits</u></p> <p>Before proceeding to this method, children must have a very secure understanding of all other additions methods prior to this. It should be taught that when the children are 'carrying' a digit into the next column, they are actually carrying 10 multiples of the previous column e.g. 10 units becomes an extra ten in that column, not just 'carrying' over 1.</p> <p>HTU $\begin{array}{r} 386 \\ +495 \\ \hline 881 \\ \hline 11 \end{array}$</p> <p>ThHTU $\begin{array}{r} 2593 \\ +3648 \\ \hline 6241 \end{array}$</p>	<p>when they 'borrow' 1 from the thousands column, they are actually exchanging it for 10 hundreds.</p> <p>$5368 - 3295 = 2073$</p> <p>Th H T U $\begin{array}{r} 21 \\ 5, \cancel{3} 6 8 \\ -3, \underline{2} 9 5 \\ \hline 2, 0 7 3 \end{array}$</p>	$\begin{array}{r} 23 \\ \times 5 \\ \hline 15 \\ 100 \\ \hline 115 \end{array}$ $\begin{array}{r} 23 \\ \times 5 \\ \hline 115 \\ \hline 1 \end{array}$	<p><u>Short division</u></p> <p>Once children are confident with this method, introduce short division.</p> <p>$72 \div 5 = 14 \text{ r } 2$</p> $5 \overline{) 72} \begin{array}{l} 14 \\ \underline{72} \\ 2 \end{array}$
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Year 5

Addition and Subtraction – Pupils should be taught to:

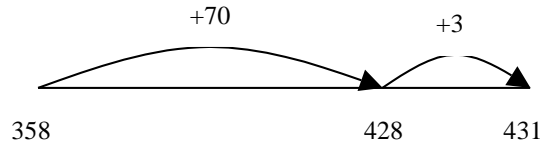
- add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction);
- add and subtract numbers mentally with increasingly large numbers;
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy and
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Multiplication and Division – Pupils should be taught to:

- identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers;
- know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers;
- establish whether a number up to 100 is prime and recall prime numbers up to 19;
- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers;
- multiply and divide numbers mentally drawing upon known facts;
- 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;
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1000;
- recognise and use square numbers and cube numbers, and the notation for squared⁽²⁾ and cubed⁽³⁾;
- solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes;
- solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign and
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates

Addition	Subtraction	Multiplication	Division
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Either partition both numbers and recombine or partition the second number only e.g.
 $358 + 73 = 358 + 70 + 3$
 $= 428 + 3$
 $= 431$



Column addition

Extend to numbers with at least four digits
 $3,587 + 675 = 4,262$

$$\begin{array}{r} 3,587 \\ + 675 \\ \hline 4,262 \\ \hline \end{array}$$

Revert to expanded method from Year 4 if the children experience any difficulty.

Adding Decimals

Link measure with addition of decimals.

Two lengths of fencing are 0.6 m and 0.2 m.

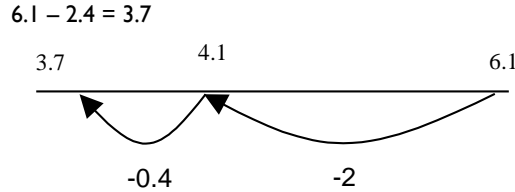
How long are they when added together?



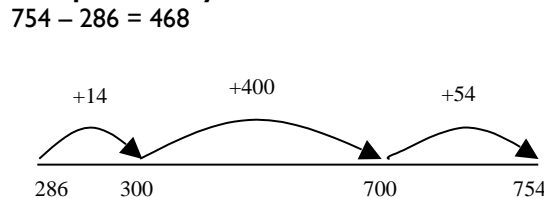
Find a difference by counting up

e.g. $8006 - 2993 = 5013$
 This can be modelled on an empty number line (see complementary addition below).

Use known number facts and place value to subtract



Complementary addition



Column subtraction

Children should be taught that when they 'borrow' 1 from the ten column to bring into their units column, they are not just 'taking 1', they are actually exchanging 1 ten for 10 units. Likewise, when they 'borrow' 1 from the thousands column, they are actually exchanging it for 10 hundreds
 $5368 - 3295 = 2073$

	Th	H	T	U
		2	1	
	5,	3	6	8
-	3,	2	9	5
	2,	0	7	3

Expanded Column Multiplication

The first step in 38×7 is 'thirty multiplied by seven', not 'three times seven', although the relationship 3×7 should be stressed.

$$\begin{array}{r} 23 \\ \times 8 \\ \hline 160 \quad (20 \times 8) \\ \underline{24} \quad (3 \times 8) \\ 184 \end{array}$$

$$\begin{array}{r} 63 \\ \times 9 \\ \hline 540 \quad (60 \times 9) \\ \underline{27} \quad (3 \times 9) \\ 567 \end{array}$$

Short multiplication

$$\begin{array}{r} 63 \\ \times 9 \\ \hline 567 \\ 2 \end{array}$$

$$\begin{array}{r} 2,849 \\ \times 7 \\ \hline 19,743 \\ 536 \end{array}$$

Long multiplication

$$\begin{array}{r} 26 \\ \times 34 \end{array}$$

Short Division

$386 \div 7 = 55 \text{ r } 1$

$$7 \overline{) 386} \begin{array}{l} 055 \\ \hline \end{array} \text{ r } 1$$

$4528 \div 9 = 503 \text{ r } 1$

$$9 \overline{) 4528} \begin{array}{l} 0503 \\ \hline \end{array} \text{ r } 1$$

Introduce the concept of the remainder being a fraction e.g. $55 \text{ r } 1 = 55 \frac{1}{7}$
 However, this should remain appropriate to the context.

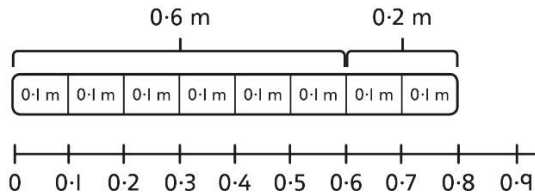
Understanding the relationship between fractions and division

Use the link between division and fractions to calculate divisions.

$5 \div 4 = \frac{5}{4} = 1 \frac{1}{4}$

$11 \div 4 = \frac{11}{4} = 2 \frac{3}{4}$

Use a bar model with a number line to add tenths.



$$0.6 + 0.2 = 0.8$$

6 tenths + 2 tenths = 8 tenths

Understand the link with adding fractions.

$$\frac{6}{10} + \frac{2}{10} = \frac{8}{10}$$

6 tenths + 2 tenths = 8 tenths

$$0.6 + 0.2 = 0.8$$

Column addition with decimals

Extend to up to two places of decimals (same number of decimals places) and adding several numbers (with different numbers of digits).

$$\begin{array}{r} 72.8 \\ +54.6 \\ \hline 127.4 \\ | \quad | \end{array}$$

Column subtraction with decimals

Use a place value grid to represent the stages of column subtraction, including exchanges where required.

$$5.74 - 2.25 = ?$$

Extend to up to two places of decimals (same number of decimals places).

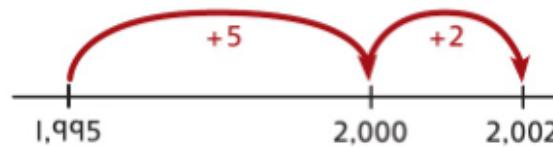
$$9467.25 - 5395.17 = 4072.08$$

$$\begin{array}{r} 3 \quad 1 \\ 9 \overline{) 46725} \\ - 539517 \\ \hline 407208 \end{array}$$

Choosing an efficient method

To subtract two large numbers that are close, children find the difference by counting on.

$$2,002 - 1,995 = ?$$



Use addition to check subtractions.

I calculated $7,546 - 2,355 = 5,191$.

I will check using the inverse.

$$\begin{array}{r} 104 \\ 780 \\ \hline 884 \end{array}$$

$$\begin{array}{r} 286 \\ \times 29 \\ \hline 2574 \\ 5720 \\ \hline 8294 \\ 1 \end{array} \quad \begin{array}{l} (9 \times 286 = 2574) \\ (20 \times 286 = 5720) \end{array}$$

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Year 6

Addition, Subtraction, Multiplication and Division – Pupils should be taught to:

- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication;
- divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context;
- divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context;
- perform mental calculations, including with mixed operations and large numbers;
- identify common factors, common multiples and prime numbers;
- use their knowledge of the order of operations to carry out calculations involving the four operations;
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why;
- solve problems involving addition, subtraction, multiplication and division and
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

Addition	Subtraction	Multiplication	Division
<p><u>Column addition</u></p> <p>By this stage, children should be confident with the column addition of any number of digits to any number of decimal places.</p> $67569.356 + 235729.905 = 303299.261$ $\begin{array}{r} 67,569.356 \\ + 235,729.905 \\ \hline 303,299.261 \\ \hline \end{array}$	<p><u>Column subtraction</u></p> <p>By this stage, children should be confident with the column subtraction of any number of digits to any number of decimal places.</p> $224.90 - 117.25 = 107.65$ $\begin{array}{r} 224.90 \\ - 117.25 \\ \hline 107.65 \end{array}$ $9467.26 - 5395.17 = 4072.08$ $\begin{array}{r} 9467.26 \\ - 5395.17 \\ \hline 4072.08 \end{array}$	<p><u>Long multiplication</u></p> $54 \times 257 = 13,878$ $\begin{array}{r} 54 \\ \times 257 \\ \hline 378 \\ 2,700 \\ \hline 13,878 \end{array}$ <p><u>Short multiplication</u></p> $4983 \times 9 = 44847$ $\begin{array}{r} 4983 \\ \times 9 \\ \hline 44847 \end{array}$	<p><u>Long division</u></p> $432 \div 15 = 28.8$ $\begin{array}{r} 28.8 \\ 15 \overline{) 432.0} \\ \underline{30} \\ 132 \\ \underline{120} \\ 120 \\ \underline{120} \\ 0 \end{array}$ <p>(20 x 15) (8 x 15) (0.8 x 15)</p> <p><u>Short division</u></p> $64528 \div 9 = 7189 \text{ r } 7 \quad \text{OR} \quad 7189 \frac{7}{9}$ $\begin{array}{r} 07,189 \text{ r } 7 \\ 9 \overline{) 64,528} \\ \underline{64,528} \\ 0 \end{array}$

		<p>Multiplying Decimals Use known facts to multiply decimals.</p> $4 \times 3 = 12$ $4 \times 0.3 = 1.2$ $4 \times 0.03 = 0.12$ $20 \times 5 = 100$ $20 \times 0.5 = 10$ $20 \times 0.05 = 1$	<p>Dividing Decimals Use short division to divide decimals with up to 2 decimal places.</p> $8 \overline{) 4.24}$ 0.5 $8 \overline{) 4.424}$ 0.53 $8 \overline{) 4.424}$
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<u>Fraction Addition</u>	<u>Fraction Subtraction</u>	<u>Fraction Multiplication</u>	<u>Fraction Division</u>
<p><u>Add proper fractions</u></p> <p>1) Convert both fractions to have the same denominator</p> <p>2) Add the numerators, but not the denominators.</p> <p>3) Simplify the answer if you can</p> <div style="display: flex; align-items: center; gap: 20px;"> <div style="text-align: center;"> $\frac{1}{3} + \frac{1}{6}$ </div> <div style="text-align: center;"> $\frac{2}{6} + \frac{1}{6}$ </div> <div style="text-align: center;"> $\frac{3}{6} = \frac{1}{2}$ </div> </div> <hr/> <p><u>Add mixed numbers (method 1)</u> $1\frac{3}{4} + 1\frac{3}{8}$</p> <p>1) Change any mixed numbers to improper fractions.</p> <p>2) Convert both fractions to have the same denominator</p> <p>3) Add the numerators together.</p> <p>4) Change any improper fractions back to mixed numbers</p> <p>5) Simplify the answer if you can.</p> <div style="display: flex; align-items: center; gap: 20px;"> <div style="text-align: center;"> $\frac{7}{4} + \frac{11}{8}$ $\frac{14}{8} + \frac{11}{8}$ $\frac{14}{8} + \frac{11}{8} = \frac{25}{8}$ </div> <div style="text-align: center;"> $\frac{25}{8} = 3\frac{1}{8}$ </div> </div> <hr/> <p><u>Add mixed numbers (method 2)</u> $1\frac{3}{4} + 1\frac{3}{8}$</p> <p>1) Add the two whole numbers together.</p> <p>2) Convert both fractions to have the same denominator.</p> <p>3) Add the numerators together.</p> <p>4) Change any improper fractions back to mixed numbers</p> <p>5) Add together your two answers.</p> <p>6) Simplify the answer if you can.</p> <div style="display: flex; align-items: center; gap: 20px;"> <div style="text-align: center;"> $1 + 1 = 2$ $\frac{6}{8} + \frac{3}{8} = \frac{9}{8}$ $\frac{9}{8} = 1\frac{1}{8}$ </div> <div style="text-align: center;"> $2 + 1\frac{1}{8} = 3\frac{1}{8}$ </div> </div>	<p><u>Subtract proper fractions</u></p> <p>1) Convert both fractions to have the same denominator</p> <p>2) Subtract the numerators, but not the denominators.</p> <p>3) Simplify the answer if you can</p> <div style="display: flex; align-items: center; gap: 20px;"> <div style="text-align: center;"> $\frac{2}{3} - \frac{1}{6}$ </div> <div style="text-align: center;"> $\frac{4}{6} - \frac{1}{6}$ </div> <div style="text-align: center;"> $\frac{4}{6} - \frac{1}{6} = \frac{3}{6}$ </div> </div> <div style="text-align: center; margin-top: 10px;"> $\frac{3}{6} = \frac{1}{2}$ </div> <hr/> <p><u>Subtract mixed numbers</u> $2\frac{3}{4} - 1\frac{1}{8}$</p> <p>1) Change any mixed numbers to improper fractions.</p> <p>2) Convert both fractions to have the same denominator.</p> <p>3) Subtract the second numerator from the first.</p> <p>4) Change any improper fractions back to mixed numbers.</p> <p>5) Simplify the answer if you can.</p> <div style="display: flex; align-items: center; gap: 20px;"> <div style="text-align: center;"> $\frac{11}{4} - \frac{9}{8}$ $\frac{22}{8} - \frac{9}{8} = \frac{13}{8}$ </div> <div style="text-align: center;"> $\frac{13}{8} = 1\frac{5}{8}$ </div> </div>	<p><u>Multiply pairs of proper fractions</u> $\frac{3}{4} \times \frac{2}{3}$</p> <p>1) Multiply the numerators</p> <p>2) Multiply the denominators</p> <p>3) Simplify the answer if you can.</p> <div style="display: flex; align-items: center; gap: 20px;"> <div style="text-align: center;"> $\frac{3}{4} \times \frac{2}{3} = \frac{6}{12}$ </div> <div style="text-align: center;"> $\frac{6}{12} = \frac{1}{2}$ </div> </div> <div style="text-align: center; margin-top: 10px;"> $\frac{3}{4}$ $= \frac{6}{12}$ </div> <hr/> <p><u>Multiply fractions by whole numbers</u> $\frac{3}{4} \times 5$</p> <p>1) Write the whole number as a fraction over 1.</p> <p>2) Multiply the numerators</p> <p>3) Multiply the denominators</p> <p>4) Change any improper fractions back to mixed numbers</p> <p>5) Simplify the answer if you can</p> <div style="display: flex; align-items: center; gap: 20px;"> <div style="text-align: center;"> $\frac{3}{4} \times \frac{5}{1}$ $\frac{3}{4} \times \frac{5}{1} = \frac{15}{4}$ </div> <div style="text-align: center;"> $\frac{15}{4} = 3\frac{3}{4}$ </div> </div> <div style="text-align: center; margin-top: 10px;"> </div>	<p><u>Divide fractions by whole numbers</u> $\frac{2}{3} \div 3$</p> <p>1) Multiply the denominator by the whole number and write the answer as the new denominator.</p> <p>2) Simplify the answer if you can.</p> <div style="display: flex; align-items: center; gap: 20px;"> <div style="text-align: center;"> $\frac{2}{3}$ </div> <div style="text-align: center;"> $\frac{2}{3} \div 3 = \frac{2}{9}$ </div> </div> <div style="text-align: center; margin-top: 10px;"> $\frac{2}{3} \div 3 = \frac{2}{9}$ </div>