



Mathematics Calculation Policy

October 2019

Maximum Effort for Maximum Achievement

About our Calculation Policy

This policy has been written in response to the National Curriculum September 2014 and aims to ensure consistency in the mathematical written methods and approaches to calculation across the school.

At Buttsbury Junior School we believe that children should be introduced to the processes of calculation through practical, oral and mental activities. As children begin to understand the underlying concepts, they develop ways of recording their workings to support their thinking and calculation methods, use particular methods that apply to special cases and learn to interpret and use the signs and symbols involved.

- **Strategies**

Choosing the appropriate strategy and recording jottings in Mathematics is an important tool both for furthering the understanding of ideas and for communicating these ideas to others.

The aim is that children use mental methods when appropriate, but for calculations that they cannot do in their heads, they use an efficient written method accurately and with confidence.

A useful written method is one that helps children carry out a calculation and can be understood by others. Written methods are complementary to mental methods and should not be seen as separate from them. It is important children acquire secure mental methods of calculation and one efficient written method each for calculation for addition, subtraction, multiplication and division, which they know they can rely on when mental methods are not appropriate. Children should be encouraged to use a range of strategies and to consider the most appropriate strategy for any given calculation. The children's ability to consider a range of strategies should be given greater emphasis than their ability to use a particular informal or formal written method.

- **Problem Solving**

The National Curriculum for Mathematics aims to ensure that all pupils can solve problems by applying their mathematical knowledge to a variety of problems with increasing sophistication, including breaking down problems into a series of simple steps and persevering in seeking solutions. Problem solving should be a key element, which is interwoven into maths lessons throughout the week across the year groups and stages of calculation. Children should be given a variety of problems to increase their fluency and understanding at a particular level.

- **Using Mathematical Reasoning**

The National Curriculum for Mathematics aims to ensure that all pupils reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing arguments, justification or proof using mathematical language. Alongside problem solving, opportunities should be provided to children throughout the lesson and week to develop their mathematical reasoning skills.

- **Progression**

The majority of children will move through the policy at broadly the same pace. However, decisions about when to progress should always be based on the security of children's understanding and their readiness to progress to the next stage (stage before age). Children who grasp concepts rapidly should be challenged through being offered deepening problems that are thought stimulating and applicable to real life. However, those who are not sufficiently fluent at a particular stage should not be progressed. It is essential that children's mental methods in all four operations are secure and they are able to use a variety of strategies as appropriate.

This document is organised according to age related expectation, however it may be necessary for teachers to consult with lower year groups for children in order to meet their needs at the stage these children are working at.

ADDITION AND SUBTRACTION

Year 3

Objectives:

- Add and subtract numbers mentally, including a three-digit number and 1s; a three-digit number and 10s and a three-digit number and 100s.
- 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.
- Children practise solving varied addition and subtraction questions. For mental calculations with two-digit numbers, the answers could exceed 100.
- Children 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

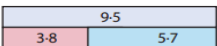
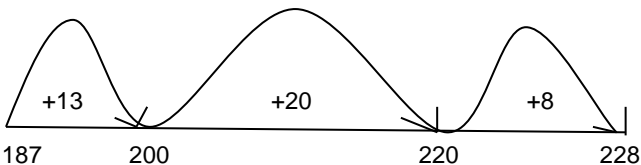
Addition	<p>Continue to develop understanding of partitioning and place value and use this to support addition. Use practical apparatus to support this, as are number tracks /100 squares and number lines.</p> <p>Where units combine to make totals greater than 10, regroup using partitioning skills:</p> <p>25 + 36 20 + 30 = 50 5 + 6 = 11 50 + 11 = 50 + 10 + 1 = 61</p> <p>Children continue to determine when calculations are best carried out using mental strategies.</p> <p>Record in columns with a focus on place value. Use expanded recording and apparatus to illustrate concept initially if required before moving towards the formal written method.</p> <p>TO + TO HTO+TO HTO+HTO</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">T O</td> <td style="text-align: center;">H T O</td> <td style="text-align: center;">H T O</td> </tr> <tr> <td style="text-align: center;">2 4</td> <td style="text-align: center;">5 6 6</td> <td style="text-align: center;">4 2 3</td> </tr> <tr> <td style="text-align: center;">+ 3 7</td> <td style="text-align: center;">+ 5 5</td> <td style="text-align: center;">+ 3 9 8</td> </tr> <tr> <td style="text-align: center;"><u>6 1</u></td> <td style="text-align: center;"><u>6 2 1</u></td> <td style="text-align: center;"><u>8 2 1</u></td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1 1</td> <td style="text-align: center;">1 1</td> </tr> </table>	T O	H T O	H T O	2 4	5 6 6	4 2 3	+ 3 7	+ 5 5	+ 3 9 8	<u>6 1</u>	<u>6 2 1</u>	<u>8 2 1</u>	1	1 1	1 1	<p>Example of Mastery:</p> <p>Joe has completed these calculations but he is incorrect, can you explain why?</p> $\begin{array}{r} 325 \\ + 247 \\ \hline 581 \end{array}$																			
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Subtraction	<p>Continue to develop understanding of partitioning and place value and use this to support subtraction. Use practical apparatus to support this (100 squares, number lines etc...) Use expanded recording and apparatus to illustrate concept initially if required before moving towards the formal written method.</p> <ul style="list-style-type: none"> • No exchange: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">T O</td> <td></td> <td style="text-align: center;">T O</td> </tr> <tr> <td style="text-align: center;">4 9</td> <td></td> <td style="text-align: center;">4 9</td> </tr> <tr> <td style="text-align: center;">- 7</td> <td style="text-align: center;">→</td> <td style="text-align: center;">- 7</td> </tr> <tr> <td></td> <td style="text-align: center;">→</td> <td style="text-align: center;">4 2</td> </tr> <tr> <td></td> <td style="text-align: center;">→</td> <td style="text-align: center;">4 2</td> </tr> </table> <p style="text-align: center;">$40 + 9$ $40 + 2 = 42$</p> <ul style="list-style-type: none"> • Exchange: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">T O</td> <td></td> <td style="text-align: center;">3 0 + 1 6</td> </tr> <tr> <td style="text-align: center;">4 6</td> <td></td> <td style="text-align: center;">- 7</td> </tr> <tr> <td style="text-align: center;">- 7</td> <td style="text-align: center;">→</td> <td style="text-align: center;">- 7</td> </tr> <tr> <td></td> <td style="text-align: center;">→</td> <td style="text-align: center;">3 9</td> </tr> <tr> <td></td> <td style="text-align: center;">→</td> <td style="text-align: center;">3 9</td> </tr> </table> <p style="text-align: center;">$30 + 16$ $30 + 9 = 39$</p> <p>This becomes:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">T O</td> </tr> <tr> <td style="text-align: center;">3 6</td> </tr> <tr> <td style="text-align: center;">- 7</td> </tr> <tr> <td style="text-align: center;"><u>3 9</u></td> </tr> </table>	T O		T O	4 9		4 9	- 7	→	- 7		→	4 2		→	4 2	T O		3 0 + 1 6	4 6		- 7	- 7	→	- 7		→	3 9		→	3 9	T O	3 6	- 7	<u>3 9</u>	<p>Example of Mastery:</p> <p>Joe has completed these calculations but he is incorrect, can you explain why?</p> $\begin{array}{r} 355 \\ - 247 \\ \hline 112 \end{array}$
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Objectives:		
<ul style="list-style-type: none"> 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. Children continue to practise both mental methods and columnar addition and subtraction with increasingly large numbers to aid fluency 		
Addition	<p>Expanded column method (ones first):</p> $215 + 133$ $ \begin{array}{r} 325 \\ + 133 \\ \hline 8 \quad (5 + 3 = 8) \\ 50 \quad (20 + 30 = 50) \\ 400 \quad (300 + 100 = 400) \\ \hline 458 \end{array} $ <p>Compact column:</p> $ \begin{array}{r} 325 + 133 \quad \text{OR} \quad 356 + 183 \\ \hline 315 \quad \quad \quad * \\ + 133 \quad \quad \quad + 183 \\ \hline 458 \quad \quad \quad 539 \\ \quad \quad \quad \quad \quad \quad \quad 1 \end{array} $ <p>*Ensure that on the middle column, children are taught to say '50 + 80' as opposed to '5 + 8' and for the hundreds column '300 + 100' instead of '3 + 1'.</p>	<p>Example of Mastery:</p> <p>Fill in the missing numbers.</p> $352 + \square = 480$ $70 + 99 + \square = 270$
Subtraction	<p>Expanded partitioning with exchange:</p> $193 - 66$ $ \begin{array}{r} 193 = \cancel{100} + \cancel{90} + 3 \\ - 66 = 60 + 6 \\ \hline 127 = 100 + 20 + 7 \end{array} $ <p>Compact column:</p> $ \begin{array}{r} 193 - 66 \\ \hline \overset{8}{1} \overset{13}{9} \\ - 66 \\ \hline 127 \end{array} $	<p>Example of Mastery:</p> <p>Fill in the missing numbers</p> $\square - 55 = 84$ $\square - 3000 = 600$

Years 5 & 6

Objectives:

- 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.
 - Children practise using the formal written methods of columnar addition and subtraction with increasingly large numbers to aid fluency
 - Children practise mental calculations with increasingly large numbers to aid fluency (for example, $12\,462 - 2300 = 10\,162$).
- In the KS2 tests at the end of Year 6, children are expected to use the formal methods for addition and subtraction.**

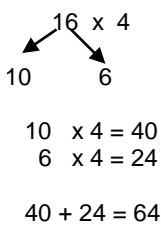
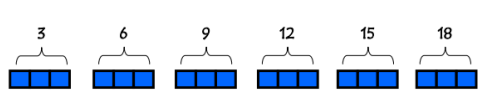
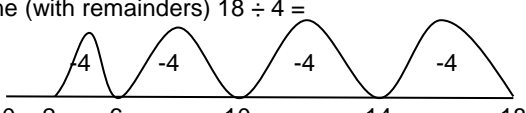
Addition	<p>Add larger numbers (including hundreds and thousands) or decimal amounts using partitioning and place value to support this.</p> <p>$2.9 + 1.7$ $2 + 1 = 3$ $0.9 + 0.7 = 1.6$ $3 + 1.6 = 4.6$</p> <p>Formal (compact column) method:</p> $\begin{array}{r} 2872 \\ + 1358 \\ \hline 4230 \\ 111 \end{array}$ <p>Extend to numbers with any number of digits and decimals with 1 and 2 decimal places. e.g. $124.9 + 117.25 = 242.15$ (can use a number line also to support if necessary)</p> $\begin{array}{r} 214.8 \\ + 117.35 \\ \hline 332.15 \\ 11 \end{array}$	<p>Example of Mastery: Year 5</p> <p>Write two number facts that this bar diagram shows.</p>  <p><input type="text"/> + <input type="text"/> = <input type="text"/> <input type="text"/> + <input type="text"/> = <input type="text"/></p> <p>Example of Mastery: Year 6</p> <p>Choose digits to go in these empty boxes to make this number sentence true.</p> $23 \cdot 12 + 22 \cdot \square = 45 \cdot 23$
	Subtraction	<p>Find the difference between the two numbers by adding from 187 to 228 (working left to right).</p> <p>$187 + 13 = 200$ $200 + 20 = 220$ $220 + 8 = 228$ then count the leaps ($13 + 20 + 8 = 41$)</p>  <p>Number line should always be used in favour of formal vertical methods when subtracting between close amounts e.g. 2008 – 1996. You just need to jump from 1996 to 2000 (+4), then 2000 to 2008 (+8). $4 + 8 = 12$, therefore $2008 - 1996 = 12$.</p> <p>Formal method:</p> $\begin{array}{r} 3 \overset{1}{\cancel{2}} 2 8 \\ - 2 8 7 \\ \hline 0 4 1 \end{array}$ <p>Answer: 41</p> <p>Start with the units $8 - 7 = 1$ Then the tens $2 (20) - 8 (80)$. Take one group of hundred from 2 (200). $120 - 80 = 40$. Finally, the hundreds column $1(100) - 1 (100) = 0$</p> <p>Leaving an answer of 41</p>

MULTIPLICATION AND DIVISION

Year 3

Objectives:

- Recall and use multiplication and division facts for the 2,3, 4, 5, 8 and 10 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.
- Children 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.
- Children develop efficient mental methods, for example, using commutativity and associativity (for example, $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$) and multiplication and division facts (for example, using $3 \times 2 = 6$, $6 \div 3 = 2$ and $2 = 6 \div 3$) to derive related facts (for example, $30 \times 2 = 60$, $60 \div 3 = 20$ and $20 = 60 \div 3$).
- Children 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.
- Children 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).

MULTIPLICATION	<p>Develop the use of \times and $=$ symbols to record calculations horizontally. Use arrays and other practical apparatus to illustrate commutativity (that multiplication calculations can be carried out in any order) e.g. 2×5 arrives at the same product as 5×2.</p> <p>Begin to derive new facts from known facts e.g. $3 \times 2 = 6$ (known fact) $30 \times 2 = 60$ $300 \times 2 = 600$ etc.</p> <p>Begin to use understanding of place value and partitioning to carry out multiplication of two digit by one -digit numbers</p> <div style="text-align: center;">  </div> <p>Begin to use grid approaches to illustrate as appropriate using practical apparatus to support.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td> <td>10</td> <td>6</td> </tr> <tr> <td>4</td> <td>40</td> <td>24</td> </tr> </table>	x	10	6	4	40	24	<p>Example of Mastery:</p> <p>Complete the following:</p> <p>$3 \times \square = 12$ $4 \times \square = 20$</p> <p>$\square \times 3 = 15$ $8 \times \square = 24$</p>
x	10	6						
4	40	24						
DIVISION	<p>Develop the use of \div and $=$ symbols to record calculations horizontally. Use arrays and other practical apparatus to illustrate making of repeated groups. Begin to derive new facts from known facts e.g. $6 \div 2 = 3$ (known fact) $60 \div 2 = 30$ $600 \div 2 = 300$</p> <p>Begin to carry out division of two- digit by one -digit numbers, first without remainders, then introducing remainders, illustrating this using informal methods first if required.</p> <p>$18 \div 3$</p> <div style="text-align: center;">  </div> <p>Number line (with remainders) $18 \div 4 =$</p> <div style="text-align: center;">  </div> <p>Four jumps of 4 with 2 left over $18 \div 4 = 4$ remainder 2</p>	<p>Example of Mastery:</p> <p>The following problems can be solved by using the calculation $8 \div 2$. True or false?</p> <ul style="list-style-type: none"> There are 2 bags of bread rolls that have 8 rolls in each bag. How many rolls are there altogether? A boat holds 2 people. How many boats are needed for 8 people? I have 8 pencils and give 2 pencils to each person. How many people receive pencils 						

Year 4

Objectives:

- 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.
- Children continue to practise recalling and using multiplication tables and related division facts to aid fluency.
- Children practise mental methods and extend this to three-digit numbers to derive facts, (for example, $600 \div 3 = 200$ can be derived from $2 \times 3 = 6$).
- Children practise to become fluent in the formal written method of short multiplication and short division with exact answers
- Children write statements about the equality of expressions (for example, use the distributive law $39 \times 7 = 30 \times 7 + 9 \times 7$ and associative law $(2 \times 3) \times 4 = 2 \times (3 \times 4)$).
- Children combine their knowledge of number facts and rules of arithmetic to solve mental and written calculations for example, $2 \times 6 \times 5 = 10 \times 6 = 60$.
- Children solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as the numbers of choices of a meal on a menu, or three cakes shared equally between 10 children.

MULTIPLICATION	<p>Using the Grid Method for TO x TO 24 x 26</p> <table style="border-collapse: collapse; margin-bottom: 10px;"> <tr> <td style="border-right: 1px solid black; border-bottom: 1px solid black; padding: 5px;">X</td> <td style="border-bottom: 1px solid black; padding: 5px;">20</td> <td style="border-bottom: 1px solid black; padding: 5px;">4</td> <td style="padding: 5px;"></td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">20</td> <td style="padding: 5px;">400</td> <td style="padding: 5px;">80</td> <td style="padding: 5px;">$400 + 80 = 480$</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">6</td> <td style="padding: 5px;">120</td> <td style="padding: 5px;">24</td> <td style="padding: 5px;">$120 + 24 = 144$</td> </tr> <tr> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px;">$480 + 144 = 624$</td> </tr> </table> <p>Develop expanded recording in columns and then move to formal written method, using practical apparatus to support as required.</p> <table style="margin-left: 20px;"> <tr> <td style="text-align: center;">T O</td> <td style="padding: 0 20px;">→</td> <td style="text-align: center;">T O</td> <td></td> </tr> <tr> <td style="text-align: center;">1 6</td> <td></td> <td style="text-align: center;">1 6</td> <td></td> </tr> <tr> <td style="text-align: center;">x 4</td> <td></td> <td style="text-align: center;">x 4</td> <td></td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">2 4</td> <td style="padding-left: 20px;">(6×4)</td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">4 0</td> <td style="padding-left: 20px;">(10×4)</td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">6 4</td> <td></td> </tr> </table>	X	20	4		20	400	80	$400 + 80 = 480$	6	120	24	$120 + 24 = 144$				$480 + 144 = 624$	T O	→	T O		1 6		1 6		x 4		x 4				2 4	(6×4)			4 0	(10×4)			6 4		<p>Example of Mastery:</p> <p>Tom ate 9 grapes at the picnic. Sam ate 3 times as many grapes as Tom. How many grapes did they eat all together?</p>
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DIVISION	<p>Formal vertical method for short division: Move to develop the standard method for short division, first with no remainders:</p> <table style="margin-left: 20px;"> <tr> <td style="border: 1px solid black; padding: 5px; text-align: center;">3 2</td> <td style="padding: 0 20px;">$9 \div 3 = 3$</td> <td rowspan="3" style="padding-left: 20px;">$(\text{don't forget it is really } 90 \div 3 = 30)$</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px; text-align: center;">3) 9 6</td> <td style="padding: 0 20px;">$6 \div 3 = 2$</td> </tr> <tr> <td></td> <td style="padding: 0 20px;">$30 + 2 = 32$</td> </tr> </table> <p>Then short division with remainders</p> <table style="margin-left: 20px;"> <tr> <td style="border: 1px solid black; padding: 5px; text-align: center;">4 7 r 2</td> <td style="padding: 0 20px;">$2 \div 6 =$ can't get a whole number so carry it over to the 8.</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px; text-align: center;">6) 2 8 4</td> <td style="padding: 0 20px;">$28 \div 6 = 4$ remainder 4 – carry remainder over to the 4</td> </tr> <tr> <td></td> <td style="padding: 0 20px;">$44 \div 6 = 7$ remainder 2</td> </tr> </table>	3 2	$9 \div 3 = 3$	$(\text{don't forget it is really } 90 \div 3 = 30)$	3) 9 6	$6 \div 3 = 2$		$30 + 2 = 32$	4 7 r 2	$2 \div 6 =$ can't get a whole number so carry it over to the 8.	6) 2 8 4	$28 \div 6 = 4$ remainder 4 – carry remainder over to the 4		$44 \div 6 = 7$ remainder 2	<p>Example of Mastery:</p> <p>Henry divided George's 132 sweets between 6 friends. How many did each friend receive? Can Sam divide 135 sweets equally between the same 6 friends?</p>																											
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Objectives:

- Children practise to become fluent in the formal written method of short multiplication and short division with exact answers
- Children write statements about the equality of expressions (for example, use the distributive law $39 \times 7 = 30 \times 7 + 9 \times 7$ and associative law $(2 \times 3) \times 4 = 2 \times (3 \times 4)$).
- Children combine their knowledge of number facts and rules of arithmetic to solve mental and written calculations for example, $2 \times 6 \times 5 = 10 \times 6 = 60$.
- Children solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as the numbers of choices of a meal on a menu, or three cakes shared equally between 10 children.
- 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.
- Children practise and extend their use of the formal written methods of short multiplication and 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.
- They use and understand the terms factor, multiple and prime, square and cube numbers.
- Children 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, $98 \div 4 = 49 \text{ r } 2 = 24 \frac{2}{4} = 24.5 \approx 25$).
- Children 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.
- Distributivity can be expressed as $a(b + c) = ab + ac$.
- They understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalence statements (for example, $4 \times 35 = 2 \times 2 \times 35$; $3 \times 270 = 3 \times 3 \times 9 \times 10 = 92 \times 10$).
- Children use and explain the equals sign to indicate equivalence, including in missing number problems (for example, $13 + 24 = 12 + 25$; $33 = 5 \times \dots$).

MULTIPLICATION	<p>Extend written approaches to HTO x O, then to ThHTO x O</p> <p>Illustrate using partitioning approaches or grid approaches as required.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> $\begin{array}{r} 225 \times 4 \\ \swarrow \quad \downarrow \quad \searrow \\ 200 \quad 20 \quad 5 \end{array}$ <p> $200 \times 4 = 800$ $20 \times 4 = 80$ $5 \times 4 = 20$ $800 + 80 + 20 = 900$ </p> </div> <div style="text-align: center;"> <p>or</p> <table border="1" style="border-collapse: collapse;"> <tr> <td style="padding: 5px;">x</td> <td style="padding: 5px;">200</td> <td style="padding: 5px;">20</td> <td style="padding: 5px;">5</td> </tr> <tr> <td style="border-top: 1px solid black; padding: 5px;">4</td> <td style="border-top: 1px solid black; padding: 5px;">800</td> <td style="border-top: 1px solid black; padding: 5px;">80</td> <td style="border-top: 1px solid black; padding: 5px;">20</td> </tr> </table> <p>$800 + 80 + 20 = 900$</p> </div> </div>	x	200	20	5	4	800	80	20
	x	200	20	5					
4	800	80	20						

DIVISION	<p>Extend written calculation methods to more complex problems involving larger numbers, firstly with no remainders.</p> <p>No carrying forward required: e.g. $448 \div 4$ (as in Year 4, but with additional hundreds column)</p> <p>No carrying forward required, but with remainders: e.g. $449 \div 4$ (as in year 4, but with additional hundreds column)</p> <p>Carrying forward required, but with remainders:</p> $\begin{array}{r} 0952 \text{ r } 3 \\ 6 \overline{) 5715} \end{array}$ <p>Ensure children have a secure understanding of what they are doing and are able to use their knowledge of related facts to either make a rough estimate first or have an idea about whether their final answer is reasonable or not.</p> <p>Answers could also be given as remainders, decimals or fractions:</p> $\begin{array}{r} 0952.5 \\ 6 \overline{) 5715.30} \end{array}$ <p>Or rounded: 952.5 rounded = 953</p>	<p>Example of Mastery:</p> <p>A 50cm piece of wood is cut into 4cm pieces. How many 4cm pieces are cut and how much wood is left over?</p> <p><input type="text"/> \div <input type="text"/> = <input type="text"/> remainder <input type="text"/></p>
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Objectives:

- 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
- Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.
- Children practise addition, subtraction, multiplication and division for larger numbers, using the formal written methods of columnar addition and subtraction, short and long multiplication, and short and long division (see Mathematics Appendix 1 in the national Curriculum).
- Children undertake mental calculations with increasingly large numbers and more complex calculations.
- Children continue to use all the multiplication tables to calculate mathematical statements in order to maintain their fluency.
- Children round answers to a specified degree of accuracy, for example, to the nearest 10, 20, 50 etc., but not to a specified number of significant figures.
- Children explore the order of operations using brackets; for example, $2 + 1 \times 3 = 5$ and $(2 + 1) \times 3 = 9$.
- Common factors can be related to finding equivalent fractions.

In the KS2 tests at the end of Year 6, children are expected to use the formal methods for multiplication and division.

MULTIPLICATION	<p>Extend written approaches to HTO x TO and ThHTO x TO</p> <p>Illustrate using grid approaches as required 26×13</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 20px;"> <p>20 6</p> <table border="1" style="border-collapse: collapse;"> <tr> <td style="padding: 5px;">10</td> <td style="padding: 5px; width: 40px;">200</td> <td style="padding: 5px; width: 40px;">60</td> </tr> <tr> <td style="padding: 5px;">3</td> <td style="padding: 5px;">60</td> <td style="padding: 5px;">18</td> </tr> </table> </div> <div style="margin-left: 20px;"> <p>$200 + 60 + 60 + 18 = 338$</p> </div> </div> <p>Develop expanded recording in columns and then move to formal written method of long multiplication, using practical apparatus to support as required.</p> <div style="display: flex; align-items: center; justify-content: center; margin: 10px 0;"> <table style="border-collapse: collapse; text-align: center;"> <tr><td>H</td><td>T</td><td>O</td></tr> <tr><td>2</td><td>6</td><td></td></tr> <tr><td>x</td><td>1</td><td>3</td></tr> <tr><td colspan="3"><hr/></td></tr> <tr><td></td><td>1</td><td>8</td></tr> <tr><td></td><td>6</td><td>0</td></tr> <tr><td></td><td>6</td><td>0</td></tr> <tr><td></td><td>2</td><td>0</td></tr> <tr><td></td><td>3</td><td>3</td></tr> <tr><td></td><td>1</td><td>8</td></tr> </table> → <table style="border-collapse: collapse; text-align: center;"> <tr><td>H</td><td>T</td><td>O</td></tr> <tr><td></td><td>2</td><td>6</td></tr> <tr><td>x</td><td>1</td><td>3</td></tr> <tr><td colspan="3"><hr/></td></tr> <tr><td></td><td>7</td><td>8</td></tr> <tr><td></td><td></td><td>1</td></tr> <tr><td></td><td>2</td><td>6</td></tr> <tr><td></td><td>3</td><td>3</td></tr> <tr><td></td><td></td><td>8</td></tr> <tr><td></td><td></td><td>1</td></tr> </table> </div>	10	200	60	3	60	18	H	T	O	2	6		x	1	3	<hr/>				1	8		6	0		6	0		2	0		3	3		1	8	H	T	O		2	6	x	1	3	<hr/>				7	8			1		2	6		3	3			8			1	<p>Example of Mastery:</p> <p>It is correct that $273 \times 32 = 8736$.</p> <p>Use this fact to work out:</p> <p>$27.3 \times 3.2 =$</p> <p>$2.73 \times 32000 =$</p>																																										
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DIVISION	<p>Extend written approaches to the formal method of long division when dividing by two-digit numbers, illustrating this using informal methods first if required.</p> <p>(Chunking method)</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <table style="border-collapse: collapse; text-align: right;"> <tr><td></td><td>2</td><td>8</td><td>r</td><td>1</td><td>2</td></tr> <tr><td>1</td><td>5</td><td>)</td><td>4</td><td>3</td><td>2</td></tr> <tr><td></td><td></td><td></td><td>-</td><td>3</td><td>0</td></tr> <tr><td></td><td></td><td></td><td></td><td>0</td><td>0</td></tr> <tr><td></td><td></td><td></td><td></td><td>1</td><td>3</td></tr> <tr><td></td><td></td><td></td><td></td><td>2</td><td>0</td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td>0</td></tr> <tr><td></td><td></td><td></td><td></td><td>1</td><td>2</td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td>2</td></tr> </table> <table style="border-collapse: collapse; text-align: right;"> <tr><td></td><td>2</td><td>8</td><td>r</td><td>1</td><td>2</td></tr> <tr><td>1</td><td>5</td><td>)</td><td>4</td><td>3</td><td>2</td></tr> <tr><td></td><td></td><td></td><td>3</td><td>0</td><td>0</td></tr> <tr><td></td><td></td><td></td><td></td><td>0</td><td>0</td></tr> <tr><td></td><td></td><td></td><td></td><td>1</td><td>3</td></tr> <tr><td></td><td></td><td></td><td></td><td>2</td><td>0</td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td>0</td></tr> <tr><td></td><td></td><td></td><td></td><td>1</td><td>2</td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td>2</td></tr> </table> </div>		2	8	r	1	2	1	5)	4	3	2				-	3	0					0	0					1	3					2	0						0					1	2						2		2	8	r	1	2	1	5)	4	3	2				3	0	0					0	0					1	3					2	0						0					1	2						2	<p>Example of Mastery:</p> <p>A box of labels of labels cost £24</p> <p>There are 100 sheets in the box</p> <p>There are 10 labels on each sheet.</p> <p>Calculate the cost of each label in pence.</p>
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