Love, Learn, Live

Great Kimble C of E School
Calculation Policy
2022

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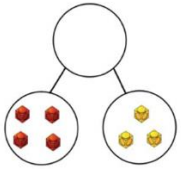
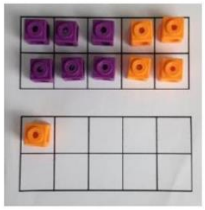
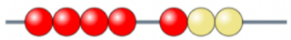
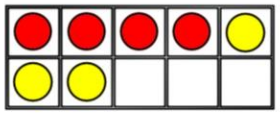
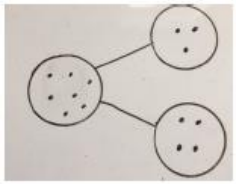
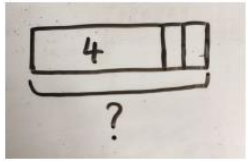
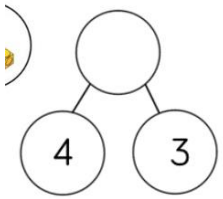
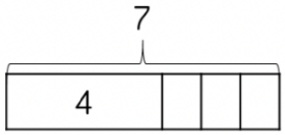
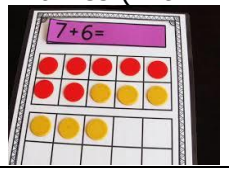
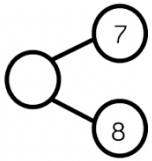
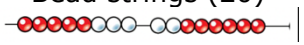
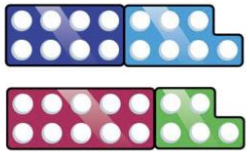
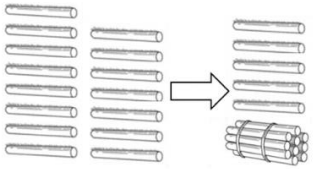
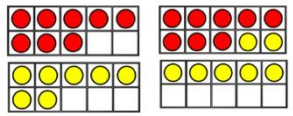
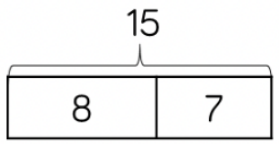
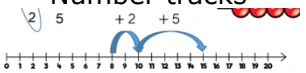
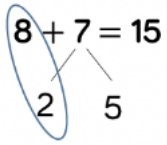
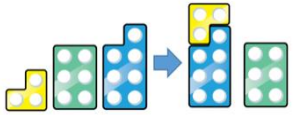
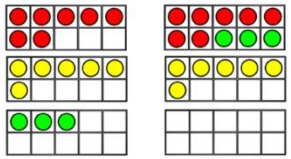
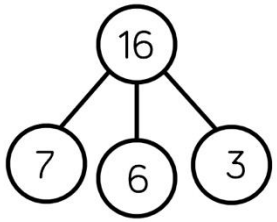
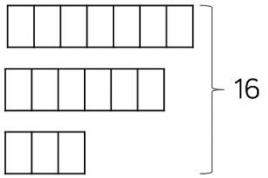
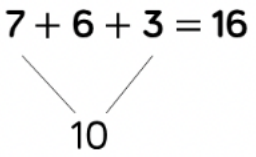
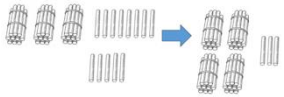
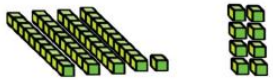
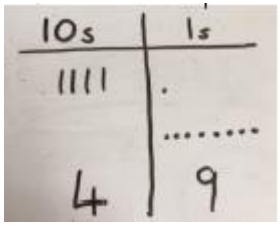
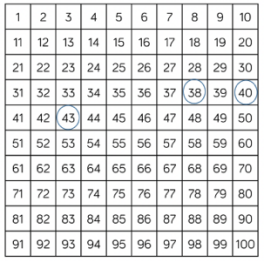
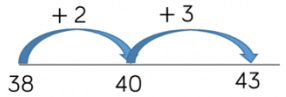
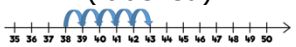
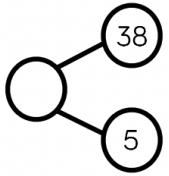
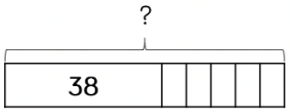
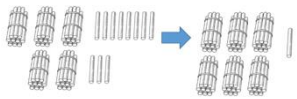
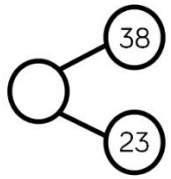
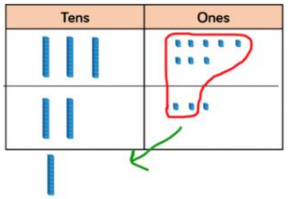
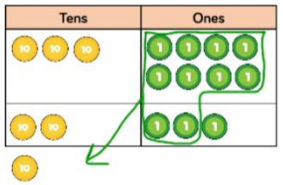
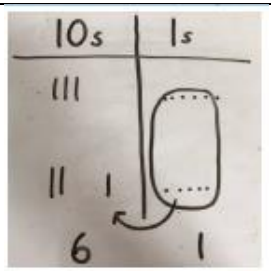
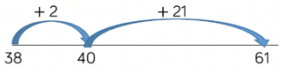
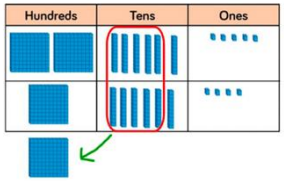
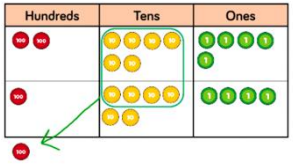
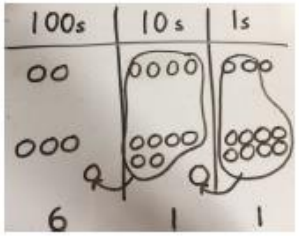
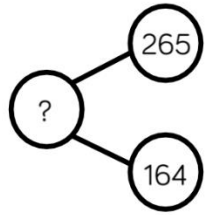
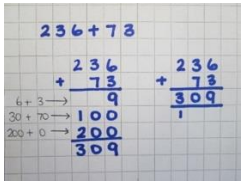
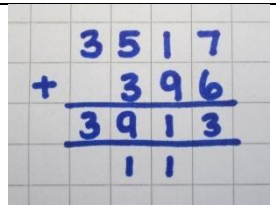
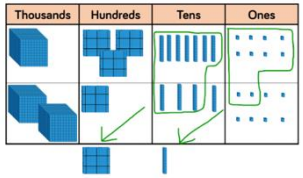
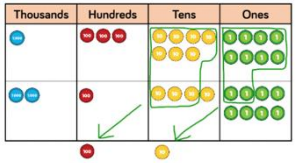
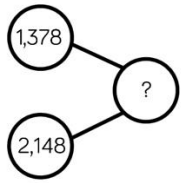
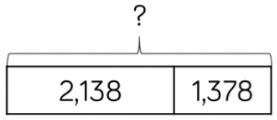
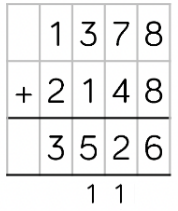
Addition

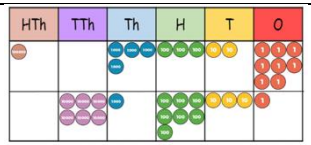
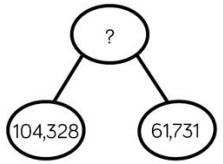
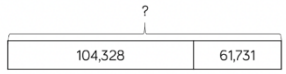
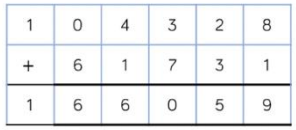
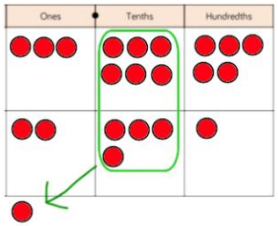
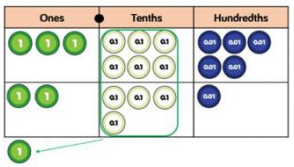
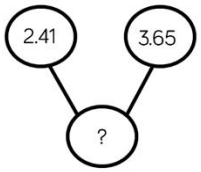
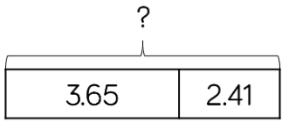
Small step	Year group most commonly introduced	National Curriculum	Concrete	Pictorial	Abstract	Vocabulary
Add two 1-digit numbers to 10	1	Year 1 Pupils should be taught to: • read, write and interpret mathematical statements involving addition (+) and equals (=) signs • represent and use number bonds within 20 • add one-digit and two-digit numbers to 20, including zero • solve one-step problems that involve addition, using concrete objects and pictorial representations, and missing number problems.	Objects   Ten frames (within 10)  Bead strings (10)  Number tracks  Number shapes 	Spots  Ten frames (within 10)  Part-whole model  Bar model  	Part-whole model  Bar model  Calculations $4 + 3 = 7$	Number bonds Number line Add More Plus Make Sum Total Altogether Inverse Double Near double Equals Is the same as (including equals sign) How many more to make …? How many more is … than … ? How much more is … ?
Add 1 and 2-digit numbers to 20	1/2	Year 2 Pupils should be taught to: • solve problems with addition:	Ten frames (within 20)  	Ten frames (within 20)	Part-whole model  	

		○ 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 facts to 20 fluently, and derive and use related facts up to 100 • add 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	Bead strings (20)  Number shapes  Straws 		Bar model  Number tracks  Calculations 	
Add three 1-digit numbers	2		Number shapes  Bead strings 	Ten frames 	Part-whole model  Bar model  Calculations 	Add, more, and Make, sum, total Altogether Double Near double Half, halve One more, two more … ten more … one Hundred more How many more to make …? How many more is …

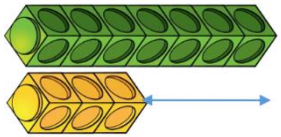
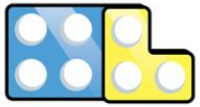
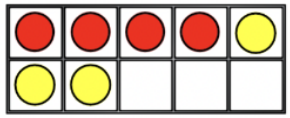
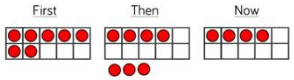
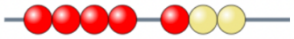
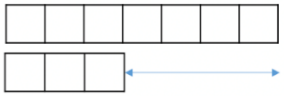
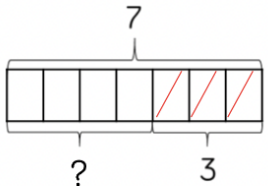
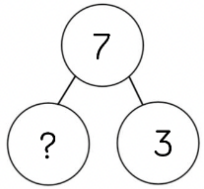
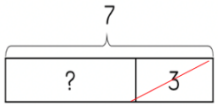
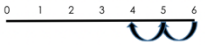
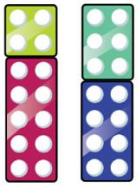
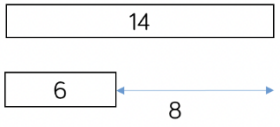
		○ adding three one-digit numbers			$7 + 6 + 3 = 16$	than …? How much more is …?
Add 1 and 2-digit numbers to 100	2	• show that addition of two numbers can be done in any order (commutative) • recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.	Straws  Base 10 	Base 10 	Hundred square   Number lines (labelled)  Part-whole model  Bar model 	
Add two 2-digit numbers	2		Straws  Base 10	Base 10	Part-whole model  Bar model	

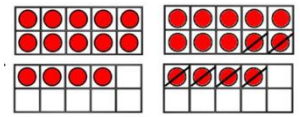
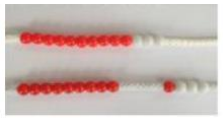
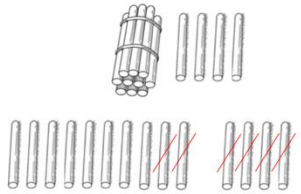
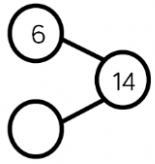
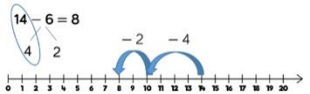
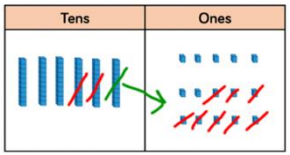
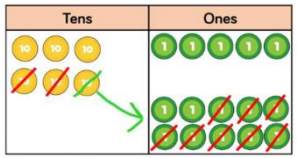
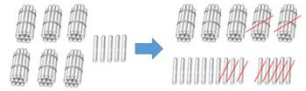
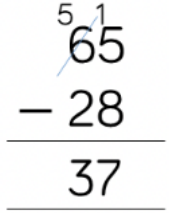
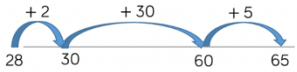
			 Place Value counters 		? 38 | 23 Number lines (blank)  Column addition 38 + 23 61 1	
Add with up to 3-digits	3	Year 3 Pupils should be taught to: • add numbers mentally, including: ○ a three-digit number and ones ○ a three-digit number and tens ○ a three-digit number and hundreds • add numbers with up to three digits, using formal written methods of columnar addition • estimate the answer to a calculation and	Base 10  Place Value counters 	Representing Place value 	Part Whole Model  Bar Model ? 265 | 164 Colum addition 	Add, more, and Make, sum, total Altogether Double Near double Half, halve One more, two more … ten more … one Hundred more How many more to make …? How many more is … than …? How much more is …?

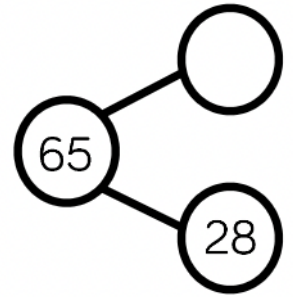
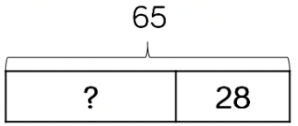
		use inverse operations to check answers • solve problems, including missing number problems, using number facts, place value, and more complex addition.				
Add with up to 4-digits	4	Year 4 Pupils should be taught to: • add numbers with up to 4 digits using the formal written methods of columnar addition where appropriate • estimate and use inverse operations to check answers to a calculation • solve addition two-step problems in contexts, deciding which operations and methods to use and why.	Base 10  Place Value counters 		Part Whole Model  Bar Model  Column addition 	Add, more, and Make, sum, total Altogether Double Near double Half, halve One more, two more… ten more… one Hundred more How many more to make …? How many more is … than …? How much more is …?
Add with more than 4 digits	5	Year 5 Pupils should be taught to: • add whole	Place Value counters		Part Whole Model	Add, more, and Make, sum, total

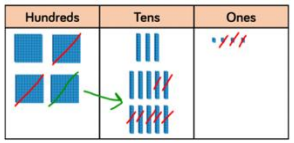
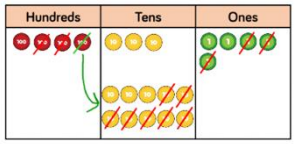
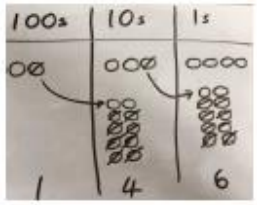
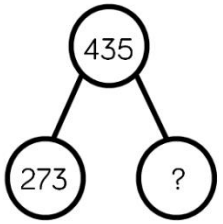
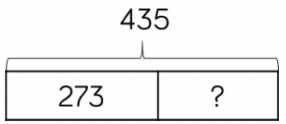
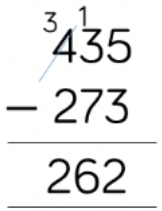
		numbers with more than 4 digits, including using formal written methods (columnar addition) • add numbers mentally with increasingly large numbers • use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy • solve addition multi-step problems in contexts, deciding which operations and methods to use and why.			 Bar Model  Column addition 	Altogether Double Near double One more, two more … ten more … one Hundred more How many more to make …? How many more is … than …? How much more is …?
Add with up to 3 decimal places	5		 Place Value counters 		Part Whole Model  Bar Model  Column addition 3.65 + 2.41 6.06 1	

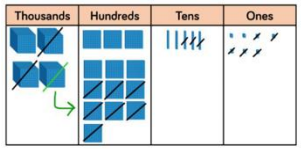
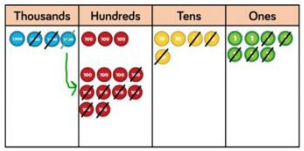
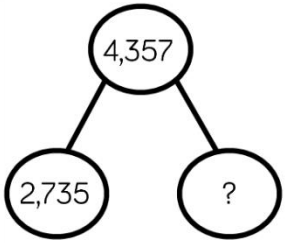
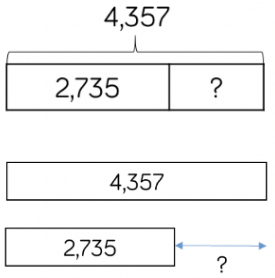
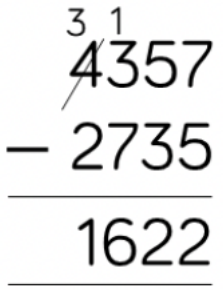
Subtraction

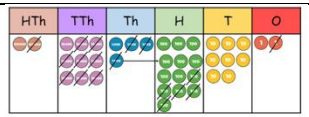
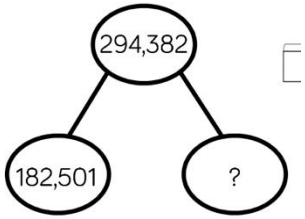
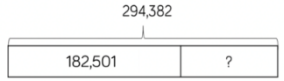
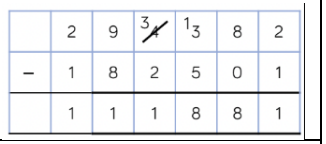
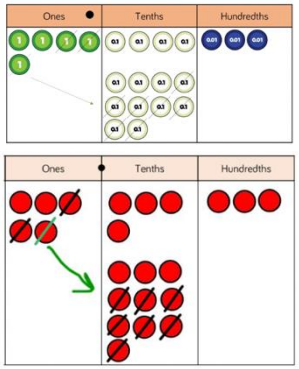
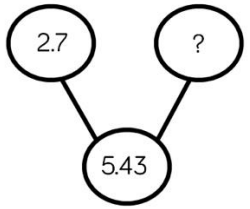
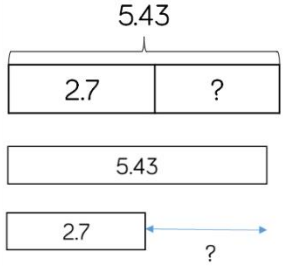
Small step	Year group most commonly introduced	National Curriculum	Concrete	Pictorial	Abstract	Vocabulary
Subtract two 1-digit numbers to 10	1	Year 1 Pupils should be taught to: • read, write and interpret mathematical statements involving subtraction (–) and equals (=) signs • represent and use number bonds and related subtraction facts within 20 • Subtract one-digit and two-digit numbers to 20, including zero • solve one-step problems that involve subtraction using concrete objects and pictorial representations, and missing number problems such as 7 = – 9.	Objects  Number shapes  Ten frames (within 10)   Bead strings (10) 	Bar model   	Part-whole model  Bar model  Number tracks  Calculations $7 - 3 = 4$	Subtract Take away How many are left/left over? How many have gone? One less, two less, ten less … How many fewer is … than …? How much less is …? Difference between Equals Is the same as Number bonds/pairs Missing number
Subtract 1 and 2-digit numbers to 20	1		Number shapes  Ten frames (within 20)	Place value	Bar model  Part-whole model	

			 Bead strings (20)  Straws 		 Number tracks  Number lines (labelled)  Calculations $14 - 6 = 8$	
Subtract 1 and 2-digit numbers to 100	2	Year 2 Pupils should be taught to: • solve problems with addition and subtraction: ○ using concrete objects and pictorial representations, including those involving numbers,	Straws   	Part-whole model Bar model Number lines (labelled) Number lines (blank) Hundred square Base 10 	Column subtraction  Blank number lines  Part-whole model	Take away How many are left/left over? How many have gone? One less, two less, ten less … one hundred Less How many fewer is … than …? How much less is …? Difference between Equals

		quantities and measures ○ applying their increasing knowledge of mental and written methods • recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100 • 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 subtraction of one number from another cannot be done in any order (commutative) • recognise and use the inverse			 Bar model 	Is the same as Number bonds/pairs/facts Tens boundary
Subtract two 2-digit numbers	2		Straws Base 10 Place value counters	Part-whole model Bar model Number lines (blank)	Column subtraction	

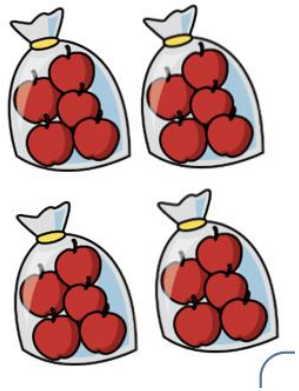
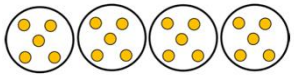
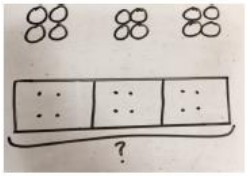
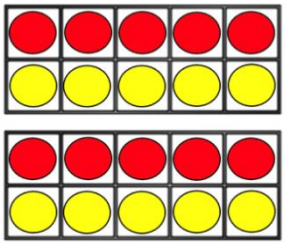
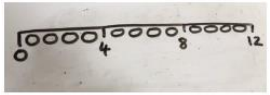
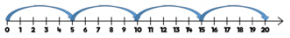
		relationship between addition and subtraction and use this to check calculations and solve missing number problems.				
Subtract with up to 3-digits	3	Year 3 Pupils should be taught to: • subtract numbers mentally, including: ○ a three-digit number and ones ○ a three-digit number and tens ○ a three-digit number and hundreds • subtract numbers with up to three digits, using formal written methods of columnar subtraction • estimate the answer to a calculation and use inverse operations to check answers • solve problems, including missing	Base 10  Place value counters  	Base 10  	Part-whole model  Bar model  Column subtraction  	Take away How many are left/left over? How many have gone? One less, two less, ten less … one hundred Less How many fewer is … than …? How much less is …? Difference between Equals Is the same as Number bonds/pairs/facts Missing number Tens boundary, hundreds boundary

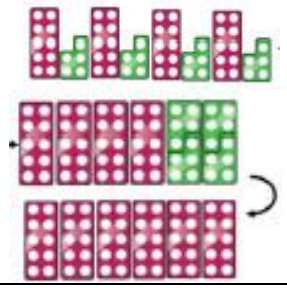
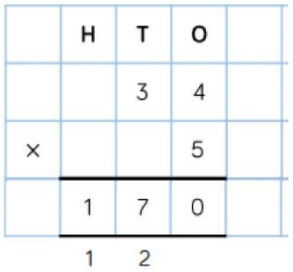
		number problems, using number facts, place value, and more complex subtraction.				
Subtract with up to 4-digits	4	Year 4 Pupils should be taught to: • subtract numbers with up to 4 digits using the formal written methods of columnar subtraction where appropriate • estimate and use inverse operations to check answers to a calculation • solve subtraction two-step problems in contexts, deciding which operations and methods to use and why.	Base 10  Place value counters  		Part-whole model  Bar model  Column subtraction  	Subtract Take away How many are left/left over? How many have gone? One less, two less, ten less … one hundred Less How many fewer is … than …? How much less is …? Difference between Equals Is the same as Number bonds/pairs/facts Missing number Tens boundary, hundreds boundary Inverse
Subtract with more	5	Year 5 Pupils should be taught to:	Place value counters		Part-whole model	Half, halve Subtract Take away

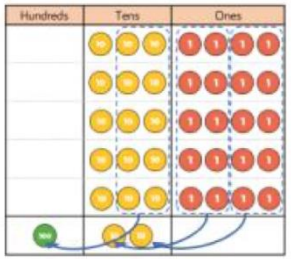
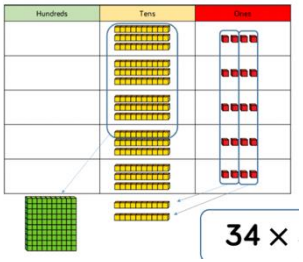
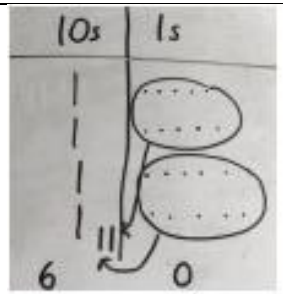
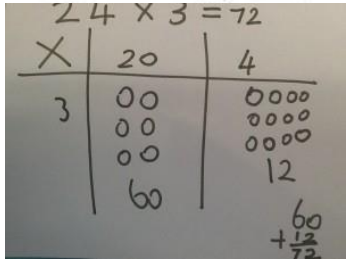
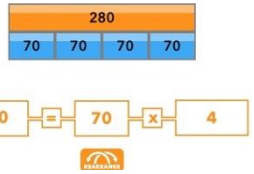
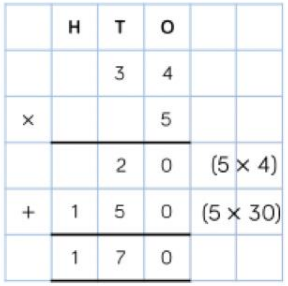
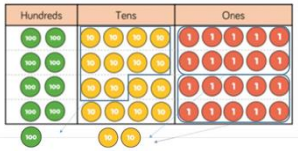
than 4 digits		• subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction) • subtract numbers mentally with increasingly large numbers • use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy • solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why.			 Bar model  Column subtraction 	How many are left/left over? How many have gone? One less, two less, ten less … one hundred Less How many fewer is … than …? How much less is …? Difference between
Subtract with up to 3 decimal places	5		Place value counters 		Part-whole model  Bar model  Column subtraction	

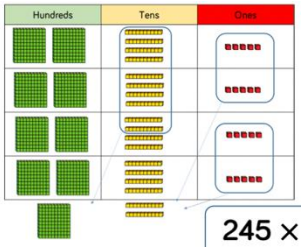
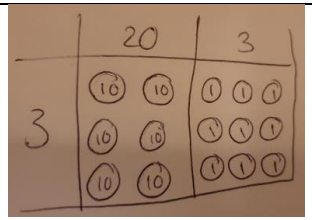
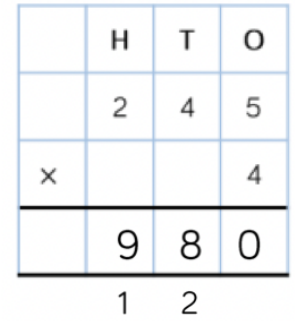
					$\begin{array}{r} {}^{4}\not{5}.{}^{1}43 \\ -\ 2.7 \\ \hline 2.73 \end{array}$	

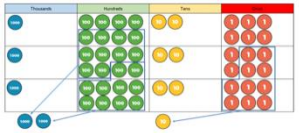
Multiplication

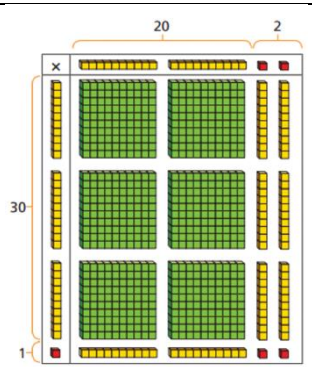
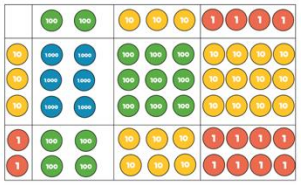
Small step	Year group most commonly introduced	National Curriculum	Concrete	Pictorial	Abstract	Vocabulary
Solve one-step problems with multiplication	1/2	Year 1 Pupils should be taught to: • solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. Year 2 Pupils should be taught to: • recall and use multiplication facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers • calculate mathematical	 Number shapes  Counters  Bead strings 	Bar model  Ten frames  Number lines 	Number lines  Calculations $5 + 5 + 5 + 5 = 20$ $4 \times 5 = 20$ $5 \times 4 = 20$	Multiplication Multiply Multiplied by Multiple Doubling Array Number patterns Groups of Times Once, twice, three times … ten times Repeated addition

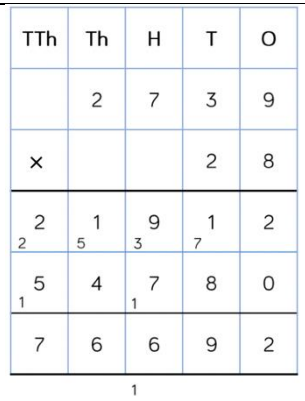
		statements for multiplication within the multiplication tables and write them using the multiplication (×) and equals (=) signs • show that multiplication of two numbers can be done in any order (commutative) • solve problems involving multiplication, using materials, arrays, repeated addition, mental methods, and multiplication facts, including problems in contexts.				
Multiply 2-digit by 1-digit numbers	3/4	Year 3 Pupils should be taught to: • recall and use multiplication facts for the 3, 4 and 8 multiplication tables	Number shapes 	Place Value	Short written method  	Multiplication Multiply Multiplied by Multiple, factor Groups of Times Product Once, twice,

		• write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods • solve problems, including missing number problems, involving multiplication, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.	Place value counters  Base 10  	  Bar Model   	Expanded method  	three times … ten times Repeated addition Doubling Array Row, column Number patterns Multiplication table Multiplication fact
Multiply 3-digit by 1-digit numbers	4	Year 4 Pupils should be taught to: • recall multiplication	Place value counters  	Place value	Short written method	Multiply Multiplied by Multiple, factor Groups of

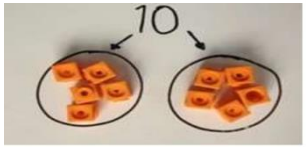
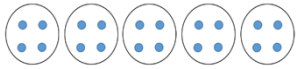
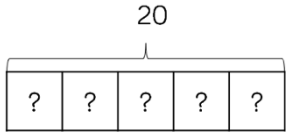
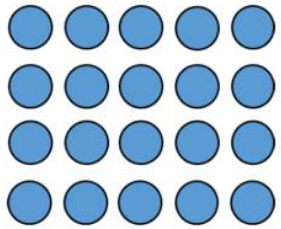
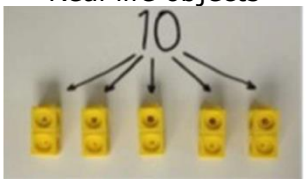
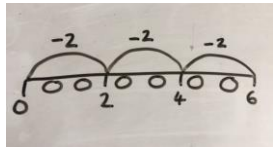
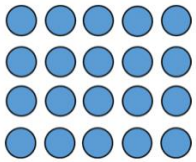
		facts for multiplication tables up to 12 × 12 • use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1; multiplying together three numbers • recognise and use factor pairs and commutativity in mental calculations • multiply two-digit and three-digit numbers by 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	Base 10  	 	 	Times Product Once, twice, three times … ten times Repeated addition

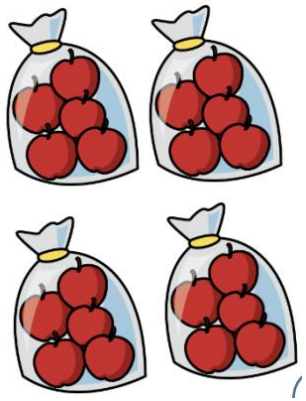
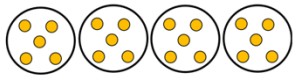
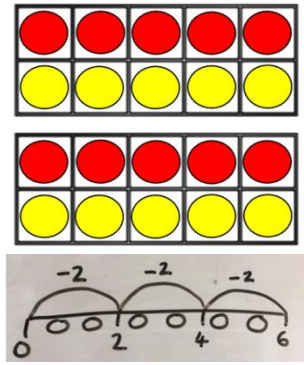
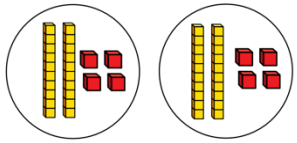
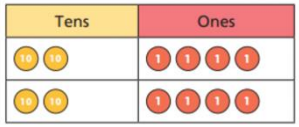
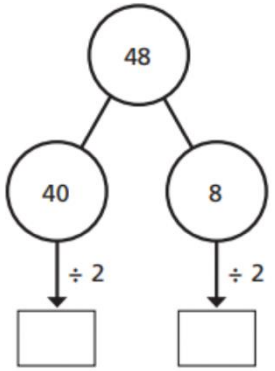
		scaling problems and harder correspondence problems such as n objects are connected to m objects.				
Multiply 4-digit by 1-digit numbers	5	Year 5 Pupils should be taught to: • identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers • know and 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	Place value counters 		Short written method Th H T O 1 8 2 6 × 3 5 4 7 8 2 1	Multiply Multiplied by Multiple, factor Groups of Times Product Once, twice, three times … ten times Repeated addition
Multiply 2-digit by 2-digit numbers	5		Place value counters  Base 10		Short written method H T O 2 2 × 3 1 2 2 6 6 0 6 8 2 Grid method	

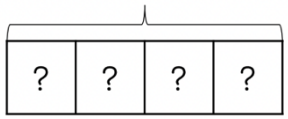
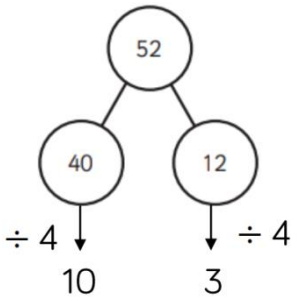
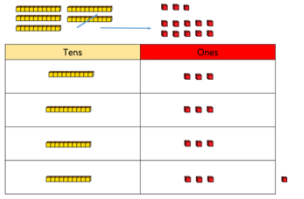
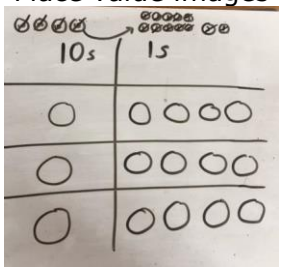
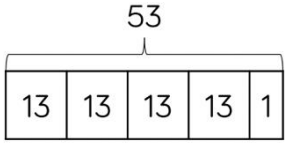
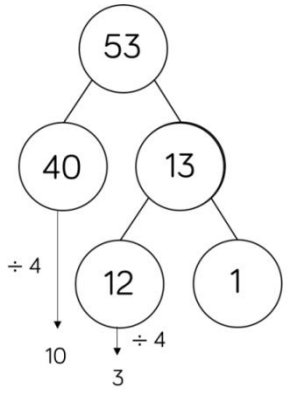
		numbers up to 19 • multiply numbers up to 4 digits by a one- or two-digit number using a formal written • method, including long multiplication for two-digit numbers • multiply numbers mentally drawing upon known facts • multiply whole numbers and those involving decimals by 10, 100 and 1000			<table><tr><td>×</td><td>20</td><td>2</td></tr><tr><td>30</td><td>600</td><td>60</td></tr><tr><td>1</td><td>20</td><td>2</td></tr></table>	
Multiply 2-digit by 3-digit numbers	5		Place value counters 		Short written method <table><tr><td>Th</td><td>H</td><td>T</td><td>O</td></tr><tr><td></td><td>2</td><td>3</td><td>4</td></tr><tr><td>×</td><td></td><td>3</td><td>2</td></tr><tr><td></td><td>4</td><td>6</td><td>8</td></tr><tr><td>1 7</td><td>1 0</td><td>2</td><td>0</td></tr><tr><td>7</td><td>4</td><td>8</td><td>8</td></tr></table> Grid method <table><tr><td>×</td><td>200</td><td>30</td><td>4</td></tr><tr><td>30</td><td>6,000</td><td>900</td><td>120</td></tr><tr><td>2</td><td>400</td><td>60</td><td>8</td></tr></table>	
Multiply 2-digit by 4-digit numbers	5/6	Year 6 Pupils should be taught to: • multiply multi-digit numbers up to 4 digits by a two-digit whole number			Formal written method	Multiply Multiplied by Multiple, factor Groups of Times Product

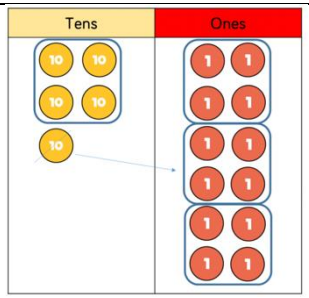
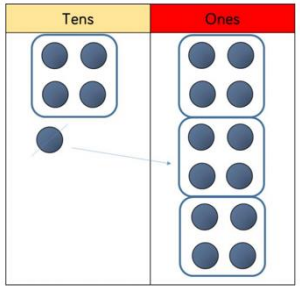
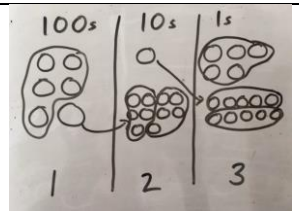
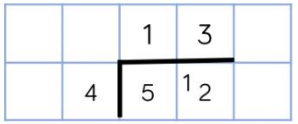
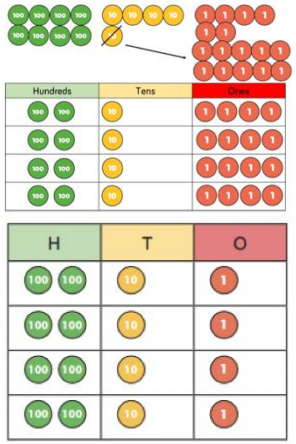
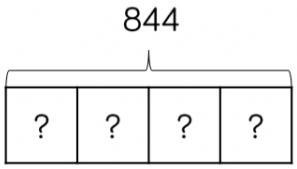
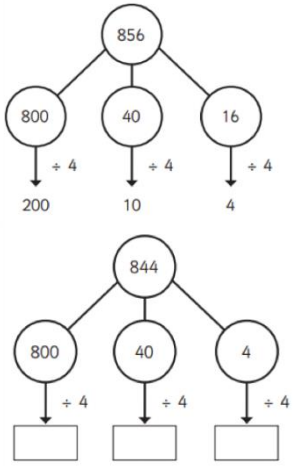
		using the formal written method of long multiplication • perform mental calculations, including with mixed operations and large numbers • identify common factors, common multiples and prime numbers • use their knowledge of the order of operations to carry out calculations involving the four operations				Once, twice, three times … ten times Repeated addition

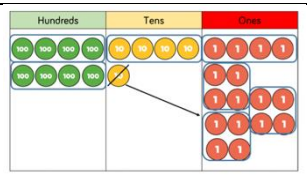
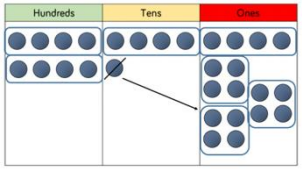
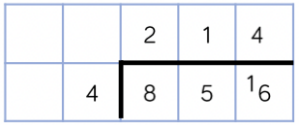
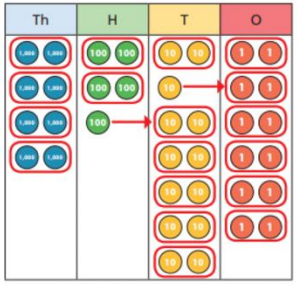
Division

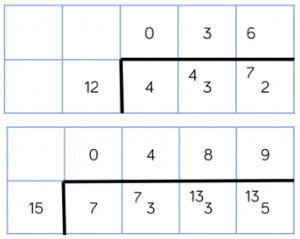
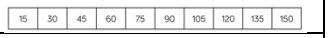
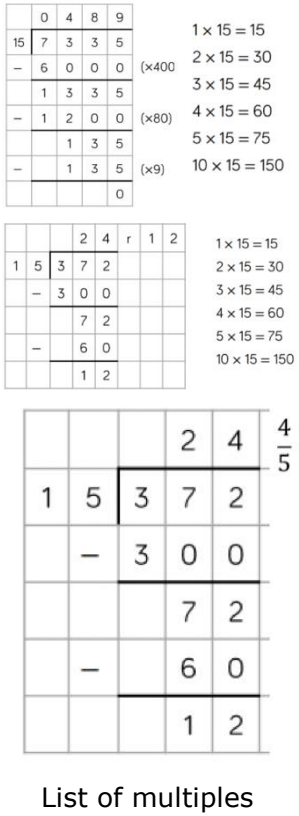
Small step	Year group most commonly introduced	National Curriculum	Concrete	Pictorial	Abstract	Vocabulary
Solve one-step problems with division (sharing)	1/2	Year 1 Pupils should be taught to: • solve one-step problems involving division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.	Real life objects   Counters  Number shapes 	Bar model  Arrays 	$20 \div 5 = 4$	Division Dividing Grouping Sharing Halving Array Number patterns
Solve one-step problems with division (grouping)	1/2	Year 2 Pupils should be taught to: • recall and use division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers • calculate mathematical statements for division within the multiplication tables and write them using the	Real life objects  	Number lines  Arrays  Ten frames	Calculations $20 \div 5 = 4$ Number lines 	Dividing, divide, divided by, divided into Grouping Sharing, share, share equally Left, left over One each, two each, three each … ten each Group in pairs, threes … tens

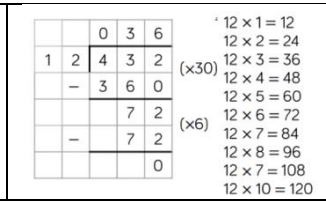
		division (÷) and equals (=) signs • show that and division of one number by another cannot be done in any order (commutative) • solve problems involving division, using materials, arrays, repeated addition, mental methods, and division facts, including problems in contexts.	 Number shapes  Bead strings  Counter 			Equal groups of Doubling Halving Array Row, column Number patterns Multiplication table Multiplication fact, division fact
Divide 2-digits by 1-digit (no exchange sharing)	3	Year 3 Pupils should be taught to: • recall and use division facts for the 3, 4 and 8 multiplication tables • write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers times one-digit	Straws Base 10  Place value counters 	Bar model	Part-whole model  Calculations $48 \div 2 = 24$	Division Dividing, divide, divided by, divided into Left, left over, remainder Grouping Sharing, share, share equally One each, two each, three each … ten each Group in pairs, threes
Divide 2-	3		Straws	Bar model	Part-whole model	

digits by 1-digit (sharing with exchange)		numbers, using mental and progressing to formal written methods • solve problems, including missing number problems, involving division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.	Base 10  Place value counters  	52  Part-whole model	 $10 + 3 = 13$ Calculations $\mathbf{52 \div 4 = 13}$	… tens Equal groups of Halving Array Row, column Number patterns Division fact
Divide 2-digits by 1-digit (sharing with remainders)	3/4	Year 4 Pupils should be taught to: • recall division facts for multiplication tables up to 12 × 12 • use place value, known and derived facts to divide mentally, including: dividing by 1 • recognise and use factor pairs and commutativity in mental calculations	Straws Base 10  Place value counters  	Place value images  	Bar model  Part-whole model  	Dividing, divide, divided by, divided into Left, left over, remainder Grouping Sharing, share, share equally One each, two each, three each … ten each Group in pairs, threes … tens Equal groups of Doubling
Divide 2-digits by 1-	4/5		Place value counters	Place value grid	Written short division	

digit (grouping)			 Counters 			Halving Array Row, column Number patterns Multiplication table Multiplication fact, division fact Inverse Square, squared Cube, cubed
Divide 3-digits by 1-digit (sharing with exchange)	4		Base 10 Place value counters 	Bar model 	Part-whole model 	
Divide 3-digits by 1-	4/5	Year 5 Pupils should be	Place value counters	Place value grid	Written short division	Dividing, divide,

digit (grouping)		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 • 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 • divide whole numbers and those involving decimals by 10, 100 and 1000	 Counters 			divided by, divided into Left, left over, remainder Grouping Sharing, share, share equally One each, two each, three each … ten each Group in pairs, threes … tens Equal groups of Doubling Halving Array Row, column Number patterns Multiplication table Multiplication fact, division fact Inverse Square, squared Cube, cubed
Divide 4-digits by 1-digit (grouping)	5		Place value counters  Counters	Place value grid	Written short division 	

Divide multi-digits by 2-digits (short division)	6	Year 6 Pupils should be taught to: • 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			Written short division  List of multiples 	Dividing, divide, divided by, divided into Left, left over, remainder Grouping Sharing, share, share equally One each, two each, three each … ten each Group in pairs, threes … tens Equal groups of Doubling Halving Array Row, column Number patterns Multiplication table Multiplication fact, division fact Inverse Square,
Divide multi-digits by 2-digits (long division)	6				Written long division  List of multiples	

		knowledge of the order of operations to carry out calculations involving the four operations				squared Cube, cubed

References

This calculation policy has been created using resources from:
White Rose Maths
Third Space Learning
Schools within the GLT