Calculation Policy

Introduced:	September 2020
Reviewed:	September 2022
To be reviewed:	September 2024

	Expectation by the end of Year 1	Expectation by the end of Year 2	Expectation by the end of Year 3	Expectation by the end of Year 4	Expectation by the end of Year 5	Expectation by the end of Year 6
Place Value	Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number. Count, read and write numbers to 100 in numerals. Given a number, identify one more and one less. Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than, most, least.	Read and write numbers to at least 100 in numerals and in words. Recognise the place value of each digit in a two digit number (tens, ones) Identify, represent and estimate numbers using different representations including the number line. Compare and order numbers from 0 up to 100; use <, > and = signs. Use place value and number facts to solve problems. Count in steps of 2, 3 and 5 from 0, and in tens from any number, forward and backward.	Identify, represent and estimate numbers using different representations. Find 10 or 100 more or less than a given number Recognise the place value of each digit in a three-digit number (hundreds, tens, ones). Compare and order numbers up to 1000 Read and write numbers up to 1000 in numerals and in words. Solve number problems and practical problems involving these ideas. Count from 0 in multiples of 4, 8, 50 and 100	Count in multiples of 6, 7, 9. 25 and 1000. Find 1000 more or less than a given number. Recognise the place value of each digit in a four digit number (ths, hs, ts and ones) Order and compare numbers beyond 1000 Identify, represent and estimate numbers using different representations. Round any number to the nearest 10, 100 or 1000 Solve number and practical problems involving all of the above and with increasingly large positive numbers. Count backwards through zero to include negative numbers. Read Roman numerals to 100 and know that over time, the numeral system changed to include the concept of zero and place value.	Read, write, order and compare numbers to at least 1000000 and determine the value of each digit. Count forwards or backwards in steps of powers of 10 for any given number up to 1000000. Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers including through zero. Round any number up to 1000000 to the nearest 10, 100, 1000, 10000 and 100000 Solve number problems and practical problems that involve all of the above. Read Roman numerals to 1000 (M) and recognise years written in Roman numerals.	Read, write, order and compare numbers up to 10,000,000 and determine the value of each digit. Round any whole number to a required degree of accuracy. Use negative numbers in context, and calculate intervals across zero. Solve number and practical problems that involve all of the above.

	Expectation by the end of Year 1	Expectation by the end of Year 2	Expectation by the end of Year 3	Expectation by the end of Year 4	Expectation by the end of Year 5	Expectation by the end of Year 6
Addition, subtraction, multiplication and division	Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs. Represent and use number bonds and related subtraction facts within 20. Add and subtract one-digit and two-digit numbers to 20, including zero.	Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: -a two-digit number and ones -a two-digit number and tens -two two-digit numbers -adding three one-digit numbers Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot. Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs. Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.	Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction Add and subtract numbers mentally, including: - a three-digit number and ones; a three-digit number and tens ; - a three-digit number and hundreds Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.	Add and subtract numbers with up to four digits using the formal written methods of columnar addition and subtraction Use place value, known and derived facts to multiply and divide mentally, including: - multiplying by 0 and 1 - dividing by 1 - multiplying together three numbers Multiply two-digit and three-digit numbers by a one-digit number using formal written layout	Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction). Add and subtract numbers mentally with increasingly large numbers. Multiply and divide numbers mentally drawing upon known facts Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 Multiply numbers up to 4 digits by a one or two digit number using a formal written method, including long multiplication for 2-digit numbers Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.	Perform mental calculations, including with mixed operations and large numbers Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context Use their knowledge of the order of operations to carry out calculations involving the four operations
Derive and recall +-x÷		Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers. Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100	Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.	Recall multiplication and division facts for multiplication tables up to 12 × 12		

	Expectation by the end of Year 1	Expectation by the end of Year 2	Expectation by the end of Year 3	Expectation by the end of Year 4	Expectation by the end of Year 5	Expectation by the end of Year 6
Prime numbers and factors				Recognise and use factor pairs and commutativity in mental calculations	Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers. Establish whether a number up to 100 is prime and recall prime numbers up to 19. Recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3}).	Identify common factors, common multiples and prime numbers
Solving problems	Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ? - 9. Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.	Solve problems with addition and subtraction using concrete objects and pictorial representations, including those involving numbers, quantities and measures. Solve problems with addition and subtraction applying their increasing knowledge of mental and written methods. Solve problems with addition and subtraction recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100. Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts. calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs	Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction. Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects	Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects	Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes. Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign. Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.	Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why Solve problems involving addition, subtraction, multiplication and division

	Expectation by the end of Year 1	Expectation by the end of Year 2	Expectation by the end of Year 3	Expectation by the end of Year 4	Expectation by the end of Year 5	Expectation by the end of Year 6
Checking		Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.	Estimate the answer to a calculation and use inverse operations to check answers.	Estimate and use inverse operations to check answers to a calculation	Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy	Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy
Fractions	Recognise, find and name a half as one of two equal parts of an object, shape or quantity. Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity. Compare, describe and solve practical problems for: lengths and heights (for example, long/short, longer/shorter, tall/short, double/half) Compare, describe and solve practical problems for: mass/weight [for example, heavy/light, heavier than, lighter than]; capacity and volume [for example, full/empty, more than, less than, half, half full, quarter]	Recognise, find, name and write fractions 1/3, 1/4, 2/4 and 3/4 of a length, shape, set of objects or quantity. Write simple fractions for example, 1/2 of 6 = 3 and recognise the equivalence of 2/4 and 1/2.	Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10 Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators. Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators. Recognise and show, using diagrams, equivalent fractions with small denominators. Compare and order unit fractions, and fractions with the same denominators. Add and subtract fractions with the same denominator within one whole [for example, 5/7 + 1/7 = 6/7] Solve problems that involve all of the above.	Recognise and show, using diagrams, families of common equivalent fractions. Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten. Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number. Add and subtract fractions with the same denominator.	Compare and order fractions whose denominators are multiples of the same number. Identify, name and write equivalent fractions of a given fraction, represented visually including tenths and hundredths. Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements >1 as a mixed number [for example 2/5 + 4/5 = 6/5 = 1 1/5] Add and subtract fractions with the same denominator and denominators that are multiples of the same number. Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams. Read and write decimal numbers as fractions [for example 0.71 = 71/100] Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.	Use common factors to simplify fractions; use common multiples to express fractions in the same denomination. Compare and order fractions, including fractions > 1 Generate and describe linear number sequences (with fractions) Add and subtract fractions with different denominations and mixed numbers, using the concept of equivalent fractions. Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example 1/4 x 1/2 = 1/8] Divide proper fractions by whole numbers [for example 1/3 ÷ 2 = 1/6] Associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example 3/8] Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

	Expectation by the end of Year 1	Expectation by the end of Year 2	Expectation by the end of Year 3	Expectation by the end of Year 4	Expectation by the end of Year 5	Expectation by the end of Year 6
Decimals				Recognise and write decimal equivalents of any number of tenths or hundredths. Find the effect of dividing a one or two digit number by 10 or 100, identifying the value of the digits in the answer as ones, tenths and hundredths Solve simple measure and money problems involving fractions and decimals to two decimal places. Convert between different units of measure Compare numbers with the same number of decimal places up to two decimal places. Round decimals with one decimal place to the nearest whole number. Recognise and write decimal equivalents to 1/4, 1/2 and ¾. Find the effect of dividing a one or two digit number by 10 or 100, identifying the value of the digits in the answer as ones, tenths and hundredths	Read, write, order and compare numbers with up to three decimal places. Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents. Round decimals with two decimal places to the nearest whole number and to one decimal place. Solve problems involving number up to three decimal places. Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000. Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.	Identify the value of each digit in numbers given to 3 decimal places and multiply numbers by 10, 100 and 1,000 giving answers up to 3 decimal places. Multiply one-digit numbers with up to 2 decimal places by whole numbers. Use written division methods in cases where the answer has up to 2 decimal places. Solve problems which require answers to be rounded to specified degrees of accuracy.
Percentages					Recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal. Solve problems which require knowing percentage and decimal equivalents of 1/2, 1/4, 1/5, 2/5, 4/5 and those fractions with a denominator of a multiple of 10 or 25.	Solve problems involving the calculation of percentages [for example, of measures and such as 15% of 360] and the use of percentages for comparison. Recall and use equivalences between simple fractions, decimals and percentages including in different contexts.

	Expectation by the end of Year 1	Expectation by the end of Year 2	Expectation by the end of Year 3	Expectation by the end of Year 4	Expectation by the end of Year 5	Expectation by the end of Year 6
Algebra						Use simple formulae Generate and describe linear number sequences. Express missing number problems algebraically. Find pairs of numbers that satisfy an equation with two unknowns. Enumerate possibilities of combinations of two variables.
Ratio						Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts. Solve problems involving similar shapes where the scale factor is known or can be found. Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.

White Rose Maths Hub

Calculation policy: Guidance

	EYFS/Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition	Combining two parts to make a whole: part whole model. Starting at the bigger number and counting on- using cubes. Regrouping to make 10 using ten frame.	Adding three single digits. Use of base 10 to combine two numbers.	Column method- regrouping. Using place value counters (up to 3 digits).	Column method- regrouping. (up to 4 digits)	Column method- regrouping. Use of place value counters for adding decimals.	Column method- regrouping. Abstract methods. Place value counters to be used for adding decimal numbers.
Subtraction	Taking away ones Counting back Find the difference Part whole model Make 10 using the ten frame	Counting back Find the difference Part whole model Make 10 Use of base 10	Column method with regrouping. (up to 3 digits using place value counters)	Column method with regrouping. (up to 4 digits)	Column method with regrouping. Abstract for whole numbers. Start with place value counters for decimals- with the same amount of decimal places.	Column method with regrouping. Abstract methods. Place value counters for decimals- with different amounts of decimal places.

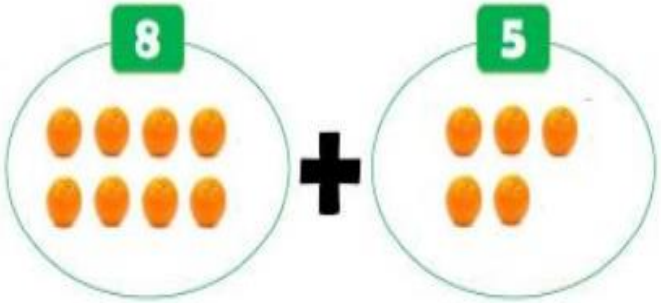
Multiplication	Recognising and making equal groups. Doubling Counting in multiples Use cubes, Numicon and other objects in the classroom	Arrays- showing commutative multiplication	Arrays 2d × 1d using base 10	Column multiplication- introduced with place value counters. (2 and 3 digit multiplied by 1 digit)	Column multiplication Abstract only but might need a repeat of year 4 first(up to 4 digit numbers multiplied by 1 or 2 digits)	Column multiplication Abstract methods (multi-digit up to 4 digits by a 2 digit number)
Division	Sharing objects into groups Division as grouping e.g. I have 12 sweets and put them in groups of 3, how many groups? Use cubes and draw round 3 cubes at a time.	Division as grouping Division within arrays- linking to multiplication Repeated subtraction	Division with a remainder-using lollipop sticks, times tables facts and repeated subtraction. 2d divided by 1d using base 10 or place value counters	Division with a remainder Short division (up to 3 digits by 1 digit- concrete and pictorial)	Short division (up to 4 digits by a 1 digit number including remainders)	Short division Long division with place value counters (up to 4 digits by a 2 digit number) Children should exchange into the tenths and hundredths column too

Models and images to support understanding

8 + 5 = 13

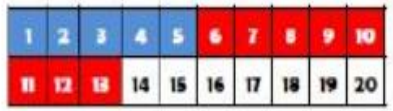
8 things and 5 things is 13 things.

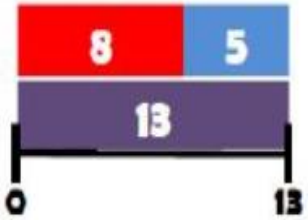
8 + 5 = 13



8 + 5 = 13

5 + 8 = 13

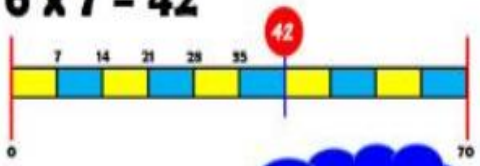




6 x 7 = 42

6 lots of 7 things is 42 things.

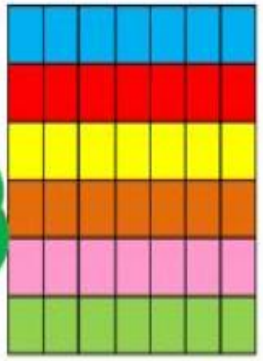
6 x 7 = 42



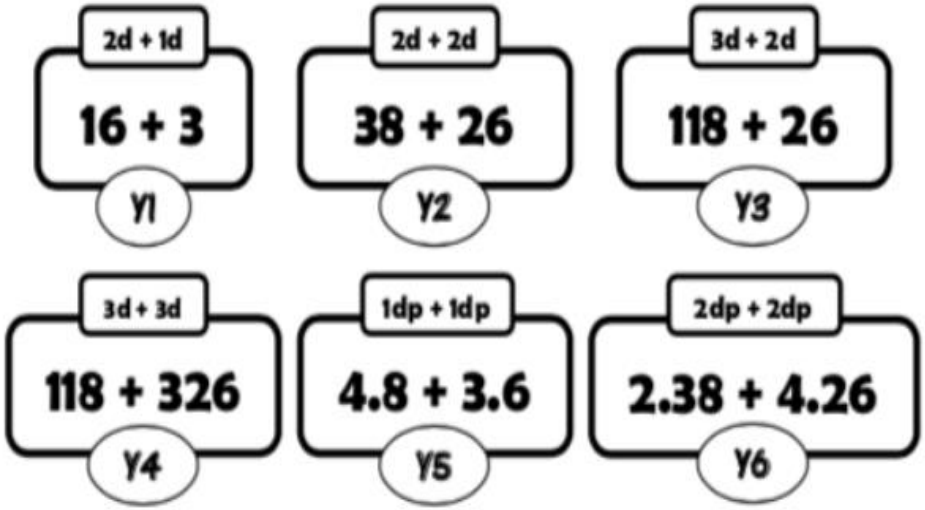
42 is the 6th multiple of 7

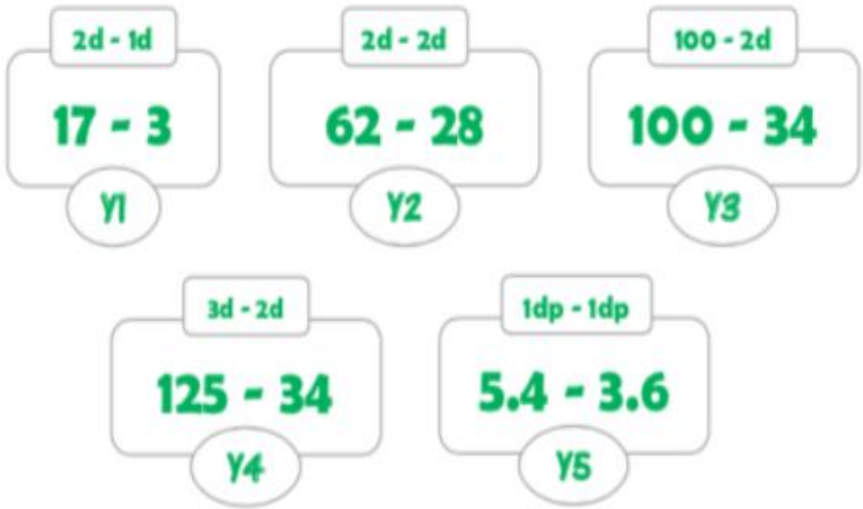
6 x 7 = 42

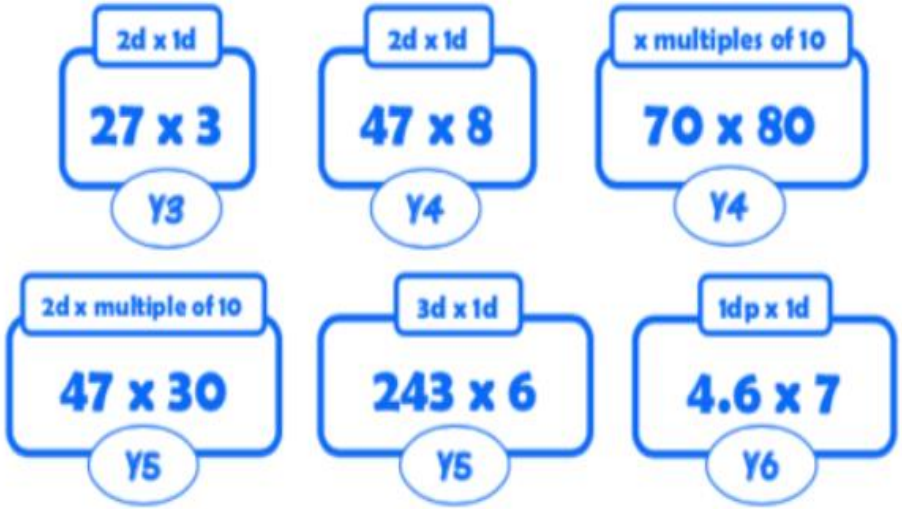
6 lots of 7 things is 42 things.

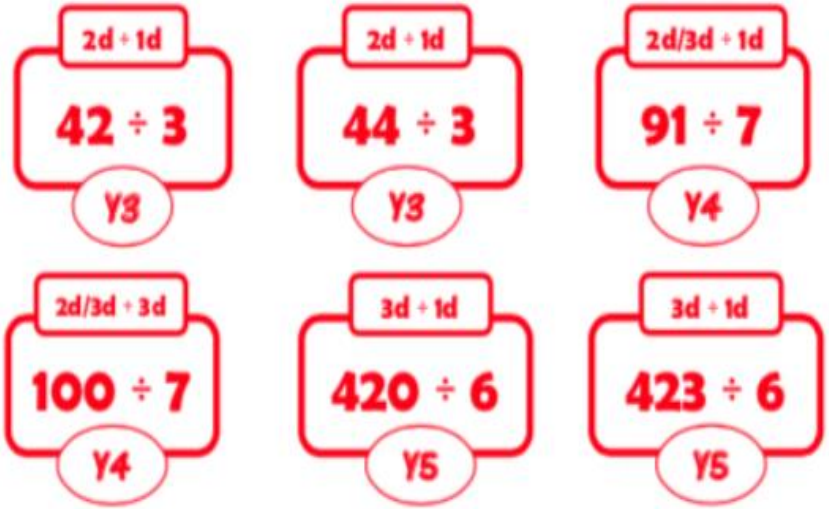


Key (Milestone) Mental Calculations for Addition, Subtraction, Multiplication and Division





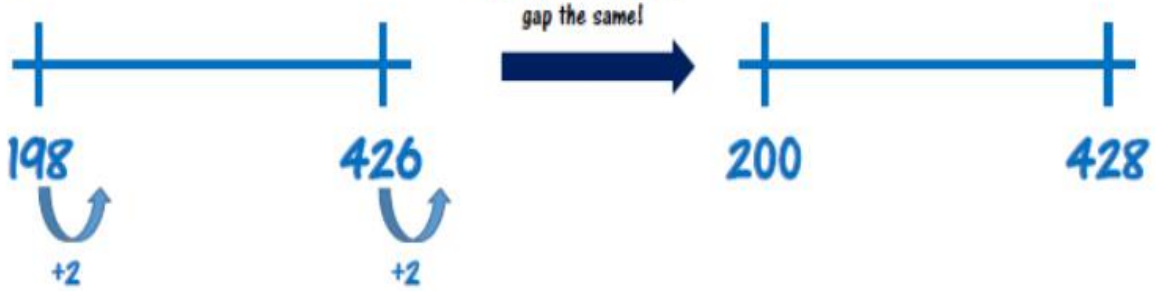




Examples of creative and efficient mental shortcuts ('Freestyling')

Subtraction: Adjusting the gap

426 - 198



Addition: Round and adjust

56 + 98 → 56 + 100 - 2

Subtraction: Round and adjust

275 - 99 → 275 - 100 + 1

Multiplication: Round and adjust

69 x 7 → (70 x 7) - 7

This policy stresses the importance of a **high understanding** 'catch-all' agreed core method for mental calculation. As children become more confident with number they will develop greater '**number sense**' – at one time what we called a 'feel for number'. Consequently, they will learn that there are occasions when they can take more creative approaches if the numbers support this alternative strategy. These efficient shortcuts which we will call '**Freestyling**' are particularly likely to be appropriate in problem solving and real life maths. For example to work out the total cost of two pens at 99p each, we would hope they would understand why it is much quicker to imagine that each pen costs £1 and then adjust, rather than using the core method for 2d + 2d, i.e. (90 + 90) + (9 +9)

ADDITION

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'

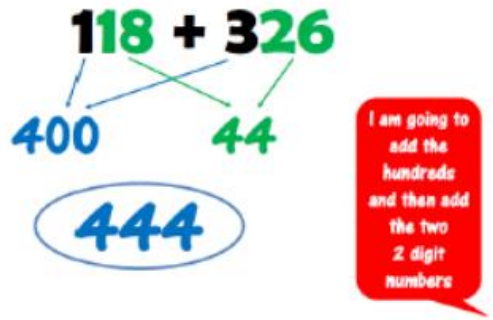
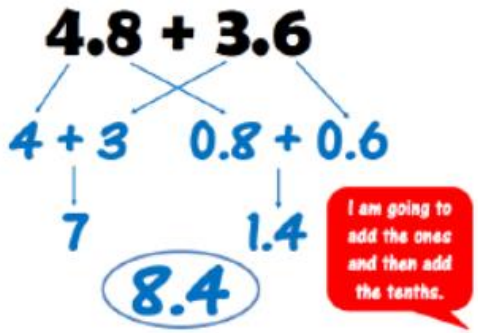
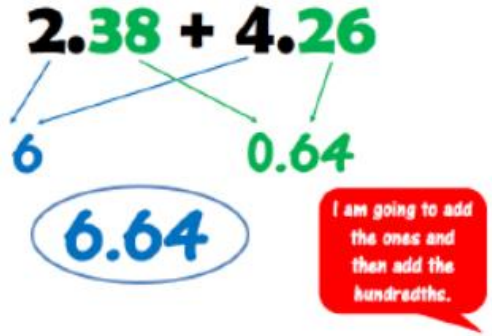
N.B. – Positioning of exchanging **MUST** be consistent across school and therefore must follow this policy.

<table>
<tr><th>EYFS</th><th>Year 1</th><th>Year 2</th><th colspan="2">Year 3</th></tr>
<tr><td rowspan="4">Pupils will continue to develop their actual counting skills. They engage in a range of practical activities using different apparatus to support both 'doing' and 'understanding'.

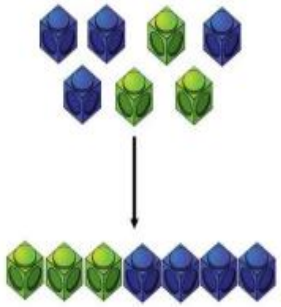
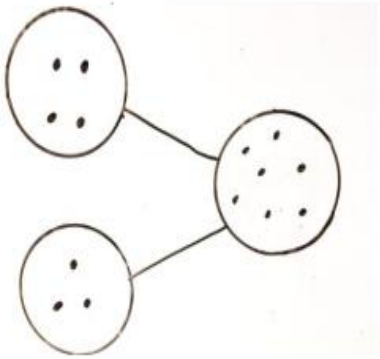
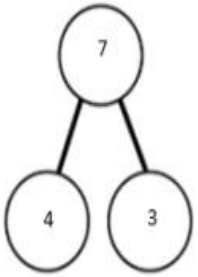
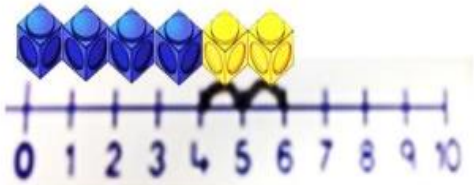
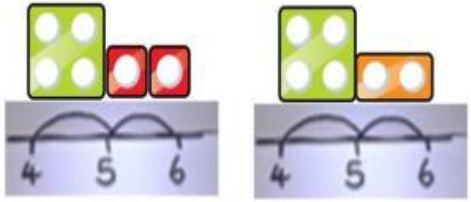
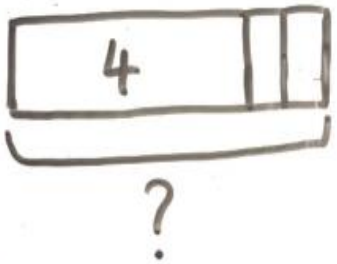
They respond to the question, 'How many altogether?' by counting and knowing that the final number in the count is the total.

Given two groups, they learn to count on the larger group, understanding why this is more efficient.

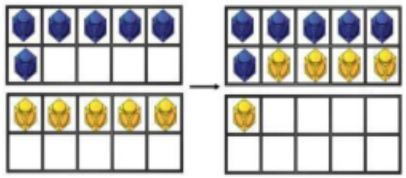
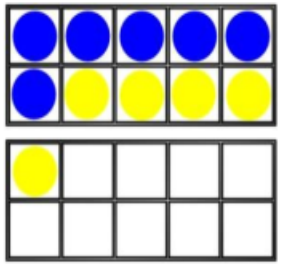
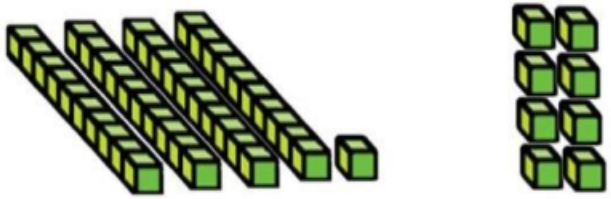
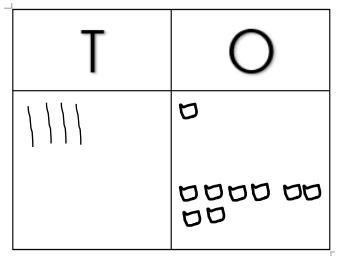
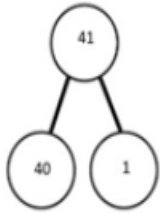
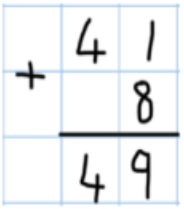
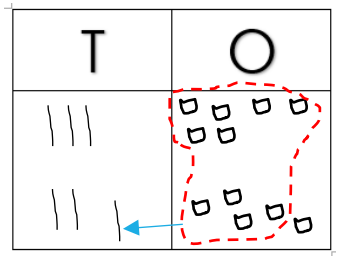
There are six number facts, i.e. counting shortcuts to be achieved by the end of Reception. These include knowing the doubles of any number to five.</td><td colspan="4">Mental Calculation (Agreed Core Method)</td></tr>
<tr><td>16 + 8
17, 18, 19, 20, 21, 22, 23, 24
I am going to count on 8 from 16
16 + 3
10 + 9
19
I don't need to count on because I just know that 6 and 3 is 9</td><td>38 + 26
30 + 20 8 + 6
50 14
64
I am going to add the tens and then add the ones.</td><td colspan="2">118 + 26
100 30 + 14
44
144
I am going to 'park-up' the hundreds and then add the tens and then add the ones.</td></tr>
<tr><td colspan="4">(Formal) Written Method</td></tr>
<tr><td></td><td>4 3
+3 2
7 5
2d +2d (not crossing 10)</td><td>5 7
+8 6
1 4 3
2d +2d (crossing 10)</td><td>7 8 5
+4 2 9
1 2 1 4
3d +3d (crossing 10)</td></tr>
</table>

Year 4	Year 5		Year 6	
Mental Calculation (Agreed Core Method)				
				
(Formal) Written Method				
7, 8 5 6 +4, 2 9 7 1 2, 1 5 3 Up to 4d +4d (crossing 10)	4 2 5 6 5 2 +3 4 9 1,4 2 5 Several numbers (crossing 10)	6 8, 9 6 2 +1 4, 8 7 5 8 3, 8 3 7 5d +5d (crossing 10)	6 8 . 9 + 4 . 8 7 3 . 7 Adding decimals with 1 or more dp (crossing 10)	6 . 8 2 + 3 . 5 7 1 0 . 3 9 Adding decimals with 1 or more dp (crossing 10)

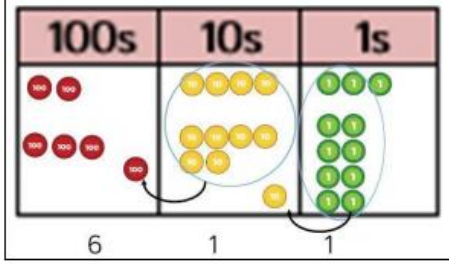
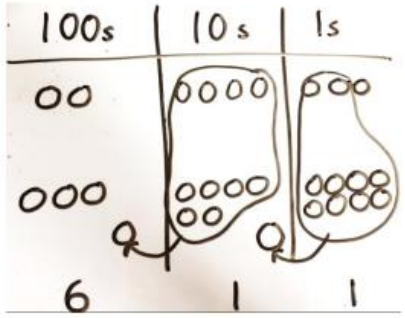
EYFS/ Year One

Concrete	Pictorial	Abstract
Combining two parts to make a whole (use other resources too e.g. eggs, shells, teddy bears, cars). 	Children to represent the cubes using dots or crosses. They could put each part on a part whole model too.  4 + 7	4 + 3 = 7 Four is a part, 3 is a part and the whole is seven. 
Counting on using number lines using cubes or Numicon.  	A bar model which encourages the children to count on, rather than count all.  4 + 2	The abstract number line: What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2? 4 + 2 

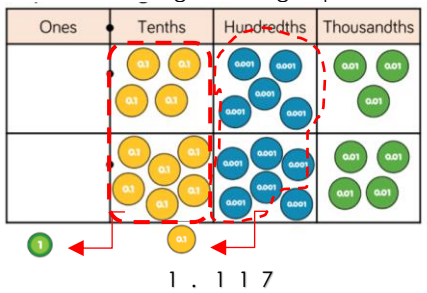
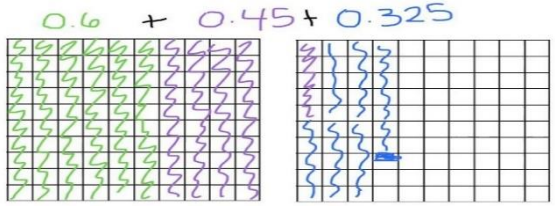
Year Two onwards

Concrete	Pictorial	Abstract
Regrouping to make 10; using ten frames and counters/cubes or using Numicon. 6 + 5 	Children to draw the ten frame and counters/cubes. 6 + 5 	Children to develop an understanding of equality e.g. $6 + \square = 11$ $6 + 5 = 5 + \square$ $6 + 5 = \square + 4$
TO + O using base 10. Continue to develop understanding of partitioning and place value. 41 + 8 	Children to represent the base 10 e.g. lines for tens and dot/crosses for ones. 41 + 8 	41 + 8 1 + 8 = 9 40 + 9 = 49  
TO + TO using base 10. Continue to develop understanding of partitioning and place value. 36 + 25	Children to represent the base 10 in a place value chart. 36 + 25 	Looking for ways to make 10.  30 + 20 = 50 5 + 5 = 10 50 + 10 + 1 = 61 Formal method: 36 +25 61 1

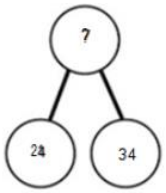
Year Three onwards

Concrete	Pictorial	Abstract
Use of place value counters to add HTO + TO, HTO + HTO etc. When there are 10 ones in the 1s column - we exchange/regroup for 1 ten. When there are 10 tens in the 10s column - we Exchange/regroup for 1 hundred. 243 + 368 	Children to represent the counters in a place value chart, circling when they make an exchange. 243 + 368 	**2 4 3** **+3 6 8** **6 1 1** 1 1

Year Five onwards

Concrete	Pictorial	Abstract
Use of place value counters to add decimals numbers. Where there are ten or more in a column demonstrate exchange and regroup. 	0.6 + 0.45 + 0.325 = 1.375 	**0 . 4 3** **+0 . 6 8** **1 . 1 1** 1 1 **£1 2 . 4 3** **+£ 5 . 6 8** **£1 8 . 1 1** 1 1

Conceptual variation; different ways to ask children to solve 21 + 34



?	
21	34

Word problems:
In year 3, there are 21 children and in year 4, there are 34 children.

How many children in total?

21 + 34 = 55. Prove it

21
+34

21 + 34 =

☐ = 21 + 34

Calculate the sum of twenty-one and thirty-four.

Missing digit problems:

10s	1s
	?
?	5

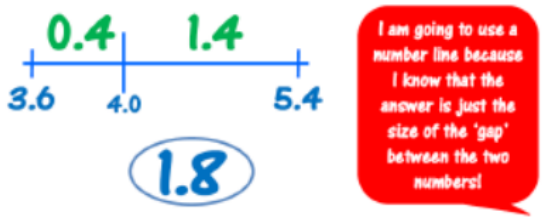
SUBTRACTION

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

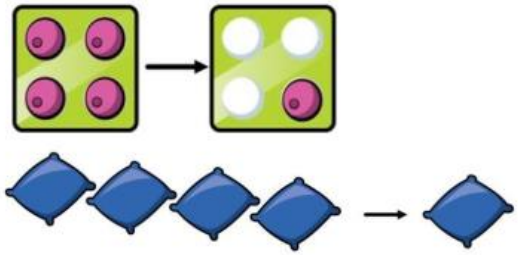
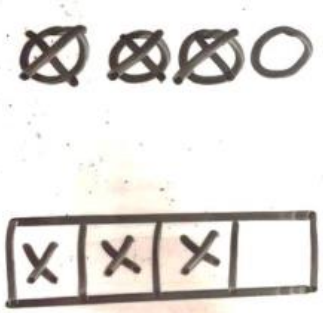
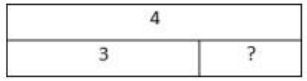
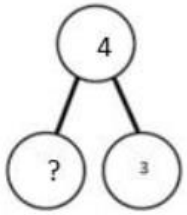
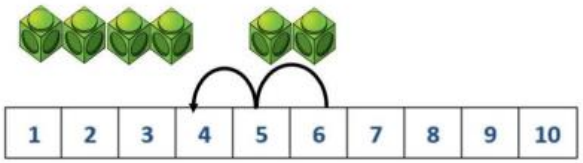
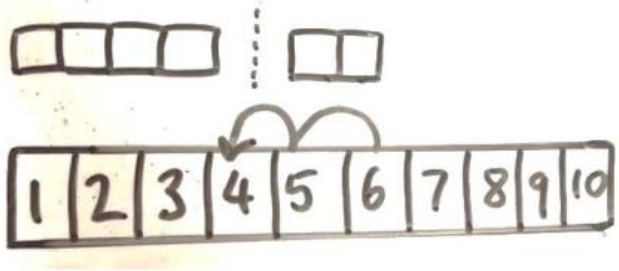
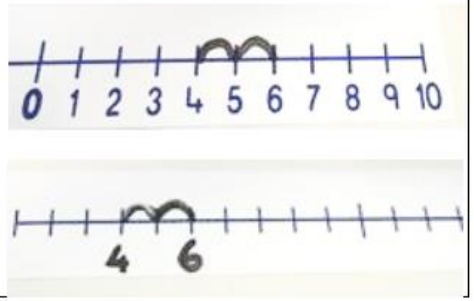
N.B. – Positioning of exchanging **MUST** be consistent across school and therefore must follow this policy.

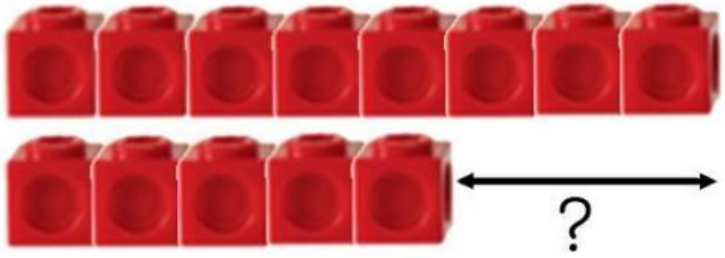
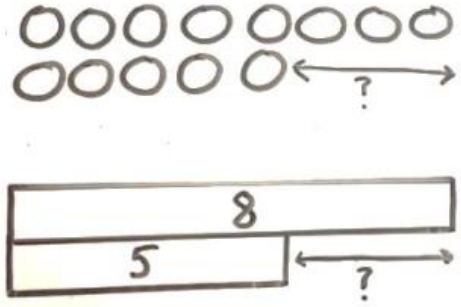
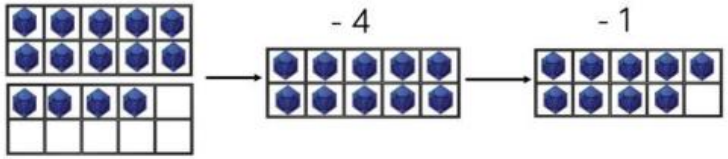
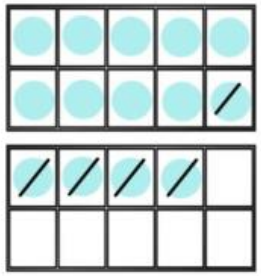
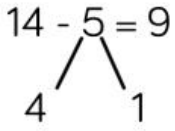
Guidance for Mental Strategies

EYFS	Year 1	Year 2	Year 3
Pupils engage in a range of practical activities starting with different amounts and know that the process of 'taking away' will result in fewer items being left. Once again keep pushing both 'doing' and 'understanding'. "How do you know?" Pupils can take away the right amount and count how many are left. Pupils learn about subtraction by knowing how to count back in ones to find the answer. They learn the skill of taking away one. When an addition number fact becomes secure, show the resulting inverse (subtraction) relationship. Encourage children to 'just know it' without counting!	**Mental Calculation (Agreed Core Method)**		
	19 - 4 18, 17, 16, 15 I am going to count back 4 from 19 17 - 3 10 + 4 14 I don't need to count back because I just know that 4 and 3 is 7 so 7 take away 3 must be 4!	* Must encourage to use number bonds to 10/100 62 - 28 2 32 28 30 62 34 I am going to use a number line because I know that the answer is just the size of the 'gap' between the two numbers! Use a number line/100 square to count on.	100 - 34 6 60 34 40 100 66 I am going to use a number line because I know that the answer is just the size of the 'gap' between the two numbers! Use a near-multiple method. 100 – 59 = 100 – 60 and then add 1 back on
	(Formal) Written Method		
		68 - 14 = 54 2d - 2d (not exchanging)	43 - 28 = 15 2d - 2d (exchanging) 512 - 267 = 245 3d - 3d (exchanging)

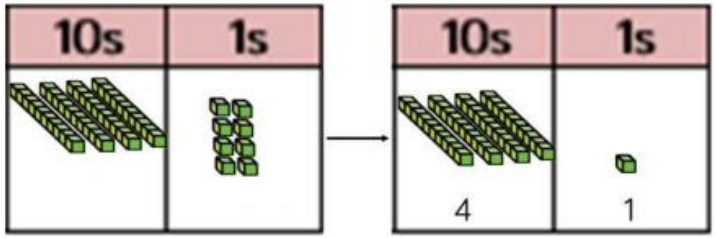
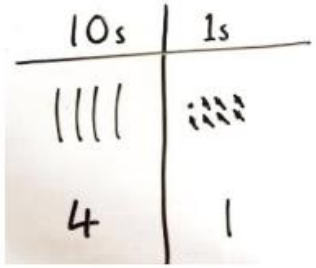
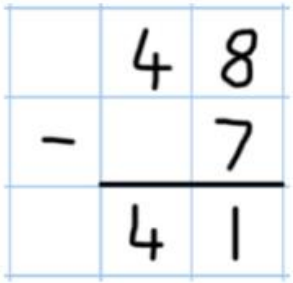
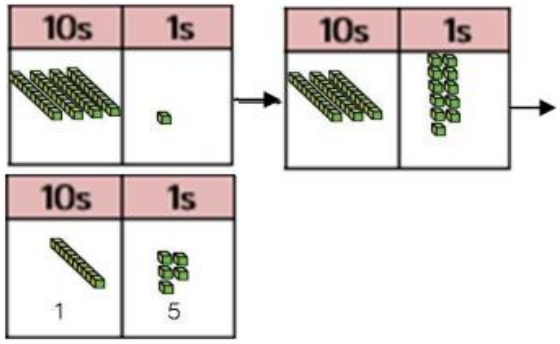
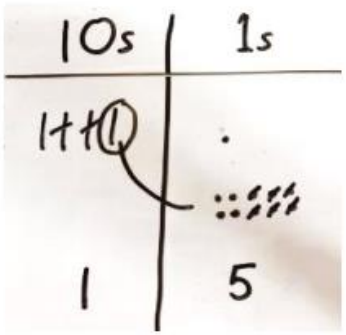
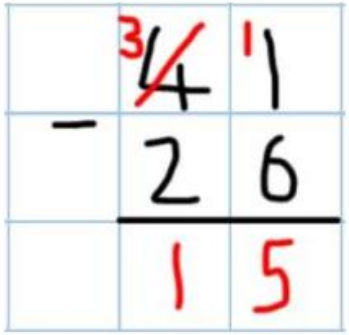
Year 4		Year 5	Year 6
Mental Calculation (Agreed Core Method)			
125 - 34  **May still need to go to next 10 then 100.		**5.4 – 3.6**  	
(Formal) Written Method			
$^{0}\not{1}\,{}^{1}2\,{}^{3}\not{4}\,{}^{1}3$ $-\ 7\ 0\ 5$ $5\ 3\ 8$ 4d – 2/3d (exchanging)	$6\,{}^{3}\not{4}\,{}^{10}\not{1}\,{}^{1}2$ $-2\ 2\ 8\ 7$ $4\ 1\ 2\ 5$ 4d – 4d (exchanging)	$8\,{}^{8}\not{9},\,{}^{11}\not{2}\,{}^{10}\not{1}\,{}^{1}\not{4}$ $-1\ 6,\ 7\ 3\ 5$ $7\ 2,\ 4\ 7\ 9$ 5d – 5d (exchanging)	$^{5}\not{6}\ .\ ^{10}\not{1}\ {}^{1}\not{2}\,{}^{1}5$ $-\ 3\ .\ 4\ 7\ 8$ $2\ .\ 6\ 4\ 7$ Subtract decimals with 1 or more dp

EYFS / Year One

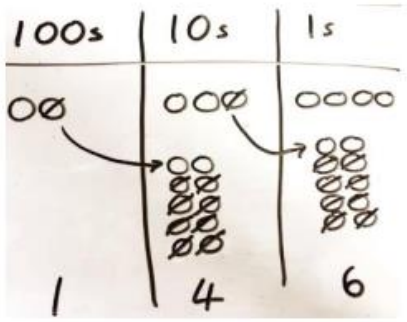
Concrete	Pictorial	Abstract
Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used). 4 – 3 = 1 	Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used. 4 – 3 = 1 	**4 - 3 =**  **= 4 – 3** 
Counting back (using number lines or number tracks) children start with 6 and count back 2. 6 – 2 = 4 	Children to represent what they see pictorially e.g. 6 – 2 = 4 	Children to represent the calculation on a number line or number track and show their jumps. Encourage children to use an empty number line. 6 – 2 = 4 

Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used). Calculate the difference between 8 and 5. 	Children to draw the cubes/other concrete objects which they have used or use the bar model to illustrate what they need to calculate. 8 -5, the difference is ? 	Find the difference between 8 and 5. 8 – 5, the difference is Children to explore why 9 - 6 = 8 – 5 = 7 – 4 have the same difference.
Making 10 using ten frames. 14 – 5 	Children to present the ten frame pictorially and discuss what they did to make 10. 14 – 5 	Children to show how they can make 10 by partitioning the subtrahend.  14 – 4 = 10 10 – 1 = 9

Year Two upwards

Column method using base 10. 48-7 	Children to represent the base 10 pictorially. 48 - 7 	Column method or children could count back 7. 
Column method using base 10 and having to exchange. 41 – 26 	Represent the base 10 pictorially, remembering to show the exchange. 41 – 26 	Formal column method. Children must understand that when they have exchanged the 10 they still have 41 because 41 = 30 + 11. 

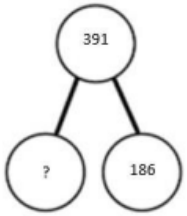
Year Three upwards

Column method using place value counters. 234 – 88 (see right)	Represent the place value counters pictorially; remembering to show what has been exchanged. 234 – 88  	Formal column method. Children must understand what has happened when they have crossed out digits. $\begin{array}{r} {}^{2}\not{2}\,{}^{1}\not{3}4 \\ -\ 88 \\ \hline 6 \end{array}$

Year 5 upwards

Concrete	Pictorial	Abstract
		$\begin{array}{r} {}^{0}\not{1}\,{}^{13}\not{4}\,{}^{1}\not{3} \\ -\ 0.68 \\ \hline 0.75 \end{array}$ $\qquad$ $\begin{array}{r} {}^{0}\not{£}\,{}^{11}\not{1}\,{}^{13}\not{2}\,{}^{1}\not{.}\not{4}3 \\ -\ £\ 5.68 \\ \hline £\ 6.75 \end{array}$

Conceptual variation; different ways to ask children to solve 391 – 186



391	
186	?

Raj spent £391,
Timmy spent £186.
How much more did Raj spend?

Calculate the difference between 391 and 186.

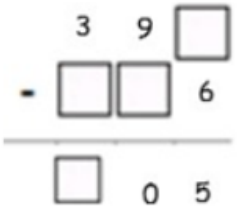
i i = 391 – 186

391

-186

What is 186 less than 391?

Missing digit calculations



MULTIPLICATION

Key language: double, times, multiplied by, the product of, groups of, lots of, equal groups.

N.B. – Positioning of exchanging **MUST** be consistent across school and therefore must follow this policy.

Guidance for Mental Strategies

<table>
<tr><th>EYFS</th><th>Year 1</th><th>Year 2</th><th>Year 3</th></tr>
<tr><td rowspan="4">Pupils learn extend their counting skills by setting out groups of objects with the same number in each group.

They understand instructions such as:
Set out 1 group of 3 toy cars, set out 2 groups, 3 groups, etc.

They are able to check that there is the same number in each group and that they have the correct number of groups.

They can find out 'how many altogether' by counting all the items.

They understand the concept of 'doubling', i.e. two groups with the same amount in each group.

They 'just know' the doubles of 1, 2, 3, 4 and 5.</td><td colspan="3">Mental Calculation (Agreed Core Method)</td></tr>
<tr><td></td><td></td><td>27 x 3
20 x 3 = 60
7 x 3 = 21
81

3 lots of 2 'tens' is 6 'tens'.

I am going to multiply the tens and then multiply the ones.</td></tr>
<tr><td colspan="3">(Formal) Written Method</td></tr>
<tr><td></td><td></td><td>35
x 4
20 (4x5)
120 (4x30)
140
(x2, 3, 4, 5 and 8)</td></tr>
</table>

Year 4

Mental Calculation (Agreed Core Method)

47 x 8

40 x 8 = 320
8 x 7 = 56

376

8 lots of 4 'tens' is 32 'tens'.

I am going to multiply the tens and then multiply the ones.

70 x 80

7 x 80 = 560
70 x 80 = 5600

5600

7 lots of 8 'tens' is 56 'tens'.

I am going to use the fact that I just know the answer to 7 lots of 8 'tens'.

(Formal) Written Method

```
  256
x   7
 1792
```

42 (7x6)
350 (7x50)
1400 (7x200)

2/3d x 1d

Year 5

Mental Calculation (Agreed Core Method)

47 x 30

47 x 3 = 141
47 x 30 = 1410

1410

I am going to multiply 47 by 3 first (easy!) and then make my answer ten times bigger!

243 x 6

200 x 6 = 1200
43 x 6 = 258

1458

6 lots of 2 'hundreds' is 12 'hundreds'.

I am going to multiply 43 by 6 (easy!) and multiply 200 by 6 (easy!)

(Formal) Written Method

```
  2741
x    6
 16446
```

4d x 1d

```
  321
x  27
 2247
6420
8667
```

3/4d x 2d

```
  24
X 16
 144
 240
 384
```

2d x 2d (long)

Year 6

Mental Calculation (Agreed Core Method)

4.6 x 7

7 x 4 = 28
7 x 0.6 = 4.2

32.2

7 lots of 6 'tenths' is 42 'tenths'.

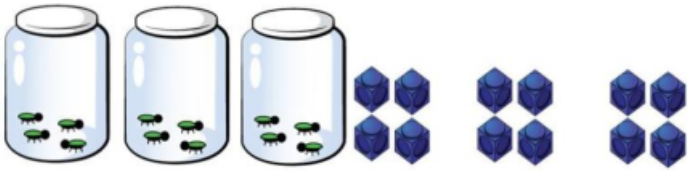
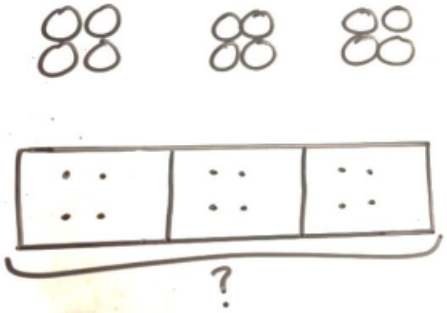
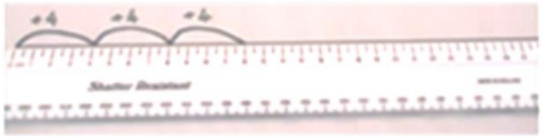
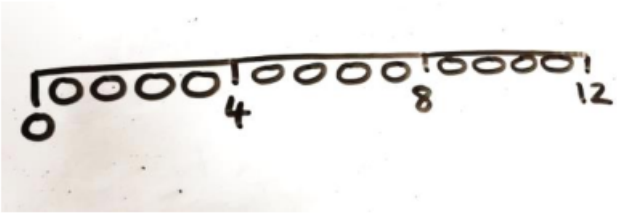
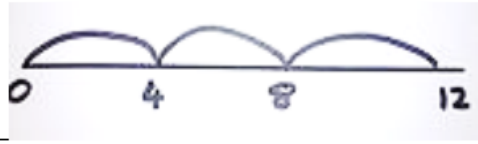
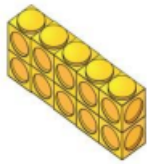
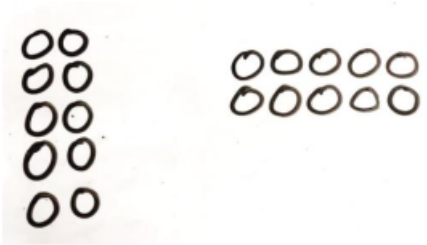
I am going to multiply the ones and then multiply the tenths.

(Formal) Written Method

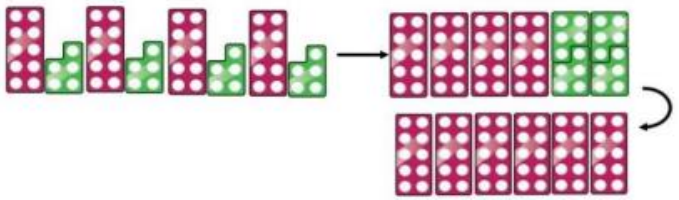
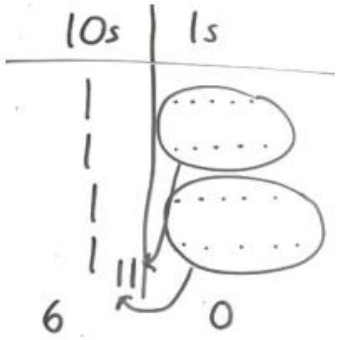
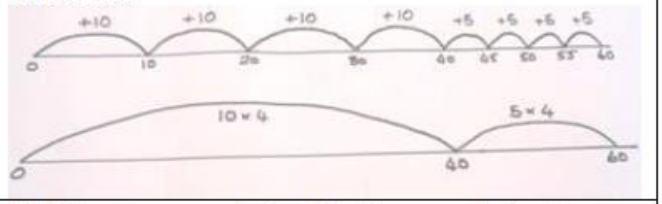
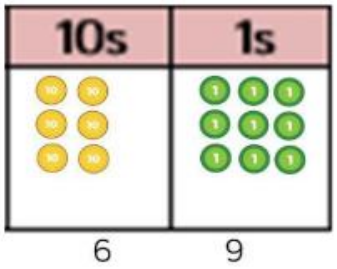
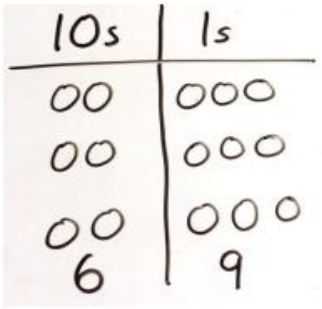
```
  2573
X   32
 5146
77190
82336
```

Up to 4d x 2d (long)

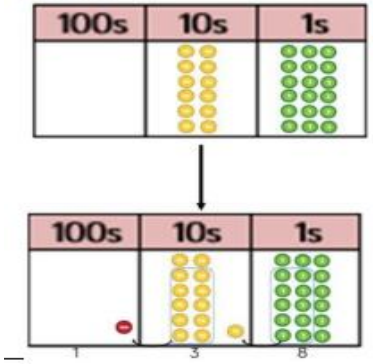
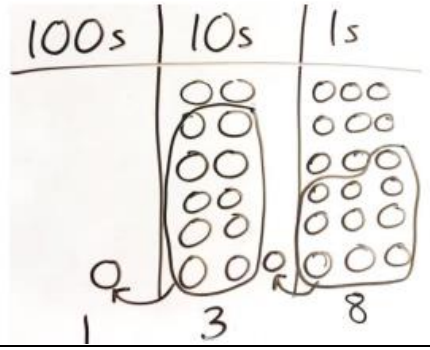
EYFS / Key Stage One

Concrete	Pictorial	Abstract
Repeated grouping/repeated addition 3 × 4 4 + 4 + 4 There are 3 equal groups, with 4 in each group. 	Children to represent the practical resources in a picture and use a bar model. 3 × 4 4 + 4 + 4 	3 × 4 = 12 4 + 4 + 4 = 12
Number lines to show repeated groups. 3 × 4 4 + 4 + 4  Cuisenaire rods can be used too. 	Represent this pictorially alongside a number line e.g. 3 × 4 4 + 4 + 4 	Abstract number line showing three jumps of four. 3 × 4 = 12 4 + 4 + 4 = 12 
Use arrays to illustrate commutativity counters and other objects can also be used. 2 × 5 = 5 × 2  2 lots of 5  5 lots of 2	Children to represent the arrays pictorially. 2 × 5 = 5 × 2 	Children to be able to use an array to write a range of calculations e.g. 10 = 2 × 5 5 × 2 = 10 2 + 2 + 2 + 2 + 2 = 10 10 = 5 + 5

Year Three onwards

Concrete	Pictorial	Abstract
Partition to multiply using Numicon, base 10 or Cuisenaire rods. 4 × 15 	Children to represent the concrete manipulatives pictorially. 4 × 15 	Children to be encouraged to show the steps they have taken. 4 x 15 10 5 10 x 4 = 40 5 x 4 = 20 40 + 20 = 60 A number line can also be used. 
Formal column method with place value counters (base 10 can also be used.) 3 × 23 	Children to represent the counters pictorially. 3 × 23 	Children to record what it is they are doing to show understanding. 3 × 23 = 3 × 3 = 9 3 × 20 = 60 60 + 9 = 69 23 × 3 69

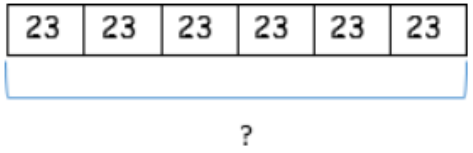
Year Four onwards

Concrete	Pictorial	Abstract
Formal column method with place value counters. 6 x 23  	Children to represent the counters/base 10, pictorially. E.g. the image below. 6 x 23  	Formal written method 6 x 23 = 23 × 6 138 1 1

Year 5 onwards

Concrete	Pictorial	Abstract
Steps: 124 x 26 = (6 x 124) + (20 x 124) Step one: 6 x 124 = 6 x 4 (ones) = 24 6 x 20 (tens) = 120 (+ 2 tens) = 140 6 x 100 (hundreds = 600 (+ 1 hundred) = 700 TOTAL = 744 (after exchanging) 20 x 124 20 x 4 (ones) = 80 20 x 20 (tens) =400 20 x 100 (hundreds) = 2000 TOTAL = 2480 2480 + 744 = 3224	When children start to multiply 3d x 3d and 4d x 2d etc. they should be confident with abstract method (column).	1 2 4 × 2 6 7 4 4 1 2 2 4 8 0 3 2 2 4 1 1 Answer: 3224

Conceptual variation; different ways to ask children to solve 6 × 23

<table>
<tr>
<td>


</td>
<td>
Mai had to swim 23 lengths, 6 times a week. How many lengths did she swim in one week?

With the counters, prove that 6 x 23 = 138
</td>
<td>
Find the product of 6 and

23 6 × 23 =

= 6 × 23

6 × 23 = ____

23 × 6 = ____
</td>
<td>
What is the calculation? What is the product?


</td>
</tr>
</table>

DIVISION

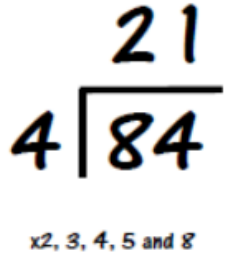
N.B. – Positioning of exchanging **MUST** be consistent across school and therefore must follow this policy.

Key Vocabulary: share, group, divide, divided by, half.

<table>
<tr><th>EYFS</th><th>Year 1</th><th>Year 2</th><th>Year 3</th></tr>
<tr><td></td><td colspan="3">Mental Calculation (Agreed Core Method)</td></tr>
<tr><td rowspan="3">Pupils understand the process of 'sharing' by giving out objects fairly!

Pupils can share an even number of objects between two people and understand that they are finding 'one half'.

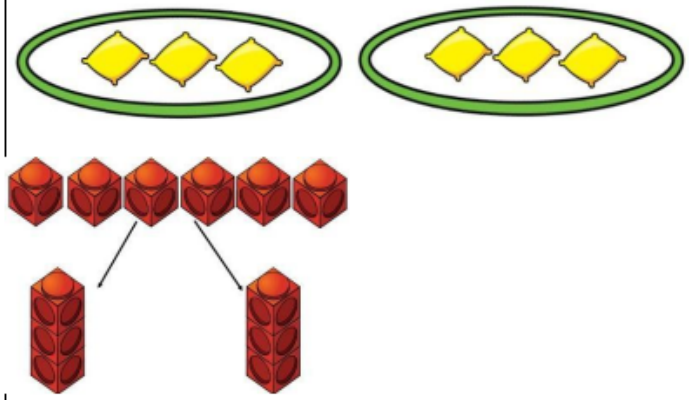
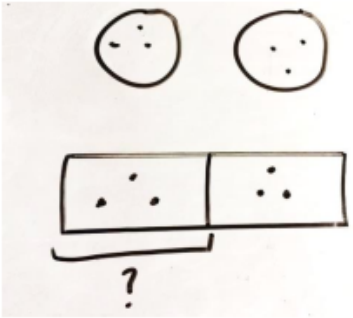
Example: Pupils understand that one half of six must be three because they just know that double three is six.

Pupils are able to share an amount into three equal size groups. They can check that each group has the same amount and they can count how many in each group.</td><td></td><td></td><td> 
</td></tr>
<tr><td colspan="3">(Formal) Written Method</td></tr>
<tr><td></td><td></td><td> 

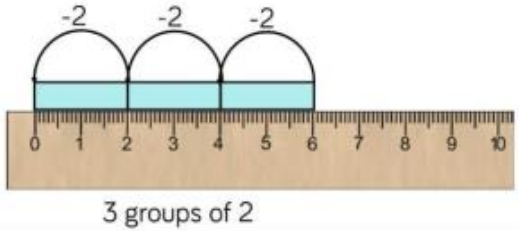
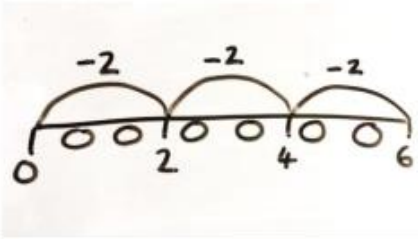
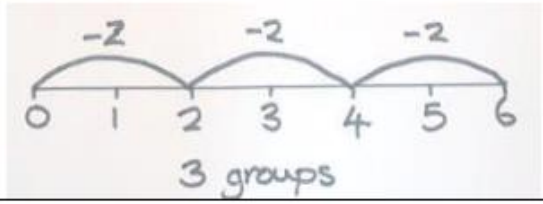
x2, 3, 4, 5 and 8</td></tr>
</table>

Year 4		Year 5		Year 6
Mental Calculation (Agreed Core Method)				
91 ÷ 7 70 (10x) 21 (3x) 13 I am going to combine two multiplication facts – first ten lots and then another fact that I just know!	100 ÷ 7 70 (10x) 28 (4x) 2 14 r2 I am going to combine two multiplication facts – first ten lots and then another fact that I just know!	420 ÷ 6 42 ÷ 6 = 7 420 ÷ 6 = 70 42 'tens' divided by 6 is 7 'tens'. 70 I am going 'see' the question as 42 'things' divided by 6 and the 'things' are 'tens'.	423 ÷ 6 420 3 420 ÷ 6 = 70 42 'tens' divided by 6 is 7 'tens'. 70 r3 I can just use that 420 (42 tens) is a multiple of 6 because 42 is a multiple of 6.	
(Formal) Written Method				
1 4 3 | 4 1 2 2d ÷ 1d (no remainders)	6 2 6 | ~~3~~ ~~7~~ 2 3d ÷ 1d (no remainders)	0 6 2 6 | 3 7 1 2	0 6 6 1r5 6 | 3 9 7 1 Up to 4d ÷ 1d (interpret remainders)	2 4 8r24 32 | 7 9 6 0 - 6 4 0 0 (200 x 32) 1 5 6 0 - 1 2 8 0 (40 x 32) 0 2 8 0 - 2 5 6 (8 x 32) r 0 2 4 Up to 4d divided by 2d long/short Remainders as r, decimals or fractions.

EYFS / YEAR ONE

Concrete	Pictorial	Abstract
Sharing using a range of objects. 6 ÷ 2 	Represent the sharing pictorially. 	6 ÷ 2 = 3  Children should also be encouraged to use their 2 times tables facts.

YEAR TWO

Repeated subtraction using Cuisenaire rods above a ruler. 6 ÷ 2 6 – 2 – 2 – 2  3 groups of 2	Children to represent repeated subtraction pictorially. 6 ÷ 2 6 – 2 – 2 – 2 	Abstract number line to represent the equal groups that have been subtracted. 6 ÷ 2 6 – 2 – 2 – 2 

YEAR THREE

2d÷1d with remainders using lollipop sticks. Cuisenaire rods, above a ruler can also be used.

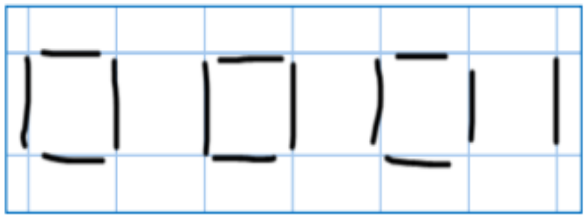
13 ÷ 4

Use of lollipop sticks to form wholes- squares are made because we are dividing by 4.

There are 3 whole squares, with 1 left over.

Children to represent the lollipop sticks pictorially.

13 ÷ 4

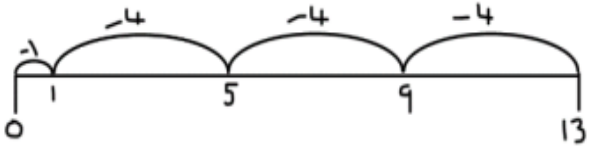


There are 3 whole squares, with 1 left over.

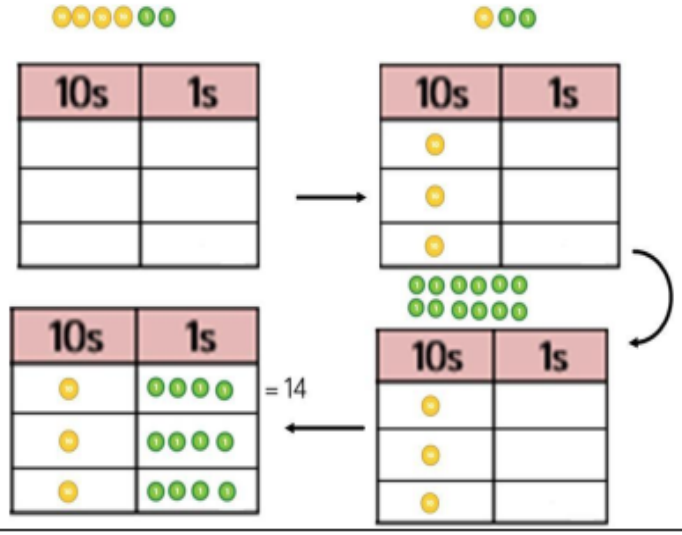
13 ÷ 4 – 3 remainder 1

Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line.

'3 groups of 4, with 1 left over'

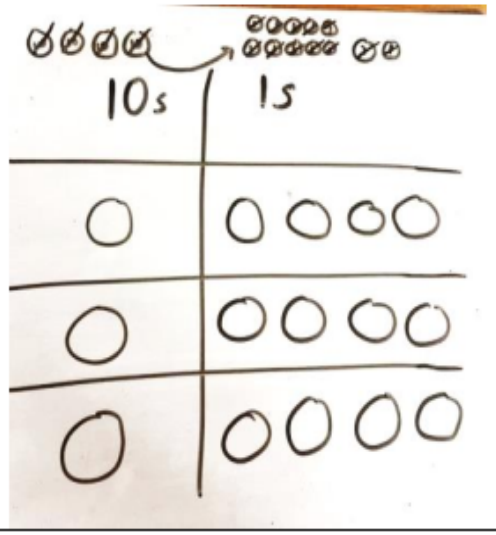


Sharing using place value counters. 42 ÷ 3 = 14



Children to represent the place value counters pictorially.

42 ÷ 3 = 14

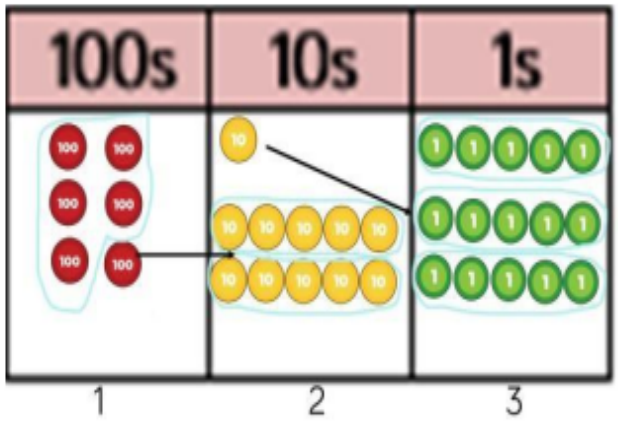


Children to be able to make sense of the place value counters and write calculations to show the process.

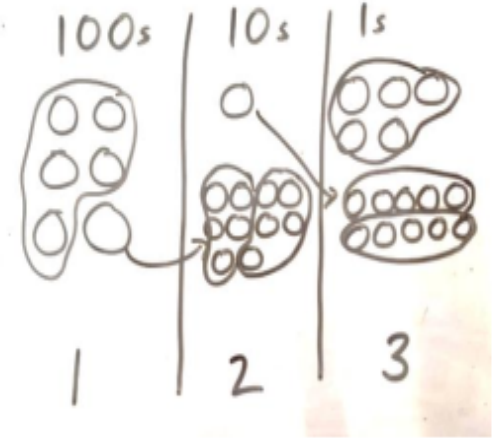
42 ÷ 3
42 = 30 + 12
30 ÷ 3 = 10
12 ÷ 3 = 4
10 + 4 = 14

YEAR FOUR ONWARDS

Short division using place value counters to group. 615 ÷ 5



Represent the place value counters pictorially. 615 ÷ 5



Children to the calculation using the short division scaffold.

$$5\overline{)615}\quad 123$$

Concrete and pictorial steps:

1. Make 615 with place value counters.
2. How many groups of 5 hundreds can you make with 6 hundred counters?
3. Exchange 1 hundred for 10 tens.
4. How many groups of 5 tens can you make with 11 ten counters?
5. Exchange 1 ten for 10 ones.

How many groups of 5 ones can you make with 15 ones?

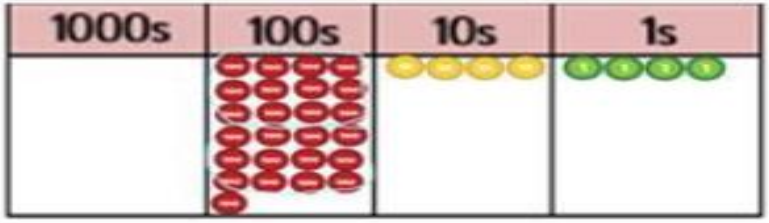
Short Division steps:

1. How many groups of 5 hundreds are there in 6 hundred?
   1 with 1 left over.
2. How many groups of 5 tens are there in 11 tens?
   2 with 1 left over.
3. How many groups of 5 ones are there in 15 ones?
   3 with no remainders.

YEAR SIX

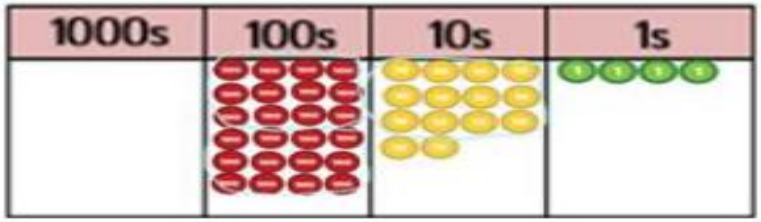
Long division using place value counters
2544 ÷ 12

We can't group 2 thousands into groups of 12 so will exchange them.



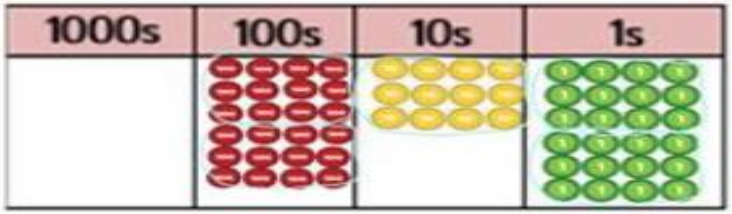
We can group 24 hundreds into groups of 12 which leaves with 1 hundred.

$$\begin{array}{r} 02 \\ 12\overline{)2544} \\ 24 \\ \hline 1 \end{array}$$



After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.

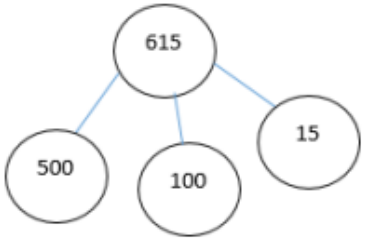
$$\begin{array}{r} 021 \\ 12\overline{)2544} \\ 24 \\ \hline 14 \\ 12 \\ \hline 2 \end{array}$$



After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 group of 12, which leaves no remainder.

$$\begin{array}{r} 0212 \\ 12\overline{)2544} \\ 24 \\ \hline 14 \\ 12 \\ \hline 24 \\ 24 \\ \hline 0 \end{array}$$

Conceptual variation; different ways to ask children to solve 615 ÷ 5

Using the part whole model below, how can you divide 615 by 5 without using short division?  	I have £615 and share it equally between 5 bank accounts. How much will be in each account? 615 pupils need to be put into 5 groups. How many will be in each group?	$5\overline{)615}$ 615 ÷ 5 = = 615 ÷ 5	What is the calculation? What is the answer?