Winston Way Academy
The best in everyone™
Part of United Learning

Winston Way Primary Academy Mathematics Calculation Policy

Curriculum Statements

Key Stage 1

The principal focus of mathematics teaching in key stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This should involve working with numerals, words and the four operations, including with practical resources [for example, concrete objects and measuring tools].

At this stage, pupils should develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teaching should also involve using a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money.
By the end of year 2, pupils should know the number bonds to 20 and be precise in using and understanding place value. An emphasis on practice at this early stage will aid fluency.
Pupils should read and spell mathematical vocabulary, at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Lower Key Stage 2

The principal focus of mathematics teaching in lower key stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

At this stage, pupils should develop their ability to solve a range of problems, including with simple fractions and decimal place value. Teaching should also ensure that pupils draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them. It should ensure that they can use measuring instruments with accuracy and make connections between measure and number.

By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12-multiplication table and show precision and fluency in their work. Pupils should read and spell mathematical vocabulary correctly and confidently, using their growing word reading knowledge and their knowledge of spelling.

Upper Key Stage 2

The principal focus of mathematics teaching in upper key stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio.

At this stage, pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems. Teaching in geometry and measures should consolidate and extend knowledge developed in number. Teaching should also ensure that pupils classifyshapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them.

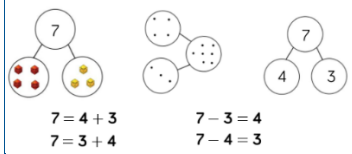
By the end of year 6, pupils should be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals andpercentages.

Year 1

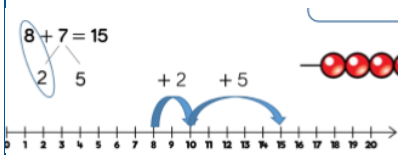
Addition	Subtraction	Multiplication	Division
United Learning KPIs M1.1 he/she can count to and across 100 forwards and backwards, beginning with0 or 1, or from any given number. M1.2 he/she can count, read and writenumbers to 100.	**United Learning KPIs** M1.4 he/she can represent (including symbols) and use number bonds and related subtraction facts within 20	**United Learning KPIs** M1.3 he/she can count in multiples oftwos, fives and tens.	**United Learning KPIs** M1.3 he/she can count in multiples oftwos, fives and tens.
White Rose Hub Policy Statement - Combining two parts to make a whole:part whole model - Starting at the bigger number andcounting on- using cubes. - Making 10 using ten frames.	**White Rose Hub Policy Statement** - Taking away ones - Counting back - Finding the differencePart whole model - Making 10 using the ten frames	**White Rose Hub Policy Statement** - Recognising and making equal groups. - Doubling - Counting in multiples - Using cubes, ten frames and other objects inthe classroom	**White Rose Hub Policy Statement** - Sharing objects into groups - Division as grouping e.g. I have 12 sweets and put them in groups of 3, how many groups? - Using cubes and drawing round 3 cubes at atime.
Key vocabulary: add, plus, together, total, altogether, sum, more than, commutative, aggregation	**Key vocabulary:** take away, subtract, minus, difference, less than, partition, subitise	**Key vocabulary:** times, repeated addition, commutative law, equal groups, arrays, multiply, lots of	**Key vocabulary:** share, divide, equal groups, lots of, fractions, half, quarter, numerator, denominator

Children move away from using fingers to add, instead they begin to use objects. Using objects enables children to see how much each number represents.

Part-whole model
Children partition a number into two or more parts. When the parts are complete and the whole is empty, children use aggregation to add the parts together to find the total.

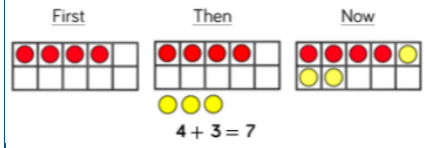


Number lines
Number lines are introduced and usedfor adding on by jumping on. Children also use the number line to findone more.



Ten frames and number bonds Children learn number bonds up to 10 using calculations and ten frames e.g.

5 + 5 = 10 3 + 7 = 10 4 + 6 = 10
7 + 3 = 10 6 + 4 = 10 2 + 8 = 10 8 +2 = 10 9 + 1 = 10 1 + 9 = 10 0 + 10 = 10

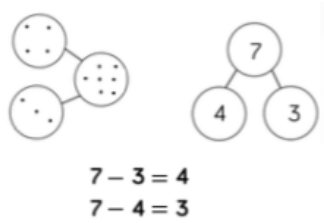


Children then move onto learning number bonds up to 20.

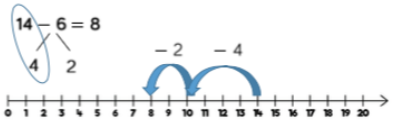
Number shapes
Children use number shapes to see how the

Children understand that subtraction means taking something away.

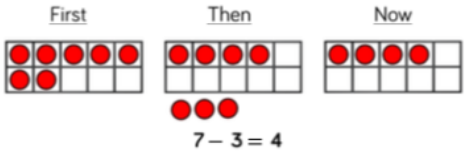
Part-whole model
Children partition a number into two or more parts. When the parts are complete and the whole is empty, children use aggregation to add the parts together to find the total.



Number lines
Children can subtract numbers by firstly jumping to the nearest 10. Children can see how they partition the smaller number into two separate jumps.



Ten frames and number bonds
Children use ten frames to count backwards.



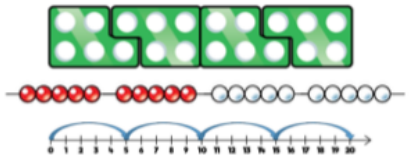
Number shapes
Children can start with the whole and then palce of the parts on top of the whole to see what part is missing. Children will start to be able to subitise the part that is missing due to their familiarity with the shapes.

Children represent multiplication as repeated addition in many different ways.

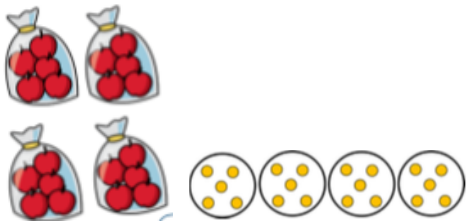
Children use concrete and pictorial representations to solve problems. They are not expected to record multiplication formally.

Arrays (Use cubes to support) Use arrays to help them visually understand multiplication.
Understand commutative law.
e.g. 4 x 5 = 20 and 5 x 4 = 20

Repeated addition (cubes to support)
Children use repeated addition using diagrams or practical resources such as diene, counters, number shapes, bead strings and number lines. e.g. 3 x 2 = 6



Equal groups
Understand that 2 x 6 means 2 groups of 6. When they hear 'groups', they should know they need to draw circles, squares or bars and put 6 in each.



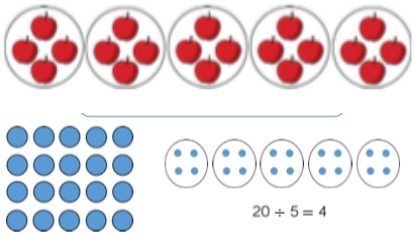
Children learn to count on and back in 2s, 5s and 10s, using a variety of concrete resources and real life objects.

Children look at the hundred-square grid and begin to recognise patterns when counting. Children also learn to count on and back from any given number.

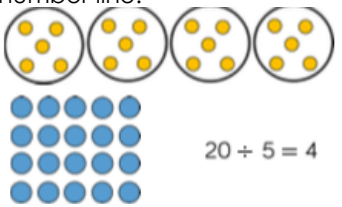
Children learn to group objects into 2s, 3s, 4s, etc. using objects to understand sharing. e.g. You have 10 sweets, can you share these between two people.

Children learn odd and even numbers; numbers that are equally shared are fair and even, numbers that do not share equally are unfair and odd. They then move onto recognising odd and even numbers by looking at the ones column.

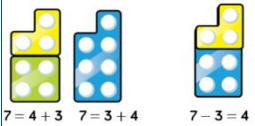
Sharing
Children use cubes, counters and real-life objects to share into big circles concretely.

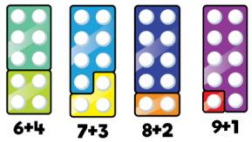


Grouping (Repeated subtraction)
Children solve problems by grouping and counting the number of groups. Grouping encourages children to count in multiples and links to repeated subtraction on a number line.

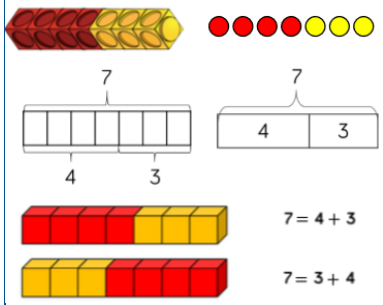


parts come together to make a whole.



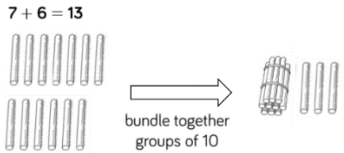


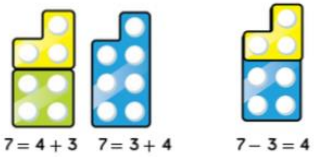
Bar model and Cubes
Children can use cubes and discrete models to add and find the difference.



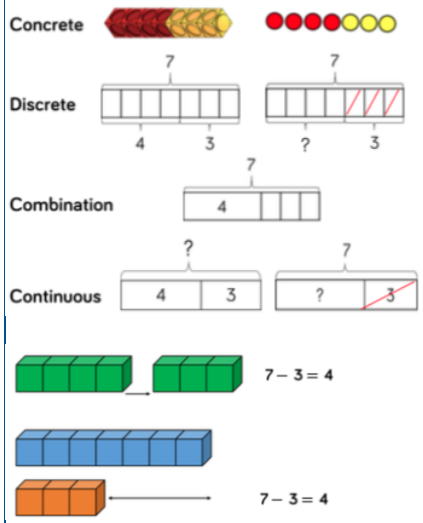
Bead strings
Children can find all the number bonds to 10 by moving one bead at a time to see the different numbers they have partitioned the 10 beads into e.g. 2+8 = 10, move one bead, 3 + 7 = 10

Straws
Children bundle a group of 10 straws to represent the exchange from 10 ones to 1 ten. They then add the individual straws (ones) and bundles of straws (tens) to find the total.

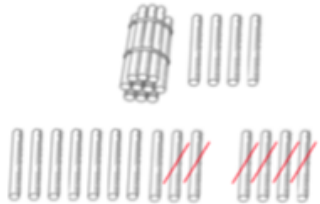




Bar model and Cubes
Cubes and counters can be used in a line as a concrete representation of the bar model. Children use discrete, combination and continuous bar models to take away.



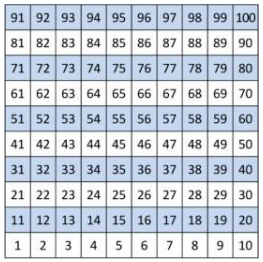
Straws
When subtracting numbers, children unbundle a group of 10 straws to represent exchange from 1 ten to 10 ones.



Hundred-square
Children learn to take away in 10s using the hundred-square grid.

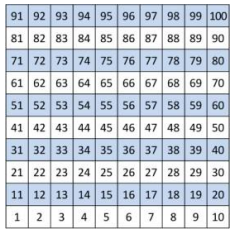
Fractions
Children learn about halves and quarters using a variety of resources, cutting fruits,drawing shapes, sharing objects. They use the fractions ½ and ¼. (Use the same method used for division)

Hundred Square
Children learn to add in 10s using the hundred square grid.



91	92	93	94	95	96	97	98	99	100
81	82	83	84	85	86	87	88	89	90
71	72	73	74	75	76	77	78	79	80
61	62	63	64	65	66	67	68	69	70
51	52	53	54	55	56	57	58	59	60
41	42	43	44	45	46	47	48	49	50
31	32	33	34	35	36	37	38	39	40
21	22	23	24	25	26	27	28	29	30
11	12	13	14	15	16	17	18	19	20
1	2	3	4	5	6	7	8	9	10

Children to use known addition facts to help them quickly work out subtraction sums. e.g. I know that 4 + 6 = 10, so 10 – 4 = 6.



91	92	93	94	95	96	97	98	99	100
81	82	83	84	85	86	87	88	89	90
71	72	73	74	75	76	77	78	79	80
61	62	63	64	65	66	67	68	69	70
51	52	53	54	55	56	57	58	59	60
41	42	43	44	45	46	47	48	49	50
31	32	33	34	35	36	37	38	39	40
21	22	23	24	25	26	27	28	29	30
11	12	13	14	15	16	17	18	19	20
1	2	3	4	5	6	7	8	9	10

Context: Money
Subtraction in a different context: Children are introduced to money. They use all these methods to work out moneyproblems.

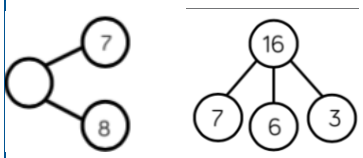
Year 2

Addition	Subtraction	Multiplication	Division
United Learning KPIs M2.5 he/she can solve problems with addition and subtraction using concrete objects and pictorial representations. M2.6 he/she can apply increasing knowledge of mental and written methods. M2.7 he/she can recall and use addition and subtraction facts to 20 fluently.	**United Learning KPIs** M2.5 he/she can solve problems with addition and subtraction using concrete objects and pictorial representations. M2.6 he/she can apply increasing knowledge of mental and written methods. M2.7 he/she can recall and use addition and subtraction facts to 20 fluently.	**United Learning KPIs** M2.8 he/she can recall and use multiplication and division facts for the 2,5 and 10 multiplication tables, including recognizing odd and even numbers M2.9 he/she can solve problems involvingmultiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in context	**United Learning KPIs** M2.8 he/she can recall and use multiplication and division facts for the 2,5 and 10 multiplication tables, including recognizing odd and even numbers M2.9 he/she can solve problems involvingmultiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in context
White Rose Hub Policy Statement - Adding three single digits - Use of base 10 to combine two numbers	**White Rose Hub Policy Statement** - Counting back - Find the difference - Part whole model - Make 10 - Use of base 10	**White Rose Hub Policy Statement** - Arrays- showing commutative multiplication	**White Rose Hub Policy Statement** - Division as grouping - Division within arrays- linking to multiplication - Repeated subtraction
Key vocabulary: add, plus, together, altogether, total, more, sum, forward, aggregation	**Key vocabulary:** take away, subtract, minus, less, fewer,left, back, difference, partition	**Key vocabulary:** times, repeated addition, double, groups of, multiply, triple, lots of, inverse, commutative law	**Key vocabulary:** share, divide, divide by, share equally, groups, sets, inverse, numerator, denominator

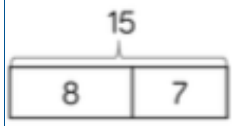
When adding one-digit numbers that cross 10, it is important to highlight the importance of ten ones equaling one ten.

Different manipulatives can be used to represent exchange.

Part-whole model
When the parts are complete and the whole is empty, children use aggregation to add the parts together to find the total.

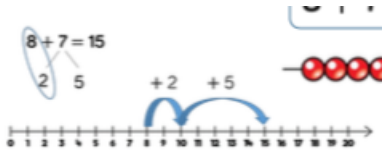


Bar models
Discrete and continuous bar models support aggregation. Cubes and counters can be concrete resources to support bar models.



Number lines
Children start from the larger number and partition the smaller number so that they know how to partition their jumps and move forward.

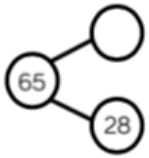
When adding single digits to a two-digit number, children should be encouraged to count on from the larger number.



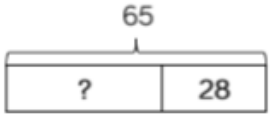
Children can also use a blank number line to count on to find the total. Encourage them to jump to multiples of 10 to become more efficient.

Children to continue building their number bond skills and using a variety of concrete resources to support their understanding of taking away.

Part-whole model
Children partition a number into two or more parts. When the parts are complete and the whole is empty, children use aggregation to add the parts together to find the total.

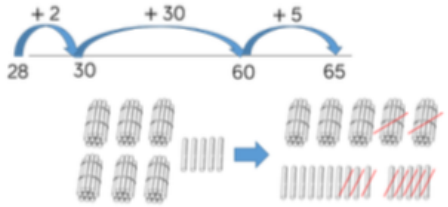


Bar models
Discrete and continuous bar models to support partitioning.



Number lines
Children to start from the larger number and partition the smaller number so that they know how to partition their jumps and move backwards.

Children can also use a blank number line to count on to find the difference. Encourage them to jump to multiples of 10 to become more efficient.



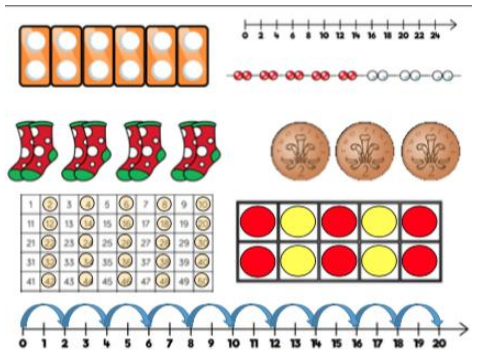
Formal column method
Encourage children to use the formal

Children need to be able to recall and use multiplication and division facts for the 2, 5 and 10 times table. Children are introduced to the multiplication symbol.

2 times table
Encourage daily counting in multiples both forwards and backwards using a number line or a hundred square.

Look for patterns in the two times table, using concrete manipulatives to support. Notice how all the numbers are even and there is a pattern in the ones.

Use different models to develop fluency.

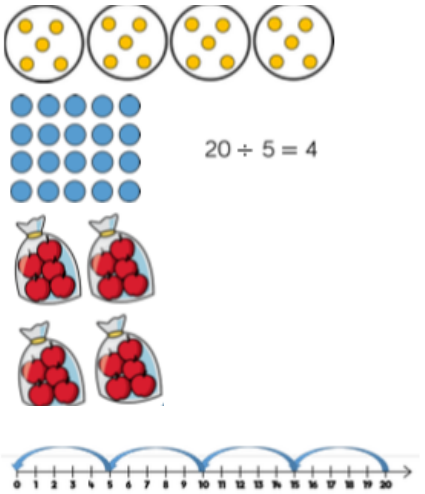


5 times table
Encourage daily counting in multiples both forwards and backwards using a number line or a hundred square.

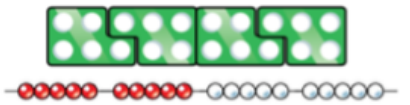
Look for patterns in the five times table, using concrete manipulatives. Notice the pattern in ones as well as highlighting the odd, even, odd, even pattern.

Children need to be able to recall and use multiplication and division facts for the 2, 5 and 10 times table. Children are introduced to the division symbol.

Grouping (Repeated subtraction)
Children solve problems by grouping and counting the number of groups. Grouping encourages children to count in multiples and links to repeated subtraction on a number line.

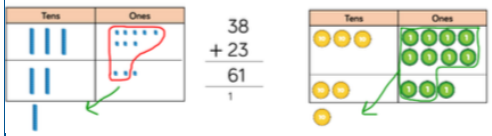


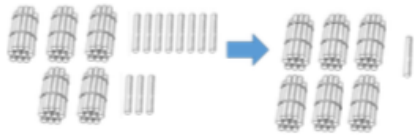
Number shapes and bead strings
Children can use concrete representations in fixed groups such as number shapes which helps to show the link between multiplication and division. Children can count in multiples using bead strings forwards and backwards.



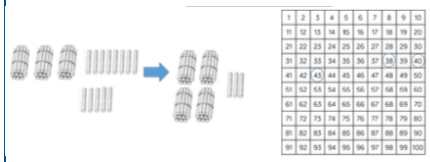
Straws, Base 10 and place value counters
When dividing larger numbers, children can use manipulatives that allow them to partition into tens and ones. These concrete resources can all be used to share numbers into equal groups.

Formal column method
Encourage children to use this method when calculating alongside concrete resources such as dienes, place value counter and straws. Children to exchange 10 ones for 1 tens.

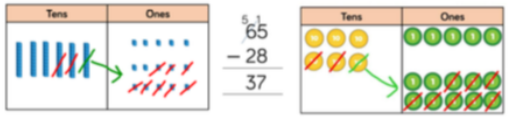


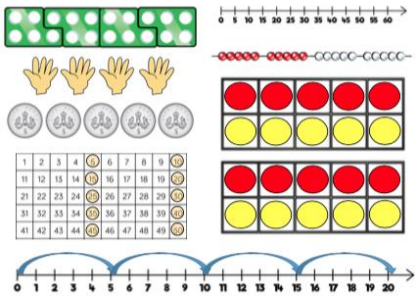


Hundred squares and Straws
Hundred straws and straws can support children to find the number bond to 10. As numbers become larger, straws become less efficient.



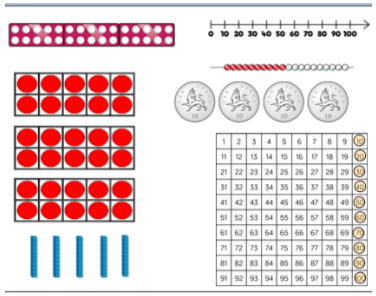
column method when calculating alongside straws, base 10 or place value counters. As numbers become larger, straws become less efficient. Children to exchange 10 ones for 1 tens when the ones digit is smaller than the ones digit in the bottom number.





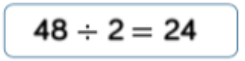
10 times table
Encourage daily counting in multiples both forwards and backwards using a number line or a hundred square.

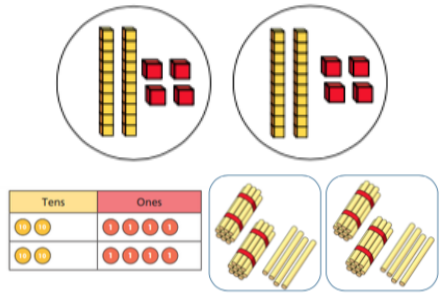
Look for patterns in the 10 times table, using concrete manipulatives. Notice the pattern in the digits – the ones are always 0, and the tens increase by 1 ten each time.



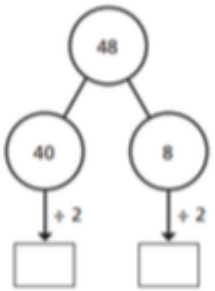
Arrays (Use cubes to support) Use arrays to help them visually understand multiplication.
Understand commutative law.
e.g. 4 x 5 = 20 and 5 x 4 = 20

Repeated addition (cubes to support)
Children use repeated addition using diagrams or practical resources such as





Part-whole model
This model provides children with a clear written method that matches the concrete representation.

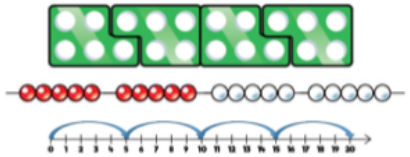
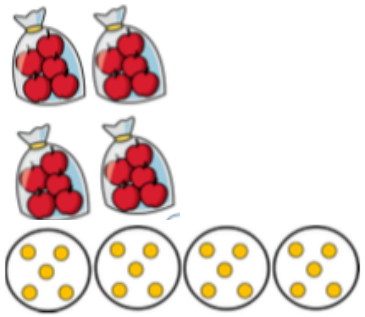


Inverse: We understand that divisionis the opposite to multiplication

Example
I know that: 4 x 3 =12 so 12 ÷ 3 = 4

Fractions

Children learn about halves and quarters using a variety of resources, cutting fruits, drawing shapes, sharing objects. They use the fractions ½, ¾ and ¼. They must also know the equivalence of 2

		diene, counters, number shapes, bead strings and number lines. e.g. 3 x 2 = 6  **Equal groups** Understand that 2 x 6 means 2 groups of 6. When they hear 'groups', they should know they need to draw circles, squares or bars and put 6 in each. 	4 and ¼ (Use the same method used for division) 1. Look at the denominator 2. Draw that number of circles (groups) 3. Share the amount into the circles 4. Look at the numerator to know how many circles (groups) they should count.  Children should understand that this (above) is the same as saying "We are finding out how many is in one group if we split 10 into 2 groups." Or "If we have 10, and we share it into 2 groups, how many will be in 1 group?"

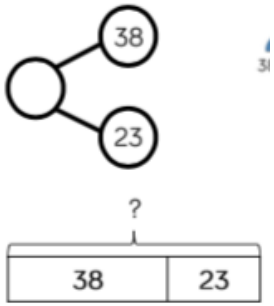
Year 3

Addition	Subtraction	Multiplication	Division
United Learning KPIs M3.5 he/she can add and subtract numbers mentally, including: A 3 digit number and ones; A 3 digit number and tens; A 3 digit number and hundreds.	**United Learning KPIs** M3.5 he/she can add and subtract numbers mentally, including: A 3 digit number and ones; A 3 digit number andtens; A 3 digit number and hundreds.	**United Learning KPIs** M3.6 he/she can recall and use multiplication and division facts for the 3,4 and 8 times tables.	**United Learning KPIs** M3.7 he/she can write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two digit numbers times onedigit numbers, using mental and progressing to formal written methods.
White Rose Hub Policy Statement Column method-exchanging. Using place value counters (up to 3 digits).	**White Rose Hub Policy Statement** Column method with exchanging.(up to 3 digits using place value counters)	**White Rose Hub Policy Statement** Arrays 2d × 1d using base 10 and place value counters	**White Rose Hub Policy Statement** Division with a remainder, using lollipopsticks, times tables facts and repeated subtraction. 2d divided by 1d using base 10 and place value counters
Key vocabulary: add, plus, together, altogether, total, more, sum of, forward, exchanging	**Key vocabulary:** take away, subtract, minus, less, fewer,left, back, exchanging	**Key vocabulary:** times, repeated addition, double, groups of, multiply, triple, commutative	**Key vocabulary:** share, divide, divide by, share equally,groups, sets, fractions, numerator, denominator

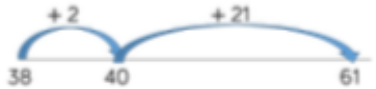
Children to continue building on their number bond skills from Year 2 in Year 3.

At this stage, encourage children to use the formal column method when calculating alongside straws, base 10 or place value counters. As numbers become larger, straws become less efficient.

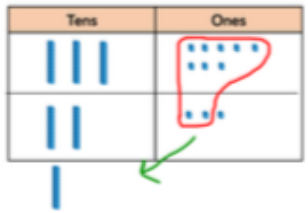
Part-whole model and bar model
When the parts are complete and whole is empty, children use aggregation to find the total.



Number lines
Children use blank number to count on to find the total. Encourage them to jump to multiples of 10 to become more efficient

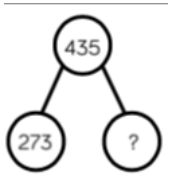


Written column method (using exchange)



Children to continue building on subtracting 1 and 2-digit numbers from 100. Children learn how to subtract numbers up to 3 digits.

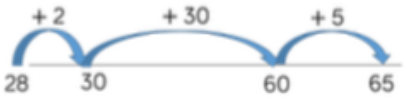
Part-whole model
Children partition a number into two or more parts. When the parts are complete and the whole is empty, children use aggregation to add the parts together to find the total.



Bar models
Discrete and continuous bar models to support partitioning.

Number lines
Children to start from the larger number and partition the smaller number so that they know how to partition their jumps and move backwards.

Children can also use a blank number line to count on to find the difference. Encourage them to jump to multiples of 10 to become more efficient.



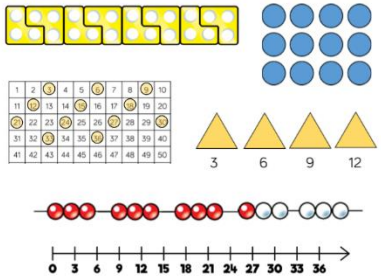
Children to continue consolidating their times table skills from Year 2 and are introduced to the 3, 4 and 8 times table. Children learn how to the use formal written method.

Repeated addition
Children understand multiplication as repeated addition
4 x 2 = 4 + 4 2 x 4 = 2 + 2 + 2 + 2
This can be taught using arrays to show repeated addition (see Year 2).

3 times table

Encourage daily counting in multiples both forwards and backwards using a number line or a hundred square.

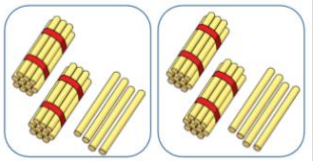
Look for patterns in the three times table, using concrete manipulatives to support. Notice the odd, even, odd, even pattern using number shapes to support. Highlight the pattern in the ones using a hundred square.



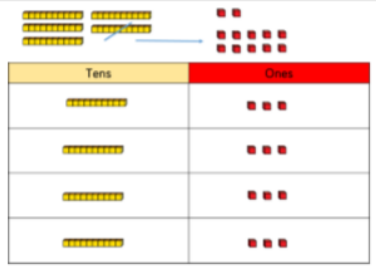
4 times table
Look for patterns in the four times table, using manipulatives to support. Make links to the 2 times table, seeing how much each multiple is double the twos. Notice the pattern in the ones within each group of 5 multiples. Highlight that all the multiples are even using number shapes to support.

Children to continue consolidating their division facts using their multiplication facts. Children to use repeated subtraction to support their understanding of division. Children to use base 10 and place value counters to support their knowledge of exchanging.

Pictorial sharing (use concrete resources)
Children to understand that 48 ÷ 2 means 48 shared into 2 groups. Again, when they hear 2 groups they should know that they need to draw 2 circles/square/bars and share 48 into them.



Base 10 (with sharing)
Children to use Base 10 to exchange 1 ten for 10 ones. Children should start with the equipment outside the place value grid before sharing the tens and ones equally between the rows.



Remainders

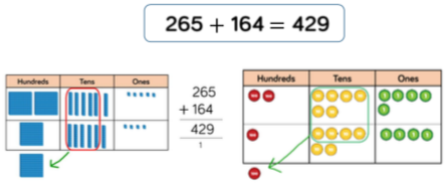
Starting with the equipment outside the place value grid will highlight the remainders as they will be left outside the grid once the equal groups have been made.

Base 10 and place value counters are the most effective manipulatives when adding numbers with up to 3 digits.

Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method.

Plain counters on a place value grid can also be used to support learning.

Children use understand that 10 ones = 1 tens and 10 tens = 1 hundred and physically exchange base 10s or place value counters.



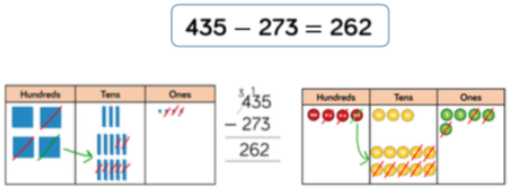
Written column method

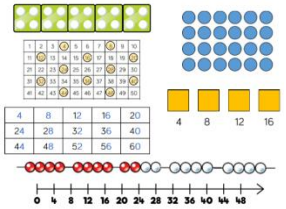
Base 10 and place value counters are the most effective manipulatives when subtracting numbers with up to 3 digits.

Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method.

Plain counters on a place value grid can also be used to support learning.

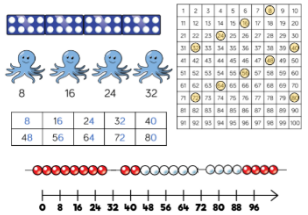
Children use understand that 10 ones = 1 tens and 10 tens = 1 hundred and physically exchange base 10s or place value counters.





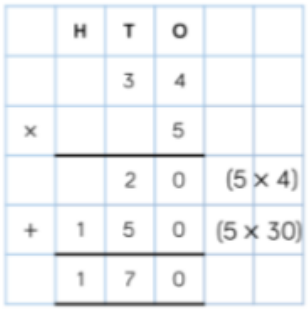
8 times table

Make links to the 4 times table, seeing how much each multiple is double the fours. Notice the pattern in the ones within each group of five multiples. Highlight that all the multiples are even using number shapes to support.

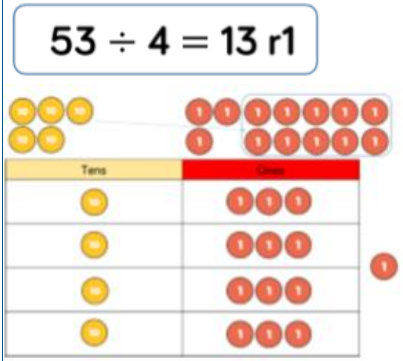


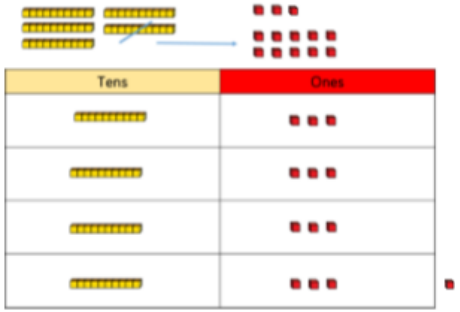
Expanded column method

Children to multiply the ones column first, then the tens columns but understand that the 3 in 34 is 30 in 34 x 5 = 170



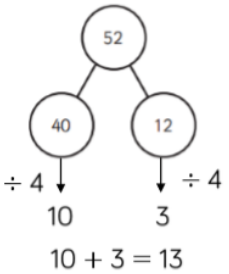
Children use place value counters to support the understanding of the method rather than supporting the multiplication, as children should use times table knowledge.



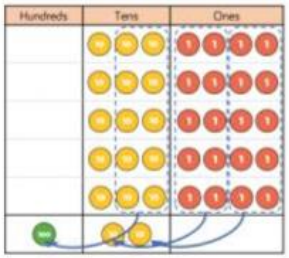


Base 10 (with part-whole model)

When children are sharing, children start with the larger place value and work from left to right. If there any left in a column, they exchange e.g. one ten for ten ones. When recording, encourage children to use the part-whole model so they can consider how the number has been partitioned in order to divide.



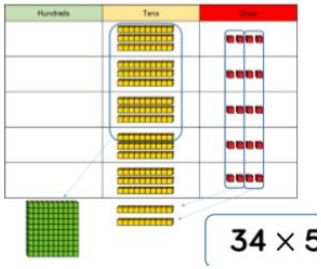
Flexible partitioning in a part-whole model to support base 10.



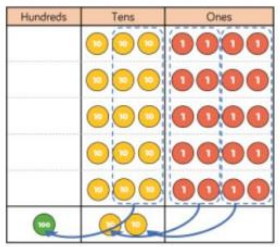
Column Method

Children use dienes and base 10s to support their knowledge of exchanging when multiplying 2-digit by 1-digit numbers.

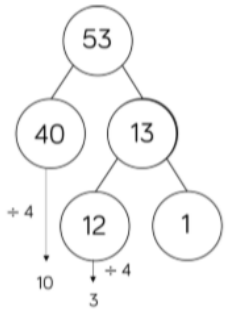
	H	T	O	
		3	4	
×			5	
	1	7	0	
	1	2		



Children use place value counters to support their knowledge of exchanging when multiplying 2-digit by 1-digit numbers

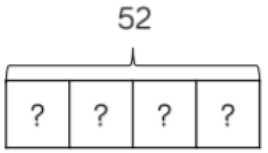


$$\begin{array}{r} 34 \\ \times\ 5 \\ \hline 170 \\ \hline 1\ 2 \end{array}$$



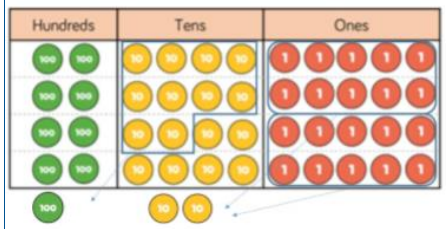
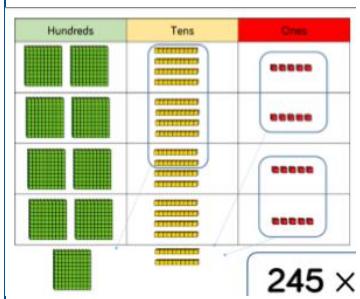
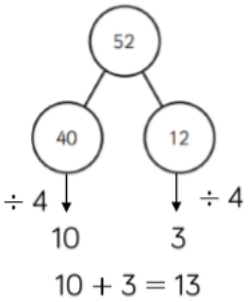
Bar model

Children to use the bar model to divide. Children understand that in 53 ÷ 4, there should be 4 bars and the total is outside the bar.



Place value counters (with sharing)
Children to use place value counters to exchange 1 ten for 10 ones. Children should start with the equipment outside the place value grid before sharing the tens and ones equally between the rows.

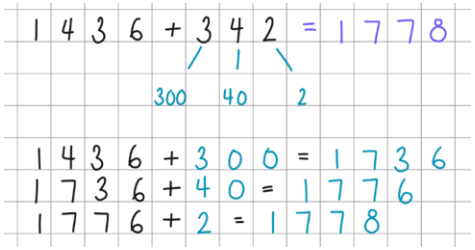
Place value counters (with part-whole model)
When children are sharing, children start with the larger place value and work from left to right. If there any left in a column, they exchange e.g. one ten for ten ones.

		Short formal written method When moving to 3-digit by 1-digit multiplication, encourage children to move towards the short, formal written method.  Base 10 and place value counters continue to support the understanding of the written method.   Limit the number of exchanges needed in the questions to move the children away from resources when multiplying larger numbers.	When recording, encourage children to use the part-whole model so they can consider how the number has been partitioned in order to divide. 

Year 4

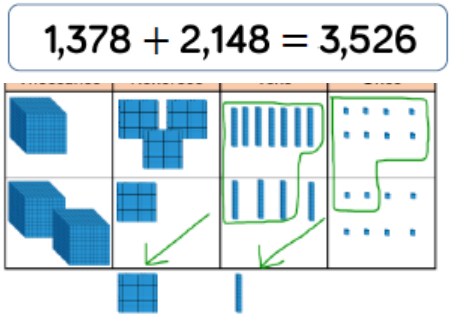
Addition	Subtraction	Multiplication	Division
United Learning KPIs M4.5 he/she can solve addition and subtraction two step problems in contexts, deciding which operations andmethods to use and why.	United Learning KPIs M4.5 he/she can solve addition and subtraction two step problems in contexts, deciding which operations andmethods to use and why.	United Learning KPIs M4.6 he/she can recall multiplication anddivision facts of multiplication tables up to 12 x 12 Count in multiples of 6, 7, 9. 25 and 1000	United Learning KPIs M4.6 he/she can recall multiplication and division facts of multiplication tables up to 12 x 12
White Rose Hub Policy Statement - Column method- exchanging. (up to 4 digits)	**White Rose Hub Policy Statement** - Column method with exchanging. (up to 4 digits)	**White Rose Hub Policy Statement** - Column multiplication- introduced withplace value counters. - (2 and 3-digit multiplied by 1 digit)	White Rose Hub Policy Statement - Division with a remainder - Short division (up to 3 digits by 1 digit-concrete and pictorial)
Key vocabulary: add, plus, together, altogether, total, more, sum of, forward, increase, combined , addend , aggregation , commutative , complement	Key vocabulary: take away, subtract. minus, less, fewer,left, back , decrease, difference, exchange , minuend , reduction , subtrahend	Key vocabulary: times, repeated addition, double, groups of, multiply, double, triple , product, multiple, communicative law , factor, multiplicand	Key vocabulary: share, divide, divide by, share equally, groups, sets , quotient, remainder , dividend, divisor ,

Partition the second number into H T O. add the H then T and the O.



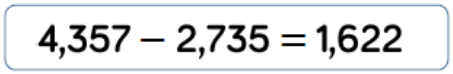
Base 10 and place value counters are the most effective manipulatives when adding numbers with up to 4 digits.

Children write out their calculation alongside any concrete resources so they can see the links to the written column method.

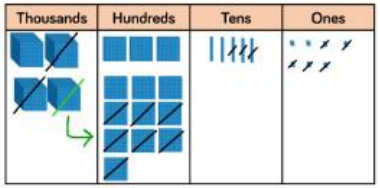


Column subtraction

The children are introduced to column method to work out a subtraction of four digit and three digit numbers.

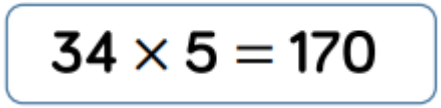


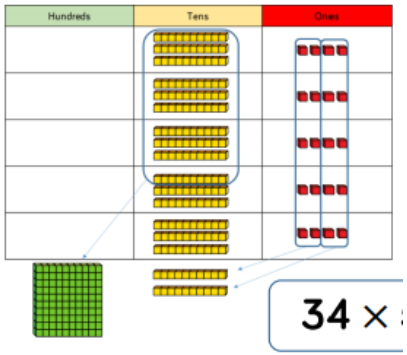
Base 10 and place value counters are the most effective manipulatives when subtracting numbers up to 4 digits. Children should write out their calculation alongside any concrete resources so they can see the links to written column method.

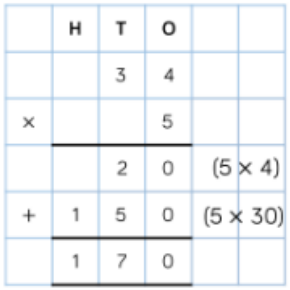


Column multiplication

Children to multiply2-digit numbers by 1-digit numbers using long multiplication before moving on to the short multiplication method. The place value counters should be used to support the understanding of the method rather than supporting the multiplication, as children should use times table knowledge.

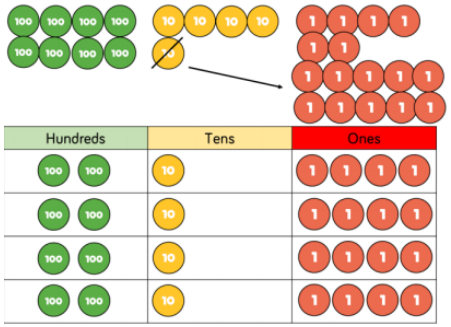






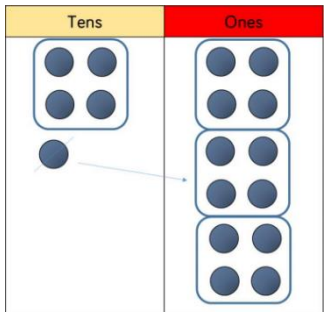
Place value counters (with sharing)

Children can continue to use place value counters to share 3-digit numbers into equal groups. Children should start with the equipment outside the place value grid before sharing the hundreds, tens and ones equally between the rows.



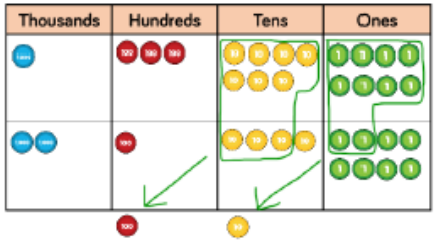
Remainders

When dividing numbers with remainders, children can use Base 10 and place value counters to exchange one ten for ten ones.



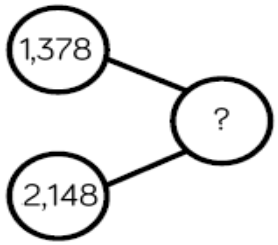
Place value counters (with part-whole model)

When children are sharing, children start with the larger place value and work from left to right. If there any left in a column, they exchange e.g. one ten for ten ones.



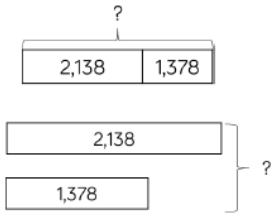
Part-whole model

When the parts are complete and the whole is empty, children will use aggregation to add the parts together to find the total.



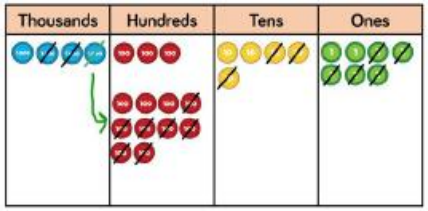
Bar model

Discrete and continuous bar models support aggregation



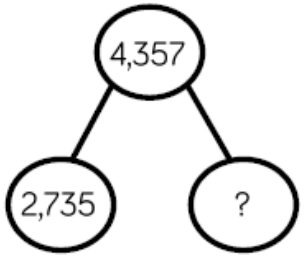
Column method

Children to identify the TH H T O in a number. Write the calculation with the symbol on the left -hand side (to avoid a lack of space when exchanging).



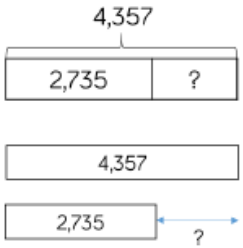
Part-whole model

When the whole is complete and at least one of the parts is empty, children using partitioning (a form of subtraction) to find the missing part.



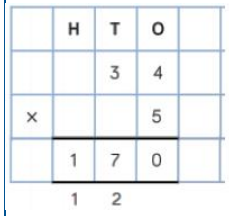
Bar model

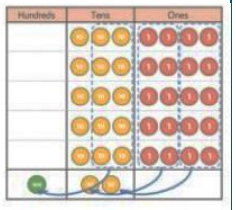
Discrete and continuous bar models to support partitioning.



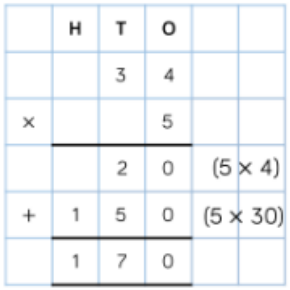
Column subtraction using exchanging **(exchanging)**

Children are then introduced to subtraction calculations where they are





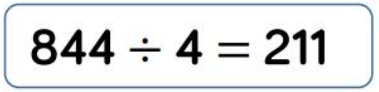
Set it out as shown below. Ensure that the multiplication sign is on the left hand side.

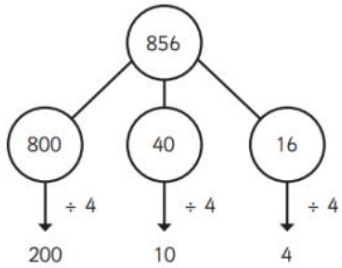


When moving to 3-digit by 1-digit multiplication, encourage children to move towards the short, formal written method.

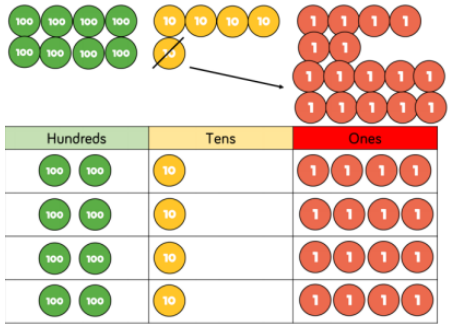
Base 10 and place value counters continue to support the understanding of the written method.

Limit the number of exchanges needed in the questions and move children away from resources when multiplying larger numbers.





When recording, encourage children to use the part-whole model so they can consider how the number has been partitioned in order to divide.



Flexible partitioning in a part-whole model to support this method.

Bar model

Children to use the bar model to divide. Children understand that in 844 ÷ 4, there should be 4 bars and the total is outside the bar.

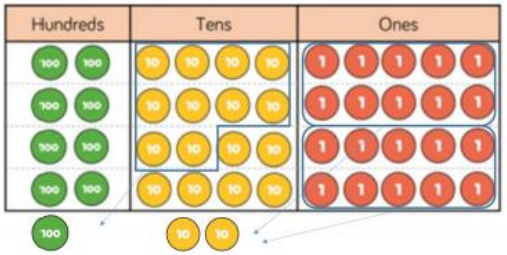
Extend to decimals in the context of money. (vertically)

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

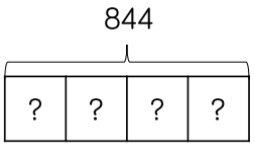
requiredto take one group of a place value and exchange it with another.

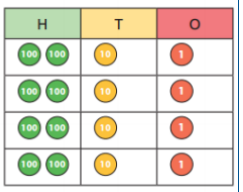
$$\begin{array}{r} {}^{3}\not{4}\,{}^{1}357 \\ -\ 2735 \\ \hline 1622 \end{array}$$

$$245 \times 4 = 980$$



$$844 \div 4 = 211$$



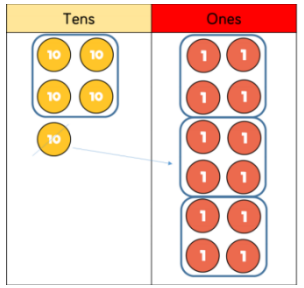


Short division

When using the short division methods, children use grouping. Starting with the largest place value, they group by the divisor.

Language is important here. Children should consider 'How many groups of 4 tens can we make?' and ' How many groups of 4 ones can we make?'

$$52 \div 4 = 13$$



		1	3	
	4	5	12	

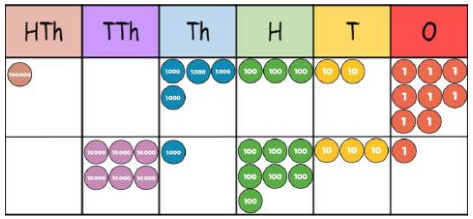
Year 5

Addition	Subtraction	Multiplication	Division
United Learning KPIs M5.4 he/she can add and subtract whole numbers with more than 4 digits,including using formal written methods (columnar addition and subtraction). M5.5 he/she can add and subtract whole numbers with more than 4 digitsmentally.	**United Learning KPIs** M5.4 he/she can add and subtract wholenumbers with more than 4 digits, including using formal written methods (columnar addition and subtraction). M5.5 he/she can add and subtract wholenumbers with more than 4 digits mentally.	**United Learning KPIs** M5.8 he/she can solve problems involving multiplication and division, including scaling by simple fractions andproblems involving simple rates. M5.6 he/she can identify multiples and factors, including finding all factor pairsof a number, and common factors of two numbers. Including prime numbers. M5.7 he/she can solve problems involving multiplication and division including using their knowledge of factorsand multiples, squares and cubes.	**United Learning KPIs** M5.8 he/she can solve problems involving multiplication and division, including scaling by simple fractions andproblems involving simple rates. M5.6 he/she can identify multiples and factors, including finding all factor pairsof a number, and common factors of two numbers. Including prime numbers. M5.7 he/she can solve problems involving multiplication and divisionincluding using their knowledge of factors and multiples, squares and cubes.
White Rose Hub Policy Statement - Column method- exchanging. - Use of place value counters for addingdecimals.	**White Rose Hub Policy Statement–** - Column method with exchanging.Abstract for whole numbers. - Start with place value counters for decimals- with the same number of decimal places.	**White Rose Hub Policy Statement** - Column multiplication - Abstract only but might need a repeat ofyear 4 first. (up to 4 digit numbers multiplied by 1 or 2digits)	**White Rose Hub Policy Statement** - Short division (up to 4 digits by a 1 digit numberincluding remainders)
Key vocabulary: add, plus, together, altogether, total, more, sum of, forward, increase, combined , addend , aggregation , commutative , complement	**Key vocabulary:** take away, subtract. minus, less, fewer, left, back , decrease, difference, exchange , minuend , reduction , subtrahend	**Key vocabulary:** times, repeated addition, double, groupsof, multiply, double, triple , product, multiple, communicative law , factor, multiplicand	**Key vocabulary:** share, divide, divide by, share equally,groups, sets , quotient, remainder , dividend, divisor ,

Short column addition with and without exchanging

Adding with more than 4 digit numbers. Children to identify the TH H T O in a number. Write the calculation with the symbol on the left-hand side (to avoid a lack of space when exchanging).

$$104{,}328 + 61{,}731 = 166{,}059$$



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.

Place value counters and plain counters on a place value grid are most effective when adding decimals with 1,2 and then 3 decimal places.

Ensure children have experience of adding decimals with a variety of decimal places. This includes putting into context when adding money and other measure.

Subtract numbers with more than 4 digits

Column method

At this stage, children should be encouraged to work in abstract, using column method to subtract larger numbers efficiently

The children are introduced to column method to work out a subtraction of four digit and three digit numbers.

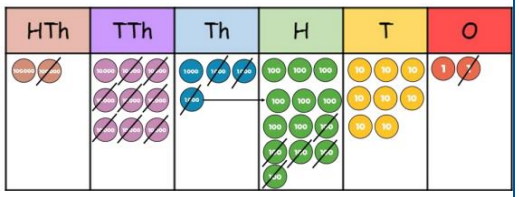
Column method using exchanging(exchanging)

Children are then introduced to subtraction calculations where they are required to take one group of a place value and re-group it with another.

$$294{,}382 - 182{,}501 = 111{,}881$$

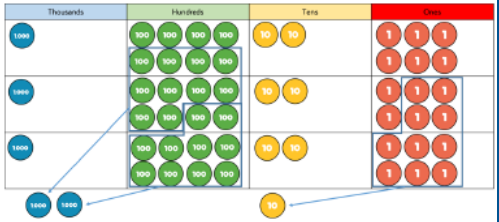
	2	9	$^{3}\not{4}$	$^{1}3$	8	2
−	1	8	2	5	0	1
	1	1	1	8	8	1

Place value counters or plain counters on a place value grid are the most effective concrete resources when subtracting numbers with more than 4 digits .



Place value counters

When multiplying 4-digit numbers by 1-digit numbers place value counters are the best manipulative to use to support children in their understanding of the formal written method.



$$1{,}826 \times 3 = 5{,}478$$

Grid method with the use of base tens and place value counters when multiplying 2-digit by 2-digit numbers.

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

If children are multiplying larger numbers and struggling with their times tables, encourage the use of multiplication grids so children can focus on the use of the written method.

Set the numbers in a grid (see below) then multiply each pair of numbers. Addthe products to get your final answer.

Formal written method with place value counters.

Children can continue to use grouping to support their understanding of short division when dividing a 3-digit number by a 1-digit number.

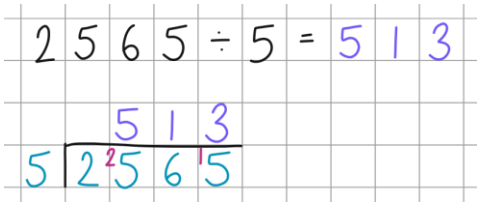
Place value counters or place counters can be used on a place value grid to support their understanding.

$$856 \div 4 = 214$$

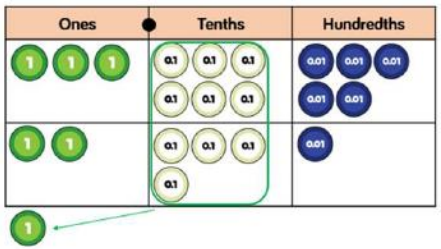
		2	1	4
	4	8	5	$^{1}6$

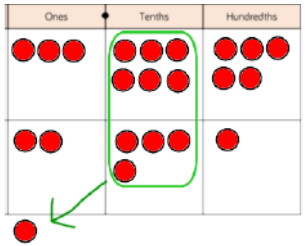
Short division

Divide 5 into 2565 one digit at a time starting from the left with the digit 2 (which represents 2,000)



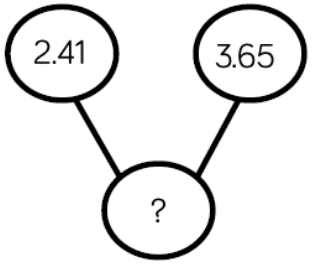
$$\begin{array}{r} 3.65 \\ +\ 2.41 \\ \hline 6.06 \\ \hline \end{array}$$





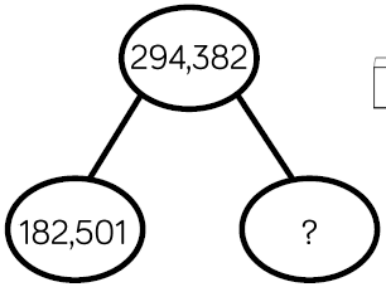
Part- whole model

When the parts are complete and the whole is empty, children will use aggregation to add the parts together to find the total.



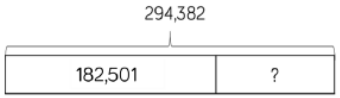
Part-whole model

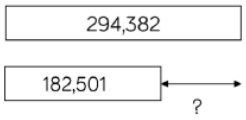
When the whole is complete and at least one of the parts is empty, children using partitioning (a form of subtraction) to find the missing part.



Bar model

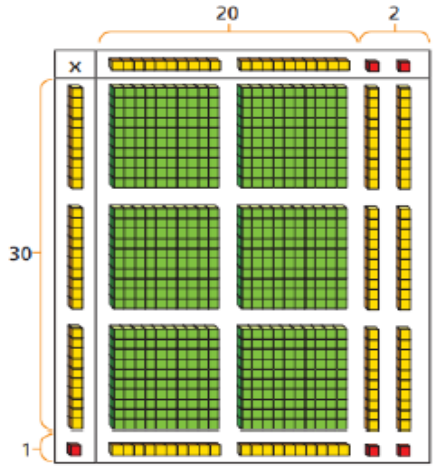
Discrete and continuous bar models to support partitioning.





Children work out calculations withmissing numbers.

$$22 \times 31 = 682$$

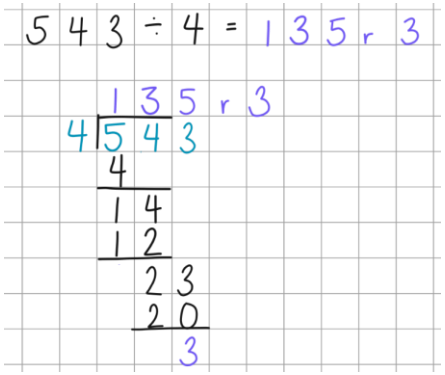


	H	T	O
		2	2
×		3	1
		2	2
	6	6	0
	6	8	2

1. The 5 into 2 won't go, so you carry the 2 over to the next column, whereyou now have 25 in the H column.
3. 5 goes into 25 five times exactly (putthis on top
4. 5 goes into 6 once with 1 remainderwhich is carried over to the next column where you now have 15.
5. 5 goes into 15 3 times exactly.5.

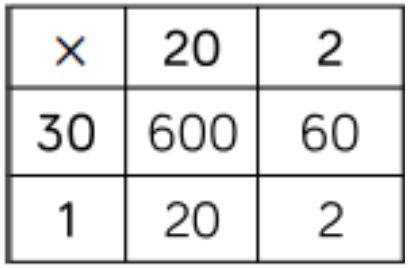
2565 ÷ 5 = 513

Long division



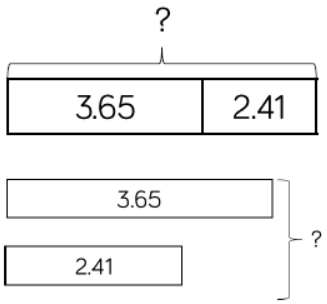
1. 4 goes into 5 one time, so put a 1above the 5.
2. 1 x 4 = 4 (put this below the 5)
3. Subtract 4 from 5
4. drop down the 4
5. 4 goes into 14 three times, so put a 3above the 4.
6. 3 x 4 = 12 (put this below the 14)
7. subtract 12 from 14 = 2
8. drop the 3 down making 23
9. 4 goes into 23 5 times, so put a 5above the 3
10. 4 x 5 = 20 (put this below the 23)
11. subtract 20 from 23

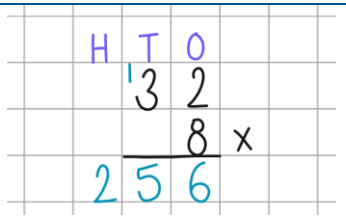
there is a remainder of 3.

Bar model		**Short column multiplication**	

Discrete and continuous bar models support aggregation.

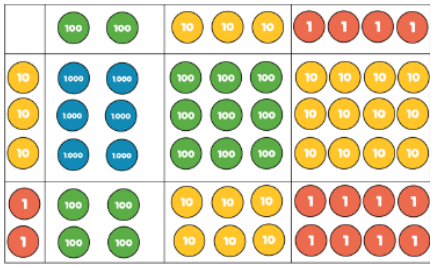




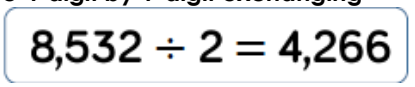
1. 2 x 8 = 16
2. put the 6 in the ones place and carrythe ten over
3. 3 x 8 = 24
4. 24 + 1 = 25
5. put 25 in the H and T place.

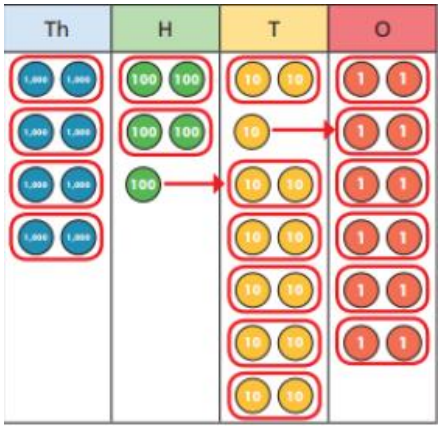
Multiply 3-digit by 2-digit

Children can continue to use the area model when multiplying 3-digits by 2-digits. Place value counters become more efficient to use but Base 10 can be used to highlight the size of numbers.



Divide 4-digit by 1-digit exchanging





1. 2 goes into 8 four times
2. 2 goes into 5 two times so you have 1 hundred left over
3. Exchange 1 hundred for 10 tens. 2 goes into 13 six times. So there will be 1 ten left over.
4. Exchange the 1 ten for 10 ones.
5. 2 goes into 12 six times.

So 8,532 ÷ 2 = 4,266

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

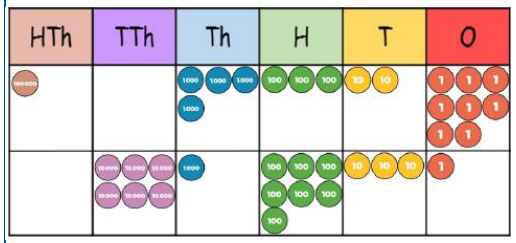
Th	H	T	O
	2	3	4
×		3	2
	4	6	8
1^{7}	1^{0}	2	0
7	4	8	8

Year 6

Addition	Subtraction	Multiplication	Division
United Learning KPIs M6.5 he/she can solve addition and subtraction multi-step problems in contexts, deciding which operations andmethods to use and why. M6.6 he/she can use estimation to checkanswers to calculations.	United Learning KPIs M6.5 he/she can solve addition and subtraction multi-step problems in contexts, deciding which operations andmethods to use and why. M6.6 he/she can use estimation to check answers to calculations.	United Learning KPIs M6.3 he/she can multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.	United Learning KPIs M6.3 he/she can divide multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of division.
White Rose Hub Policy Statement - Column method- exchanging. Abstract methods. - Place value counters to be used foradding decimal numbers.	**White Rose Hub Policy Statement** - Column method with exchanging. Abstract methods. - Place value counters for decimals- withdifferent amounts of decimal places.	**White Rose Hub Policy Statement** - Column multiplication - Abstract methods (multi-digit up to 4 digits by a 2-digitnumber)	**White Rose Hub Policy Statement** - Short division - Long division with place value counters (up to 4 digits by a 2-digit number) Children should exchange into the tenthsand hundredths column too
Key vocabulary: add, plus, together, altogether, total, more, sum of, forward, increase, combined , addend , aggregation , commutative , complement	Key vocabulary: take away, subtract. minus, less, fewer,left, back , decrease, difference, exchange , minuend , reduction , subtrahend	Key vocabulary: times, repeated addition, double, groupsof, multiply, double, triple , product, multiple, communicative law , factor, multiplicand, scaling	Key vocabulary: share, divide, divide by, share equally, groups, sets , quotient, remainder , dividend, divisor ,

Column method with and without exchanging (using concrete resources)

Children to identify the TH H T O in a number. Write the calculation with the symbol on the left-hand side (to avoid a lack of space when carrying).



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

Extend to decimals in the context of money.

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

Part-whole model

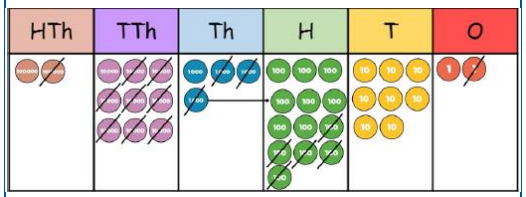
When the parts are complete and the whole is empty, children will use aggregation to add the parts together to find the total.

Short column

The children are introduced to column method to work out a subtraction of four digit and three digit numbers.

Short column using exchanging (exchanging)

Children are then introduced to subtraction calculations where they arerequired to take one group of a place value and re-group it with another.



	2	9	$\cancel{3}\ 2$	$1\ \cancel{3}$	8	2
−	1	8	2	5	0	1
	1	1	1	8	8	1

Part-whole model

When the whole is complete and at least one of the parts is empty, children using partitioning (a form of subtraction) to find the missing part.

Multiplying 4-digit numbers by 2-digit numbers

When multiplying 4-digits by 2-digits, children should be confident in the written method.

If they are still struggling with times tables, provide multiplication grids to support when they are focusing on the use of the method.

Refer to year 5.

$$2{,}739 \times 28 = 76{,}692$$

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

.

Divide multi digits by 20digts using short division

When children begin to divide up to 4-digits by 2-digits, written methods become the most accurate as concrete and pictorial representations become less effective.

Children can write out multiples to support their calculations with larger remainders. Children will also solve problems with remainders where the quotient can be rounded as appropriate

$$432 \div 12 = 36$$

		0	3	6
	12	4	4 3	7 2

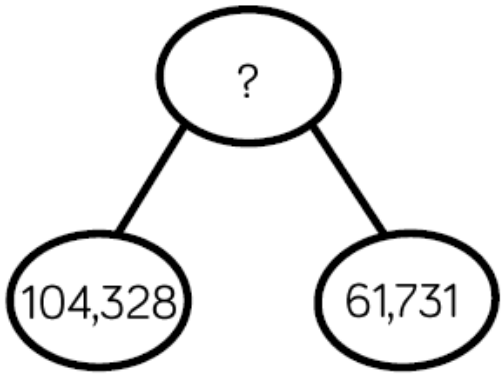
$$7{,}335 \div 15 = 489$$

	0	4	8	9
15	7	7 3	13 3	13 5

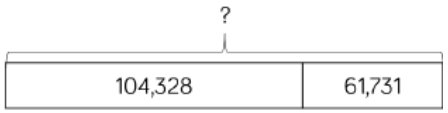
15	30	45	60	75	90	105	120	135	150

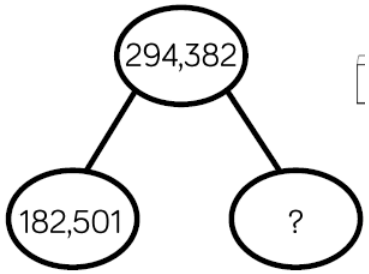
Divide multi-digits by 2-digit using long division.

Children can also divide by 2-digit numbers

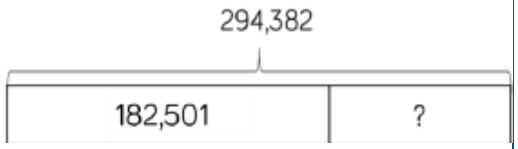


Bar model
Discrete and continuous bar models support aggregation.





Bar model
Discrete and continuous bar models to support partitioning.



using long division. Children can write out multiples to support their calculations with larger remainders.
Children will also solve problems with remainders where the quotient can be rounded as appropriate.

432 ÷ 12 = 36

		0	3	6
1	2	4	3	2
	–	3	6	0
			7	2
	–		7	2
				0

(×30)
(×6)

$12 \times 1 = 12$
$12 \times 2 = 24$
$12 \times 3 = 36$
$12 \times 4 = 48$
$12 \times 5 = 60$
$12 \times 6 = 72$
$12 \times 7 = 84$
$12 \times 8 = 96$
$12 \times 7 = 108$
$12 \times 10 = 120$

7,335 ÷ 15 = 489

	0	4	8	9
15	7	3	3	5
–	6	0	0	0
	1	3	3	5
–	1	2	0	0
		1	3	5
–		1	3	5
				0

(×400
(×80)
(×9)

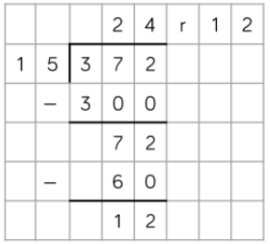
$1 \times 15 = 15$
$2 \times 15 = 30$
$3 \times 15 = 45$
$4 \times 15 = 60$
$5 \times 15 = 75$
$10 \times 15 = 150$

Divide multi digits by 2-digits (long division)

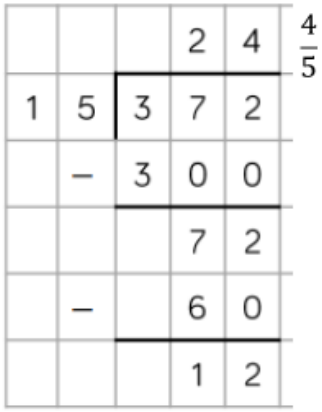
When a remainder is left at the end of a calculation, children can either leave it as a remainder or convert it to a fraction. This will depend on the context of the question.

Children can also answer questions where the quotient needs to be rounded according to the context.

$$372 \div 15 = 24 \text{ r}12$$



$$372 \div 15 = 24\frac{4}{5}$$

2 4
4/5
1 5 3 7 2
– 3 0 0
7 2
– 6 0
1 2