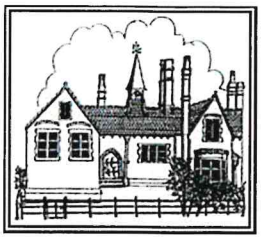
Calculations Policy

developed, agreed and adopted by



We aim to teach calculation with understanding, and not just as a process that is to be remembered. This Calculation Policy clarifies progression in calculation with examples which illustrate how the calculation works and supports the development of mathematical concepts.

The expectation from the 2014 National Curriculum is that the majority of pupils will move through the programmes of study at broadly the same pace and this document broadly matches the yearly expectations. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

The Aims of the curriculum:

The national curriculum for mathematics aims to ensure that all pupils:

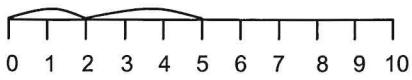
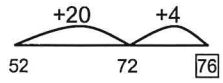
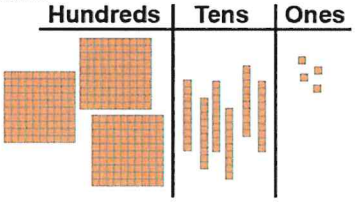
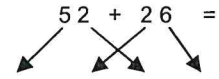
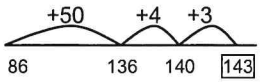
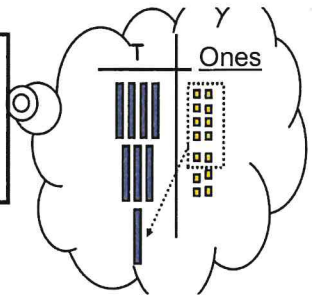
- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

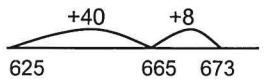
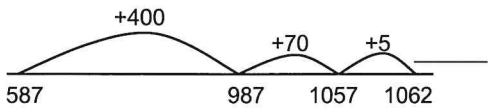
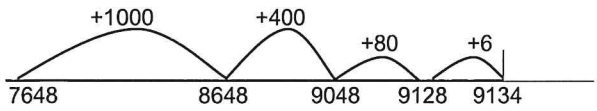
Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

The following pages illustrate:

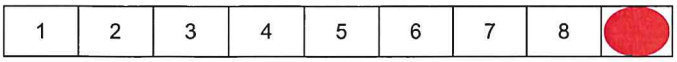
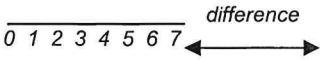
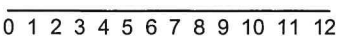
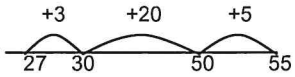
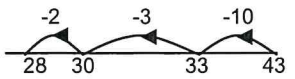
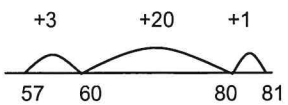
- The development of addition, subtraction, multiplication and division calculations.
- The statutory requirements of the National Curriculum regarding the 4 rules of calculation.
- Mathematical Vocabulary checklist
- Additional guidance (specific to particular schools)

Progression in Addition

Year	What will addition look like?	Italics indicate non-statutory guidance from the 2014 National Curriculum
EY FS	Practical, counting objects and relating addition to combining two groups of objects	
Y1	Use of the number line - hopping and recording. (a)  2 and 3 equals 5 2 + 3 = □ □ + △ = 4 10 = 6 + △ 5 + 3 + 1 = 9 Continue to develop pupils' understanding of addition with practical activities using pictures and concrete apparatus, such as bundles of straws, Numicon, counters and Diennes.	*Pupils memorise and reason with number bonds to 10 and 20 in several forms (e.g. 9 + 7 = 16; 16 - 7 = 9; 7 = 16 - 9). They should realise the effect of adding or subtracting zero. This establishes addition and subtraction as related operations. Pupils combine and increase numbers, counting forwards and backwards.* *They discuss and solve problems in familiar practical contexts, including using quantities. Problems should include the terms put together, add, altogether, total, take away, distance between, more than and less than, so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.*
Y2	Pupils continue to use the number line to calculate with bigger numbers, partitioning the smaller number and adding the most significant digit first (a) 52 + 24  (b) 61 + 14 = □ (c) 12 + 7 + 4 = □ When children have a good understanding of place value and partitioning, introduce the columnar methods with additions that do not cross the tens boundary using concrete apparatus laid out in a columnar form.   70 8 = 7 8	*Pupils extend their understanding of the language of addition and subtraction to include sum and difference* *Pupils practise addition and subtraction to 20 to become increasingly fluent in deriving facts such as using 3 + 7 = 10, 10 - 7 = 3 and 7 = 10 - 3 to calculate 30 + 70 = 100, 100 - 70 = 30 and 70 = 100 - 30.* *They check their calculations, including by adding to check subtraction and adding numbers in a different order to check addition (e.g. 5 + 2 + 1 = 1 + 5 + 2 = 1 + 2 + 5). This establishes commutativity and associativity of addition.* *Recording addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers.* Adding a series of 10s leading to adding multiples of 10 on the number line
Y3	Pupils continue to use the number line to support mental calculation  86 + 57 Pupils build on their understanding of place value, partitioning and their concrete experiences to develop columnar methods of addition which bridge the tens, then hundreds, initially in the expanded form. Expanded method It is important that the children have a good understanding of place value and partitioning using concrete resources and visual images to support calculations. The expanded method enables children to see what happens to numbers in the standard written method. 48 + 36  67+ 83 + 24 42 11 5 80 120 91 125 and check answer	*Pupils practise solving varied addition and subtraction questions. For mental calculations with two-digit numbers, the answers could exceed 100.* *Pupils use their understanding of place value and partitioning, and practise using columnar addition and subtraction with increasingly large numbers up to three digits to become fluent* When the sum of the digits is more than 10 in a column use the term 'carry' to the next column.

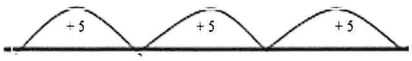
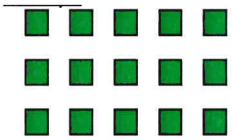
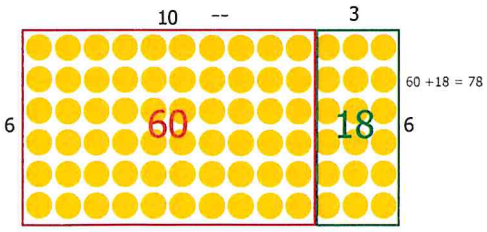
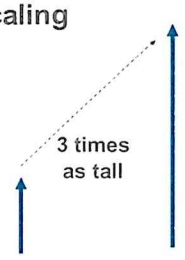
	Progressing to 3 digit numbers 124 137 + 11 50 200 261	
Y4	Partition one number when adding mentally (a) 625 + 48 =  Pupils use their understanding of the expanded columnar methods of addition to progress to use the compact method. 625 + 48 = 673 (1) 1294 + 2345 = 3639 (1) 789 + 642 = 1431 (11)	*Pupils continue to practise both mental methods and columnar spacing addition and subtraction with increasingly large numbers to aid fluency.*
Y5	Adding larger numbers mentally, partitioning the smaller number 587 + 475 =  Pupils use the compact column method to calculate with decimal numbers, and with larger whole numbers. £ 6.72 + 8.56 + 2.30 £ 17.58	*Pupils practise using the formal written methods of columnar addition and subtraction with increasingly large numbers to aid fluency* *They practise mental calculations with increasingly large numbers to aid fluency.*
Y6	Adding larger numbers mentally, supported by the number line, partitioning the smaller number (a) 7648+1486 =  Pupils add larger whole numbers using the columnar method. They add decimals with differing numbers of decimal places using the columnar method. Pupils may fill empty columns with zeros initially, to preserve place value. (a) 7648 + 1486 7648 + 1486 9134 111 (b) 124.9 + 7.25 124.90* + 7.25 132.15 11	*Pupils practise addition and subtraction for larger numbers, using the formal written methods of columnar addition and subtraction.* *They undertake mental calculations with increasingly large numbers and more complex calculations.*

Progression in Subtraction

Year	What will subtraction look like?	*Italics indicate non-statutory guidance from the 2014 National Curriculum*
EY FS	Teacher modelling, practical using objects and pictorial representation Practical demonstrations of subtraction relating to 'take away'. e.g. 10 – 1? Use of number tracks Vocabulary of subtraction in practical activities	
Y1	Number tracks leading to number lines introduced for recording 'jumps' back.  *Can you count back 5? Take away 5.* Difference introduced practically and then on number tracks and lines, e.g. 12 - 7 *Can you make a rod 12 blocks long? My block is 7 blocks long. What's the difference?*   Pupils use concrete apparatus to experience take away and difference in practical activities. *Count out 16 straws. If you give your friend 7, how many will you have left?*	*Pupils memorise and reason with number bonds to 10 and 20 in several forms (e.g. 9 + 7 = 16; 16 - 7 = 9; 7 = 16 - 9). They should realise the effect of adding or subtracting zero. This establishes addition and subtraction as related operations.* *Pupils combine and increase numbers, counting forwards and backwards.* *They discuss and solve problems in familiar practical contexts, including using quantities. Problems should include the terms put together, add, altogether, total, take away, distance between, more than and less than, so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.*
Y2	Adding and subtracting ones and tens along a number line and using a number square Pupils practice finding the difference by counting on using a number line. They are able to choose when to take away and when to find the difference when answering a subtraction problem. eg. 55 - 27   so 55 – 27 = 28 55 – 27 = 28 27 + ? = 55 55 - ? =27 ? + 26 = 55  so 43 – 15 = 28 (Counting Backwards)	*Pupils extend their understanding of the language of addition and subtraction to include sum and difference* *Pupils practise addition and subtraction to 20 to become increasingly fluent in deriving facts such as using 3 + 7 = 10, 10 - 7 = 3 and 7 = 10 - 3 to calculate 30 + 70 = 100, 100 - 70 = 30 and 70 = 100 - 30.* *They check their calculations, including by adding to check subtraction and adding numbers in a different order to check addition (e.g. 5 + 2 + 1 = 1 + 5 + 2 = 1 + 2 + 5). This establishes commutativity and associativity of addition.* *Recording addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers.*
Y3	(a) 81-57 = difference  (b) 81 – 57 = take away 81 = 80 1 "1 take away 7 is not possible so exchange" - 57 - 50 7 70 11 80 1 - 50 7 20 4 = 24 and check answers with inverse. Pupils progress to subtract numbers with up to 3 digits 341- 123 30 10+ 300 40 1 -100 20 3 200 10 8 or 345- 183 200 100+ 300 40 5 -100 80 3 100 60 2	*Pupils practise solving varied addition and subtraction questions.* *For mental calculations with two-digit numbers, the answers could exceed 100.* *Pupils use their understanding of place value and partitioning, and practise using columnar addition and subtraction with increasingly large numbers up to three digits to become fluent* For the column subtraction method by decomposition use the term 'exchange' not borrow'

Y4	(a) Pupils continue to calculate difference mentally using a number line. (b) Pupils progress to using the compact columnar method for subtraction. 70 10+ 784 = 700 80 4 exchange a ten for 7 1 - 56 - 50 6 10 ones 7 8 4 700 20 8 = 728 - 5 6 7 2 8 Progressing to 4 digit numbers 600 100+ 6 1 2754 = 2000 700 50 4 2754 -1562 1000 500 60 2 1562 1192 1000 100 90 2 1192	*Pupils continue to practise both mental methods and columnar spacing for addition and subtraction with increasingly large numbers to aid fluency.*
Y5	(a) Pupils continue to calculate difference mentally, supported with a number line. (b) Pupils use the column method to solve increasingly more complex calculations involving many exchanges, and solve subtractions with more than 4 digits 1 6 4 1 3 1 7 5 8 4 1 - 2 6 9 1 5 4 8 9 2 6 Pupils subtract decimals with more than one decimal place and with differing numbers of digits. 0 11 12 1 1 2 3 . 0 4 - 8 5 . 6 3 7 . 4 4	*Pupils practise using the formal written methods of columnar addition and subtraction with increasingly large numbers to aid fluency.* *They practise mental calculations with increasingly large numbers to aid fluency*
Y6	Pupils continue to find the difference using the number line with increasingly large numbers. (b) 6467 – 2684 5 13 1 6 4 6 7 3783 - 2 6 8 4 + 2684 3 7 8 3 and check answer 6467 1 1 then 324.9 – 7.2 1 1 8 1 3 2 4 . 9 0 - 7.2 5 and continue to use inverse to check 3 1 7 . 6 5	*Pupils practise addition and subtraction for larger numbers, using the formal written methods of columnar addition and subtraction.* *They undertake mental calculations with increasingly large numbers and more complex calculations.*

Progression in Multiplication

Year	What will multiplication look like?	Italics indicate non-statutory guidance from the 2014 National Curriculum
EY FS	Jumping along number lines in steps of…. 100 square to look at patterns of multiples. Grouping- counting in equal sized groups.	
Y1	Pupils solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.	*They make connections between arrays, number patterns, and counting in twos, fives and tens.*
Y2	Pupils calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs 2 x 5 = 10 12 = 4 x 3 Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts, e.g. 3 friends have 5 pencils each. How many pencils do they have altogether?  5 x 3 = '5 multiplied by 3' '5 times 3' Or '5, three times' 5 x 3 	*Pupils use a variety of language to describe multiplication and division.* *Pupils are introduced to the multiplication tables. They practise to become fluent in the 2, 5 and 10 multiplication tables and connect them to each other. They connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face.* *They begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations.* *Pupils work with a range of materials and contexts in which multiplication and division relate to grouping and sharing discrete and continuous quantities, to arrays and to repeated addition.* *They begin to relate these to fractions and measures (for example, 40 ÷ 2 = 20, 20 is a half of 40).* *They use commutativity and inverse relations to develop multiplicative reasoning (for example, 4 × 5 = 20 and 20 ÷ 5 = 4).*
Y3	Build on their understanding of repeated addition and arrays to multiply two digits by one digit using tables they know, e.g. 13 x 3  Informal recording of partitioned numbers, 15 x 5 = 10 x 5 and 5 x 5 or 10 x 5 + 5 x 5 Link arrays to introduce grid multiplication to multiply TU by U , e.g. 13 x 6  13 x 6 = 78 Use grid method to multiply TU by U , progressing to formal written methods when appropriate (see year 4) **Scaling**  Relate multiplication to scaling. My string is 12cm long. Cut a piece of string three times longer.	*Pupils continue to practise their mental recall of multiplication tables when they are calculating mathematical statements in order to improve fluency. Through doubling, they connect the 2, 4 and 8 multiplication tables.* *Pupils develop efficient mental methods, for example, using commutativity and associativity (for example, 4×12×5 = 4 × 5 × 12 = 20 × 12 = 240) and multiplication and division facts (for example, using 3×2 = 6, 6 ÷ 3 = 2 and 2 = 6 ÷ 3) to derive related facts (for example, 30×2 = 60, 60÷3 = 20 and 20 = 60÷ 3).* *Pupils develop reliable written methods for multiplication and division, starting with calculations of two-digit numbers by one-digit numbers and progressing to the formal written methods of short multiplication and division.* *Pupils solve simple problems in contexts, deciding which of the four operations to use and why. These include measuring and scaling contexts, (for example, four times as high, eight times as long etc.) and correspondence problems in which m objects are connected to n objects (for example, 3 hats and 4 coats, how many different outfits?*

x	20	3
4	80	12

<table>
<tr>
<td>Y4</td>
<td>Pupils multiply two-digit and three-digit numbers by a one-digit number using formal written layout

HTU x U using grid method, e.g. 136 x 5

<table>
<tr><td>x</td><td>100</td><td>30</td><td>6</td></tr>
<tr><td>5</td><td></td><td></td><td></td></tr>
</table>

Progressing to the expanded short multiplication method (least significant digit first)

136
X 5
30
150
500
680

Moving to the formal written method.

136
x 5
680
13</td>
<td>Pupils continue to practise recalling and using multiplication tables (1 to 12) and related division facts to aid fluency.
Pupils practise mental methods and extend this to three-digit numbers to derive facts, (for example 600 ÷ 3 = 200 can be derived from 2 x 3 = 6).

Pupils practise to become fluent in the formal written method of short multiplication.

Pupils write statements about the equality of expressions (for example, use the distributive law 39 × 7 = 30 × 7 + 9 × 7 and associative law (2 × 3) × 4 = 2 × (3 × 4)).

They combine their knowledge of number facts and rules of arithmetic to solve mental and written calculations for example, 2 x 6 x 5 = 10 x 6 = 60.
.</td>
</tr>
<tr>
<td>Y5</td>
<td>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 ThHTU x U using the formal written method,,e.g. 1345 x 6

1345
x 6
8070
223

Multiply TU x TU using the grid method, e.g. 38 x 72

<table>
<tr><td>x</td><td>30</td><td>8</td></tr>
<tr><td>70</td><td>2100</td><td>560</td></tr>
<tr><td>2</td><td>60</td><td>16</td></tr>
</table>

(Add either the columns or rows)

= 2600
+
= 76
2736

Progressing to the expanded written form for TU x TU

72
x 38
16 (2 X 8)
560 (70 X 8)
60 (2 X 30)
2100 (70 X 30)
2736
1

and then onto the formal written method of long multiplication.

72
X 38
576 (72 x 8)
2160 (72 x 30)
2736</td>
<td>Pupils practise and extend their use of the formal written methods of short multiplication. They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations.

They use and understand the terms factor, multiple and prime, square and cube numbers.

Pupils use multiplication and division as inverses to support the introduction of ratio in year 6, for example, by multiplying and dividing by powers of 10 in scale drawings or by multiplying and dividing by powers of a 1000 in converting between units such as kilometres and metres.</td>
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<tr>
<td>Y6</td>
<td>Pupils multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication

2635
X 27
18445 (2635 x 7)
52700 (2635 x 20)
71145</td>
<td>Pupils practise addition, subtraction, multiplication and division for larger numbers, using the formal written methods of columnar addition and subtraction, short and long multiplication.

They undertake mental calculations with increasingly large numbers and more complex calculations.

Pupils continue to use all the multiplication tables to calculate mathematical statements in order to maintain their fluency.</td>
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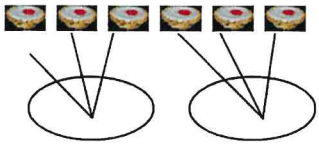
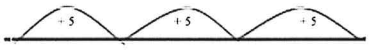
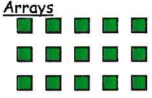
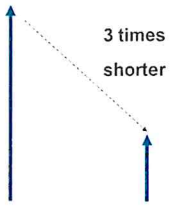
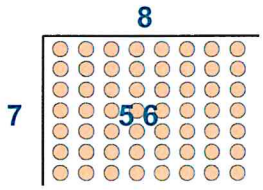
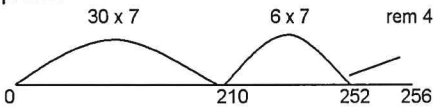
Progression in Division

Year	What will division look like?	Italics indicate non-statutory guidance from the 2014 National Curriculum
EY FS	Pupils use concrete objects and practical situations to explore sharing to answer questions such as: Share the biscuits out so that everyone has the same number. Cut the sandwich in half. How many pieces are there?	
Y1	Pupils solve one-step problems involving division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. Pupils use sharing and grouping to solve division problems. Sharing e.g. 6 cakes are shared equally between 2 people. How many cakes does each person get?  Grouping How many pairs of socks can we make from this pile of socks? Count the pairs. 	*Through grouping and sharing small quantities, pupils begin to understand: multiplication and division; doubling numbers and quantities; and finding simple fractions of objects, numbers and quantities.* *They make connections between arrays, number patterns, and counting in twos, fives and tens.*
Y2	Pupils calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs 4 x 3 = 12 3 x 4 = 12 12 ÷ 4 = 3 12 ÷ 3 = 4 Pupils solve problems involving multiplication and division, using practical materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts, e.g. 15 pencils are put into boxes of 5. How many boxes of pencils will there be?  There will be 3 boxes of 5 pencils Arrays  Use arrays to model division. 15 ÷ 5 = 3 and 15 ÷ 3 = 5	*Pupils use a variety of language to describe multiplication and division.* *Pupils are introduced to the multiplication tables. They practise to become fluent in the 2, 5 and 10 multiplication tables and connect the 5 multiplication table to the divisions on the clock face. They begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations.* *Pupils work with a range of materials and contexts in which multiplication and division relate to grouping and sharing discrete and continuous quantities, to arrays and to repeated addition.* *They begin to relate these to fractions and measures (for example, 40÷ 2 = 20, 20 is a half of 40). They use commutativity and inverse relations to develop multiplicative reasoning (eg, 4 × 5 = 20 and 20 ÷ 5 = 4).*
Y3	Pupils write and calculate mathematical statements for division using the multiplication tables that they know, using mental and progressing to formal written methods. Use knowledge of multiplication facts and repeated addition to answer division questions, e.g. How many 3s are there in 39?  Extending to use all tables that pupils know and to explore the idea of the remainder	*Pupils develop efficient mental methods, for multiplication and division facts (for example, using 3 × 2 = 6, 6 ÷ 3 = 2 and 2 = 6 ÷ 3) to derive related facts (for example, 30 × 2 = 60, 60 ÷ 3 = 20 and 20 = 60 ÷ 3).* *Pupils develop reliable written methods for division, starting with calculations of two-digit numbers by one-digit numbers.* *Pupils solve simple problems in contexts, deciding which of the four operations to use and why. These include measuring and scaling contexts, (for example, four times as high, eight times as long etc.) and correspondence problems in which m objects are connected to n objects (for example, 3 hats and 4 coats, how many different outfits?; 12 sweets shared equally between 4 children; 4 cakes shared equally between 8 children).*

	Pupils explore the use of scaling as a model for division, e.g. My ribbon is 24 cm long. Can you cut a ribbon 3 times shorter?  Pupils are introduced to the formal written method of short division with whole number answers, using the image of the array and place value apparatus initially.  Pupils progress to use the written method of short division using chunking on a number line.  69 divided by 3 or how many groups of 3 make 69 9 6 ÷ 3 10 groups of 3 make 30 10 groups of 3 make 30 3 groups of 3 make 9 answer 23	
Y4	Pupils continue to use the number line to support mental division. Extend to 3 –digit divided by a 1- digit number 257 ÷ 7 Estimate first, use a number line to count on, if appropriate.  Pupils continue to become fluent with the formal written method of short division with exact answers, e.g. 192 ÷ 6 10 x 6 = 60 leading to 30 x 6 = 180 10 x 6 = 60 2 x 6 = 12 10 x 6 = 60 32 192 2 x 6 = 12	*Pupils continue to practise recalling and using multiplication tables and related division facts to aid fluency.* *Pupils practise mental methods and extend this to three-digit numbers to derive facts, (for example 600 ÷ 3 = 200 can be derived from 2 x 3 = 6).* .
Y5	The formal concise method for short division is introduced. 98 ÷ 7 becomes 1 4 7 | 9 8 (2) Answer: 14 432 ÷ 5 becomes 8 6 r2 5 | 4 3 2 (3) Answer: 86 remainder 2 496 ÷ 11 becomes 4 5 r1 1 1 | 4 9 6 (5) Answer: $45\frac{1}{11}$	*Pupils practise and extend their use of the formal written methods of short division. They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations.* *Pupils interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (for example, 98 ÷ 4 = = 24 r 2 = 24 = 24.5 ≈ 25).* *Pupils use multiplication and division as inverses to support the introduction of ratio in year 6, for example, by multiplying and dividing by powers of 10 in scale drawings or by multiplying and dividing by powers of a 1000 in converting between units such as kilometres and metres.*

	Pupils 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, e.g. *432 school children go on a camping trip. Each tent sleeps five. How many tents will they need to take?* 432 ÷ 5 becomes $\begin{array}{r} 8\ \ 6\ \text{r}\,2 \\ 5\overline{)\,4\ \overset{3}{3}\ \ 2} \end{array}$ Answer: 86 remainder 2 *Answer: They will need to take 87 tents*	
Y6	Pupils divide numbers up to 4 digits by a two-digit whole number using the formal written method of short division where appropriate, interpreting remainders according to the context, e.g. *496 pupils attend a football tournament. When they are put into teams of 11, how many full teams will there be? Will everyone be in a team?* 496 ÷ 11 becomes $\begin{array}{r} 4\ \ 5\ \text{r}\,1 \\ 11\overline{)\,4\ 9\ \overset{5}{6}} \end{array}$ *Answer: there will be 45 full teams of 11 players and one pupil will not have a team.* Pupils progress to expressing their remainders as a fraction, e.g. *432 litres of water are stored in 15 litre drums. How many full drums of water will there be and what fraction of the final drum will be filled?* *Answer: there will be 28 full drums and the 29th drum will be 4/5 full.* Progressing to expressing the remainder as a decimal, e.g. *£432 was raised at the school fair and is to be shared equally between 15 classes. How much will each class receive?* *Answer: Each class will receive £28.80* If needed, because a child is struggling to understand the short division method, pupils divide numbers up to 4 digits by a 2 digit number using long division e.g. *Chocolates are packed in trays of 15. If I have 432 chocolates, how many full trays will I have and how many chocolates will be left over?* 432 ÷ 15 becomes $\begin{array}{r} 2\ \ 8\ \text{r}\,12 \\ 15\overline{)\,4\ 3\ 2} \\ \underline{3\ 0\ 0} \\ 1\ 3\ 2 \\ \underline{1\ 2\ 0} \\ 1\ 2 \end{array}$ *Answer: there will be 28 trays of chocolates and 12 chocolates left.* 432 ÷ 15 becomes $\begin{array}{r} 2\ \ 8\ \text{r}\,12 \\ 15\overline{)\,4\ 3\ 2} \\ \underline{3\ 0\ 0} \\ 1\ 3\ 2 \\ \underline{1\ 2\ 0} \\ 1\ 2 \end{array}$ Answer: 28 remainder 12 432 ÷ 15 becomes $\begin{array}{r} 2\ \ 8 \\ 15\overline{)\,4\ 3\ 2} \\ \underline{3\ 0\ 0}\ \ 15\times 20 \\ 1\ 3\ 2 \\ \underline{1\ 2\ 0}\ \ 15\times 8 \\ 1\ 2 \end{array}$ $\frac{12}{15} = \frac{4}{5}$ Answer: $28\frac{4}{5}$ 432 ÷ 15 becomes $\begin{array}{r} 2\ \ 8\cdot 8 \\ 15\overline{)\,4\ 3\ 2\cdot 0} \\ \underline{3\ 0\ \downarrow} \\ 1\ 3\ 2 \\ \underline{1\ 2\ 0\ \downarrow} \\ 1\ 2\ 0 \\ \underline{1\ 2\ 0} \\ 0 \end{array}$ Answer: 28·8	*Pupils practise division for larger numbers, using the formal written methods of short and long division.*

Statutory requirements regarding addition, subtraction, multiplication and division from the 2014 National Curriculum

Year 1 Statutory requirements for 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
- solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square - 9$.

Year 2 Statutory requirements for addition and subtraction

Pupils should be taught to:

- solve problems with addition and subtraction:
- using concrete objects and pictorial representations, including those involving numbers, quantities and measures
- 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:
  - a two-digit number and ones
  - a two-digit number and tens
  - two two-digit numbers
  - adding three one-digit numbers
- show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Year 3 Statutory requirements for addition and subtraction

Pupils should be taught to:

- add and subtract numbers mentally, including:
  - a three-digit number and ones
  - a three-digit number and tens
  - 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
- solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

Year 4 Statutory requirements for 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
- solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Year 5 Statutory requirements for 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
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Year 6 Statutory requirements for addition and subtraction (some 4 operations)

Pupils should be taught to:

- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- perform mental calculations, including with mixed operations and large numbers
- use their knowledge of the order of operations to carry out calculations involving the four operations
- solve problems involving addition, subtraction, multiplication and division
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

Year 1 Statutory requirements for 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.

Year 2 Statutory requirements for 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 (×), division (÷) and equals (=) signs
- show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
- solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Year 3 Statutory requirements for 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.

Year 4 Statutory requirements for 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: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
- recognise and use factor pairs and commutativity in mental calculations
- 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.

Year 5 Statutory requirements for 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
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

Year 6 Statutory requirements for multiplication and division (some 4 operations)

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
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.