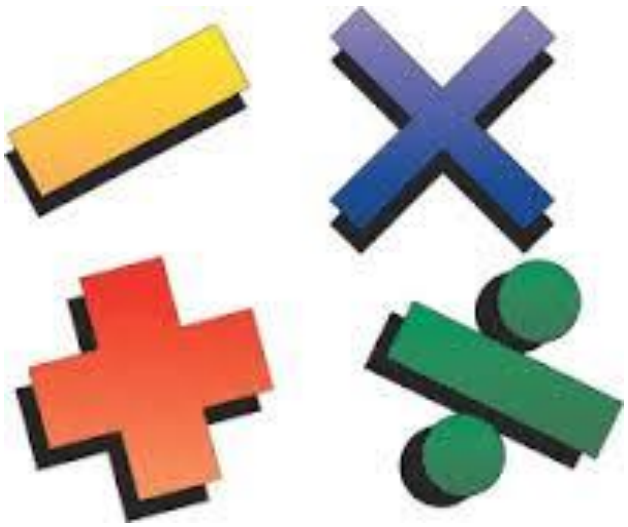
William Law C E Primary School

Mathematics
Calculation Policy



At William Law CE Primary we believe that children should be introduced to the processes of calculation through practical, oral and mental activities. As children begin to understand the underlying ideas they develop ways of recording to support their thinking and calculation methods, use particular methods that apply to special cases, and learn to interpret and use the signs and symbols involved.

Choosing the appropriate strategy, recording in mathematics and in calculation in particular is an important tool both for furthering the understanding of ideas and for communicating those ideas to others. A useful written method is one that helps children carry out a calculation and can be understood by others.

Written methods are complementary to mental methods and should not be seen as separate from them. The aim is that children use mental methods when appropriate, but for calculations that they cannot do in their heads they use an efficient written method accurately and with confidence. It is important children acquire secure mental methods of calculation and one efficient written method of calculation for addition, subtraction, multiplication and division which they know they can rely on when mental methods are not appropriate.

This document identifies progression in calculation strategies rather than specifying which method should be taught in a particular year group.

Children should not be made to go onto the next stage if:
1) they are not ready.
2) they are not confident.

By the end of Year 6, children should be able to choose the most appropriate approach to solve a problem: making a choice between using jottings (an extended written method), an efficient written method or a mental method.

This policy contains the key pencil and paper procedures that will be taught within our school alongside practical resources. It has been written to ensure consistency and progression throughout the school and reflects a whole school agreement.

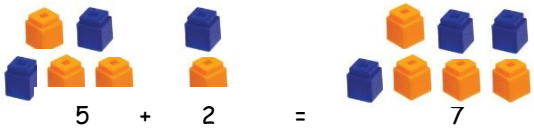
Addition

WILLIAM LAW CE PRIMARY
CALCULATION POLICY

ADDITION

EYFS

VOCABULARY: add, more, and, make, sum, total, altogether, score, double, one more, two more, ten more…, how many more to make… ?, how many more is… than…?

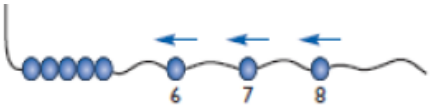
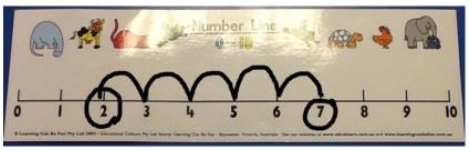
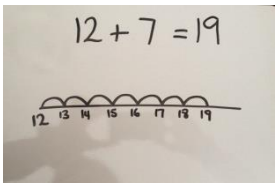
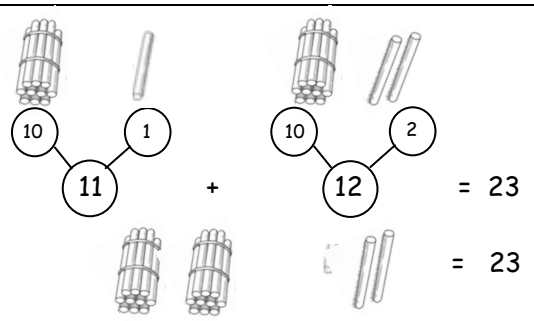
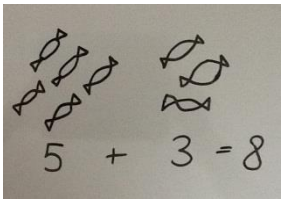
Method	**Example/Representation**
Using a range of practical resources and real life contexts, pupils develop their understanding of the concept of addition through counting activities	How many dinosaurs are there?  What about if I give you two more? How many are there now? 
Children are introduced to the addition symbol (+) and use pictures/diagrams to represent the calculation	There are 2 birds. Another bird flies in. How many are there altogether? 
Store the larger number mentally and use fingers to count on	Count on from the larger number. A child will choose the larger number, even when it is not the first and count on from there; (5 in your head) 'six, seven, eight' using their fingers: 3 + 5 = 8 
Children represent an addition number sentence in picture form and are able to solve simple addition number sentences using objects or fingers Children will begin to explain their reasoning	  5 + 2 = 7
Diagrams like 'Adam the Adder' can be used as an early introduction to a number track This will help children develop their understanding of addition	

MENTAL STRATEGIES:

- Develop a mental image of the number system.
- Understand the value of a number
- Counting forwards and backwards
- Recall of number bonds to 10

YEAR 1

VOCABULARY: number bonds, add, more, plus, make, sum, total, altogether, inverse double, near double, equals, is the same as (including equals sign), score, one more, two more… ten more, how many more to make…?, how many more is… than…?, how much more is…?

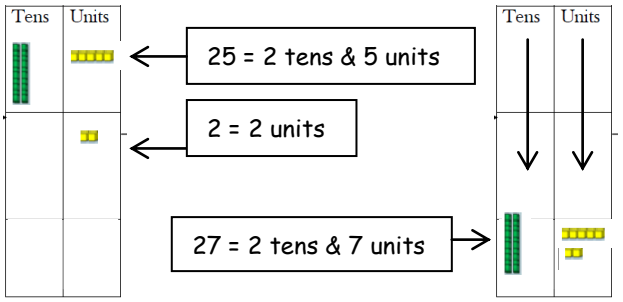
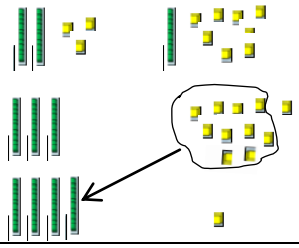
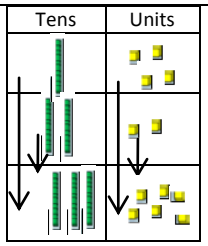
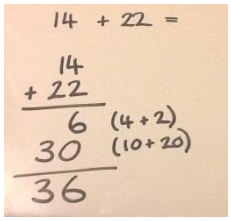
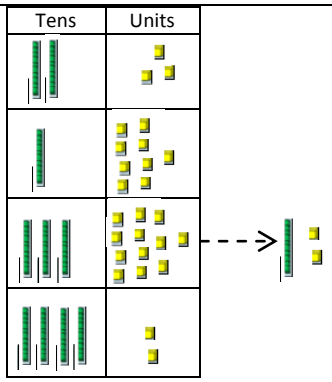
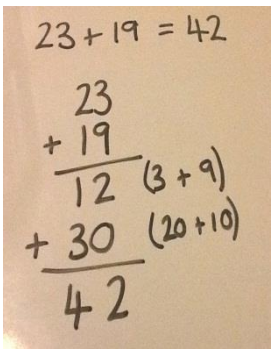
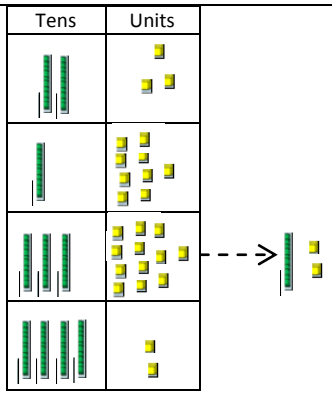
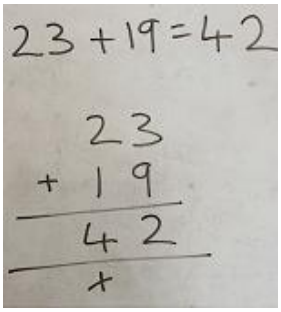
Method:	**Example/Representation:**
Children will be taught to use a number track to support addition	4 + 2 = 6 
Bead strings and counting sticks will be used to support addition	5 + 3 = 8 
Children will use a prepared number line to solve simple addition stories and number sentences	2 + 5 = 7 
Children will be taught how to solve simple addition stories with the support of a 100 number square	11 + 7 = 18 
Children are taught how to use a blank number line for addition and then encouraged to draw their own number line to help solve problems	12 + 7 = 19 
Children will partition numbers into tens and units when adding two 2-digit numbers that lie within the tens boundary 	
Children will solve one-step addition problems using concrete objects and/or pictorial representations	I have 5 sweets and I am given 3 more. How many do I have altogether? 

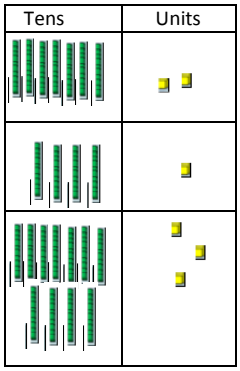
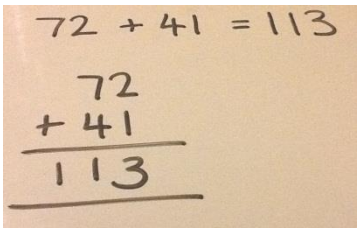
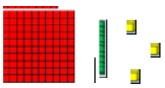
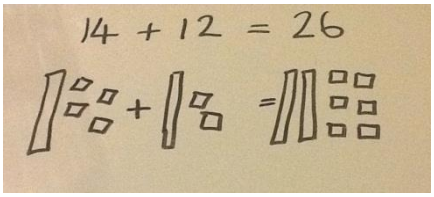
MENTAL STRATEGIES:

- Know addition can be carried out in any order (commutative)
- Add 1 and 2 digit numbers to 20 including 0
- Number bonds to 20
- Doubles of numbers up to and including double 10
- Adding 10 to a single digit number
- Identify 1 more than a given number

YEAR 2

VOCABULARY: add, addition, more, plus, make, sum, total, altogether, score, double, near double, one more, two more… ten more… one hundred more, how many more to make…?, how many more is… than…?, how much more is…?, tens boundary

Method:	**Example/Representation:**
Children will use concrete objects and pictorial representations to add: a 2-digit number and units, three 1-digit numbers and a 2-digit number and multiples of 10	25 + 2 
Children will partition numbers into tens and units when adding two 2-digit numbers that cross the tens boundary	23 + 18 = 41 
Children begin to set out TU + TU (that lie within the tens boundary) in columns and record as expanded column addition	 
Children begin to set out TU + TU (that cross the tens boundary) in columns and record as expanded column addition	 
Children begin to set out TU + TU (that cross the tens boundary) in columns and record as column addition	 

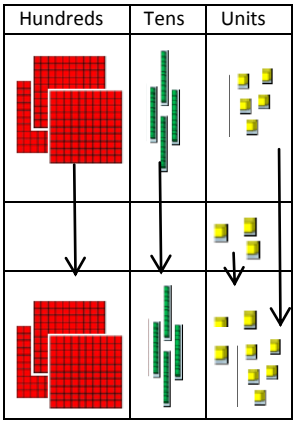
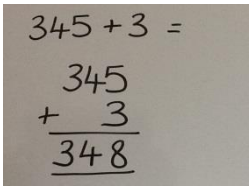
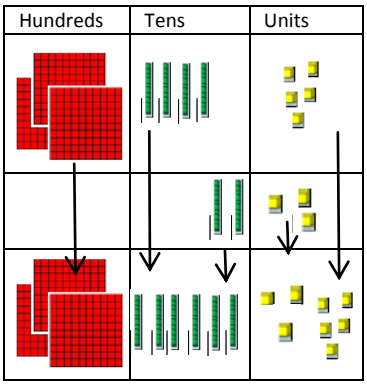
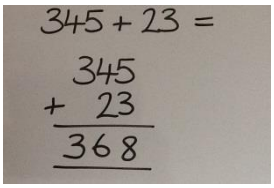
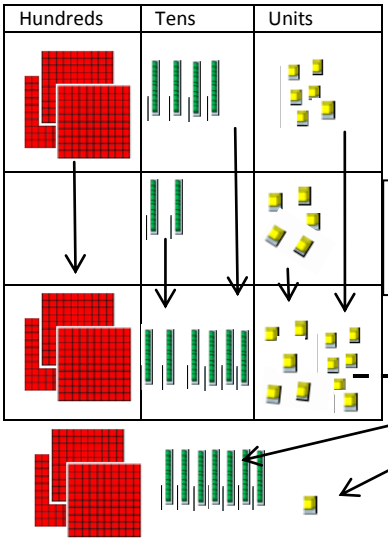
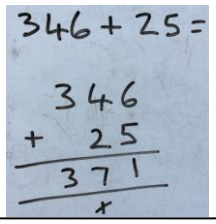
Children begin to set out TU + TU (that cross the hundreds boundary) in columns and record as column addition	  
Children will solve simple addition problems using concrete objects and pictorial representations, including those involving number, quantities and measures	George has 14 strawberries and Jess has 12 strawberries. How many strawberries are there altogether? 

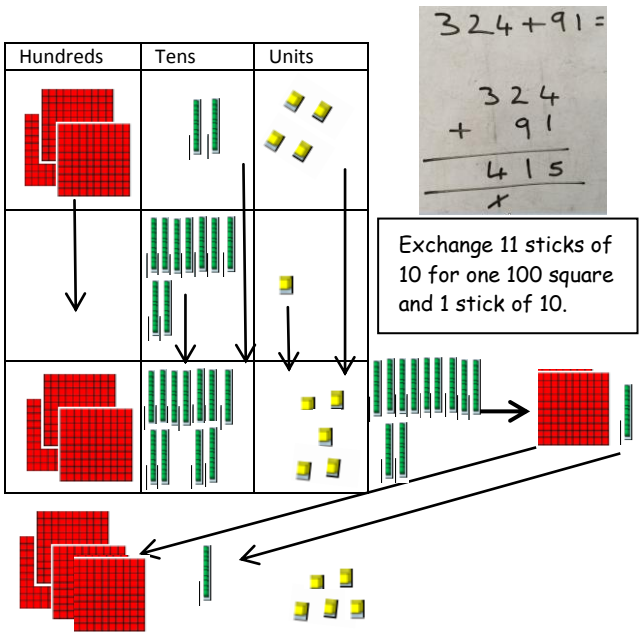
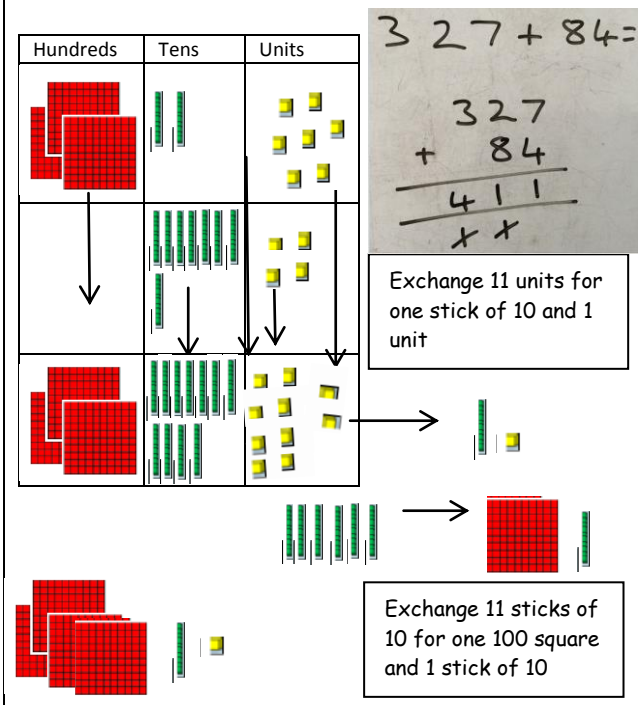
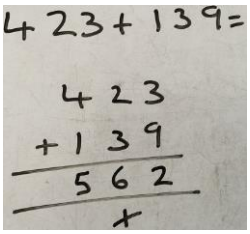
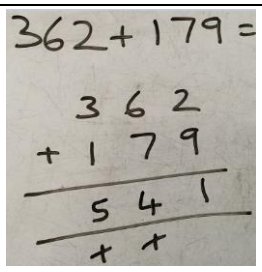
MENTAL STRATEGIES:

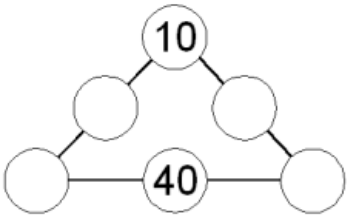
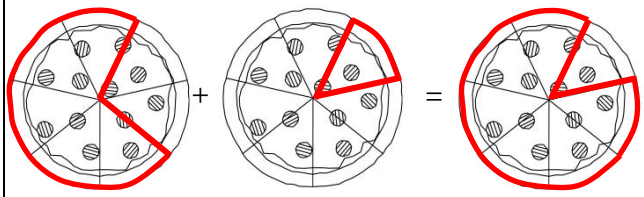
- Know that addition is the inverse of subtraction
- Add numbers mentally, including:
  - A 2-digit number and units
  - A multiple of 10 to a 2-digit number
  - Two 2-digit numbers
  - Three 1-digit numbers
- Use knowledge of inverse to check calculations and solve missing number problems
- Use knowledge of number bonds to 10 to calculate numbers bonds to 100
- Count on in tens from any given number (e.g 19 – 29 – 39 – 49 etc)

YEAR 3:

VOCABULARY: add, increase, total, plus, sum, more, altogether, column addition, estimate, inverse, double, near double, one more, ten more… one hundred more, how many more to make …? how many more is… than …? how much more is…?, tens boundary, hundreds boundary

Method:	**Example/Representation:**
Children set out HTU + U (that lie within the tens boundary) in columns and record as column addition	 
Children set out HTU + TU (that lie within the tens boundary) in columns and record as column addition	 
Children set out HTU + TU (that cross the tens boundary) in columns and record as column addition	  Exchange 11 units for one stick of 10 and 1 unit.

Children set out HTU + TU (that cross the hundreds boundary) in columns and record as column addition	
Children set out HTU + TU (that cross the hundred and tens boundaries) in columns and record as column addition	
Children set out HTU + HTU (that cross the tens boundary) in columns and record as column addition	
Children set out HTU + HTU (that cross the tens and hundreds boundaries) in columns and record as column addition	

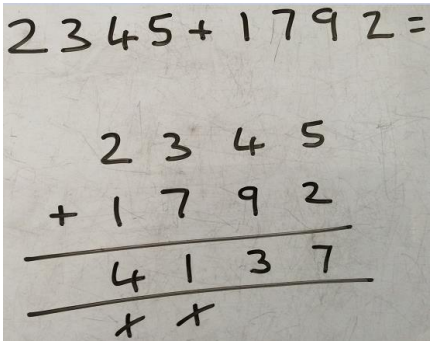
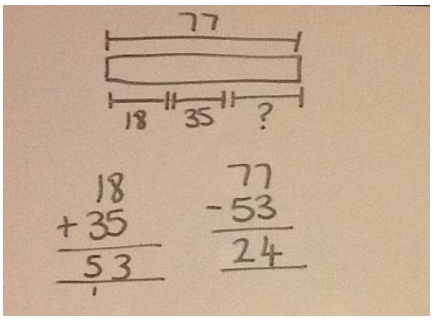
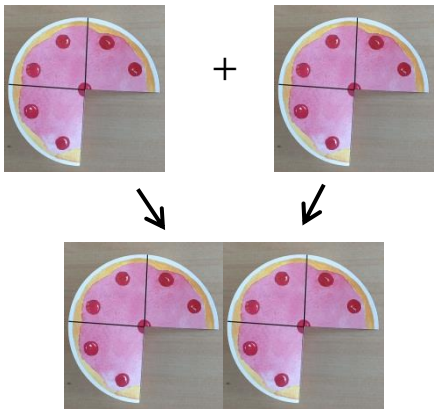
Children will solve one and two-step addition problems (including missing number problems) using concrete objects and pictorial representations	This number triangle has missing numbers. The numbers along each edge must add up to 90. Put all the numbers: 20, 30, 50 and 60 in the circles to make the totals correct. 
Pupils practise adding fractions with the same denominator through a variety of increasingly complex problems to improve fluency	$^{5}/_{7} + {}^{1}/_{7} = {}^{6}/_{7}$ 

MENTAL STRATEGIES:

- Add numbers mentally, including:
  - a three-digit number and a single digit number
  - a 3-digit number and multiples of 10
  - a 3-digit number and multiples of 100
- Estimate the answer to a calculation and use inverse operations to check answers
- Know number pairs that total 1000 (multiples of 100)
- Calculate 10 or 100 more than any given number

YEAR 4

VOCABULARY: add, addition, more, plus, increase, sum, total, altogether, score, double, near double , tens boundary, hundreds boundary, thousands boundary, inverse

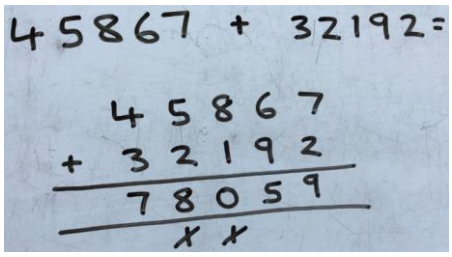
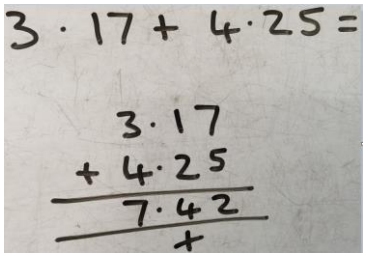
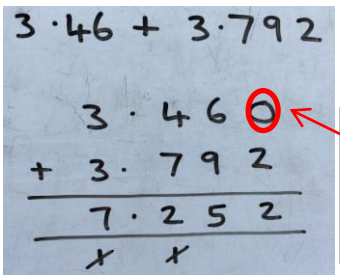
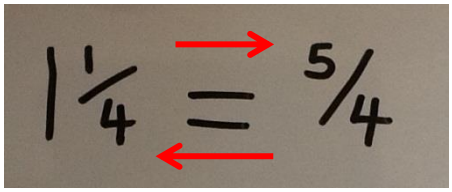
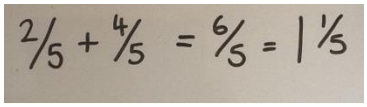
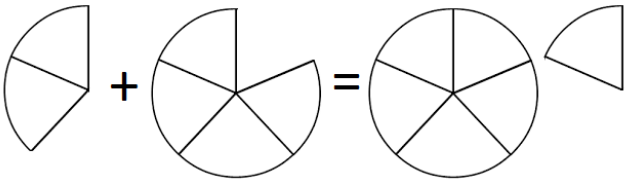
Method:	**Example/Representation:**
Children will add numbers with up to 4-digits using the formal written method of column addition	
Solve two-step problems using formal jottings and explaining reasoning behind their calculations (Singapore Bar method)	Seb has 77 cubes. He builds two towers. One tower uses 18 cubes and one tower uses 35 cubes. How many cubes does he have left over? 
Pupils continue practise in adding fractions with the same denominator to become fluent through a variety of increasingly complex problems beyond one whole	$^{3}/_{4} + {}^{3}/_{4} = {}^{6}/_{4}$ 

MENTAL STRATEGIES:

- Add numbers mentally, including:
  - a four digit number and multiples of one thousand
- Use knowledge of doubles to derive related facts (e.g 15 + 16 = 31 because 15 + 15 = 30 and 30 + 1 = 31)
- Know number pairs that total 1000 (multiples of 10)
- Estimate the answer to a calculation and use inverse operations to check answers

YEAR 5

VOCABULARY: Efficient written method, add, addition, more, plus, increase, sum, total, altogether, score, tens boundary, hundreds boundary, thousands boundary, units boundary, tenths boundary, inverse

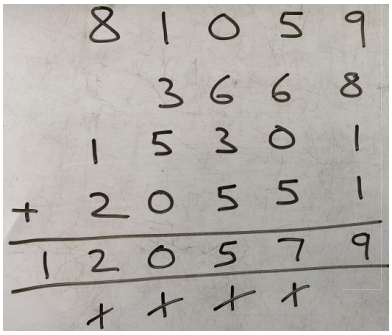
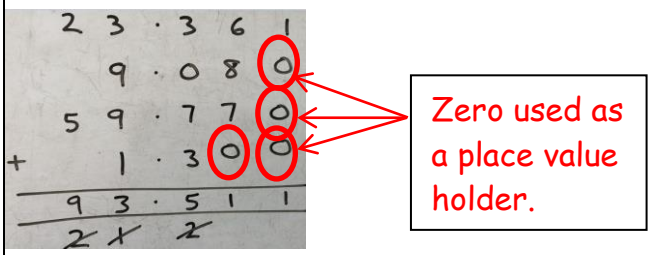
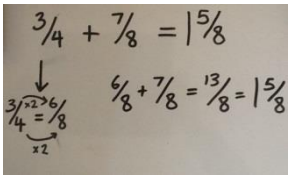
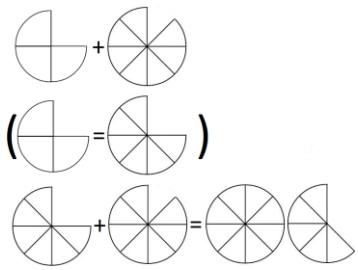
Method:	**Example/Representation:**
Children will add numbers with more than 4-digits using the formal written method of column addition	
Children will add decimal numbers with the same number of decimal places using the formal written method column addition	
Children will add decimal numbers with a different number of decimal places using the formal written method column addition using 0 as a place value holder	 Zero used as a place value holder.
Solve multi-step problems (that may include subtraction) using formal jottings and explaining reasoning behind their choice of operation and calculation (Singapore Bar Method)	
Recognise mixed numbers and improper fractions and convert from one to the other	
Practise adding fractions where calculations exceed one as a mixed number	 

MENTAL STRATEGIES:

- Add numbers mentally with increasingly large numbers (e.g 10,162 + 2,300 = 12,462)
- Mentally add tenths (e.g 0.2 + 0.6 = 0.8) and 1-digit whole numbers and tenths (8 + 0.3 = 8.3)
- Use number bonds to 100 knowledge to calculate complements to one using hundredths (e.g 0.83 + 0.17 = 1)
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy

YEAR 6

VOCABULARY: order of operations, column addition, add, in total, answer, tens boundary, hundreds boundary, thousands boundary, millions boundary, units boundary, tenths boundary, hundredths boundary, decimal place, inverse

Method:	**Example/Representation:**
Children will add several numbers of increasing complexity	81,059 + 3,668 + 15,301 + 20,551 = 120,579 
Children will add several decimals numbers with a different number of decimal places	23.361 + 9.08 + 59.77 + 1.3 = 93.511 
Solve multi-step problems (that may include subtraction) using formal jottings and explaining reasoning behind their calculations (Singapore Bar Method)	
Add fractions and mixed numbers with different denominators using the concept of equivalent fractions	 

MENTAL STRATEGIES:

- Add numbers mentally with increasingly large numbers (e.g 10,162 + 2,300 = 12,462)
- Add decimal numbers mentally (up to 2 decimal places)
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.

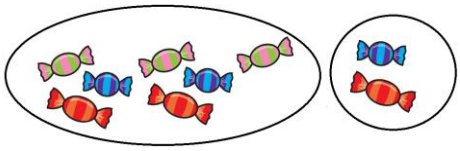
Subtraction

WILLIAM LAW CE PRIMARY
CALCULATION POLICY

SUBTRACTION

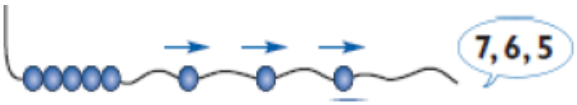
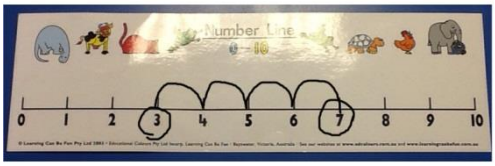
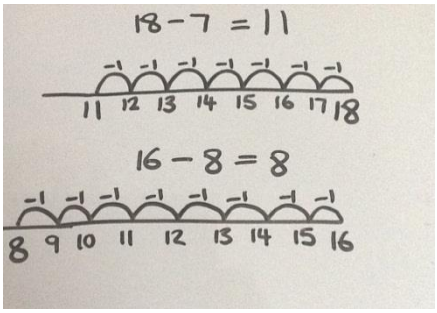
EYFS

VOCABULARY: take (away), leave, how many are left/left over?, how many have gone?, one less, two less… ten less…,how many fewer is… than…?, difference between, is the same as

Method	**Example/Representation**
Using a range of practical resources and real life contexts, pupils develop their understanding of the concept of subtraction as taking away through counting activities	I had 9 sweets and I ate 2. How many have I got left? 
Children will use counting objects, toys or their fingers to answer simple subtraction number sentences	(e.g. 6-3= 3)
Children will listen to a subtraction story and draw a set of objects (jottings) on whiteboards and cross some off - drawing a picture helps children to visualise the subtraction	
Children will use their fingers to help with subtraction, e.g. 5 – 2 = 3. A child will start with the biggest number in their head '5' and hold 5 fingers up They will count back saying '5' (touching their head) '4, 3' (curling one finger down at a time), then count how many fingers are left	
Children can use characters like 'Suzie the Subtractor' to help develop their understanding of subtraction	

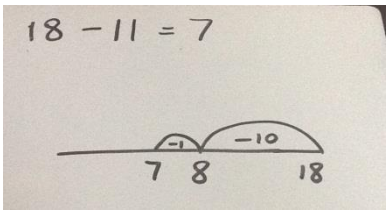
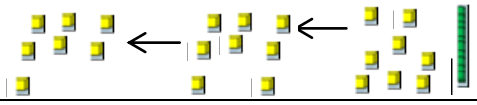
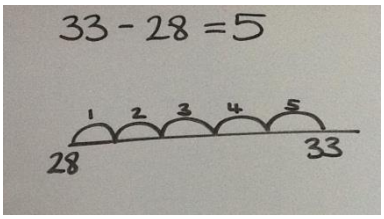
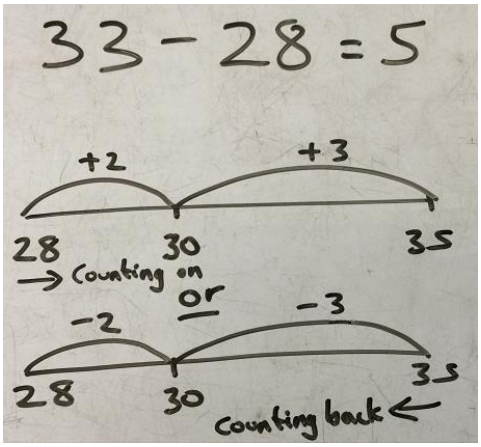
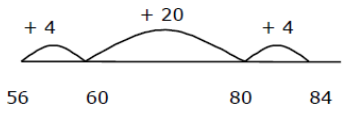
MENTAL STRATEGIES:

- Develop a mental image of the number system
- Children count backwards using familiar number rhymes (e.g '10 Green Bottles', '5 Fat Sausages')
- Count backwards from different starting points

YEAR 1	
VOCABULARY: subtract, take away, minus, leave, how many fewer is…than..?, how much less is..? half, halve, how many are left/left over?, how many are gone?, one less, two less, ten less…, how many fewer is… than…?, how much less is…? =, equals, sign, is the same as, count on, count back, difference between. how many more is…than..?, how much more is..?	
Method:	**Example/Representation:**
Children will be taught to use a number track to support subtraction by counting backwards	6 – 2 = 4 
Bead strings and counting sticks will be used to support subtraction by counting backwards	 8 – 3 = 5
Children will use a prepared number line to solve simple subtraction stories and number sentences by counting backwards	 7 – 4 = 3
Children will be taught how to solve simple subtraction stories with the support of a 100 number square	 20 – 4 = 16
Children are taught how to use a blank number line for subtraction (counting backwards) and then encouraged to draw their own number line to help solve problems Children will begin with TU – U that lie within the tens boundary then move onto TU – U that cross the tens boundary	
Children will solve one-step subtraction problems (including missing number problems) using concrete objects and pictorial representations	
MENTAL STRATEGIES	
- Subtract 1 and 2 digit numbers to 20 including 0 - To know that subtraction is not commutative and that the larger number must always come first - Use knowledge of number bonds to 10 and 20 to reason (9 + 1 = 10 so 10 – 9 = 1 and 10 – 1 = 9)	

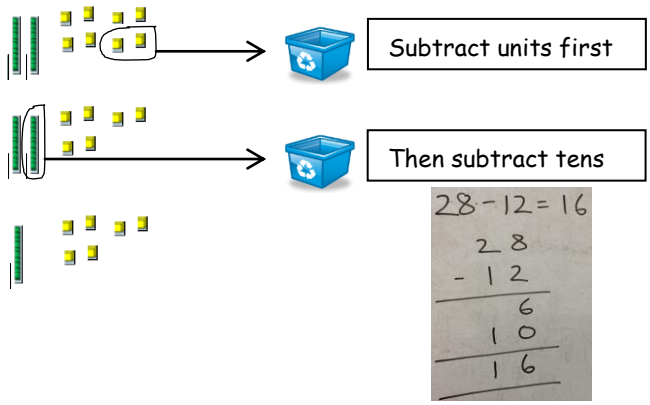
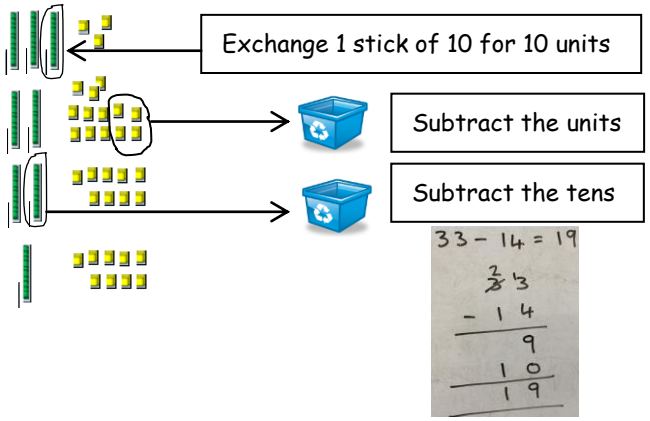
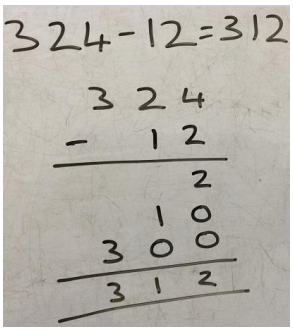
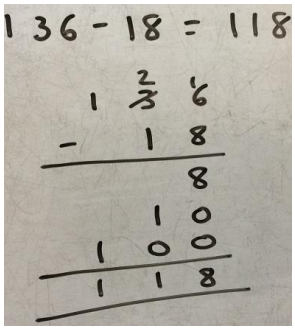
YEAR 2

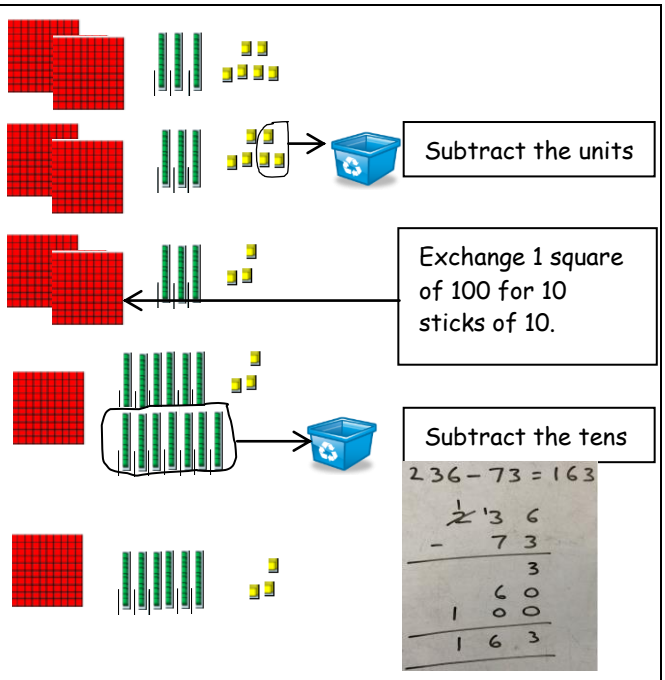
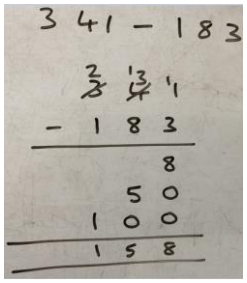
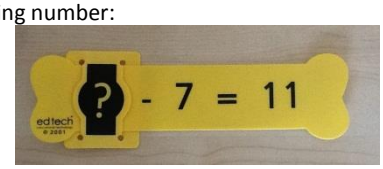
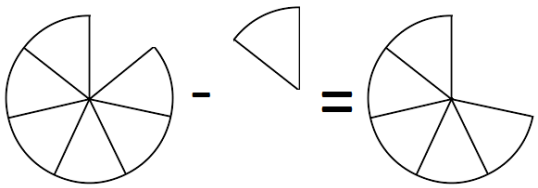
VOCABULARY: subtract, minus, leave, how many are left/left over?, how many less is… than…?, how much fewer is…?, difference between, half, halve, equals, sign, is the same as, partition, inverse, count on , count back, one less, ten less… one hundred less.

Method:	**Example/Representation:**
Children are encouraged to use a blank number line to solve TU – TU and count back in tens and then units by: • Positioning the first number in the number sentence at the end of the number line. • Partitioning the second number into tens and units • Counting back in tens (or multiples of 10) • Counting back in units	 
Children will use their knowledge of difference to use a blank number line to count on from the smallest number to the largest number (in tens and units) to solve subtraction number sentences (TU – TU)	
Children will be encouraged to draw their own number line and begin to decide on the most efficient strategy: whether to start with the smaller number and count on or start with the larger number and count back	
Recognise and use inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems	84 - 56 = ☐ 56 + ☐ = 84 
Children will solve one and two-step subtraction problems using concrete objects and pictorial representations including those involving number, quantities and measures	

MENTAL STRATEGIES:

- To know that subtraction is the inverse of addition
- Use knowledge of inverse to check calculations and solve missing number problems
- Subtract numbers mentally, including:
  - subtracting units from a 2-digit number
  - subtracting a multiple of 10 from a 2-digit number
  - subtracting a 2-digit number from another 2-digit number
- Recall and use subtraction facts to 20 fluently
- Use knowledge of number bonds to 100 (multiples of 10) to reason (40 + 60 = 100 so 100 – 60 = 40 and 100 – 40 = 60)

YEAR 3:	
VOCABULARY: leave, subtract, less, minus, column subtraction, inverse, decomposition, exchange, how many are left/left over?, difference between, how many more/fewer is… than…?, how much more/less is…?, Is the same as, equals, sign. multiples of tens and hundreds.	
Method:	**Example/Representation:**
Children begin to set out TU - TU (that lie within the tens boundary) in columns and record as column subtraction	
Children begin to set out TU - TU (that cross the tens boundary) in columns and record as column subtraction with decomposition	
Children begin to set out HTU - TU (that lie within the tens boundary) in columns and record as column subtraction	
Children begin to set out HTU - TU (that cross the tens boundary) in columns and record as column subtraction with decomposition	

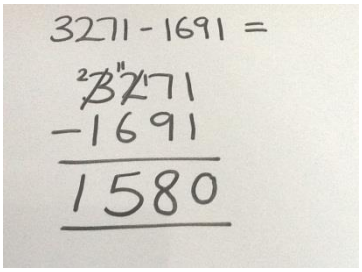
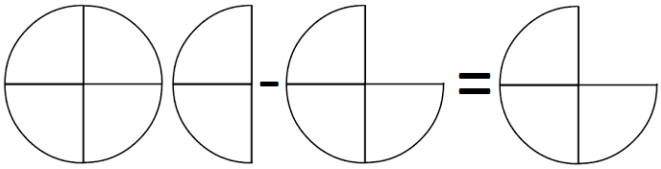
Children begin to set out HTU - TU (that cross the hundreds boundary) in columns and record as column subtraction with decomposition	
Children begin to set out HTU - TU (that cross the hundreds and tens boundary) in columns and record as column subtraction with decomposition	
Children begin to set out HTU - HTU (that cross the hundreds and tens boundary) in columns and record as column subtraction with decomposition	
Children will solve one and two-step subtraction problems (including missing number problems)	Fill in the missing number: 
Children practise subtracting fractions with the same denominator through a variety of increasingly complex problems to improve fluency	$^{6}/_{7} - {}^{1}/_{7} = {}^{5}/_{7}$ 

MENTAL STRATEGIES:

- Subtract numbers mentally, including:
  - Subtracting a single digit number from a 3-digit number
  - Subtracting a multiple of 10 from a 3-digit number
  - Subtracting a multiple of 10 from a 3-digit number
- Estimate the answer to a calculation and use inverse operations to check answer

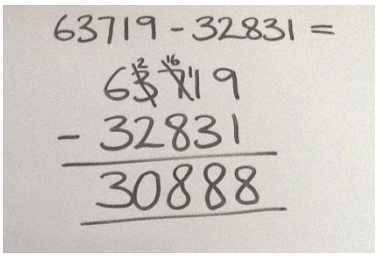
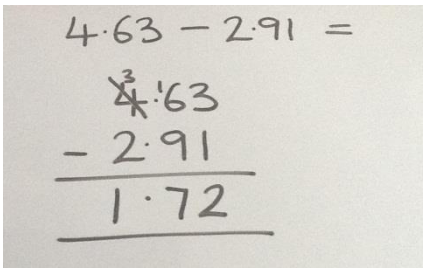
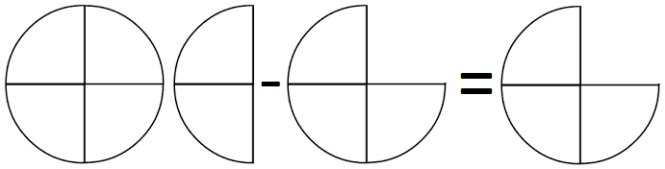
YEAR 4

VOCABULARY: subtract, subtraction, minus, *decrease,* leave, how many are left/left over?, difference between, how many more/fewer is… than…?, how much more/less is…?, Is the same as, equals, sign. Column subtraction, decomposition, exchange, multiples of thousand, inverse.

Method:	**Example/Representation:**
Children will subtract numbers with up to 4-digits using the formal written method of column subtraction with decomposition	
Solve two-step problems using formal jottings and explaining reasoning behind their choice of operation and calculations (eg. the Singapore Bar Method)	
Pupils continue practise in subtracting fractions with the same denominator to become fluent through a variety of increasingly complex problems beyond one whole	$^{6}/_{4} - {}^{3}/_{4} = {}^{3}/_{4}$ 

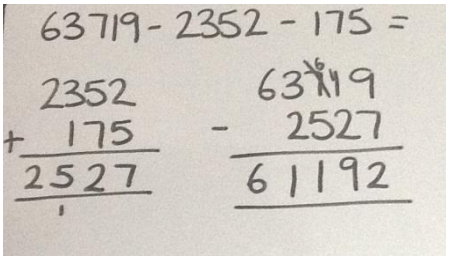
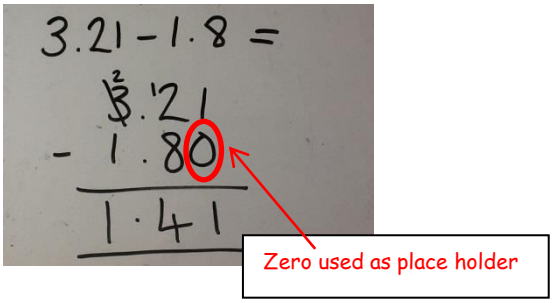
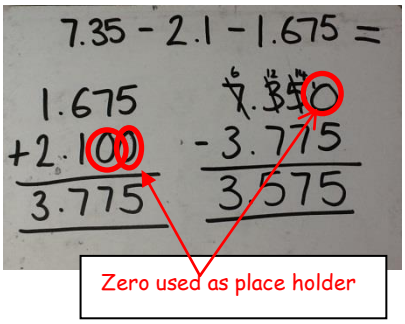
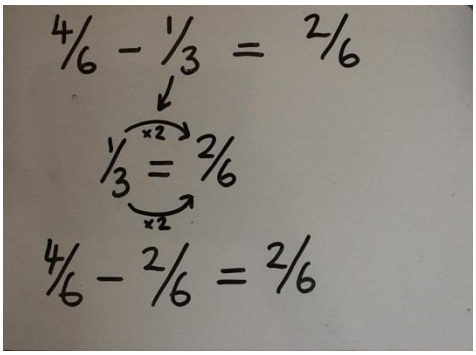
MENTAL STRATEGIES:

- Subtract numbers mentally, including:
- Subtracting multiples of one thousand from a 4-digit number
- Use of number pairs that total 1000 (multiples of 10) to calculate subtraction (e.g 1000 – 300 = 700)
- Estimate the answer to a calculation and use inverse operations to check answers

YEAR 5	
VOCABULARY: efficient written method, subtract, subtraction, minus, decrease, difference between, inverse, decimals, units and tenths boundary, column subtraction, decomposition, exchange.	
Method:	**Example/Representation:**
Children will subtract numbers with more than 4-digits using the formal written method of column subtraction with decomposition	
Children will subtract decimal numbers with the same number of decimal places with decomposition	
Solve multi-step problems using formal jottings and explaining reasoning behind their calculations ((eg. the Singapore Bar Method)	
Practise subtracting fractions where calculations exceed one as a mixed number	$1\frac{2}{4} - \frac{3}{4} = \frac{3}{4}$ $(1\frac{2}{4} = \frac{6}{4})$ $\frac{6}{4} - \frac{3}{4} = \frac{3}{4}$ 
MENTAL STRATEGIES:	
- Subtract increasingly large numbers mentally (e.g 12, 654 – 1,341 = 11, 213) - Mentally subtract tenths (e.g 0.7 - 0.5 = 0.2) and 1-digit whole numbers and tenths (8 - 0.3 = 7.7) - Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy	

YEAR 6

VOCABULARY: order of operations, subtract, decrease, difference, inverse, decimals, units , tenths and hundredths boundary, column subtraction, decomposition, exchange.

Method:	**Example/Representation:**
Children will subtract several numbers of increasing complexity and be taught to combine some of the numbers so that the subtraction can be completed	
Children will subtract decimal numbers with a different number of decimal places with decomposition	
Children will subtract several decimals numbers with a different number of decimal places be taught to combine some of the numbers so that the subtraction can be completed.	
Solve multi-step problems using formal jottings and explaining reasoning behind their calculations (eg. the Singapore Bar Method)	
Subtract fractions and mixed numbers with different denominators using the concept of equivalent fractions	

MENTAL STRATEGIES:

- Subtract increasingly large numbers mentally (e.g 12, 654 – 1,341 = 11, 213)
- Subtract decimal numbers mentally (up to 2 decimal places)
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.

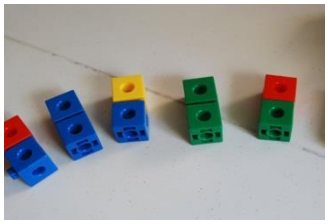
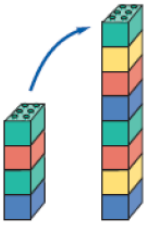
Multiplication

WILLIAM LAW CE PRIMARY
CALCULATION POLICY

MULTIPLICATION

EYFS

VOCABULARY: group, lots of, double

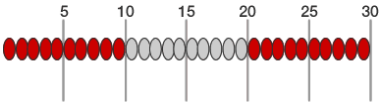
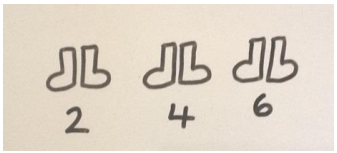
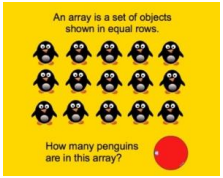
Method	**Example/Representation**
Children will count groups of the same number of objects and add them together The children learn about grouping in practical contexts and through pictorial representations	Count groups of 2 and then count all objects to add them together. 
Children will solve simple problems involving doubling	 ɐ 4 is 8

MENTAL STRATEGIES:

- Develop a mental image of the number system.
- Understand the value of a number
- Counting in 2s, 5s and 10s.
- Number patterns on a number line and on a hundred square – 2's, 5's and 10's.

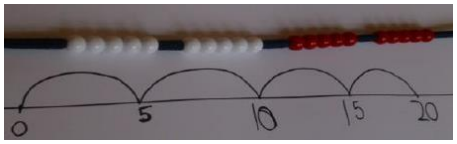
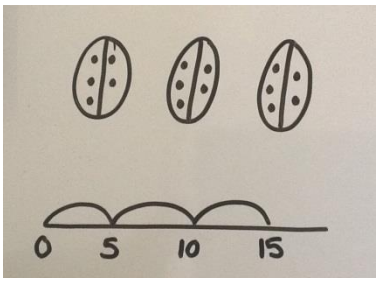
YEAR 1

VOCABULARY: odd, even, count in twos, fives, count in tens (forwards from/backwards from), how many times?
lots of, groups of, once, twice, five times, ten times , multiple of, times, multiply, multiply by, array, row, column, double.

Method:	**Example/Representation:**
Children will count groups of the same number of objects and add them together. The children learn about grouping in practical contexts, through pictorial representation Bead strings and counting sticks will be used to support counting in sequences of 2s, 5s and 10's	1) I have 5 pairs of socks in the bag. How many socks are there? 
Children will recognise and complete patterns and sequences involving multiples of 2, 5 and 10	
Children will be given one-step word problems to solve, involving counting in multiples of 2, 5 and 10 and doubles. Children will use concrete objects and pictorial representations to support their ideas	Alfie, Joseph and Ben all have a pair of socks. How many socks are there altogether? 
Children will be introduced to an array to support multiplication and to support the understanding that multiplication is repeated addition	 5 + 5 + 5 = 15

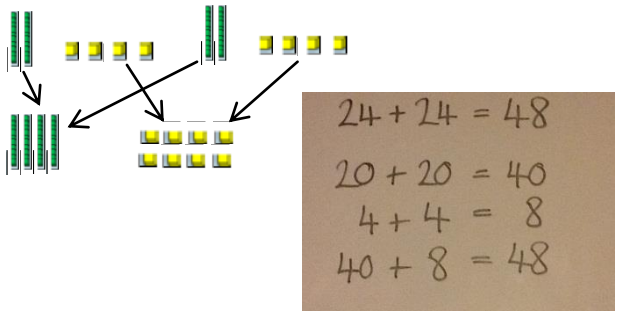
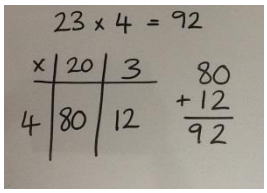
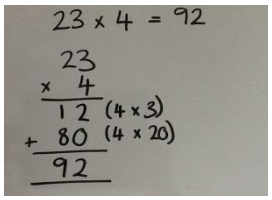
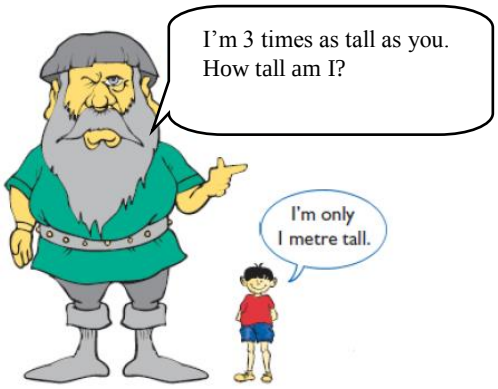
MENTAL STRATEGIES:

- Count forwards and backwards in multiples of 2s, 5s and 10s.
- Recall doubles of numbers up to and including 10.

YEAR 2	
VOCABULARY: odd, even, twos, fives, tens, threes, lots of, groups of, once, twice, three times, five times, ten times, multiple of, times, multiply, multiply by, repeated addition, array, row, column, double.	
Method:	**Example/Representation:**
Children will be able to recognise and write the multiplication symbol (x) in mathematical statements	
Children will understand the operation of multiplication as repeated addition on a blank number line and will use practical resources to support this	4 x 5 = 15 
Children will be able to represent a multiplication calculation using an array and write the multiplication symbol within a number sentence. Children will also understand that multiplication can be carried out in any order (commutative)	 3 x 5 = 15 5 x 3 = 15
Children will solve one-step multiplication problems (including missing number problems) using concrete objects and pictorial representations	I have 3 ladybirds with 5 spots each. How many spots do they have altogether? 
MENTAL STRATEGIES: - Count forwards and backwards in multiples of 3. - Know the 2, 5 and 10 times tables (in and out of order) - Recognise odd and even numbers	

YEAR 3:

VOCABULARY: multiply, times, groups of, equal groups of, multiple of, multiplied by, estimate, inverse, grid multiplication, expanded column multiplication, partition, commutative, associative, product.

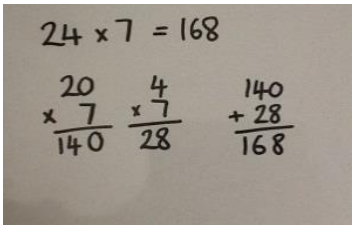
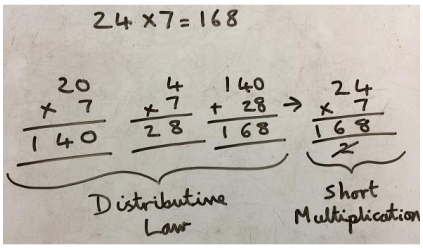
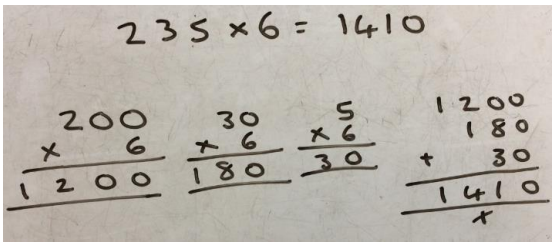
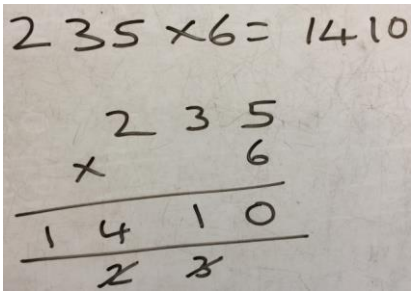
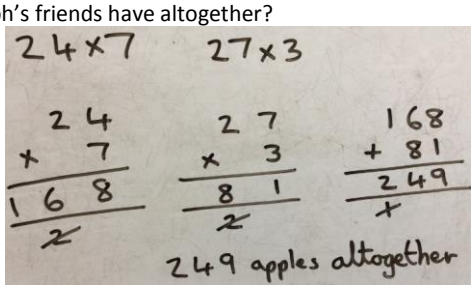
Method:	**Example/Representation:**
Children will learn to calculate doubles of 2-digit numbers through partitioning	Double 24 = 24 + 24 = 48 
Children will be taught to multiply numbers (TU x U) through partitioning and the formal written method of grid multiplication	
Children will be taught to multiply numbers (TU x U) using the formal written method of expanded column multiplication and make the link to grid method	
Children will solve problems involving multiplication, including scaling	

MENTAL STRATEGIES:

- Count forwards and backwards in multiples of 4, 8, 50 & 100
- Know the 3, 4 and 8 times tables (in and out of order)
- Connect the 2, 4 and 8 times tables through doubling
- Use knowledge of place value to calculate multiplication (e.g. 2 x 2 = 4, 2 x 20 = 40, 2 x 200 = 400)

YEAR 4

VOCABULARY: multiply, multiplied by, product, short multiplication, partition, distributive law, commutative, groups of, multiply, times, multiples, inverse.

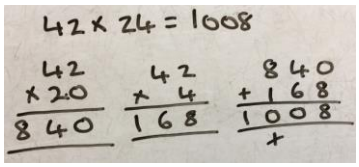
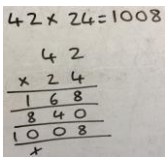
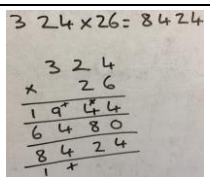
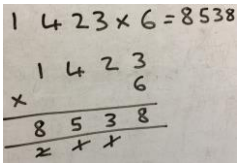
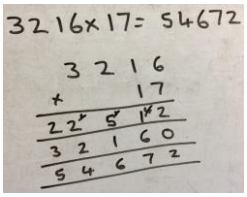
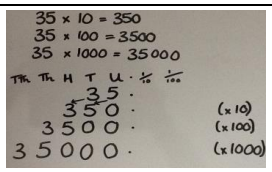
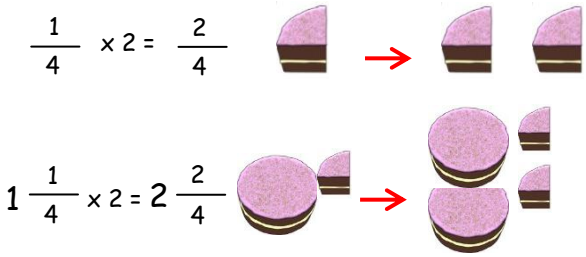
Method:	**Example/Representation:**
Children will be taught to multiply numbers (TU x U) by partitioning the 2-digit number and using two short multiplications along with addition to solve the problem (Distributive Law)	
Children will be taught to multiply numbers (TU x U) using the formal written method of short multiplication and will link with the Distributive Law method	
Children will be taught to multiply numbers (HTU & U) by partitioning the 3-digit number and using two short multiplications along with addition to solve the problem	
Children will be taught to multiply numbers (HTU x U) using the formal written method of short multiplication and will link with the Distributive Law method	
Solve problems involving multiplying and adding to multiply two or three-digit numbers by one digit	Harriet has 7 friends who each have 24 apples. Joseph has 3 friends who each have 27 apples. How many apples do Harriet and Joseph's friends have altogether? 

MENTAL STRATEGIES:

- Know all times tables up to and including 12 x 12 (by the end of Year 4)
- Recognise and use factor pairs (e.g factor pairs for numbers up to and including 10)
- Know that TU x 5 is TU x 10 then divide by 2 (e.g 18 x 5 = (18 x 10) ÷ 2 = 90)
- Know that TU x 9 is TU x 10 then subtract TU (e.g 18 x 9 = (18 x 10) – 18 = 162)

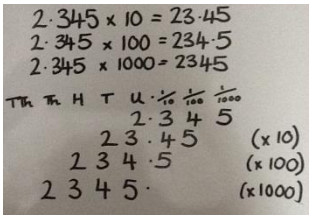
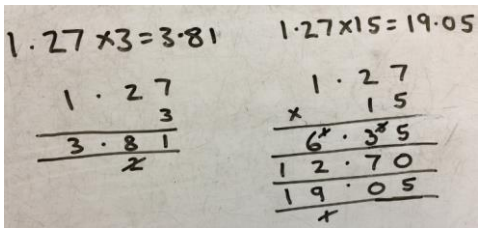
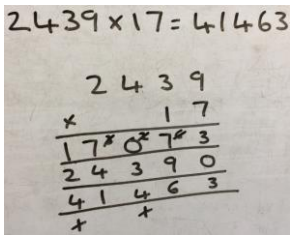
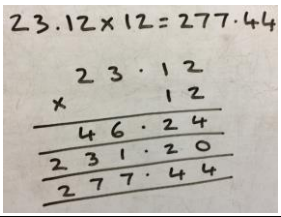
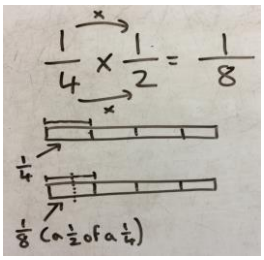
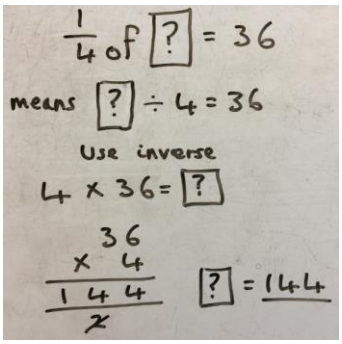
YEAR 5

VOCABULARY: composite numbers, prime number, prime factor, cube number, square number, derive, factor pairs, formal written method, times, multiply, multiplied by, multiple of, product, short multiplication, partition, long multiplication, scaling, decimal place, units, tenths and hundreds.

Method:	**Example/Representation:**
Children will be taught to multiply numbers (TU x TU) by partitioning the second 2-digit number and using two short multiplications along with addition to solve the problem	
Children will be taught to multiply numbers (TU x TU) using the formal written method of long multiplication	
Children will be taught to multiply numbers (HTU x TU) using the formal written method of long multiplication	
Children will be taught to multiply numbers (ThHTU x U) using the formal written method of short multiplication	
Children will be taught to multiply numbers (ThHTU x TU) using the formal written method of long multiplication	
Children will learn to multiply whole numbers and those involving decimals by 10, 100 and 1000 by moving the digits around the fixed decimal on a place value grid	
Children will solve problems involving multiplication, including scaling	Alfie runs 3400m on Sports Day. His friend, Harry, runs three times as far. How far does Harry run?
With the use of materials and diagrams, pupils will multiply proper fractions and mixed numbers by whole numbers	

MENTAL STRATEGIES:

- Recognise and calculate factor pairs for any number
- Use times table knowledge to derive multiples of any number
- Establish whether a number is a prime number (up to 100) or a composite number (not prime) and recall prime numbers up to 19
- To know what a square number is and recall all square numbers (up to and including 144)
- To know what a cube number is and recall the first 5 cube numbers

YEAR 6	
VOCABULARY: common factors, multiples**,** prime, formal written method, multiply, multiplied by, multiple of, product, short and long multiplication, partition, scaling, decimal place, units, tenths and hundreths.	
Method:	**Example/Representation:**
Multiply numbers by 10, 100 and 1000 where the answers are up to three decimal places	
Multiply one-digit numbers with up to two decimal places by whole numbers using: - Short multiplication when multiplying by a single digit - Long multiplication when multiplying by a 2-digit number	
Multiply multi-digit numbers up to 4 digits by a 2-digit whole number using the formal written method of long multiplication	 
Multiply simple pairs of fractions, writing the answer in its simplest form .	
Pupils use their understanding of the relationship between unit fractions and division to work backwards by multiplying a quantity that represents a unit fraction	
MENTAL STRATEGIES: - Use scaling to solve decimal number problems as whole number problems using the rule: 'the number of decimal digits in the question is the same as the number of decimal digits in the answer' - Identify common factors, common multiples and prime numbers - Use common factors to simplify fractions mentally - Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy	

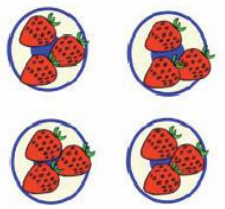
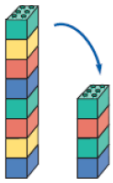
Division

WILLIAM LAW CE PRIMARY
CALCULATION POLICY

DIVISION

EYFS

VOCABULARY: halve, half, share, share equally, groups

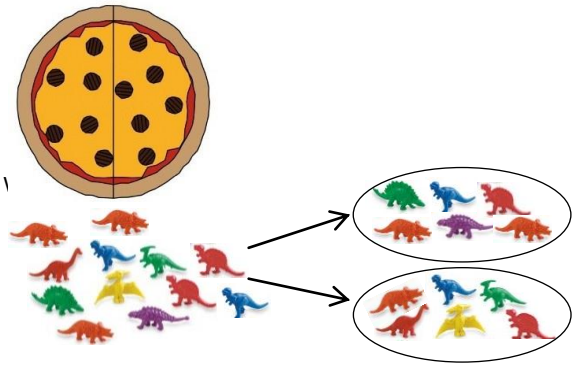
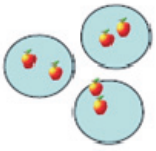
Method:	**Example/Representation:**
Children experience early division by sharing objects and counting how many in each group	
Children will solve problems including halving and sharing	 at is half of 8? f of 8 is 4

MENTAL STRATEGIES:

- Develop a mental image of the number system.
- Understand the value of a number

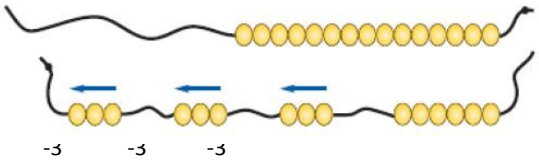
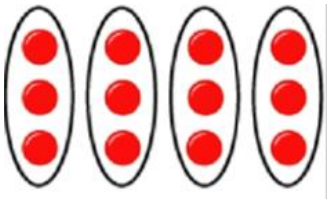
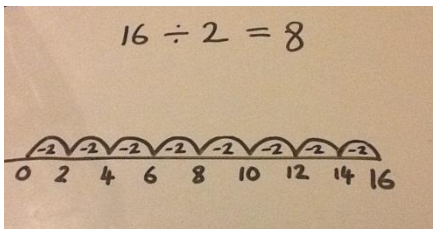
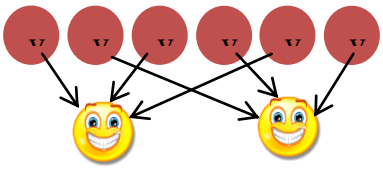
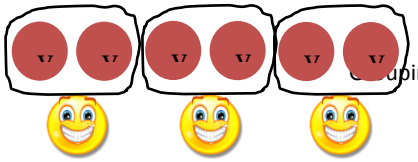
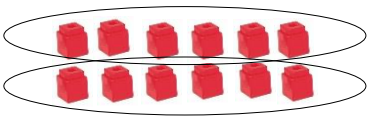
YEAR 1

VOCABULARY: halve, share, share equally, groups, equal groups of, divide, divided by, left, left over

Method	**Example/Representation:**
Children will understand equal groups and share items out in play scenarios	Share 12 cakes between 3 people equally: 
Children will be taught to associate 'half' with dividing by two and recognise, find and name a half as one of two equal parts	Can you cut the pizza in half? 
Children will be given a word problem to complete either practically or using pictorial representations	Can you share 6 apples between 3 plates? 
Children will recognise and write the division symbol (÷) in mathematical statements, calculating the answer with the teacher using concrete objects	8 ÷ 2 = 4 

MENTAL STRATEGIES:

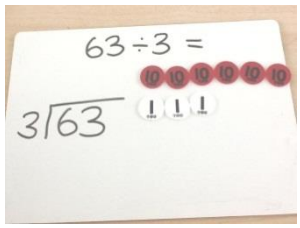
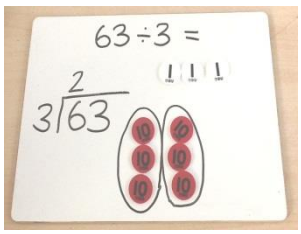
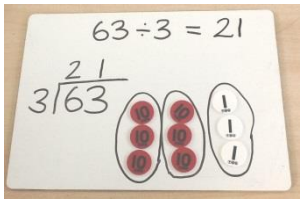
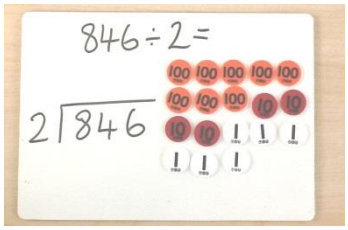
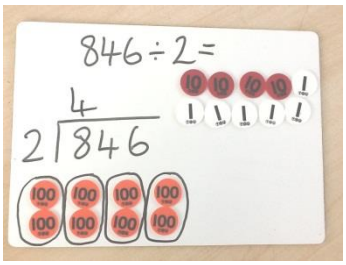
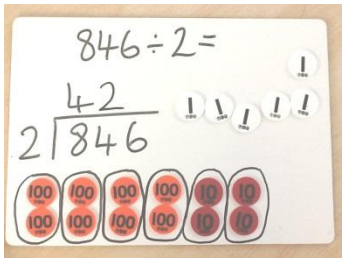
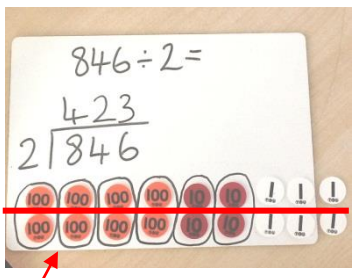
- Count forwards and backwards in multiples of 2s, 5s and 10s.

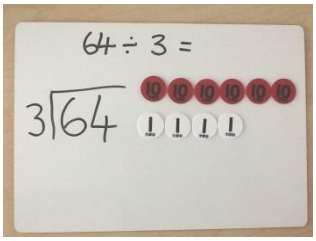
YEAR 2	
VOCABULARY: groups of, equal groups of, halve, share, share equally, divide, divided by, divided into, repeated subtraction, inverse.	
Method:	**Example/Representation:**
Children will understand the operation of division as grouping using repeated subtraction on a prepared number line	15 ÷ 3 = 5 
Children will be able to represent a division calculation using an array and write the division within a number sentence	How many groups of 3 are in 12? 12 ÷ 3 = 4 
Children will use a blank number line to carry out repeated subtraction to solve a division number sentence	
Children will be taught to understand the difference between sharing and grouping. Children will also connect unit fractions to equal sharing and grouping	If 6 sweets are shared between 2 people, how many do they get each?  Sharing If there are 6 sweets, how many people can have 2 sweets each?  Grouping
Children will solve one-step division problems (including missing number problems) using concrete objects and pictorial representations	12 ÷ ☐ = 6 
MENTAL STRATEGIES: - To know that division is the inverse of multiplication - Recall division facts for the 2, 5 and 10 times tables - Recall halves for even numbers up to and including 20	

YEAR 3:

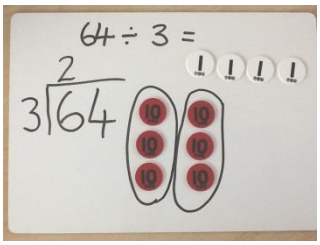
VOCABULARY: divided by, divide, divided into, grouping, divisor, short division, remainder, inverse.

quotient
divisor) dividend

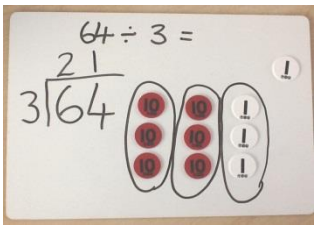
Method:	**Example/Representation:**
Children will use practical resources to support the short division method and will be encouraged to use multiples of the divisor to assist (TU ÷ U)	 Create the dividend using Place Value counters.  Group the tens counters according to the divisor and write the number of groups above the line in the tens column.  Group the tens counters according to the divisor and write the number of groups above the line in the tens column. The quotient can be seen across the groups.
Children will use practical resources to support the short division method and will be encouraged to use multiples of the divisor to assist (HTU ÷ U)	 Create the dividend using Place Value counters.  Group the 100s counters according to the divisor. Write the number of groups above the line in the hundreds column.  Next, group the 10s counters according to the divisor. Write the number of groups above the line in the tens column.  Next, group the units counters according to the divisor. Write the number of groups above the line in the units column. The quotient can be seen across the groups.

<table>
<tr>
<td>Children will use practical resources to support solving division number sentences with remainders (TU ÷ U)</td>
<td>


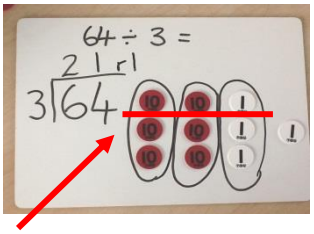
Create the dividend using Place Value counters.



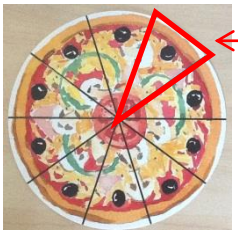
Starting with tens counters, group them according to the divisor. Write the number of groups in the tens column above the line.

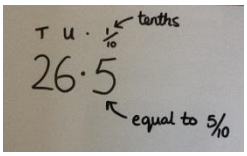


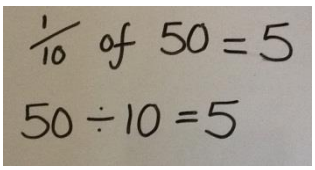
Next, group the units according to the divisor and arrange next to the groups of ten. Write the number of groups above the line in the units column.



Any counters that cannot be grouped are the remainder. Write this at the end as 'r1'.

As you look across each group, the quotient can be seen.</td>
</tr>
<tr>
<td>Pupils connect tenths to place value, decimal measures and that tenths is to divide by 10</td>
<td>

$\frac{1}{10}$



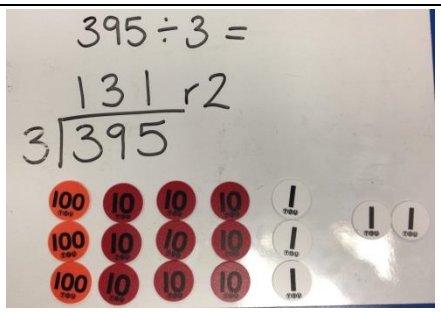
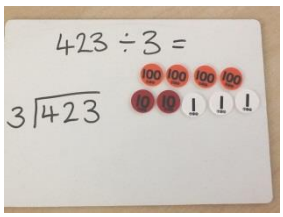
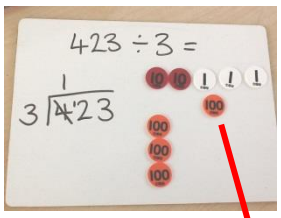
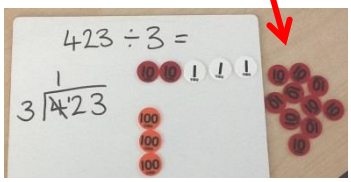
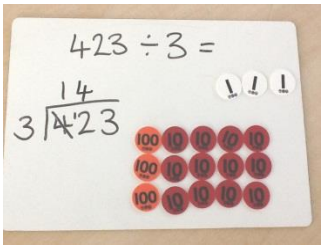
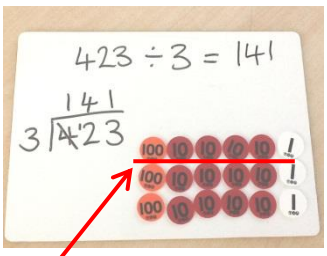


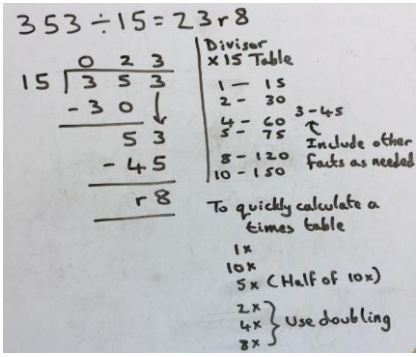
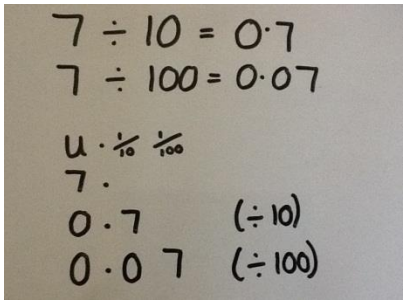
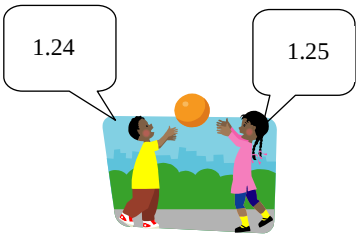
</td>
</tr>
<tr>
<td colspan="2">MENTAL STRATEGIES:
- Know the division facts from the 3, 4 and 8 times tables
- Use knowledge of place value to calculate division (e.g. 14 ÷ 2 = 7, 140 ÷ 2 = 70, 1400 ÷ 2 = 700)</td>
</tr>
</table>

YEAR 4

VOCABULARY: factor, divisor, divided by, divided into, remainders, divisible by, equivalent, short division, derive, Quotient, inverse, remainder, multiples, exchange.

quotient
divisor) dividend

Method:	**Example/Representation:**
Children will use practical resources to support solving division number sentences with remainders (HTU ÷ U)	
Children will use practical resources to support the short division method where exchange across place value columns occurs. (HTU ÷ U)	 Create the dividend using Place Value counters.  Group the hundreds counters according to the divisor. Write the number of groups above the line in the hundreds column.  Exchange the left over 100s counter for ten 10s counters and represent this beneath the line in the tens column.  Next, group the 10s counters according to the divisor and write the number of groups above the line in the tens column.  Group the units counters according to the divisor and write the number of groups above the line in the units column. The quotient can be seen across each group.

Children will use the short division method where exchange across the place value columns occurs. Pupils will be encouraged to use multiples of the divisor to assist (HTU ÷ TU)	
Find the effect of dividing a 1 or 2-digit number by 10 and 100; identifying the value of the digits in the answer as units, tenths and hundredths	
Count up and down in hundredths; recognise that hundredths arise when dividing an object by a hundred and dividing tenths by ten	 What should I cut my pizza into if I have 100 people to serve? 

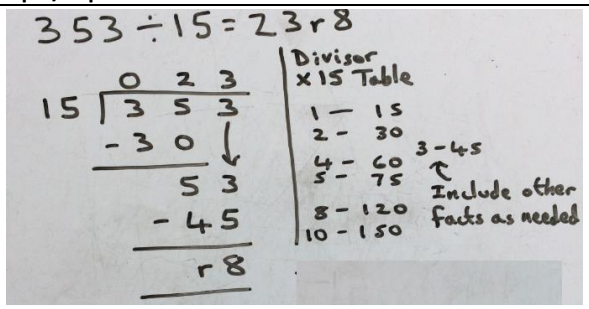
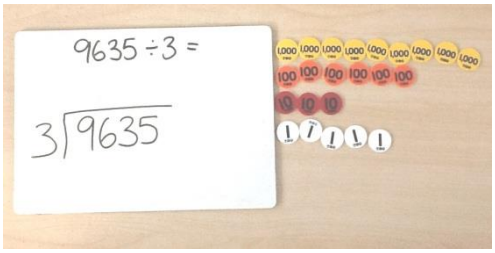
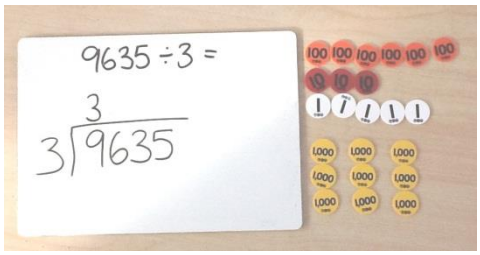
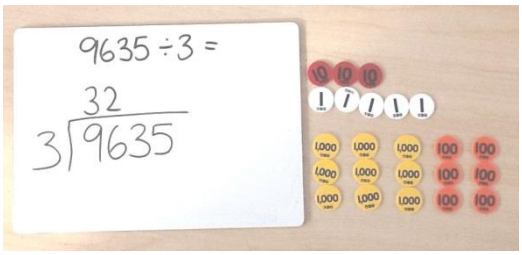
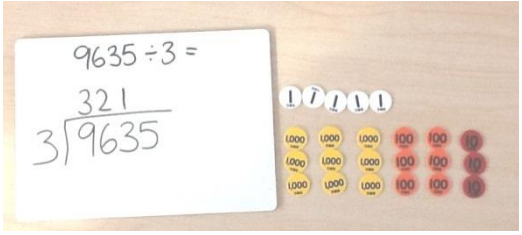
MENTAL STRATEGIES:

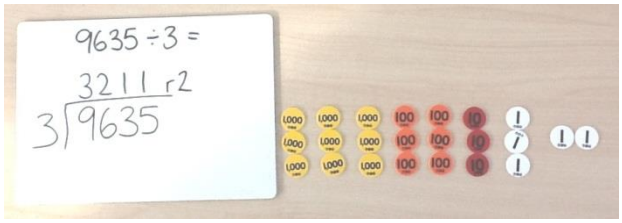
- Know all related division facts for all times tables up to 12 times table (by the end of Year 4)

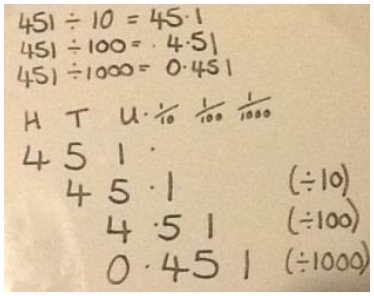
YEAR 5

VOCABULARY: divide, divided by, divided into, divisible by, remainder, quotient, inverse, decomposing, factor, decimal place, units, tenths, scaling, short division.

quotient
divisor) dividend

Method:	**Example/Representation:**
Children will use short division to solve division number sentences with remainders (HTU ÷ TU)	
Children will use practical resources to support solving division number sentences with remainders (ThHTU ÷ U)	 Create the dividend using Place Value counters.  Group the 1000s counters according to the divisor and write the number of groups above the line in the thousands column.  Group the 100s counters according to the divisor and write the number of groups above the line in the hundreds column.  Group the 10s counters according to the divisor and write the number of groups above the line in the tens column.

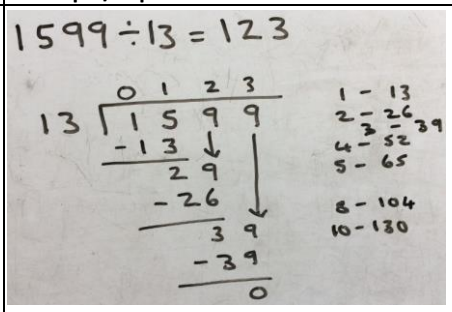
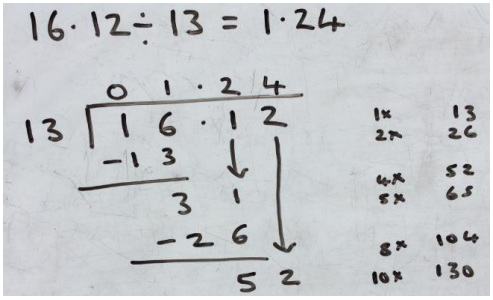
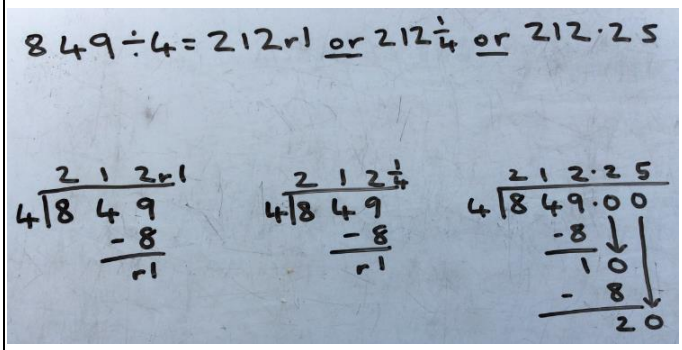
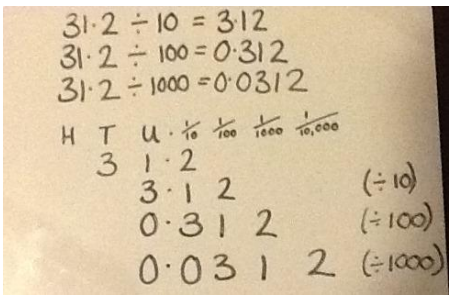
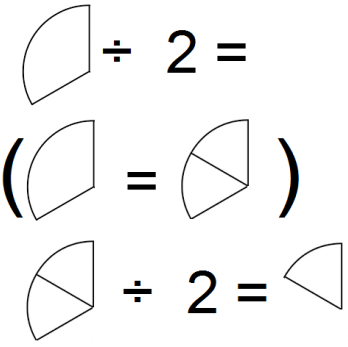
<table>
<tr><td></td><td> 

Group the units counters according to the divisor and write the number of groups about the line in the units column. Express remainders as 'r2' as part of the quotient.</td></tr>
<tr><td>Children will learn to divide whole numbers and those involving decimals by 10, 100 and 1000 by moving the digits around the fixed decimal</td><td> 
</td></tr>
<tr><td>Children will solve problems involving division, including scaling.</td><td></td></tr>
<tr><td colspan="2">MENTAL STRATEGIES:
- Multiply and divide numbers mentally drawing upon known facts
- Associate fractions with division</td></tr>
</table>

YEAR 6

VOCABULARY: divide, divided by, divided into, divisible by, remainder, factor, quotient, inverse, decimal place, units, tenths, hundredths, scaling, formal written methods.

quotient
divisor) dividend

Method:	**Example/Representation:**
Divide numbers up to 4 digits by a two-digit whole number using the formal written method of division	 
Interpret remainders as whole number remainders, fractions or decimals	
Divide numbers decimal numbers with up to 3 decimal places by 10, 100 and 1000 by moving the digits around a fixed decimal	
Divide proper fractions by whole numbers	$\frac{1}{3} \div 2 = \frac{1}{6}$ 

MENTAL STRATEGIES:

- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy
- Calculate a fraction of an amount

References:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/210969/NC_framework_document_-_FINAL.pdf

2016 Key Stage 1& 2 Mathematics Test Framework

http://www.newbyprimary.co.uk/wp-content/uploads/2013/01/Newby-Calculation-Policy-with-progression. pdf

Bourne Westfield Academy Calculation Policy – with thanks to Sarah Charlton

Recommended Maths Websites:

BBC KS1 Maths
http://www.bbc.co.uk/education/subjects/zjxhfg8

BBC KS2 Maths
http://www.bbc.co.uk/education/subjects/z826n39

Singapore Maths (Using 'Bar Method' Modelling To Solve Word Problems)
http://www.mathplayground.com/thinkingblocks.html
(also available as free i-pad apps)

General Curriculum Games Sites – with Maths
http://www.topmarks.co.uk/Search.aspx?Subject=16&AgeGroup=2

http://www.crickweb.co.uk/

http://resources.woodlands-junior.kent.sch.uk/maths/index.html

Problem Solving And Reasoning

N'Rich KS1
http://nrich.maths.org/9077

N'Rich KS2
http://nrich.maths.org/9084

L6 Maths – KS3 Videos
http://www.hegartymaths.com/ks3/all/ks3