Heigham Community Federation

Calculation Policy

We believe that everyone can do maths. Children are encouraged to enquire, ask questions and spot patterns. We aim to spark curiosity and show children the relevance of mathematics in their own everyday lives. We use a mastery approach where all children work on the same learning objectives with support, scaffolding and deepening.

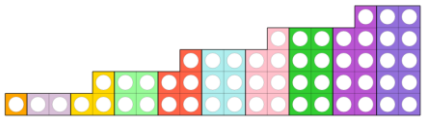
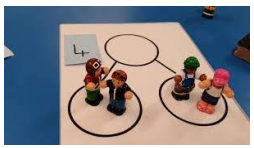
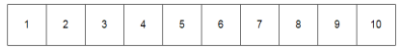
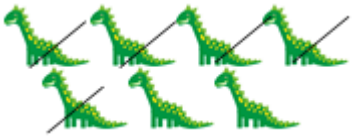
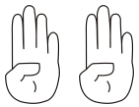
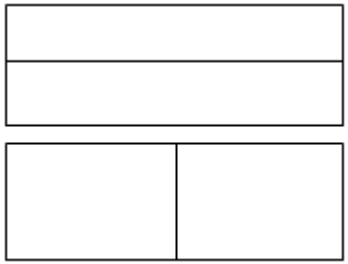
We use the concept of concrete, pictorial and abstract mathematics whereby children use physical equipment (concrete), draw pictures representing what they have done (pictorial) and work with numbers (abstract). The abstract runs alongside the concrete and pictorial stage as this enables children to better understand mathematical statements and concepts. Reinforcement is achieved through going backwards and forwards between these representations. Alongside this, we build fluency in calculation so that children can apply what they have learned in new contexts.

We aim for automaticity in recall and retrieval of number facts such as fact families (2 + 8 = 10, 3 + 7 = 10) and times tables. This reduces the demand on children's working memory so they can apply their knowledge to more complicated mathematics. Children's independence is built as they learn which skills and strategies to use when solving a problem.

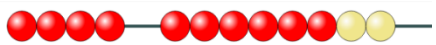
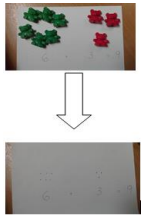
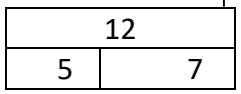
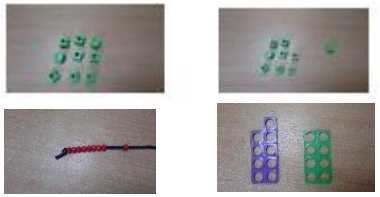
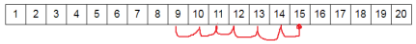
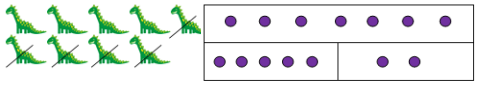
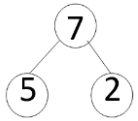
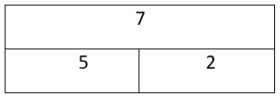
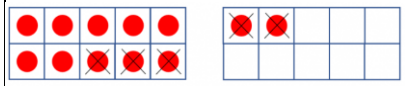
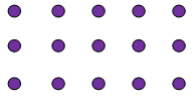
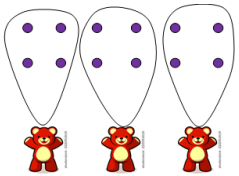
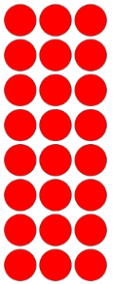
A deep understanding of calculation is essential for a firm foundation for mathematics. Calculation is the foundation on which the building blocks of mathematics are constructed. Through carefully planned progression, we support children to a confident use of calculation so that they can access creative and innovative mathematics.

A shared language of mathematics is essential for children's understanding. Across the Federation, we use the correct mathematical terminology alongside child-friendly language to ensure consistency and understanding.

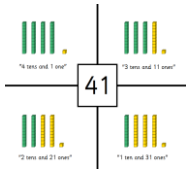
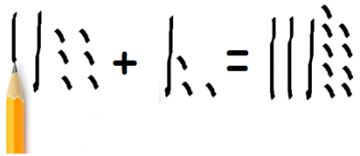
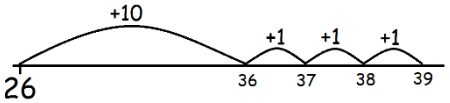
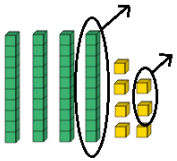
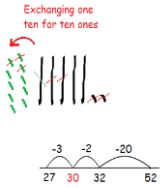
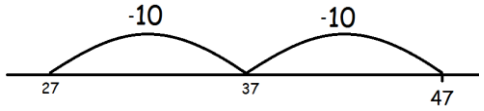
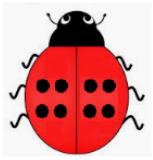
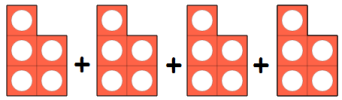
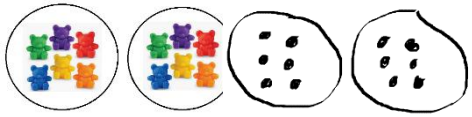
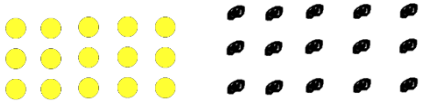
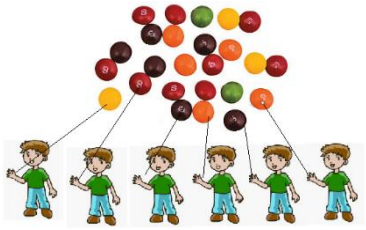
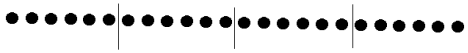
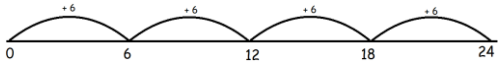
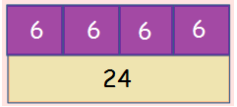
How we calculate in the EYFS

Addition	Subtraction	Multiplication	Division
Use pictures, tens frames, cubes, and other concrete resources to add numbers together. 5 frames and then 10 frames can be used with double sided counters.  Use number shapes to 10.  Explore different number shapes and play 'snap it'.  Children to be able to subitise up to 5 and to combine two groups.    By the end of the EYFS, children should have a deep understanding of numbers to 10.	Use objects, counters, cubes to show how objects can be taken away. Children are able to refer to one less than a number and can count backwards from 10.    Children to use manipulatives to take an amount away.   Children to draw a set of objects and to cross out a set amount.  By the end of EYFS, children should have a deep understanding of numbers to 10.	Explore and represent patterns with numbers up to 10, including equal groups, even and odds and double facts. Children use their fingers to recall doubling facts.  Use manipulatives to represent doubling facts.  Children to be able to recall odd and even numbers to 10.  By the end of EYFS, children should be able to recall doubling number facts to 10 and understand the concept of making equal groups.	Explore how quantities can be distributed equally and shared fairly. Share objects into groups.    Children can refer to half of something, including numbers to 10.  By the end of EYFS, children should be able to make equal groups and share objects out fairly.

How we calculate in Year 1

Addition	Subtraction	Multiplication	Division
Continue using methods from EYFS. Children to use a range of manipulatives.   Use a bead string as a number line, to add on, and to flip it to explore the commutative law.  Use manipulatives and translate this to pictorial representations.   Use a bar model to partition numbers.   By the end of Year 1, children should be able to recall bonds to 10 and family facts. Use concrete and pictorial methods to record addition number sentences up to 100.	Continue using methods from EYFS. Children to use a range of manipulatives.  Use of bead strings and number lines to count backwards.  Using manipulatives and pictorial representations.    Use ten frames to partition, showing knowledge of 10 family facts.  By the end of Year 1, children should be able to use concrete, pictorial methods to count backwards and to record subtraction number sentences up to 100.	Continue using methods from EYFS. Children learn how to count in 2s, 5s and 10s and group sets of objects.  Children use a range of manipulatives to explore doubling and repeated addition.   Children learn how to make an array using manipulatives and then move on to drawing an array.  Rotate the picture to show the commutative law.   By the end of Year 1, children should be able to recall doubles to 10 and use this knowledge to support halving and doubling larger numbers. They should understand multiplication and repeated addition. They should be able to represent numbers, groups and sets as arrays.	Continue using methods from EYFS. Children use manipulatives to share objects into equal groups.   Group and arrange arrays using manipulatives and then move onto drawing an array.   By the end of Year 1, children should understand division as sharing equally into groups. They should be able to share into groups using concrete apparatus and then move to pictorial and abstract representations.

How we calculate in Year 2

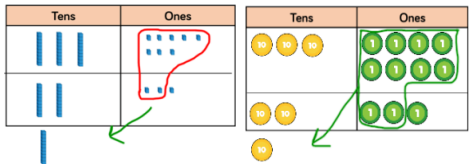
Addition	Subtraction	Multiplication	Division
Methods from Year 1 to be continued in Year 2. Use concrete resources such as Base 10 or a hundred square to support counting. Children understand place value. They partition two numbers and then add them together.   Draw tens and ones to add 2-digit numbers, including crossing 10s.  Draw number lines, including jumps of 10 or more if confident.  Introduce column addition in Summer term. By the end of Year 2, children should be able to add two 2-digit numbers.	Methods from Year 1 to be continued in Year 2. Use concrete resources such as a number line or bead string to practice counting backwards.  Subtract using concrete resources so children have to take away the whole before moving to pictorial.   Drawing tens and ones and crossing, including exchanging one ten for ten ones   Children use a number line, starting at the bigger number and counting backwards.  By the end of year 2, children should be able to subtract using two 2-digit numbers.	Methods from Year 1 to be continued in Year 2. Use knowledge of doubling to halve and double bigger numbers.   Multiplication as repeated addition  Grouping objects and drawing groups.  Making and drawing arrays, using appropriate counting methods to record number sentence.  Understand that multiplication and division are the inverse of each other. By the end of Year 2, children should be able to recall all multiplication facts for the 2, 5 and 10 times tables.	Methods from Year 1 to be continued in Year 2. Use knowledge of sharing into equal groups. Use concrete first, then move to pictorial representations.    Use of a bar model  Link division to multiplication by exploring the inverse using an array.  By the end of the year children should be able to recall all division facts for the 2,5,10 times tables.

How we calculate in Year 3

Addition

Continue to use skills from Year 2 to count on from the larger number when adding a single-digit number to a 2-digit number.

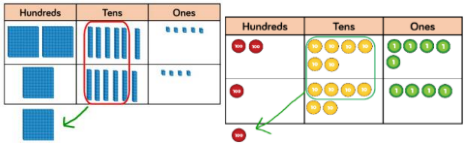
Add two 2-digit numbers, using Base 10 and counters to develop understanding of column addition.



Base 10 supports initial understanding because it is proportionally correct to the place value of the numbers. Counters then support the move to abstract methods.

$$\begin{array}{r} 38 \\ +\,23 \\ \hline 61 \\ \hline 1 \end{array}$$

Add numbers with up to three digits, using concrete apparatus to support understanding of the column method.



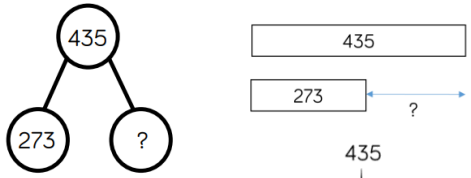
$$\begin{array}{r} 265 \\ +\,164 \\ \hline 429 \\ \hline 1 \end{array}$$

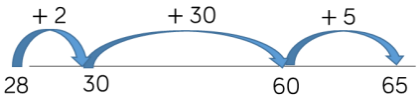
It is helpful for children to write out their calculation alongside any concrete resources they have used.

Subtraction

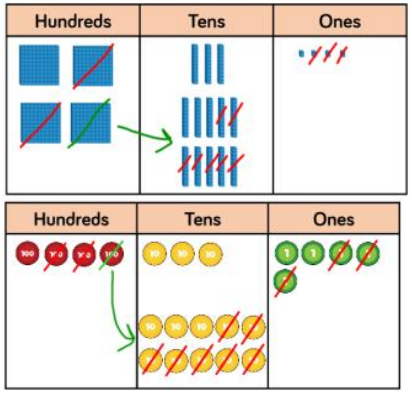
Continue to use skills from Year 2

Children are shown subtraction in different contexts to understand it as both "subtracting an amount" and "finding the difference" between two amounts.





Subtract numbers with up to 3 digits. Use Base 10 and counters to support children's understanding. This also helps them to understand the concept of exchanging.

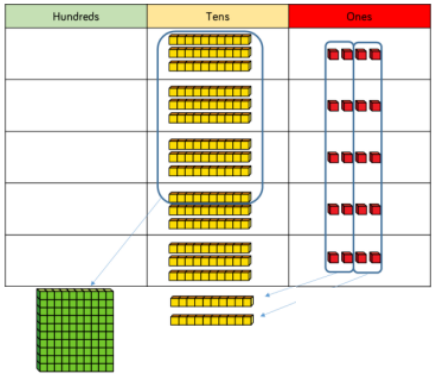


$$\begin{array}{r} {}^{3}\cancel{4}^{1}35 \\ -\,273 \\ \hline 162 \end{array}$$

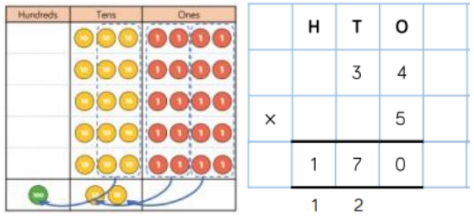
Multiplication

Continue to use arrays from Year 2 to support understanding of multiplication, including understanding of division as the inverse of multiplication.

Children develop the foundations of the formal written method of multiplication by using Base 10 apparatus.



Place value counters are also used to support understanding of the method.



Children use their knowledge of times tables facts to support with multiplication methods.

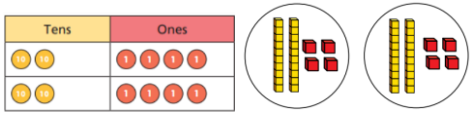
By the end of Year 3, children should be able to recall and use all multiplication facts from the 3, 4, and 8 times tables.

Division

Continue to use arrays from Year 2 to support understanding of division as grouping and the links to times tables and multiplication.

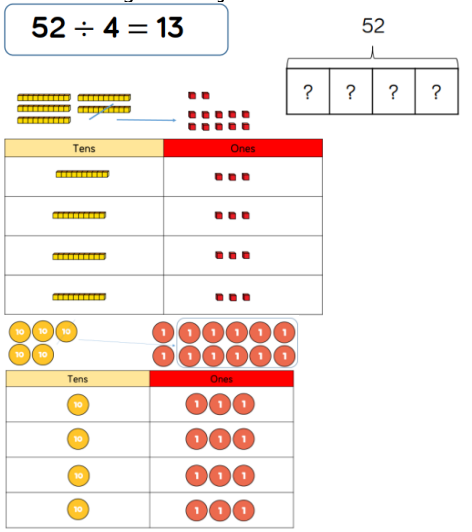
Divide a 2-digit number by a 1-digit number, using sharing. Base 10 and counters can be used to support this.

48 ÷ 2 = 24



Divide a 2-digit number by a 1-digit number, using sharing with exchange. Use Base 10 and counters to support place value understanding. When dividing numbers involving an exchange, children can exchange 1 ten for 10 ones.

52 ÷ 4 = 13

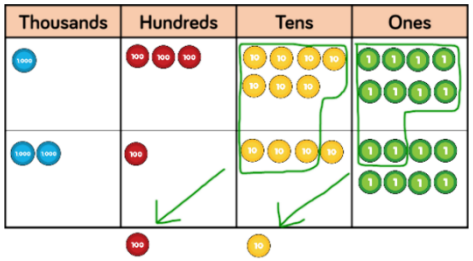


By the end of Year 3, children should be able to recall and use all division facts from the 3, 4, and 8 times tables.

How we calculate in Year 4

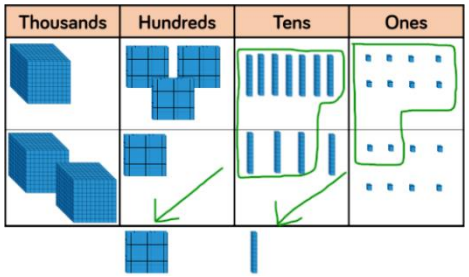
Addition

Adding numbers with up to 4 digits.
Place value counter and Base 10 are used to support children's understanding.

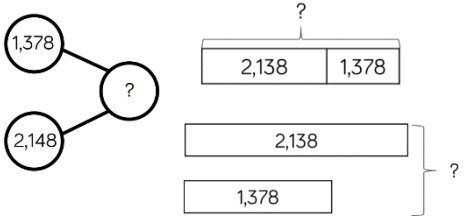


	1	3	7	8
+	2	1	4	8
	3	5	2	6
		1	1	

Children write their calculations alongside any resources used so they can see the links to the written column method.

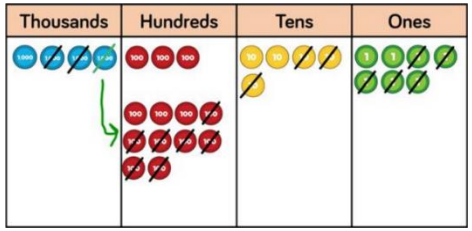


Children are also encouraged to use different representations (bar models and part-whole models) to help them.



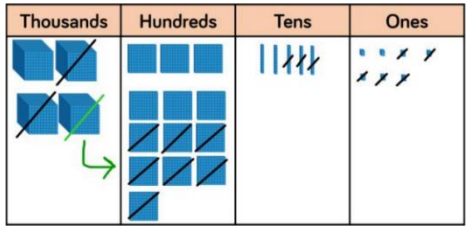
Subtraction

Adding numbers with up to 4 digits.
Place value counter and Base 10 are used to support children's understanding.

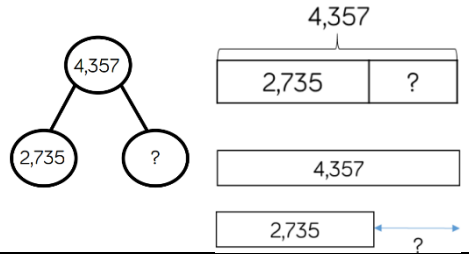


$$\begin{array}{r} {}^{3}\,{}^{1} \\ 4\cancel{3}57 \\ -\ 2735 \\ \hline 1622 \end{array}$$

Children write their calculations alongside any resources used so they can see the links to the written column method.



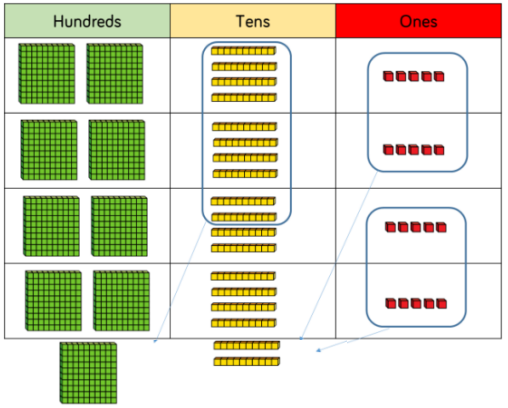
Children use the same representations as when they use addition, but the missing number is now a part of the whole.



Multiplication

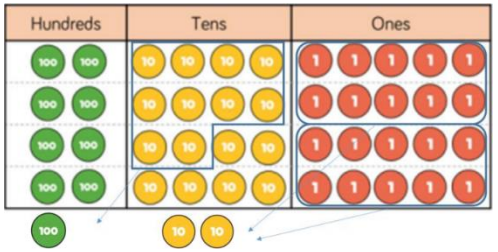
Multiply 3-digit numbers by 1-digit numbers.

Place value counters and Base 10 continue to support the understanding of the formal written method, short multiplication.



Children are encouraged to move to the short, formal written method as soon as they have a secure understanding of the concept.

		H	T	O
		2	4	5
×				4
		9	8	0
		1	2	

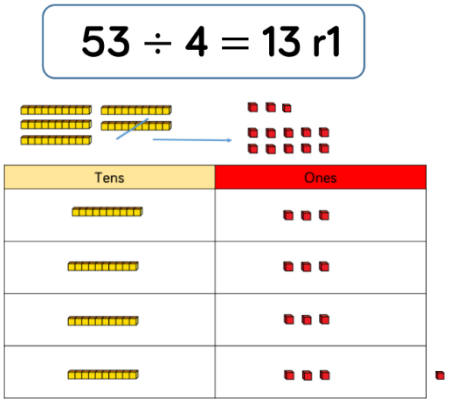


By the end of Year 4, children should be able to recall and use all multiplication facts for the 6, 7, 9, 11, and 12 times tables.

Division

Divide a 2-digit number by a 1-digit number, using sharing.

Place value counters and Base 10 are used to exchange 1 ten for 10 ones.



Starting with the equipment outside the place value grid will highlight remainders, as they will be left outside the grid once the equal groups have been made.

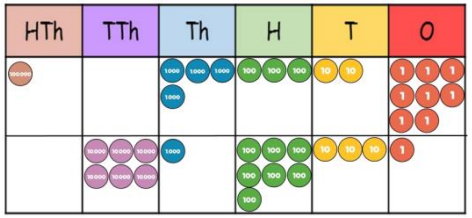


By the end of Year 4, children should be able to recall and use all division facts for the 6, 7, 9, 11, and 12 times tables.

How we calculate in Year 5

Addition

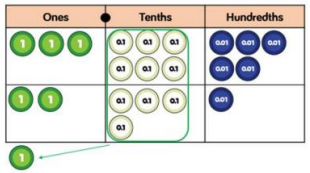
Adding numbers with more than 4 digits. Place value counters are used to support children's understanding.



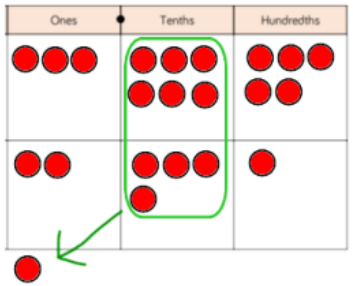
Children are encouraged to work in the abstract, using the column method.

1	0	4	3	2	8
+	6	1	7	3	1
1	6	6	0	5	9
	1				

Adding with up to 3 decimal places. Children can use place value counters or blank counters.

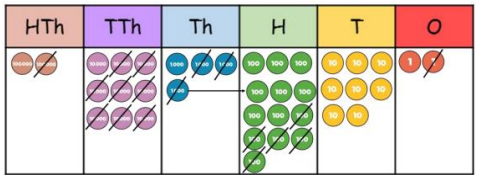


$$\begin{array}{r} 3.65 \\ +\ 2.41 \\ \hline 6.06 \\ \hline 1 \end{array}$$

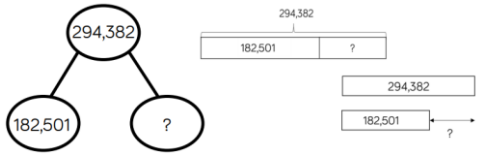


Subtraction

Children build on Year 4 work to subtract numbers with more than 4 digits. Place value counters or plain counters on a place value grid are used when working with large numbers.



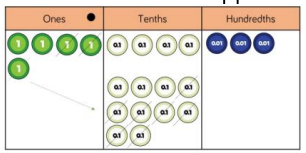
Bar models and part-whole models are used to support understanding.

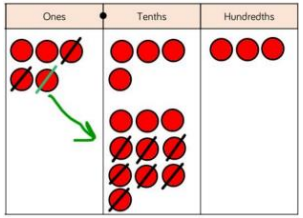


Children are encouraged to work in the abstract, using the column method.

	2	9	$^{3}\not{4}$	$^{1}3$	8	2
–	1	8	2	5	0	1
	1	1	1	8	8	1

Subtracting with up to 3 decimal places. Children can use place value counters or blank counters to support with exchanging.

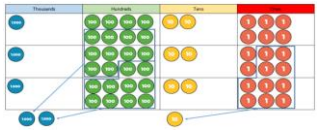




$$\begin{array}{r} {}^{4}\not{5}.{}^{1}43 \\ -\ 2.7 \\ \hline 2.73 \end{array}$$

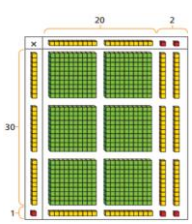
Multiplication

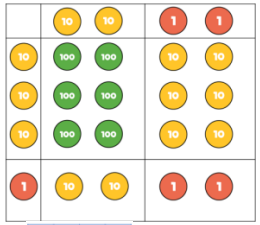
Multiply 4-digit numbers by 1-digit numbers. Place value counters support understanding of formal written method of short multiplication.



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

Multiply 2-digit numbers by 2-digit numbers. Base 10 and counters can be used in the area model to help children understand the size of the numbers.

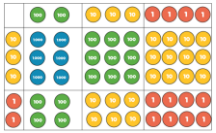




×	20	2
30	600	60
1	20	2

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

Multiply 3-digit numbers by 2-digit numbers. Continue to use area model.



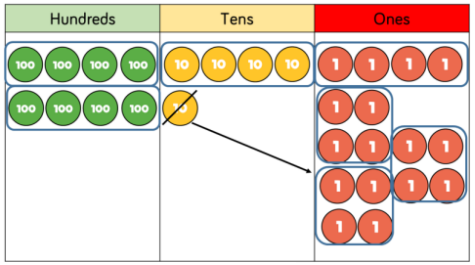
Move towards formal written methods of long multiplication.

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

	Th	H	T	O
		2	3	4
×			3	2
		4	6	8
$^{1}7$	$^{1}0$	2	0	
7	4	8	8	

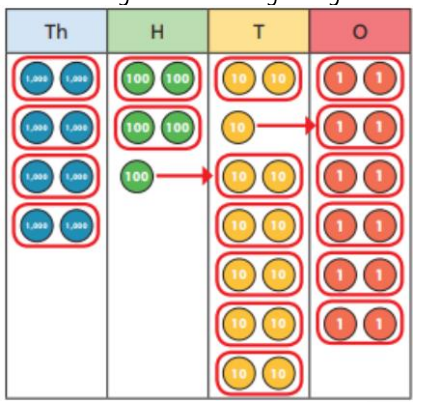
Division

Divide 3-digit numbers by 1-digit numbers using grouping to support understanding. Place value counters help to develop understanding of the short division method.



		2	1	4
	4	8	5	$^{1}6$

Divide 4-digit numbers by 1-digit numbers.



	4	2	6	6
2	8	5	$^{1}3$	$^{1}2$

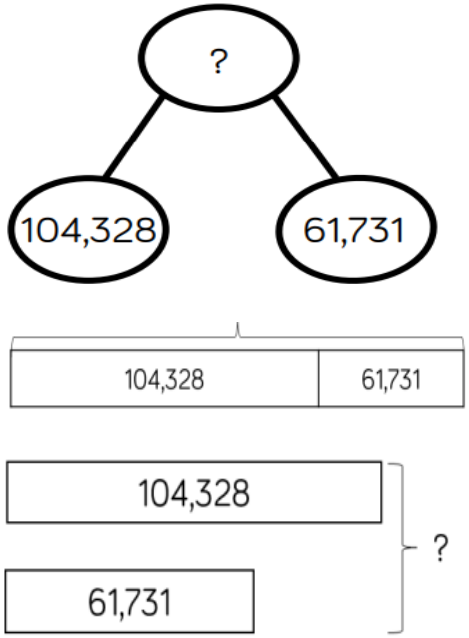
Children are encouraged to move towards the abstract, particularly when multiple exchanges are needed.

How we calculate in Year 6

Addition

Continue to use methods from Year 5 for addition with numbers with more than 4 digits and up to 3 decimal places.

Use understanding of part-whole models and bar models to solve increasingly complex problems.



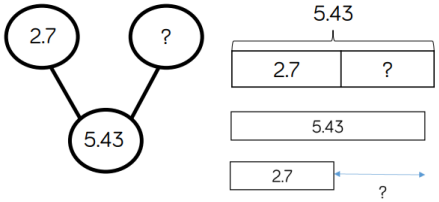
Subtraction

Continue to use methods from Year 5 for subtraction with numbers with more than 4 digits and up to 3 decimal places.

Develop further understanding of how to subtract numbers with different numbers of decimal places.

Apply understanding to solve problems involving money and other measures.

5.43 − 2.7 = 2.73



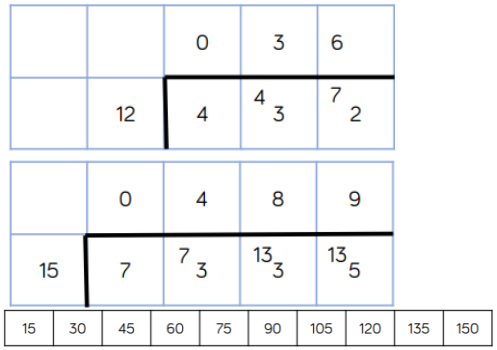
Multiplication

Multiply 4-digit numbers by 2-digit numbers. Continue to use area model and grid method to support children's understanding of the concept, while moving towards use of long multiplication as a formal written method.

TTh	Th	H	T	O
	2	7	3	9
×			2	8
2 (2)	1 (5)	9 (3)	1 (7)	2
5 (1)	4	7 (1)	8	0
7	6	6	9	2
		1		

Division

Divide multi-digits by 2-digits (short division) Written methods are the most accurate. Children are encouraged to write out times table facts to support calculation.



Problem solving may involve remainders where the quotient needs to be rounded up or down.

Divide multi-digits by 2-digits (long division)

