Calculation Policy – St Mark's Church of England Junior School

This policy lays out the expectations for both mental and written calculations for the 4 number operations and has been created to support the teaching of a consistent approach to mathematics throughout St Mark's Junior School. This is underpinned by the use of models and images that support conceptual understanding and this policy promotes a range of representations to be used across Key Stage 2.

At St Mark's, we strive to equip children to demonstrate useful written methods that, firstly, enable them carry out a calculation successfully and secondly, can be used to explain their thinking to others. We see written methods as complementary to mental methods and should not be seen as separate from them. Our 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.

This policy identifies *progression* in calculation strategies rather than specifying which method should be taught in a particular year group. Children should not be expected to move onto the next stage if they are not ready or they are not confident. By the end of Year 6, children should be able to choose the most appropriate approach to solve a problem: making a choice between using jottings, an efficient written method or a mental method.

Concrete, pictorial, abstract (CPA) concepts are reflected within the policy as Equipment, Jottings and a Formal Written Method. This approach should not be confused as differentiation for lower, middle and higher attaining children. It is to be used with the whole class where teachers promote each area as equally valid. Manipulatives (equipment) in particular should not be presented as a resource to support the less confident or lower attaining pupils; rather as an aid for all children who find them useful at any stage in their learning.

We hope you find this document useful in understanding how we teach children to carry out calculations at St Mark's. We are mindful that children will be transitioning to us from Infant School; therefore our teachers are wholly committed to building on these foundations to ensure learning makes sense. If you have any questions about the information in the calculation policy or if there is anything you are unsure about, please get in touch with your child's class teacher as they will be happy to help.

Addition

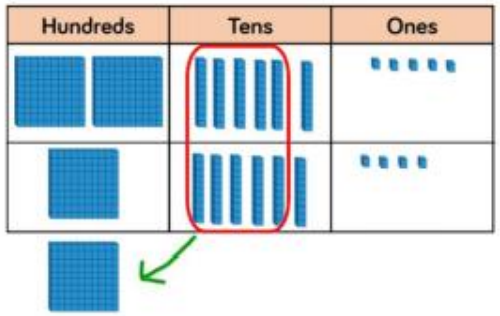
Year 1	Year 2	Year 3
Expected	**Expected**	**Expected**
• read, write and interpret mathematical statements involving addition (+), subtraction (−) and equals (=) signs • represent and use number bonds and related subtraction facts within 20 • add and subtract one-digit and two-digit numbers to 20, including 0 • Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ? − 9	• 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 1s ○ a two-digit number and 10s ○ 2 two-digit numbers ○ adding 3 one-digit numbers • show that addition of 2 numbers can be done in any order (commutative) and subtraction of 1 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	• add and subtract numbers mentally, including: a three-digit number and 1s a three-digit number and 10s a three-digit number and 100s • add and subtract numbers with up to 3 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
In-depth	**In-depth**	**In-depth**
• memorise and reason with number bonds to 10 and 20 in several forms (for example, 9 + 7 = 16; 16 − 7 = 9; 7 = 16 − 9). • realise the effect of adding or subtracting 0. • establish addition and subtraction as related operations. • combine and increase numbers, counting forwards and backwards. • 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, difference between, more than and less than, so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.	• extend their understanding of the language of addition and subtraction to include sum and difference. • 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. • check their calculations, including by adding to check subtraction and adding numbers in a different order to check addition (for example, 5 + 2 + 1 = 1 + 5 + 2 = 1 + 2 + 5). This establishes commutativity and associativity of addition. • record addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers.	• practise solving varied addition and subtraction questions. • for mental calculations with two-digit numbers, the answers could exceed 100. use their understanding of place value and partitioning, and practise using columnar addition and subtraction with increasingly large numbers up to 3 digits to become fluent

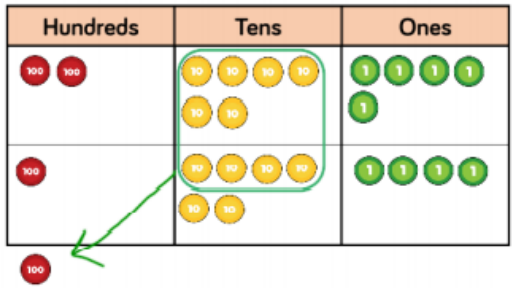
Addition

Year 4	Year 5	Year 6
Expected	**Expected**	**Expected**
• 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 • solve simple measure and money problems involving fractions and decimals to two decimal places.	• 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, accuracy • solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why • solve problems involving number up to three decimal places	• 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 4 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 • solve problems which require answers to be rounded to specified degrees of accuracy
In-depth	**In-depth**	**In-depth**
• continue to practise both mental methods and columnar addition and subtraction with increasingly large numbers to aid fluency	• practise using the formal written methods of • columnar addition with increasingly large numbers to aid fluency. • practise mental calculations with increasingly large numbers, e.g., 12,462 – 2,300 = 10,162). • introduce the language of algebra as a means of solving a variety of problems • mentally add and subtract tenths, and one-digit whole numbers and tenths. • practise adding and subtracting decimals, including a mix of whole numbers and decimals, with different numbers of decimal places, and complements of 1 (for example, 0.83 + 0.17 = 1). • Pupils should go beyond the measurement and money models of decimals to solving puzzles	• practise addition for larger numbers, using the formal written methods of columnar addition • undertake mental calculations with increasingly large numbers and more complex calculations. • 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. • explore the order of operations using brackets; for example, 2 + 1 x 3 = 5 and (2 + 1) x 3 = 9. • develop the language of algebra as a means of solving a variety of problems

Stage 3

Equipment





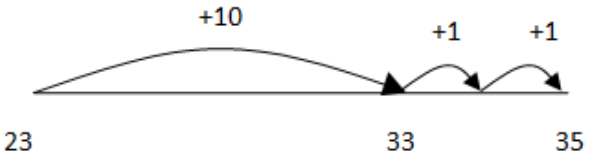
Jottings

Partition into tens and units and recombine

12 + 23 = 10 + 2 + 20 + 3
= 30 + 5
= 35

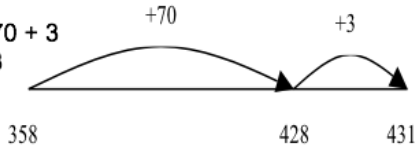
Refine to partitioning the second number only

23 + 12 = 23 + 10 + 1 + 1
= 33 + 1 + 1
= 35



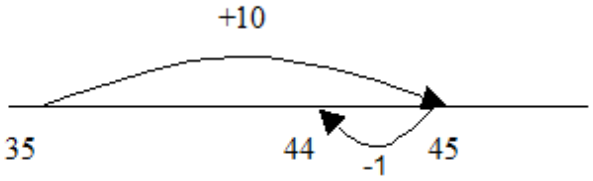
Partition into hundreds, tens and ones and recombine

Partition the second number only e.g.
358 + 73 = 358 + 70 + 3
= 428 + 3
= 431

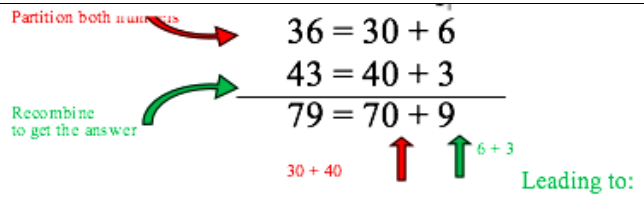


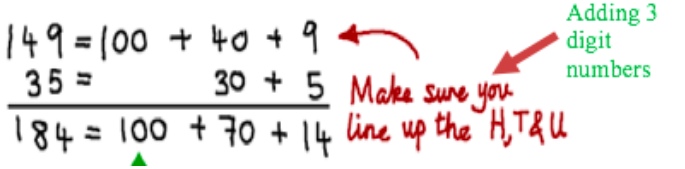
Adding 9 or 11 by adding 10 and adjusting by 1

Add 9 or 11 by adding 10 and adjusting by 1
35 + 9 = 44

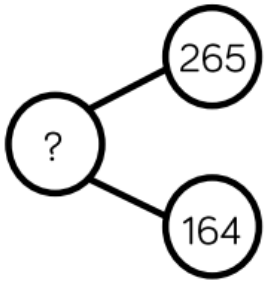


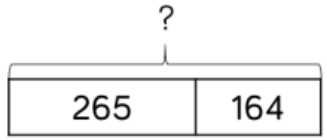
Formal Written Method



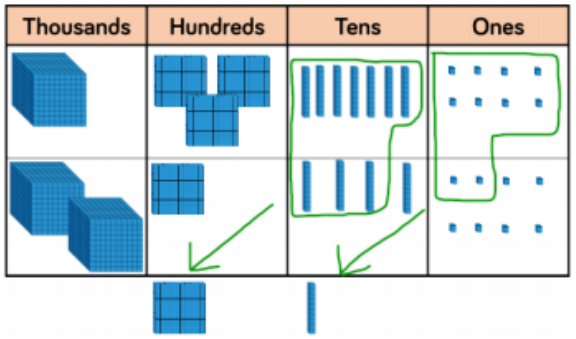
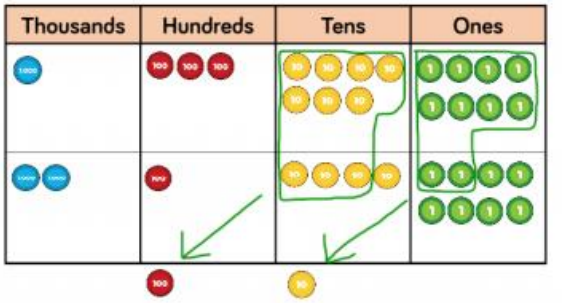
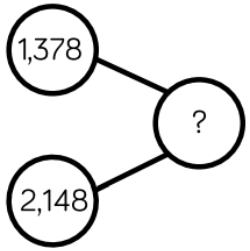
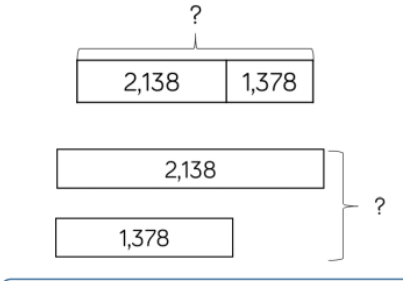


$$\begin{array}{r} 265 \\ +\ 164 \\ \hline 429 \\ \hline 1 \end{array}$$

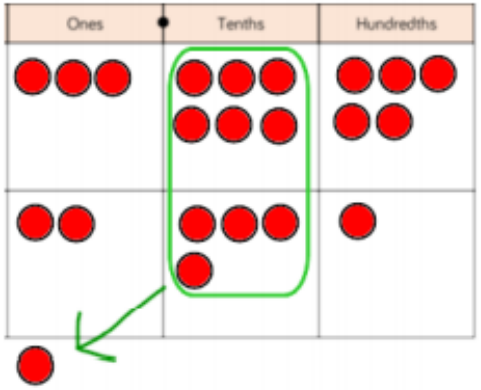
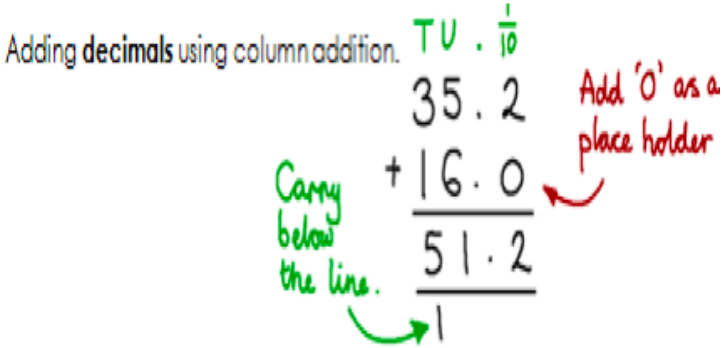
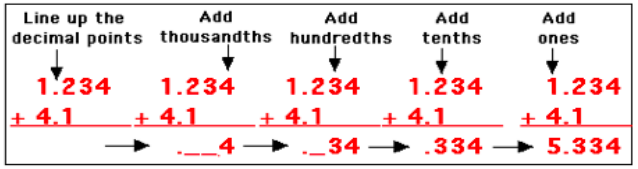
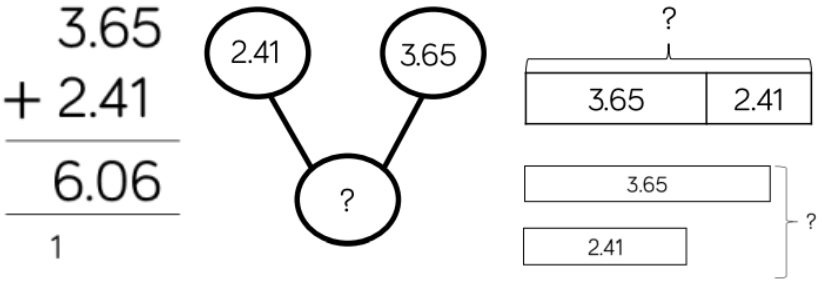




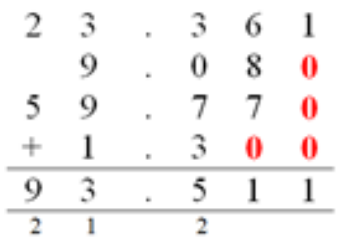
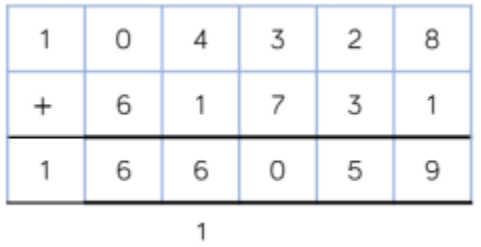
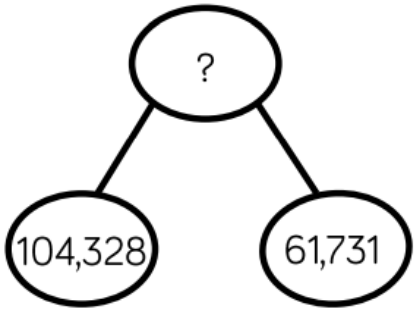
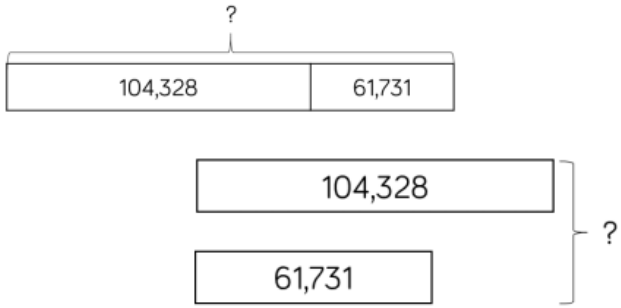
Stage 4

Equipment	Jottings	Formal Written Method
 	Per Stage 3 as required.	**Expanded vertical** 336 + 87 13 (6 + 7) 110 (30 + 80) 300 (300 + 0) 423 1 3 7 8 + 2 1 4 8 3 5 2 6 1 1   Relate to money and measures

Stage 5

Equipment	Jottings	Formal Written Method
		**Pencil and paper procedures** **Extend to decimals (same number of decimals places) and adding several numbers (with different numbers of digits).**   

Stage 6

Equipment	Jottings	Formal Written Method
		   

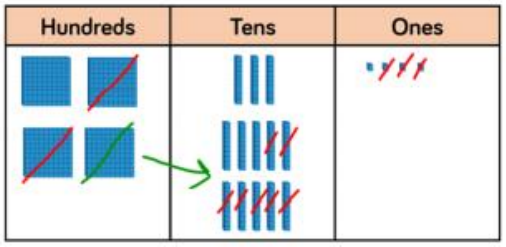
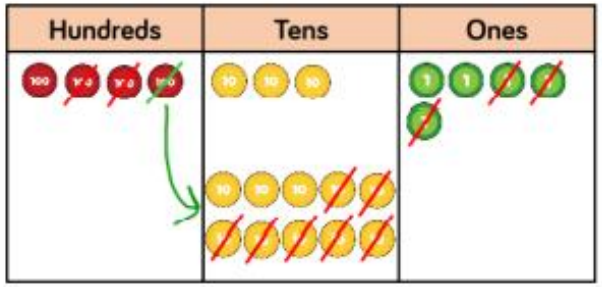
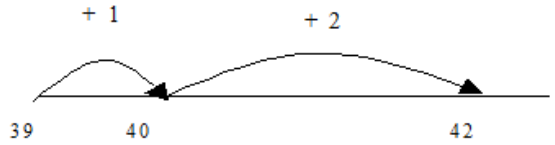
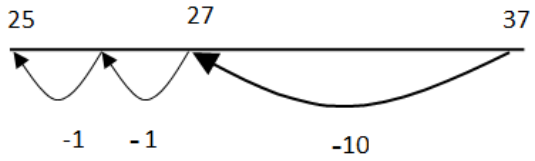
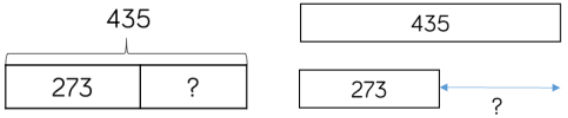
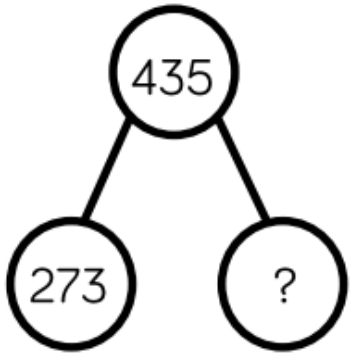
Subtraction

Year 1	Year 2	Year 3
Expected	**Expected**	**Expected**
• count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number • given a number, identify 1 more and 1 less identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least	• 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 1s ○ a two-digit number and 10s ○ 2 two-digit numbers ○ adding 3 one-digit numbers • show that addition of 2 numbers can be done in any order (commutative) and subtraction of 1 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	• add and subtract numbers mentally, including: a three-digit number and 1s three-digit number and 10s a three-digit number and 100s • add and subtract numbers with up to 3 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
• **In-depth**	• **In-depth**	**In-depth**
• memorise and reason with number bonds to 10 and 20 in several forms (for example, 9 + 7 = 16; 16 − 7 = 9; 7 = 16 − 9). • realise the effect of adding or subtracting 0. This establishes addition and subtraction as related operations. • combine and increase numbers, counting forwards and backwards. • 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, difference between, more than and less than, so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.	• extend their understanding of the language of addition and subtraction to include sum and difference. • 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. • check their calculations, including by adding to check subtraction and adding numbers in a different order to check addition (for example, 5 + 2 + 1 = 1 + 5 + 2 = 1 + 2 + 5). This establishes commutativity and associativity of addition. • record addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers	• practise solving varied addition and subtraction questions. • mental calculations with two-digit numbers, the answers could exceed 100. • use their understanding of place value and partitioning, and practise using columnar addition and subtraction with increasingly large numbers up to 3 digits to become fluent • develop the language of algebra as a means of solving a variety of problems

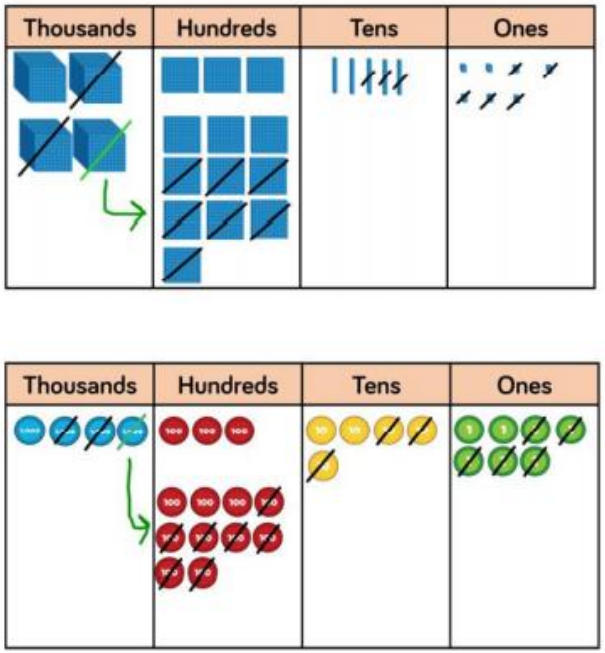
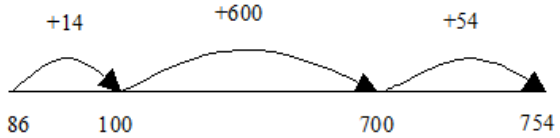
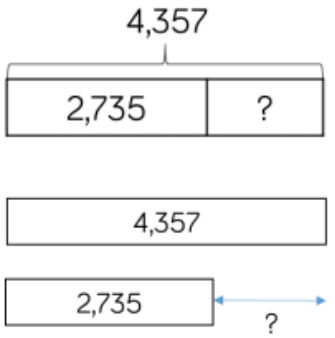
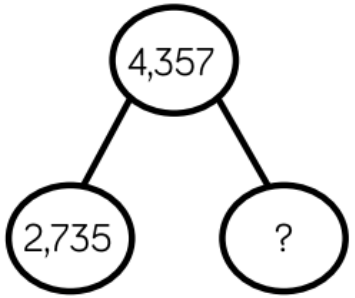
Subtraction

Year 4	Year 5	Year 6
Expected	**Expected**	**Expected**
• 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 • solve simple measure and money problems involving fractions and decimals to two decimal places.	• 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	• use their knowledge of the order of operations to carry out calculations involving the 4 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 • perform mental calculations, including with mixed operations and large numbers • solve problems which require answers to be rounded to specified degrees of accuracy
In-depth	**In-depth**	**In-depth**
• continue to practise both mental methods and columnar addition and subtraction with increasingly large numbers to aid fluency	• practise using the formal written methods of • columnar subtraction with increasingly large numbers to aid fluency. • practise mental calculations with increasingly large numbers to aid fluency (for example, 12,462 – 2,300 = 10,162). • introduce the language of algebra as a means of solving a variety of problems • mentally add and subtract tenths, and one-digit whole numbers and tenths.	• practise subtraction for larger numbers, using the formal written methods of columnar subtraction, • undertake mental calculations with increasingly large numbers and more complex calculations. • develop the language of algebra as a means of solving a variety of problems

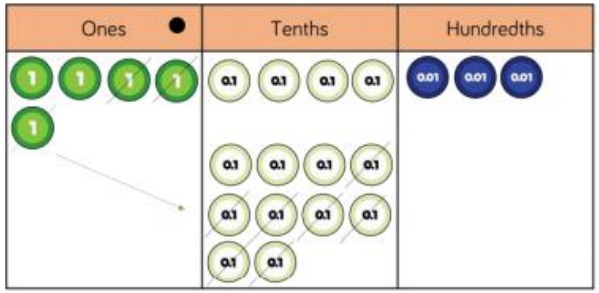
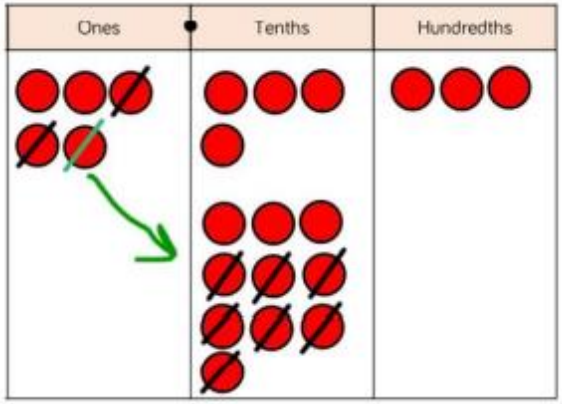
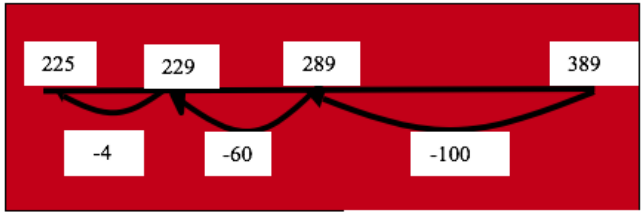
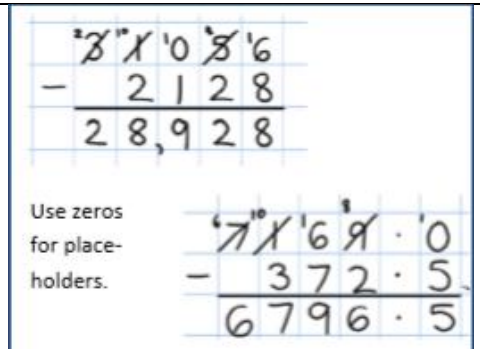
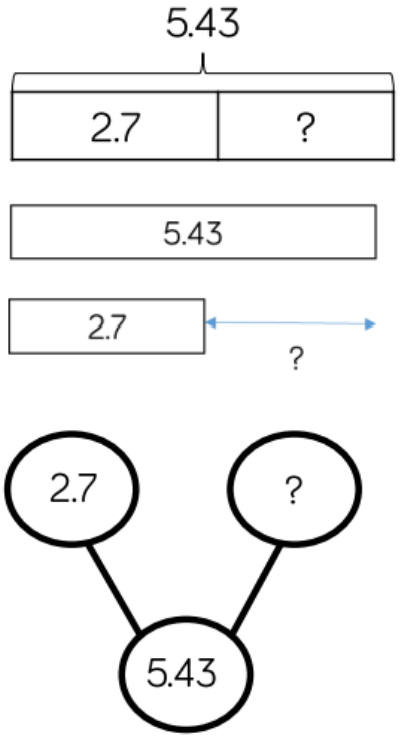
Stage 3

Equipment	Jottings	Formal Written Method
 	**Find a small difference by counting up** 42 – 39 = 3  **Use known number facts and place value to subtract** 37 – 12 = 37 – 10 – 2 = 27 – 2 = 25 	47 – 24 = 23 40 + 7 – 20 + 4 20 + 3 3 1 435 – 273 262  

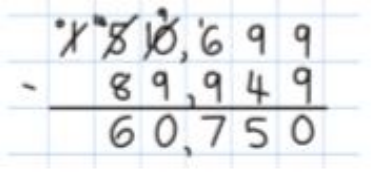
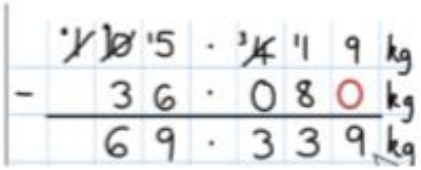
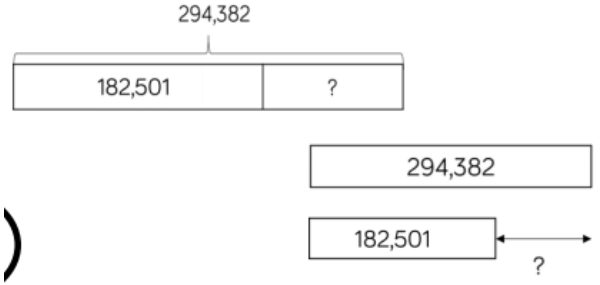
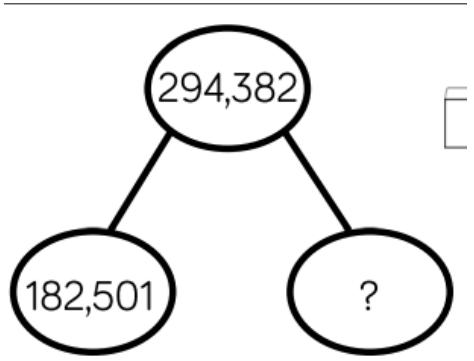
Stage 4

Equipment	Jottings	Formal Written Method
 	**Complementary addition** 754 – 86 = 668 	3 1 4357 – 2735 1622 52 - ? = 37  

Stage 5

Equipment	Jottings	Formal Written Method
 	**Find a small difference by counting on** **102 – 97 = 508 – 317 = 1002 -781 =** **Note:** Counting back is not always the most efficient method when the numbers are closer together. Reinforce concept with practical strategies essential to see 'difference'. **389 – 164 = 225**  **Leading to expanded method without borrowing** **Leading to expanded method with borrowing**	 

Stage 6

Equipment	Jottings	Formal Written Method
		   

Multiplication

Year 1	Year 2	Year 3
Expected	**Expected**	**Expected**
• 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	• 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 2 numbers can be done in any order (commutative) and division of 1 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	• 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.
In-depth	**In-depth**	**In-depth**
• through grouping and sharing small quantities, pupils begin to understand: multiplication and division; doubling numbers and quantities; finding simple fractions of objects, numbers and quantities • make connections between arrays, number patterns, and counting in twos, fives and tens.	• use a variety of language to describe multiplication and division • introduce the multiplication tables. • practise to become fluent in the 2, 5 and 10 multiplication tables and connect them to each other. • connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face. • begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations. • 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. • begin to relate these to fractions and measures (for example, 40 ÷ 2 = 20, 20 is a half of 40). • use inverse relations to develop reasoning (for example, 4 × 5 = 20 and 20 ÷ 5 = 4).	• use multiples of 2, 3, 4, 5, 8, 10, 50 and 100. • use larger numbers to at least 1,000, applying partitioning related to place value using varied and increasingly complex problems, building on work in year 2 (for example, 146 = 100 + 40 + 6, 146 = 130 +16). • use a variety of representations, including those related to measure, pupils continue to count in 1s, 10s and 100s, so that they become fluent in the order and place value of numbers to 1,000.

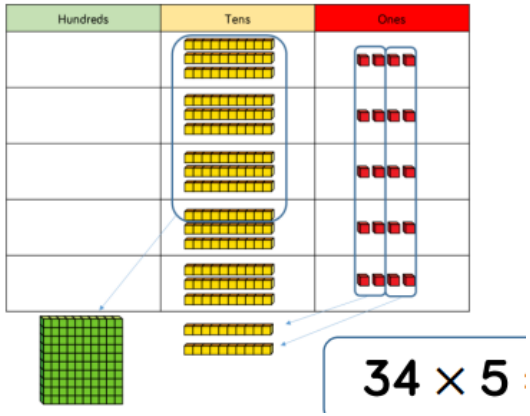
Multiplication

Year 4	Year 5	Year 6
Expected	**Expected**	**Expected**
• 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 3 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 1 digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects .	• identify multiples and factors, including finding all factor pairs of a number, and common factors of 2 numbers • 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 • multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000 • 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	• multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication • identify common factors, common multiples and prime numbers • perform mental calculations, including with mixed operations and large numbers • use their knowledge of the order of operations to carry out calculations involving the 4 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 • multiply one-digit numbers with up to two decimal places by whole numbers • solve problems which require answers to be rounded to specified degrees of accuracy • solve problems which require answers to be rounded to specified degrees of accuracy
In-depth	**In-depth**	**In-depth**
• continue to practise recalling and using multiplication tables and related division facts to aid fluency. • practise mental methods and extend this to 3-digit numbers to derive facts, (for example 600 ÷ 3 = 200 can be derived from 2 x 3 = 6). • practise to become fluent in the formal written method of short multiplication with exact answers • 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)). • 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. • solve two-step problems in contexts, choosing the	• practise and extend their use of the formal written methods of short multiplication. • apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations. • use and understand the terms factor, multiple and prime, square and cube numbers. • 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 = 98/4 = 24 r 2 = 241/2 = 24.5 ≈ 25). • 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	• practise multiplication for larger numbers, using the formal written methods of short and long multiplication. • undertake mental calculations with increasingly large numbers and more complex calculations. • continue to use all the multiplication tables to calculate mathematical statements in order to maintain their fluency. • explore the order of operations using brackets; for example, 2 + 1 x 3 = 5 and (2 + 1) x 3 = 9. • understand common factors can be related to finding equivalent fractions • develop the connection made between multiplication and division with fractions, decimals, percentages and ratio

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 3 cakes shared equally between 10 children	a 1,000 in converting between units such as kilometres and metres. • introduce the language of algebra as a means of solving a variety of problems • distributivity can be expressed as a(b + c) = ab + ac. • understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalence statements (for example, 4 x 35 = 2 x 2 x 35; 3 x 270 = 3 x 3 x 9 x 10 = 9^2 x 10). • use and explain the equals sign to indicate equivalence, including in missing number problems (for example 13 + 24 = 12 + 25; 33 = 5 x ?).	• develop the language of algebra as a means of solving a variety of problems • multiply and divide numbers with up to two decimal places by one-digit and two-digit whole numbers. • multiply decimals by whole numbers, starting with the simplest cases, such as 0.4 × 2 = 0.8, and in practical contexts, such as measures and money.

Stage 3

Equipment



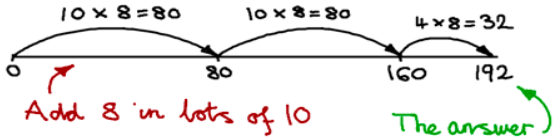
Jottings

x = signs and missing numbers

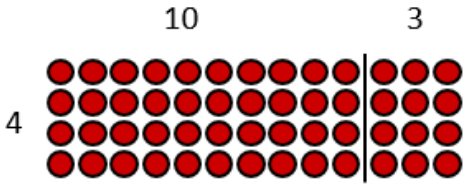
Continue using a range of equations as in Stage 2 but with appropriate numbers.

$24 \times 8 = 192$

24 lots of 8 have been added in total.



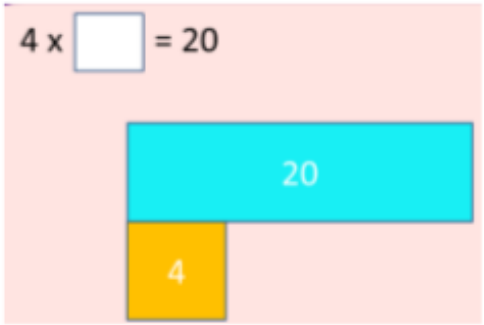
13 x 4:



10 x 4 = 40

3 x 4 = 12

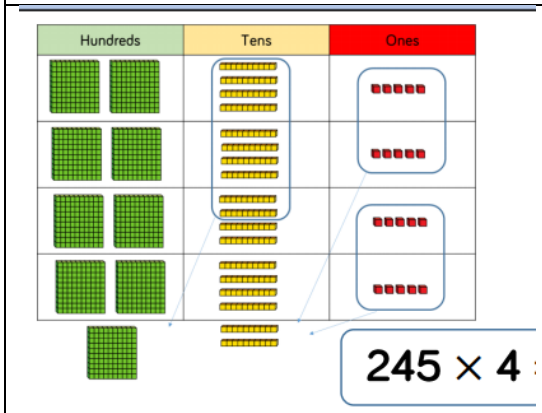
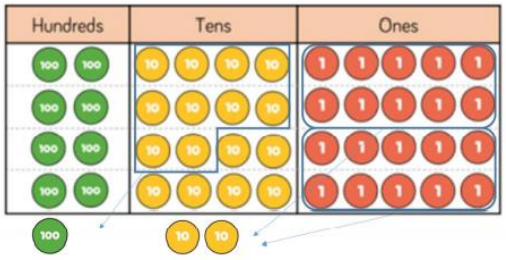
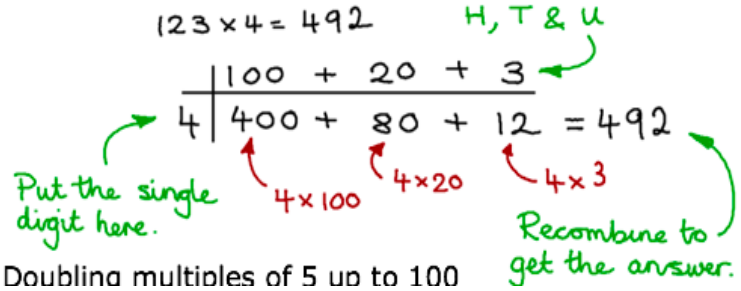
Bar model are used to explore missing numbers



Formal Written Method

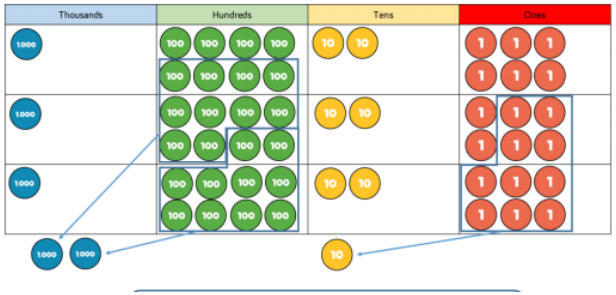
	H	T	O		
		3	4		
×			5		
		2	0	(5 × 4)	
+	1	5	0	(5 × 30)	
	1	7	0		

Stage 4

Equipment	Manageable Step	Formal Written Method
 	 Doubling multiples of 5 up to 100	237 x 4 28 (7 x 4) 120 (30 x 4) 800 (200 x 4) 948 H T O 2 4 5 × 4 9 8 0 1 2

Stage 5

Equipment



Manageable Step

Grid method

$56 \times 43 = 2408$

Partition both numbers.

Recombine the rows

×	50	6	
40	2000	+ 240	= 2240
3	150	+ 18	= + 168
			2408

Multiply the top numbers by the side.

Add to get the total.

×	200	30	4
30	6,000	900	120
2	400	60	8

Formal Written Method

	Th	H	T	O
	1	8	2	6
×				3
	5	4	7	8
	2		1	

	H	T	O
		2	2
×		3	1
		2	2
	6	6	0
	6	8	2

Th H T U

$$\begin{array}{r} 324 \\ \times\ 23 \\ \hline 972 \\ 6480 \\ \hline 7452 \\ 11 \end{array}$$

Multiply the top number by the units of the bottom.

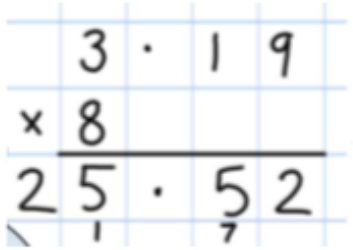
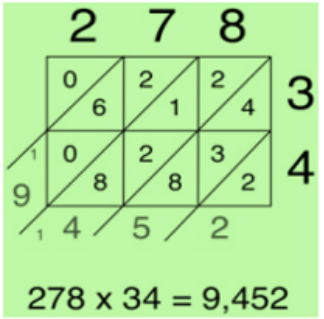
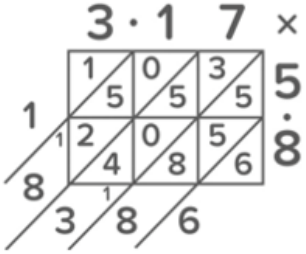
$(3 \times 4) + (3 \times 20) + (3 \times 300)$

Multiply the top number by the tens of the second number.

$(20 \times 4) + (20 \times 20) + (20 \times 300)$

Add to get the answer.

Stage 6

Equipment	Jottings	Formal Written Method
		Remind children that the single digit belongs in the units column. Line up the decimal points in the question and the answer.   

Division

Year 1	Year 2	Year 3
Expected	**Expected**	**Expected**
• 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	• 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 2 numbers can be done in any order (commutative) and division of 1 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	• 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.
In-depth	**In-depth**	**In-depth**
• through grouping and sharing small quantities, pupils begin to understand: multiplication and division; doubling numbers and quantities; finding simple fractions of objects, numbers and quantities • make connections between arrays, number patterns, and counting in twos, fives and tens.	• use a variety of language to describe multiplication and division. • begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations. • 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. • begin to relate these to fractions and measures (for example, 40 ÷ 2 = 20, 20 is a half of 40). • use commutativity and inverse relations to develop multiplicative reasoning (for example, 4 × 5 = 20 and 20 ÷ 5 = 4).	• develop efficient mental methods, for example, using commutativity and associativity to derive related facts (eg, 30 × 2 = 60, 60 ÷ 3 = 20 and 20 = 60 ÷ 3). • 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. • solve simple problems in contexts, deciding which of the four operations to use and why. 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 (eg, 3 hats and 4 coats, how many different outfits?; 12 sweets shared equally between 4 children; • 4 cakes shared equally between 8 children).

Division

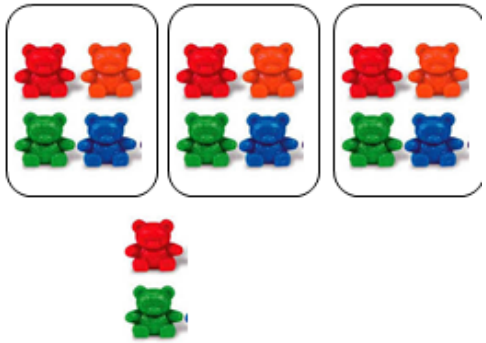
Year 4	Year 5	Year 6
Expected	**Expected**	**Expected**
• recall multiplication and division facts for multiplication tables up to 12 × 12 • use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together 3 numbers • recognise and use factor pairs and commutativity in mental calculations • find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths	• identify multiples and factors, including finding all factor pairs of a number, and common factors of 2 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 1,000 • 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 rate	• 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 • use their knowledge of the order of operations to carry out calculations involving the 4 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 • associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 3/8] • identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places • use written division methods in cases where the answer has up to two decimal places • solve problems which require answers to be rounded to specified degrees of accuracy
In-depth	**In-depth**	**In-depth**
• continue to practise recalling and using multiplication tables and related division facts to aid fluency. • practise mental methods and extend this to 3-digit numbers to derive facts, (for example 600 ÷ 3 = 200 can be derived from 2 x 3 = 6). • practise to become fluent in the formal written method of short multiplication and short division with exact answers • solve two-step problems in contexts, choosing the	• practise and extend their use of the formal written methods of short multiplication and short division. • apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations. • use and understand the terms factor, multiple and prime, square and cube numbers. • interpret non-integer answers to division by expressing results in different ways according to	• practise division for larger numbers, using the formal written methods of short and long division • explore the order of operations using brackets; for example, 2 + 1 x 3 = 5 and (2 + 1) x 3 = 9. • Understand common factors can be related to finding equivalent fractions • develop the connection made between multiplication and division with fractions, decimals, percentages and ratio

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 3 cakes shared equally between 10 children	the context, including with remainders, as fractions, as decimals or by rounding (for example, $98 \div 4 = {}^{98}/_{4} = 24$ r 2 = 24½ = 24.5 ≈ 25). • 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 1,000 in converting between units such as kilometres and metres. • distributivity can be expressed as $a(b + c) = ab + ac$. • use and explain the equals sign to indicate equivalence, including in missing number problems (for example 13 + 24 = 12 + 25; 33 = 5 x ?).	• explore and make conjectures about converting a simple fraction to a decimal fraction (for example, 3 ÷ 8 = 0.375). • For simple fractions with recurring decimal equivalents, pupils learn about rounding the decimal to three decimal places, or other appropriate approximations depending on the context. • introduce to the division of decimal numbers by one-digit whole number, initially, in practical contexts involving measures and money. • recognise division calculations as the inverse of multiplication. • develop the skills of rounding and estimating as a means of predicting and checking the order of magnitude of their answers to decimal calculations, including rounding answers to a specified degree of accuracy and checking the reasonableness of their answers.

Stage 3

Equipment

14 ÷ 3 =
Divide objects between groups and see how much is left over



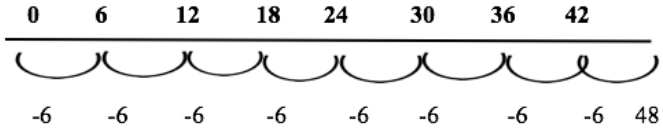
Jottings

Understand division as sharing and grouping

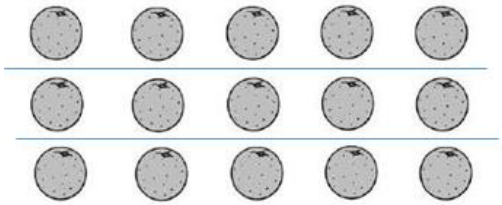
Use repeated subtraction.

Subtract 6 repeatedly

48 ÷ 6 =



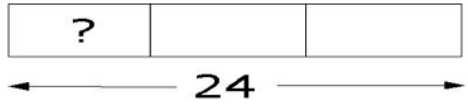
8 lots of 6 has been taken



5 lots of 3

3 lots of 5

Draw an array and use lines to split the array into groups to make multiplication and division sentences.

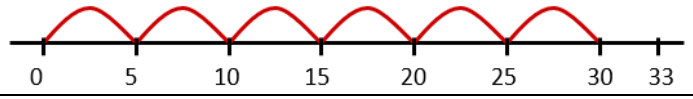


24 ÷ 3 = ?

Number lines (start from zero)

33 ÷ 5 = 6 r3

Jumps under the line if counting backwards.



Formal Written Method

Partitioning

28 ÷ 2

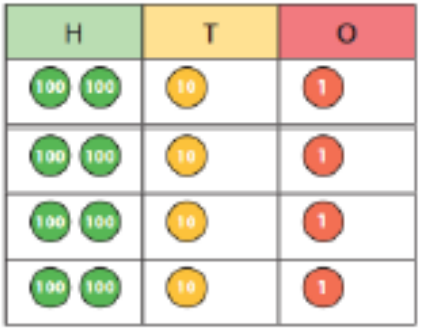
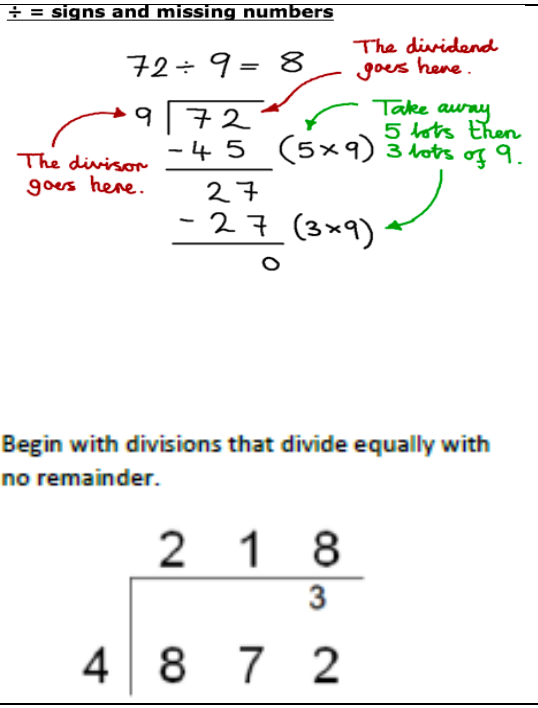
20 ÷ 2 = 10
8 ÷ 2 = 4 → 10 + 4 = 14

Partitioning (multiples of the divisor)

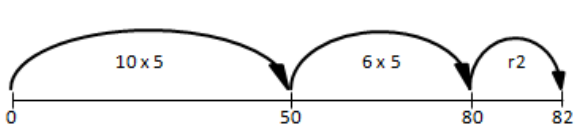
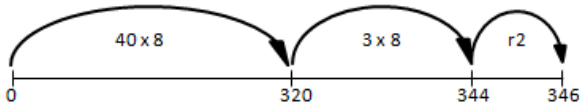
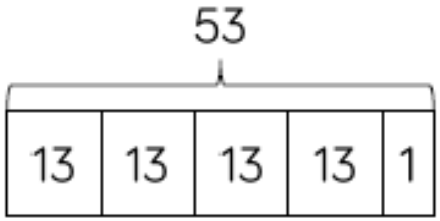
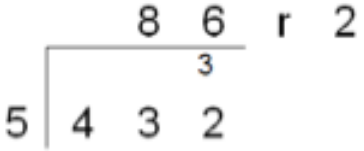
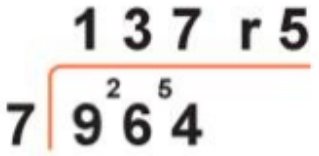
67 ÷ 4 = 16 r3

10 x 4 = 40
6 x 4 = 24 (64)

Stage 4

Equipment	Jottings	Formal Written Method
		

Stage 5

Equipment	Jottings	Formal Written Method
	82 ÷ 5 = 16r2  346 ÷ 8 = 43r2   	 

Phase 6

		Formal Written Method

$$14\overline{)24^{10}5} \quad 1\ 7\ r\ 7$$

432 ÷ 15 becomes

$$15\overline{)432} \quad 28\ r\ 12$$

$$\begin{array}{r} 300 \\ \hline 132 \\ 120 \\ \hline 12 \end{array}$$

Answer: 28 remainder 12

432 ÷ 15 becomes

$$15\overline{)432} \quad 28$$

$$\begin{array}{r} 300 \quad 15\times20 \\ \hline 132 \\ 120 \quad 15\times8 \\ \hline 12 \end{array}$$

$\frac{12}{15} = \frac{4}{5}$

Answer: $28\frac{4}{5}$

432 ÷ 15 becomes

$$15\overline{)432.0} \quad 28.8$$

$$\begin{array}{r} 30 \\ \hline 132 \\ 120 \\ \hline 120 \\ 120 \\ \hline 0 \end{array}$$

Answer: 28·8

÷ = signs and missing numbers

$\frac{4}{5}$ $5\overline{)4.0}$ $0.8 \rightarrow 0.80 = 80\%$

-4.0

0

$8\overline{)48.3}$

$2.4\overline{)38.4}$

$3\overline{)4.14}$ 1.38

$7\overline{)964}$ $137\ r\ 5$

$9\overline{)4.05}$ 0.45

$8\overline{)11.0040}$ 01.375