Calculation Policy

Nursery to Year 6

Updated January 2022

AIMS AND OBJECTIVES

This policy, which supports the White Rose maths scheme used throughout the school, aims to ensure consistency in the mathematical written methods and approaches to calculation across years 1-6. Progression within each area of calculation is in line with the programme of study in the 2014 National Curriculum and Early Learning Goals.

Through a rich and progressive mathematics curriculum, children will be taught to become fluent with key written methods for addition, subtraction, multiplication and division. They will have a mastery understanding of number so that they can reason mathematically with the calculations they are faced with. In addition, children will be able to use their knowledge and understanding of the written calculations in order to solve a range of mathematical problems.

A maths mastery approach is taken to the curriculum, in which fluency comes from deep knowledge and practice. This means that structures questioning is used to ensure that pupils develop fluent technical proficiency and think deeply about the underpinning mathematical concepts.

This calculation policy should be used to support children to develop a deep understanding of number and calculation. This policy has been designed to teach children through the use of concrete, pictorial and abstract representations.

Concrete representation— a pupil is first introduced to an idea or skill by acting it out with real objects. This is a 'hands on' component using real objects and is a foundation for conceptual understanding.

Pictorial representation *– a pupil has sufficiently understood the 'hands on' experiences performed and can now relate them to representations, such as a diagram or picture of the problem.*

Abstract representation—a pupil is now capable of representing problems by using mathematical notation, for example 12 x 2 = 24.

Nursery

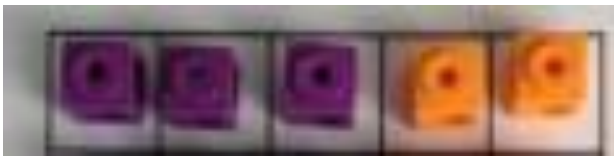
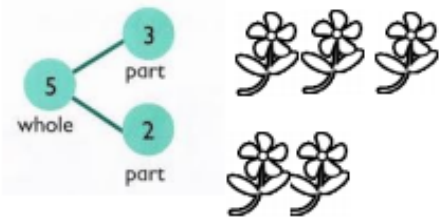
Addition

Key Vocabulary

How many?, altogether, number sentence, one more, pair, equals, number track, a lot, subitising

Key Skills for number facts and addition in Nursery

- **Compare** two groups of objects
- Compare if groups have the same amounts
- Find **one more** from a group of objects up to 5 objects
- Know a group of things changes quantity when something is added
- Using some language quantities, such as 'more' and 'a lot'
- Separates a group of three or four objects in different ways
- **Finds the total** number of items in two groups by counting all of them
- **Can add two single digits numbers**
- **Develop fast recognition of up to 3 objects, without having to count them individually ('subitising').**

Concrete Combining group of objects using the part, part whole model – 1 part add 2 parts is 3. Using a 5 grid to support addition of single digits —counting all/combining two groups. Can add objects or cubes onto the 5 grid.	
Pictorial Continue to explore part, part whole relationship— combining two parts to make a whole looking at specific digits. How can we make the number 5?	

Reception

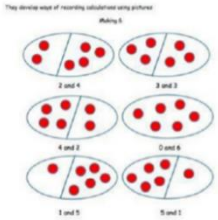
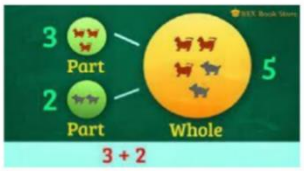
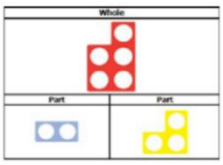
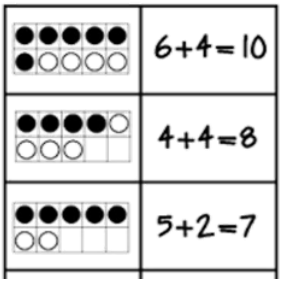
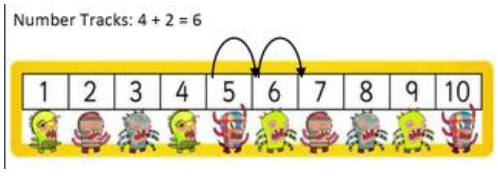
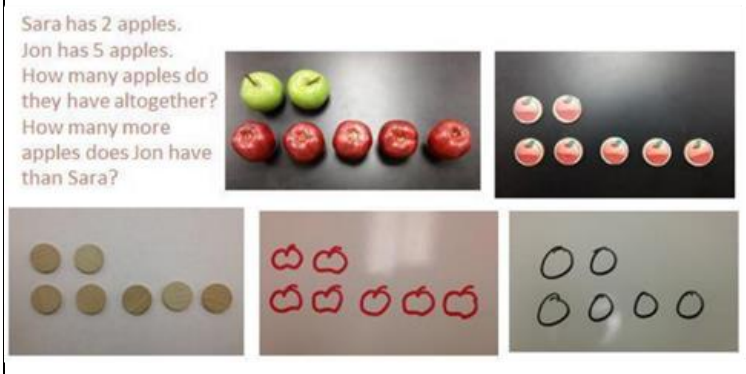
Addition

Key Vocabulary

add, more, make, and, total, altogether, addition, number sentence, one more than, most, count on, equals, number track, more than

Key Skills for addition in Reception

- Have a deep understanding of number to 10, including the composition of each number
- Count beyond 10
- Automatically recall number bonds up to 5 and some number bonds to 10, including double facts
- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity
- Say one more than a given number
- Solve real life addition problems involving for example, money and measure

Explore **part, part whole** relationship—combining two parts to make a whole. Do practically with objects, moving on to numicon. - Count each group separately and then count again after putting together.	  
Using the ten frame to support addition of single digits —counting all/combining two groups.	
Using a number track Progress alongside part, part whole to allow children to begin at first number and then count on.	
Solving problems using concrete, pictorial images.	

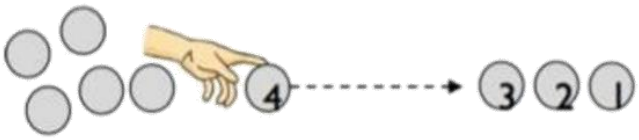
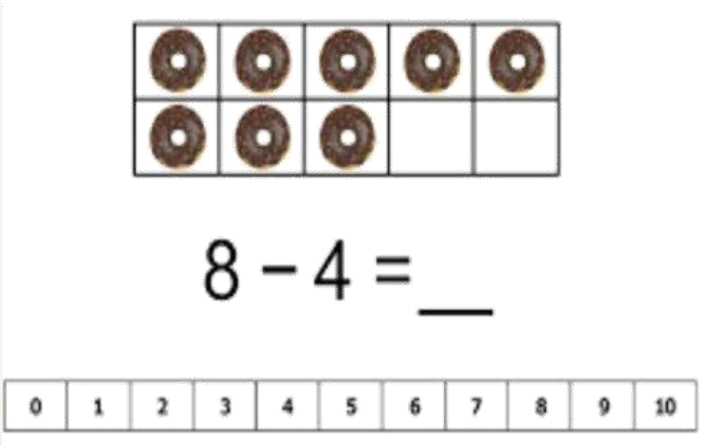
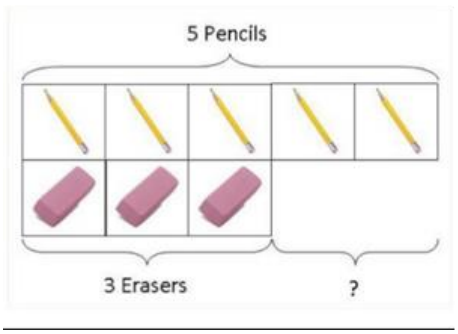
Subtraction (Reception)

Key Vocabulary

one less than, take away, how many left, how many have gone, equals

Key Skills for subtraction in Reception

- Say one less than a given number - count back in ones from 10
- Understand the 'one more than/one less than' relationship between consecutive numbers.
- Solve one-step problems involving subtraction, using concrete objects (bead strings, objects, cubes) and pictures, and missing number problems
- Recognise the – and = signs, and use these to read and write simple subtractions.

Using concrete strategies for counting.	Taking away after counting out practical equipment. . Children would be encouraged to physically remove these using touch counting.  By touch counting and dragging in this way, it allows children to keep track of how many they are removing so they don't have to keep recounting. They will then touch count the amount that are left to find the answer. **Those who are ready** may record their own calculations
Using the ten frames to support subtraction of single digits by taking away. This can be used alongside a number track.	
Solving problems using concrete, pictorial images.	Peter has 5 pencils and 3 erasers. How many more pencils than erasers does he have? 

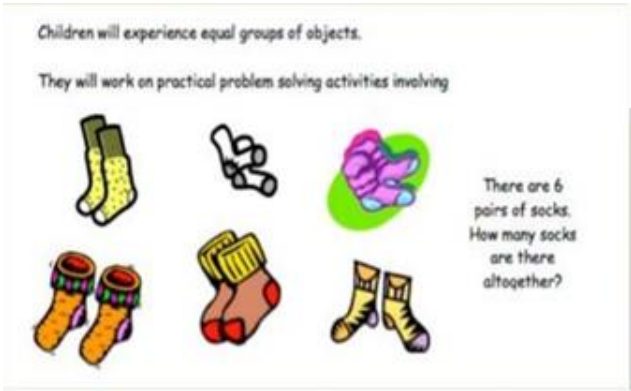
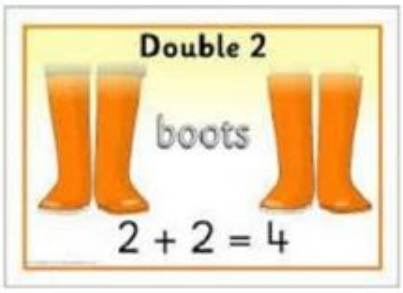
Multiplication (Reception)

Key Vocabulary

doubling, groups, lots of, altogether, count

Key Skills for multiplication in Reception

- Count in 2s (doubling)
- Understand the concept of doubling is adding together 2 groups of the same number
- Begin to solve simple one-step problems involving multiplication and division, calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

Experiencing equal groups of objects. They will think about doubling when solving practical problems.	 

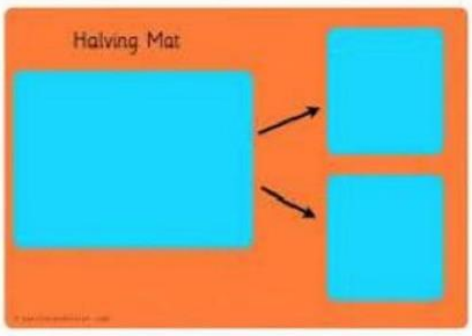
Division (Reception)

Key Vocabulary

Halve, share, share equally, one each, two each, three each. Threes... tens, equal groups of, left, left over

Key Skills for division in Reception

- To understand the concept of halving and making sure there are an equal number of items in both groups
- Begin to solve simple one-step problems involving multiplication and division, calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

Sharing practical objects. Hearing and being exposed to language to describe half and seeing visual representations.	 

Year 1

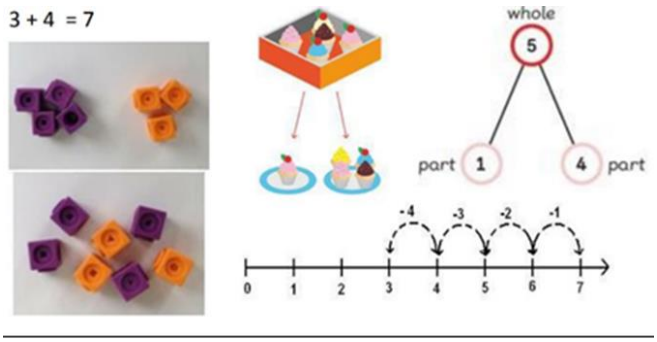
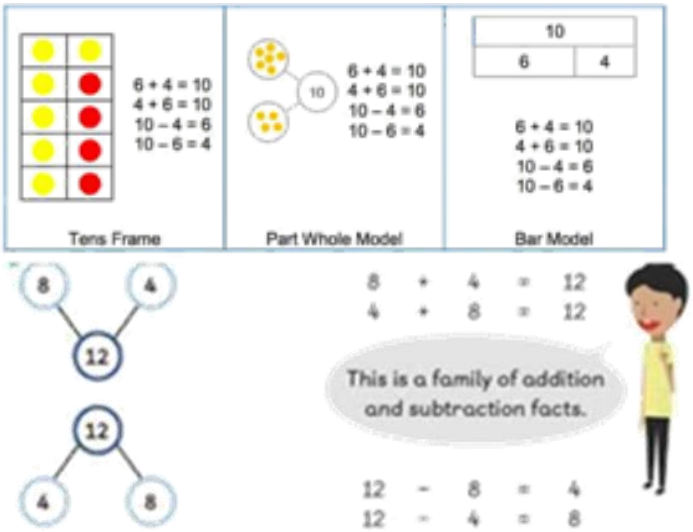
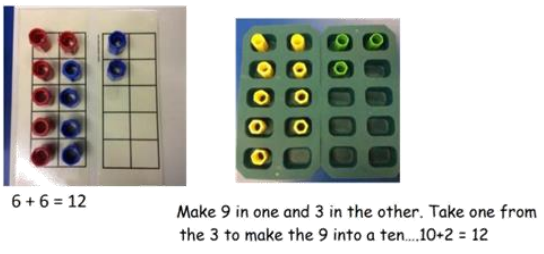
Addition (Year1)

Key Vocabulary

add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, partition, inverse.

Key Skills for addition in Year 1

- number bonds ['story of' 2, 3, 4, 5, 6, 7, 8, 9 and 10]
- count forwards and backwards in ones from a given two-digit number
- count forwards and backwards in tens from any given two-digit number
- add and subtract ten from any given number
- add and subtract one single digit with another single digit
- add three single digits, spotting pairs which make 10
- find one more and one less
- count to and across 100, forwards and backwards
- add by putting the largest number first
- represent and use number bonds and related subtraction facts within 20
- Understand the concept of equality for the = sign [2 = 1 + 1 / 2 + 3 = 4 + 1]

Combining two parts to make a whole: **part whole model** with increasingly larger numbers. Joining two groups and then recounting all objects (lots of practice making 10 and numbers to 10 e.g. 6 + 4 = 10 or 3 + 5 = 8)	
Number bonds Learn number bonds to 20 and demonstrate related facts. Addition and subtraction taught alongside each other as pupils need to see the relationship between the facts.	
Add and subtract one digit numbers and two digit numbers to 20, **including zero**. Use the **part whole model** to show.	
Bridging 10 6 + 6 =12 → Make 9 in one and 3 in the other. Take one from the 3 to make the 9 into a ten….10+2 = 12 use ten frames, Singapore bars, egg boxes and number lines to practice.	

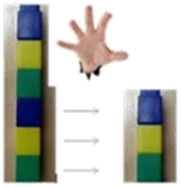
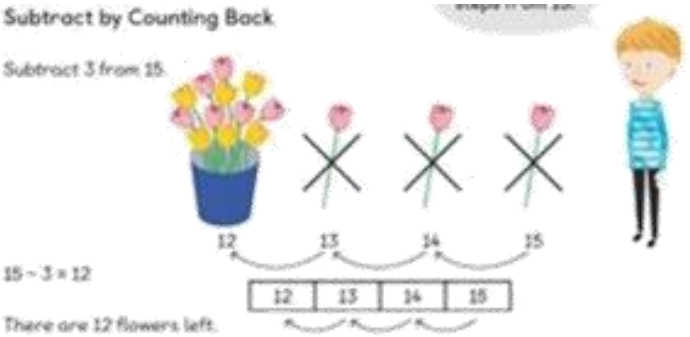
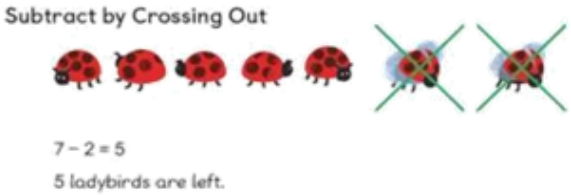
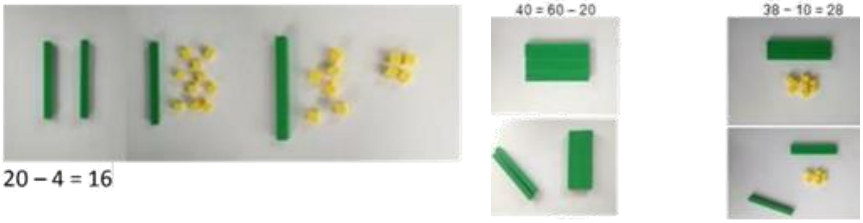
Subtraction (Year1)

Key Vocabulary

subtract, subtraction, minus, less, inverse, decrease, greatest, smallest, difference, fewer than, exchange, part-part whole circles.

Key Skills for subtraction in Year 1

- number bonds ['story of' 2, 3, 4, 5, 6, 7, 8, 9 and 10]
- count forwards and backwards in ones from a given two-digit number and in tens from any given two-digit number
- subtract ten from any given number
- subtract one single digit with another single digit
- find one more and one less
- count to and across 100, forwards and backwards
- represent and use number bonds and related subtraction facts within 20
- Understand the concept of equality for the = sign [2 = 1 + 1 / 2 + 3 = 4 + 1]

Taking away should begin with **physical objects**: counters, cubes, Dienes… etc	 6 -3=3
Subtracting by **counting back**.	
Subtracting a single digit number from a single digit number, and a single digit number from a two digit number by **crossing out** pictures.	
Subtracting using the **part, part whole** model. Including missing digits.	
Using **Dienes** (or place value counters) - Children should be taught to re-group (rename) a ten rod for 10 ones and then subtract from the ones. - Using the vocabulary of 1, ten, two tens, etc, alongside 10, 20, 30 is important.	

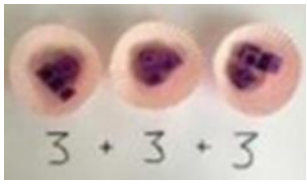
Multiplication (Year1)

Key Vocabulary

groups of, lots of, times, array, altogether, multiply, count

Key Skills for multiplication in Year 1

- begin to count in multiples of 2s, 5s and 10s
- double numbers to 10
- Solve simple one-step problems involving multiplication and division, calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

Counting in Multiples of 2, 5 and 10 from zero. Children should count the number of groups on their fingers as they are skip counting.	
When moving to **pictorial/written** calculations the language is important.	 This image represents two groups of 4 or 4 twice
Solve multiplication problems using **repeated addition**.	 

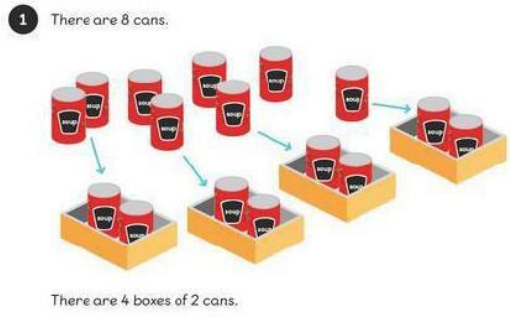
Division (Year1)

Key Vocabulary

share, share equally, one each, two each…, group, groups of, lots of, array

Key Skills for division in Year 1

- Solve one-step problems involving multiplication and division, by calculating the answer
- using concrete objects, pictorial representations arrays with the support of the teacher
- Through grouping and sharing small quantities, pupils begin to understand, division, and finding simple fractions of objects, numbers and quantities they make connections between arrays, number patterns, and counting in twos, fives and tens.

To build on reception and halving, children should be taught to divide by working practically and the sharing should be shown below the whole to familiarise children with the concept of the whole.	10 ÷ 2 = 5 

Year 2

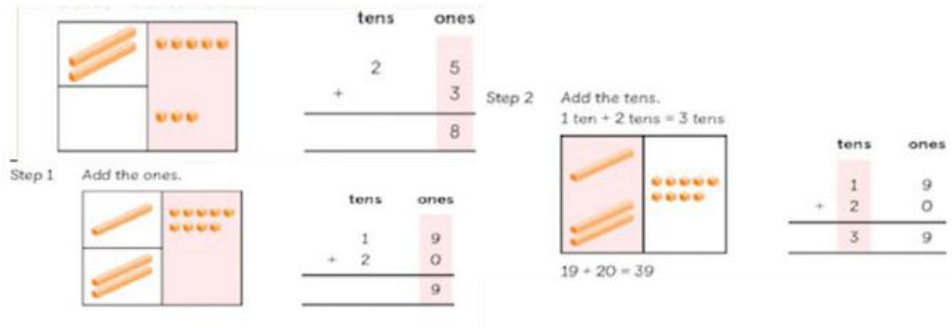
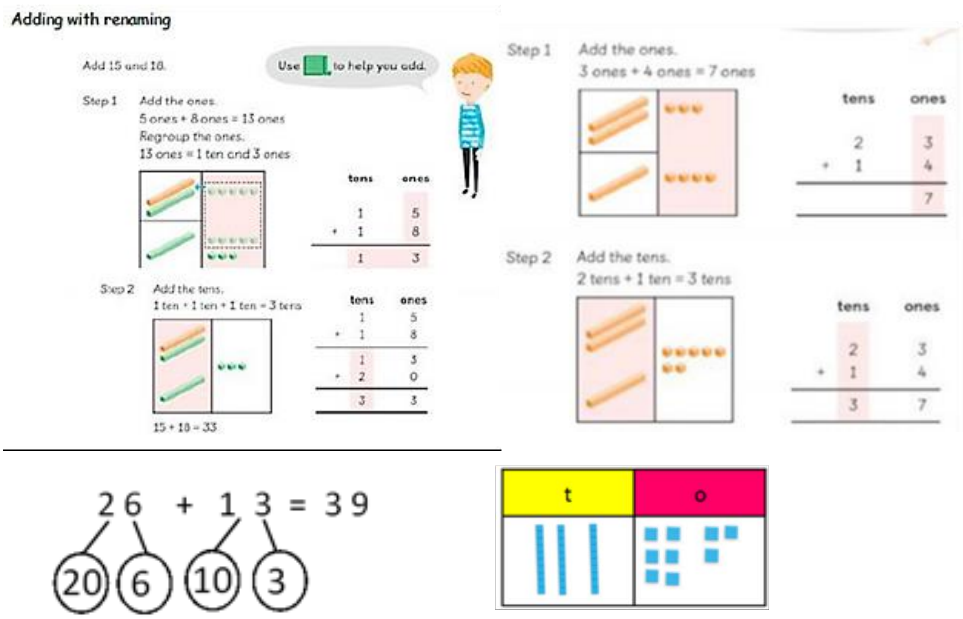
Addition (Year2)

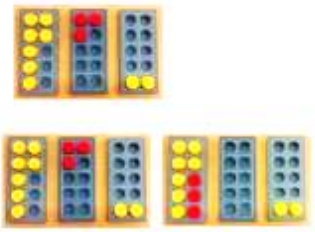
Key Vocabulary

plus, altogether, sum, total, increase, partition, inverse, greatest, smallest, exchange , is the same as/ equal to [equals sign].

Key Skills for addition in Year 2

- Identify any number on a 1-100 grid; understand that each number is some ones added to a multiple of ten (e.g. 54 is 50 and 4 more).
- Add two single digit numbers (e.g. 8 + 7) by counting up; add two 2-digit numbers which total less than 100 by counting on in tens and ones (e.g. 54 + 37 as 50 + 30 + 7).
- Know securely number pairs for all numbers up to and including 12.
- Know different ones patterns when not crossing a ten (4 + 3 = 7, 14 + 3 = 17, 24 + 3 = 27).
- Begin to recognise ones patterns when crossing a ten (e.g. 5 + 6 = 11).
- Know pairs with a total of 20 and multiples of 10 to 100.
- Count on in ones and tens from any given 2-digit number.
- Add two or three single-digit numbers.
- Add a single-digit number to any 2-digit number using number facts, including bridging multiples of 10.
- Add 10 and multiples of 10 to any 2-digit number (not crossing 100).
- Add any pairs of 2-digit numbers.
- Know that adding can be done in any order.
- Solve problems with addition using concrete objects, and/or pictorial representations involving numbers, quantities and measures, applying written and mental methods.

Using **concrete and pictorial representations** to add a 2 digit number to a 1 digit number and a 2 digit number to a tens number. Begin to show calculations through the formal method alongside concrete representation.	
Using concrete and pictorial representations to add two 2 digit numbers. **Partitioning** numbers using the part, part whole method to show different ways to add two two-digit numbers. Begin to show calculations through the formal method alongside concrete representation.	

Using concrete and pictorial representations to add 3 single digit numbers looking at known number bonds.	7+3+2 = leads to 10 + 2 = 
Using the **bar model** to find missing digits: It is important for the children to use the bar model in this way to encourage the use of it to aid problem solving.	Helen has 14 bread-sticks. Her friend has 17. How many do they have altogether? 

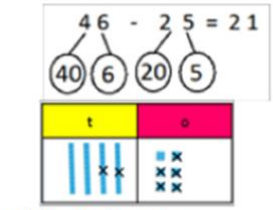
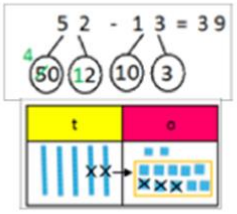
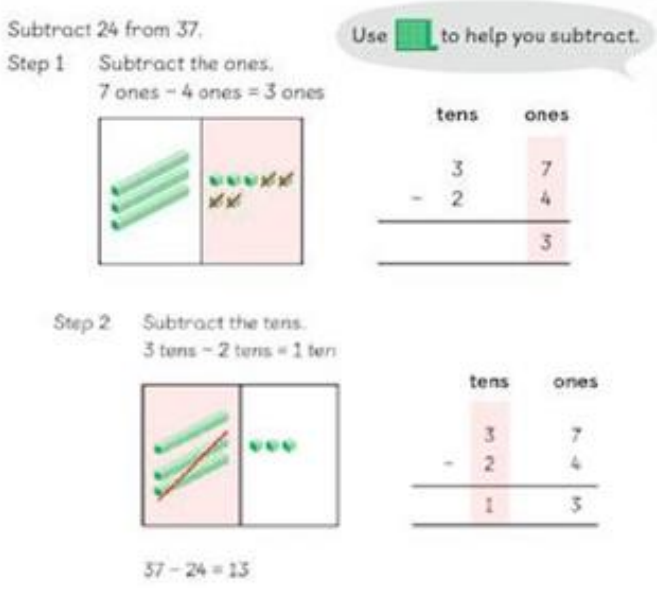
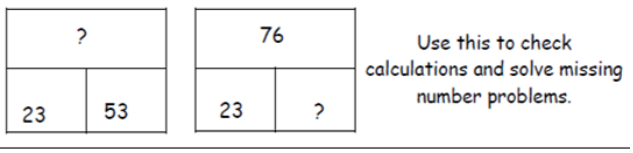
Subtraction (Year2)

Key Vocabulary

subtract, subtraction, minus, less, inverse, decrease, greatest, smallest, difference, fewer than, exchange, part-part whole circles, greatest, smallest, exchange , is the same as/ equal to [equals sign], part part whole circles.

Key Skills for subtraction in Year 2

- Recognise that addition and subtraction are inverse operations and understand that
- 10 – 4 = 6 as well as 6 + 4 = 10.
- Count back in ones or tens to take away, e.g. 27 – 3 = or 54 – 20 =.
- Begin to count up to find a difference between two numbers with a small gap (42 –
- 38). Know when to count on and when to count back.
- Recall and use subtraction facts to 20 fluently.
- Derive and use related fact to 100.
- Subtract using concrete objects, pictorial representations, 100 squares, Base Ten, Numicon and mentally, including a 2-digit number and ones, a 2-digit numbers and tens, and two 2-digit numbers.
- Use inverse to check calculations.

Using concrete and pictorial representations. **Partitioning** numbers in different ways to subtract a 1 digit number from a 2 digit number and **two two-digit numbers** from a tens number..	Without exchanging  6 – 5 = 1 40 – 20 = 20 20 + 1 = 21 *(children must be taught to always start with the ones)* With exchanging  12 – 3 = 9 50 – 10 = 30 30 + 9 = 39 *(children make the greatest number and subtract the smallest number)* ***NB Children will use the part-part whole circles to partition into tens and ones and investigate how numbers can be regrouped.***
Using **concrete and pictorial** Representations to subtract a 2 digit number from a 2 digit number. Begin to use the formal written method alongside.	
Bar Model – to recognise and use the **inverse relationship** between addition and subtraction.	

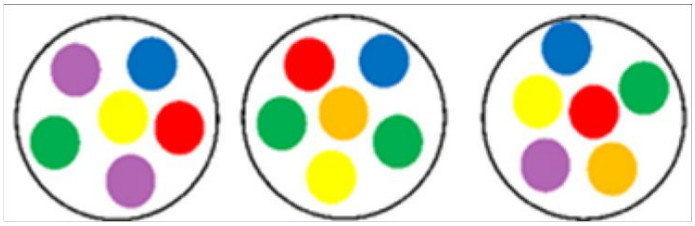
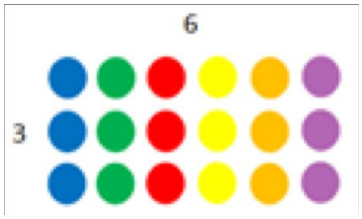
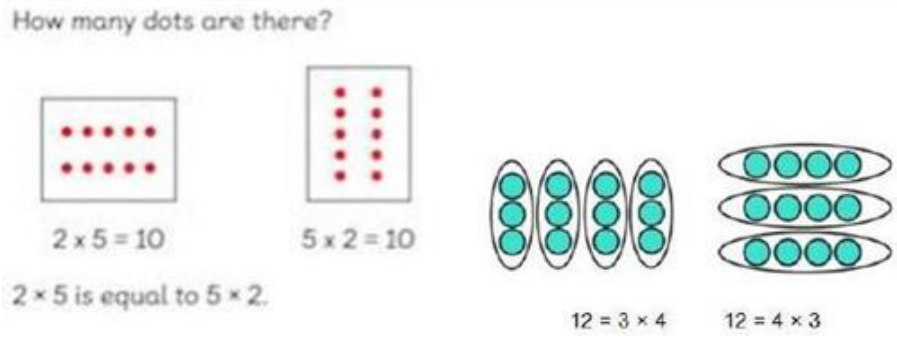
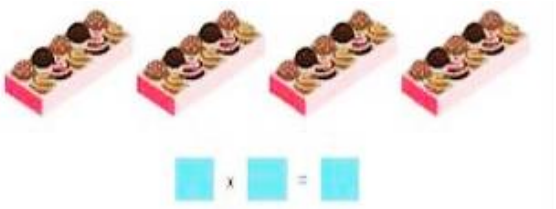
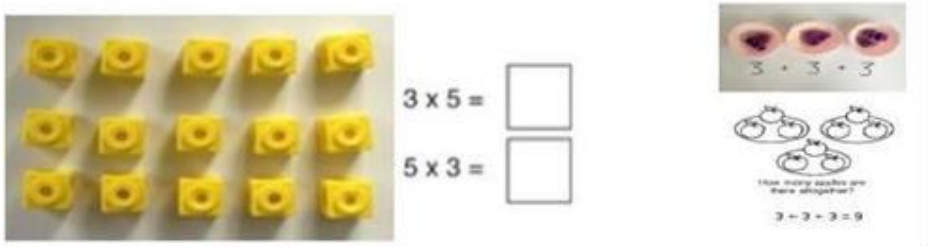
Multiplication (Year2)

Key Vocabulary

groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, sets of, equal groups, times as big as, once, twice, three times...

Key Skills for multiplication in Year 2

- Count in steps of 2, 3 and 5 from zero and in 10s from any number
- Know the 2x, 5x and 10x multiplication tables and begin to say how many 10s are in 40 or how many 5s are in 30; recognise odd and even answers
- Write and calculate number statements using x and = signs
- Show that multiplication can be done in any order
- Solve a range of problems involving multiplication, using concrete objects, arrays, repeated addition, Numicon, mental methods and multiplication facts

Grouping to multiply within known times tables.	3 x 6 = 18 
Understand that multiplication is . Pupils should understand that an array can represent different equations and that as multiplication is commutative the order doesn't affect the answer.	 6 groups of 3 3 groups of 6 
Use multiplication sign (X) and equals sign (=) when writing out multiplication tables.	
Solve multiplication problems using arrays and repeated addition.	

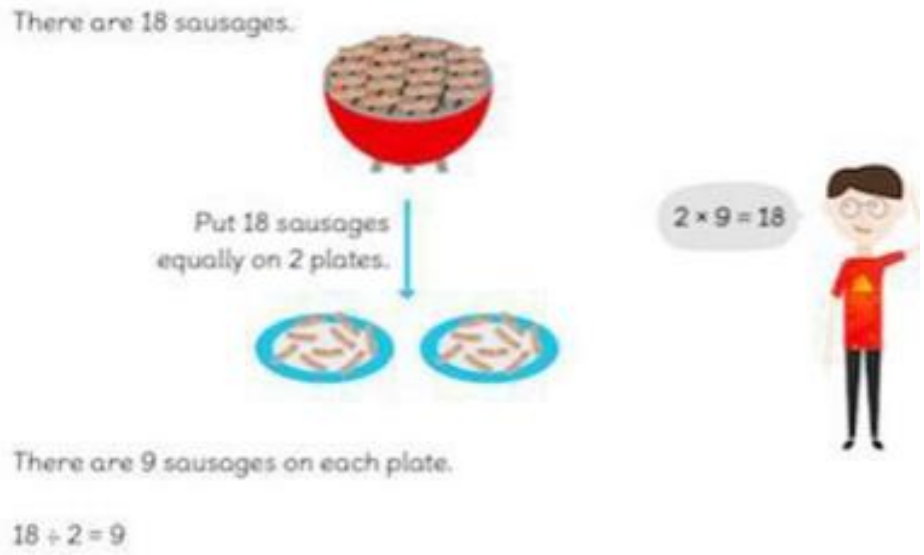
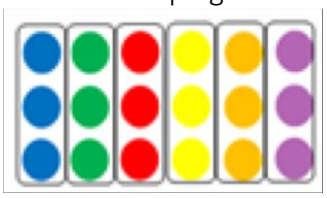
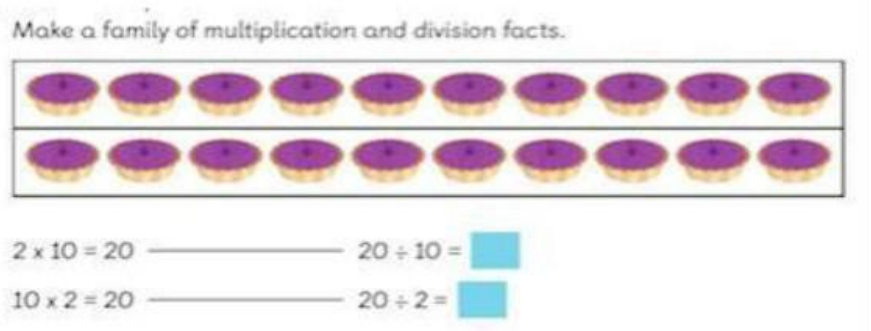
Division (Year2)

Key Vocabulary

share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over

Key Skills for division in Year 2

- Count in steps of 2, 3, and 5 from 0
- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.
- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the x, ÷ and = signs.
- Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.
- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Solve division problems in context by using concrete objects by sharing.	
Grouping/sharing to divide within known times tables. Children to use counters as a concrete apparatus and move on to drawing a pictorial representation.	Sharing  Grouping 
Use the inverse This should be taught alongside Both multiplication and division.	

Year 3

Addition (Year3)

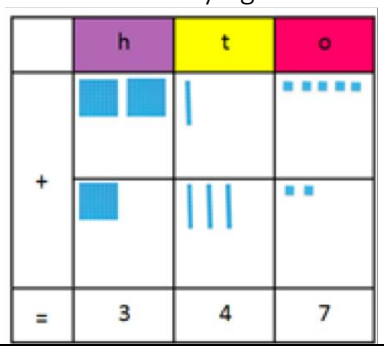
Key Vocabulary

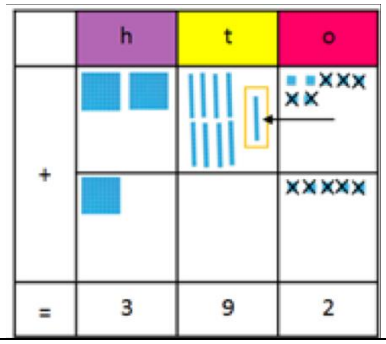
add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, ones, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, carry, expanded, compact.

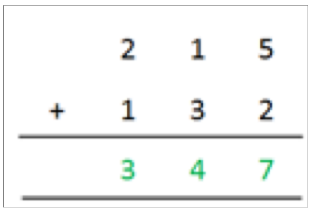
Key Skills for addition in Year 3

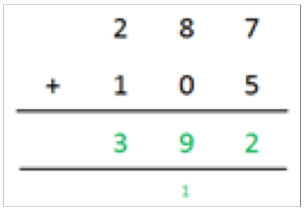
- Know pairs which each total 0.
- Know pairs of multiples of 10 with a total of 100.
- Add any 2-digit numbers by counting on in tens and ones or by using partitioning.
- Add multiples and near-multiples of 10 and 100.
- Add 1, 10 and 100 to 3-digit numbers.
- Understand place value of 3-digit numbers.
- Perform place value additions confidently (e.g. 300 + 50 + 8 = 358).
- Use place value and number facts to add a 1-digit number or 2-digit number to a 3-digit number (e.g. 104 + 56 is 160 as 104 + 50 = 154 and 6 + 4 = 10).
- Add pairs of 'friendly' 3-digit numbers mentally (e.g. 320 + 450).
- Begin to add amounts of money using partitioning.
- Solve problems with addition number facts, place value knowledge and missing numbers.

<table>
<tr>
<td>Using concrete and pictorial representations.

Without and with carrying
Children need to first use Equipment/ diagrams to support understanding of place value.
*Dienes or counters</td>
<td>Without carrying
 

Without carrying
 
</td>
</tr>
<tr>
<td>Children to use the formal method alongside the concrete/pictorial representation.

When confident move onto the formal written method.</td>
<td> 



(Please note the placement of the digits when the column boundary is crossed. Always place the carried digit below.)</td>
</tr>
<tr>
<td>Bar Modelling

It is important for the children to use the bar model in this way to encourage the use of it to aid problem solving.</td>
<td>Bar Model to support understanding of problem solving:
 
A man sold 230 balloons at a carnival in the morning. He sold another 86 balloons in the evening . How many balloons did he sell in all?
 
</td>
</tr>
</table>

Subtraction (Year3)

Key Vocabulary

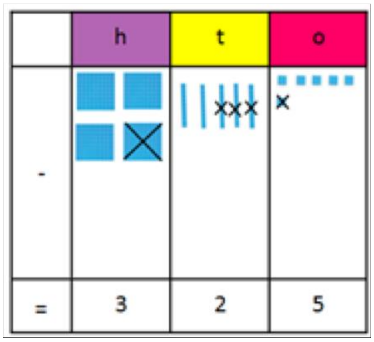
equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is…, difference, count on, strategy, partition, tens, ones, take and make, exchange, digit, value, hundreds

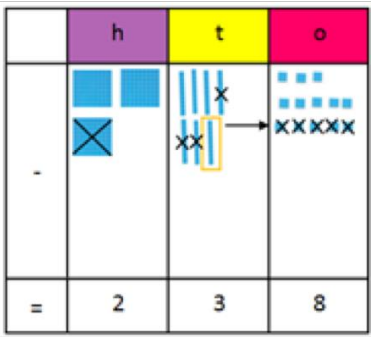
Key Skills for subtraction in Year 3

- Understand place value in 3-digit numbers; add and subtract 1s, 10s or 100s without difficulty
- Add and subtract multiples of 1, 10, 100 to/from 3-digit numbers.
- Mentally subtract any pair of 2 digit numbers, e.g. 75 – 58
- Recognise that there are two ways of completing subtractions, either by counting up using and empty number line or by counting back, e.g. 54 – 3.
- Subtract mentally using place value and number bonds, e.g. 347-5, 347-40, 347-100)

<table>
<tr>
<td>Using concrete and pictorial representations.

Without and with exchanging Children need to first use Equipment/ diagrams to support understanding of place value.

*Use Diennes to show the exchanges.</td>
<td>Without exchanging
456-131
 

With exchanging
373-135
 
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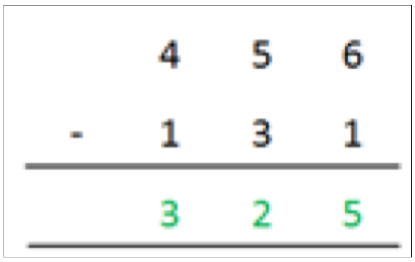
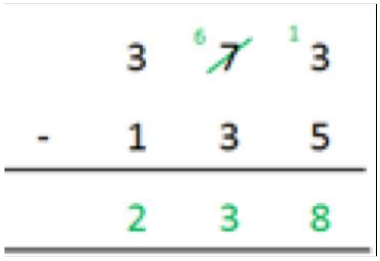
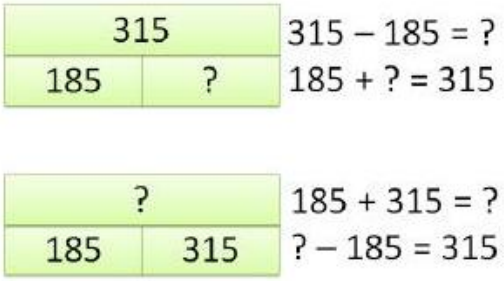
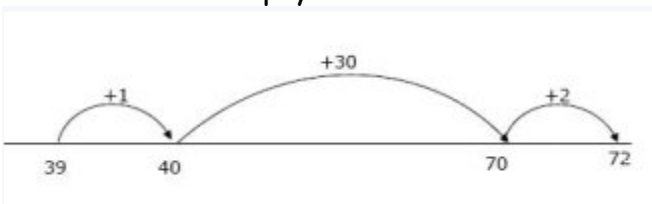
</tr>
<tr>
<td>Children to use the formal method alongside the concrete/pictorial representation.

When confident move onto the formal written method.</td>
<td> 



(Please note the placement of the digits when exchanging- always place the exchanged digit neatly just above.)</td>
</tr>
<tr>
<td>Bar model

It is important for the children to use the bar model in this way to encourage the use of it to aid problem solving.</td>
<td> 
</td>
</tr>
<tr>
<td>Mental Subtraction
Children should understand when to count back and when to count the gap. Begin to use empty number lines.</td>
<td>Use empty number lines
 
</td>
</tr>
</table>

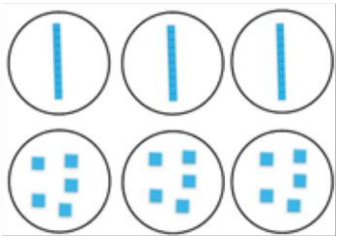
Multiplication (Year3)

Key Vocabulary

groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, sets of, equal groups, times as, big as, once, twice, three times…, partition, grid method, multiple, product, tens, units, value

Key Skills for multiplication in Year 3

- Understand that multiplication is commutative, e.g. 4 x 8 is the same as 8 x 4.
- Know the 2x, 3x, 5x and 10x multiplication tables. All tables need to be learned to 12th multiple.
- Multiply any 2-digit number by 10 or a single-digit number by 100;
- Understand the effect of multiplying whole numbers by 10 and 100.
- Multiply a 1-digit number by a 2 digit number starting to use the grid
- Solve multiplication problems involving missing numbers

Grouping to multiply 2 digit numbers by a one digit number. This will allow children to understand the effect of multiplying on each digit.	15 x 3 = 45 10 5 10 x 3 = 30 5 x 3 = 15  (ensure that children are grouping the tens and ones and that the amount of groups relates to what they are multiplying by)
Expanded short multiplication. To ensure children are aware of place value and the value of the digits begin with the expanded method.	38 x 7 56 (8 x 7) 210 (30 x 7) 266 *(Please note place the carried digit when adding will be below the line.)*
Bar Modelling It is important for the children to use the bar model in this way to encourage the use of it to aid problem solving.	4 children go to the cinema. They each pay £15. How much do they spend altogether? Whole unknown ? (15 15 15 15)

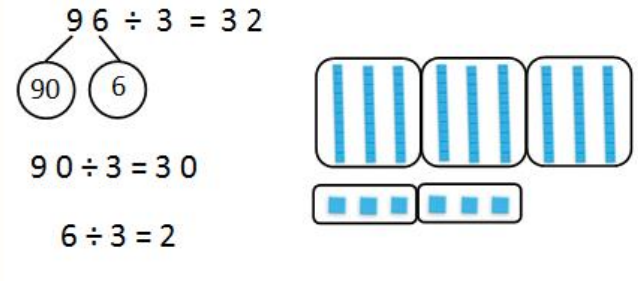
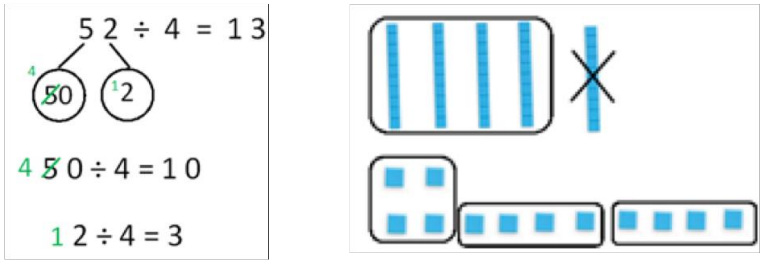
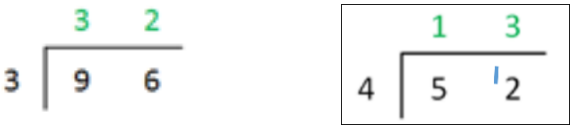
Division (Year3)

Key Vocabulary

share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, carry, remainder, multiple

Key Skills for division in Year 3

- Recall and use division facts for the 2, 3, 4, 5, 8 and 10 multiplication tables
- Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers divided by one digit
- Solve problems, in contexts, and including missing number problems, involving division.
- Pupils develop efficient mental methods, for example, using division facts (e.g. using 3 × 2 = 6, 6 ÷ 3 = 2 and 2 = 6 ÷ 3) to derive related facts (30 × 2 = 60, so 60 ÷ 3 = 20 and 20 = 60 ÷ 3).
- Pupils develop reliable written methods for division, starting with calculations of 2- digit numbers by 1-digit numbers.
- Halve even numbers up to 50 and multiples of ten to 100
- Perform divisions within the tables including those with remainders, e.g. 38 ÷ 5.

Grouping to divide two-digit numbers by one-digit numbers. **Without re-grouping**	
Grouping to divide two-digit numbers by one-digit numbers. **With re-grouping** - Show how you move the remaining 10, replacing it for 10 ones and place alongside original ones.	
Short multiplication - To begin can be used alongside the concrete methods to show how	

Year 4

Addition (Year4)

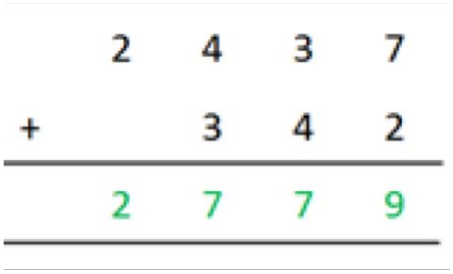
Key Vocabulary

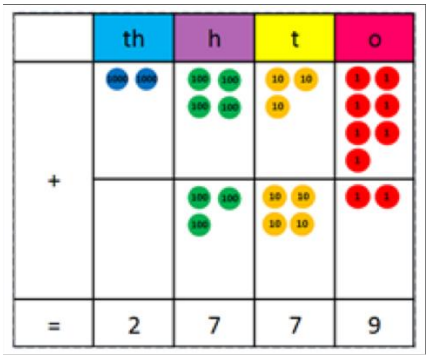
add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, ones, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', regroup, expanded, compact, thousands, hundreds, digits, inverse.

Key Skills for addition in Year 4

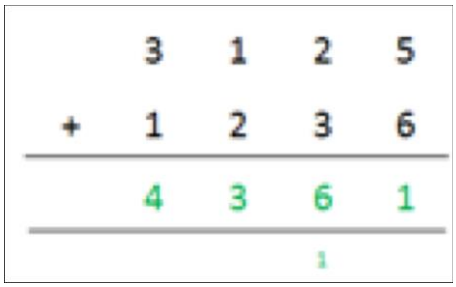
- Select appropriate methods, mental jottings, written and explain reasons for choices.
- Add any two 2-digit numbers by partitioning or counting on.
- Know by heart (quickly derive) number bonds to 100 (e.g. 32 + 68) and to £1 (64p + 36p).
- Add to the next hundred, pound and whole number (e.g. 234 + 66 = 300, 3.4 + 0.6 = 4)
- Perform place value additions confidently (e.g. 4000 + 300 +50 + 8 = 4358).
- Add multiples and near multiples of 10, 100 and 1000.
- Add £1, 10p, and 1p to amounts of money.
- Use place value and number facts to add 1, 2, 3 and 4-digit numbers where a mental calculation is appropriate (e.g. 4004 + 156 by knowing that 6 + 4 = 10 and that 4004 + 150 = 4154 so total is 4160).
- Perform inverse operations to check answers to calculations are correct.
- Solve two-step problems in context.
- Continue to practise a wide range of mental addition strategies (e.g. round and adjust, near doubles, number bonds, partitioning and recombining).

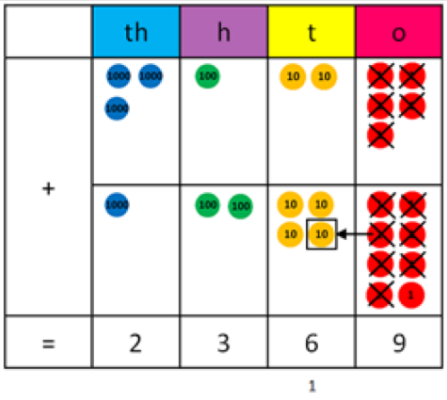
<table>
<tr>
<td>Compact column addition to add numbers with up to 4 digits. Compete alongside the use of equipment to support understanding.

Without carrying</td>
<td>




</td>
</tr>
<tr>
<td>Compact column addition to add numbers with up to 4 digits. Compete alongside the use of equipment to support understanding.

With carrying
Model how to exchange 10 ones for a ten counter.</td>
<td>




</td>
</tr>
<tr>
<td>Bar Model
Use this alongside other methods.</td>
<td>
This is not a form of getting the correct answer but helping to guide children to the correct operation.

Alison jogs 6,860 metres and Calvin jogs 5,470 metres. How far do they jog altogether?

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

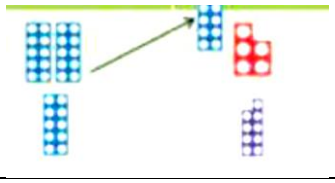
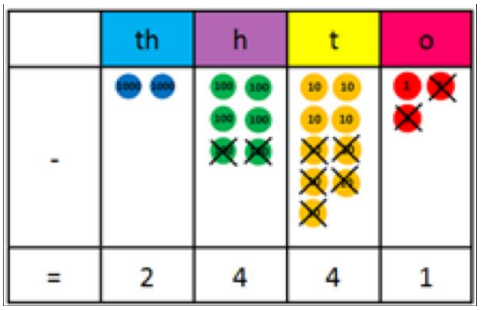
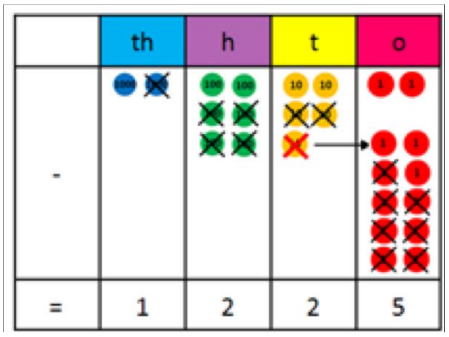
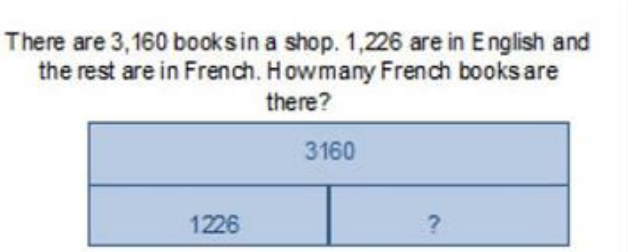
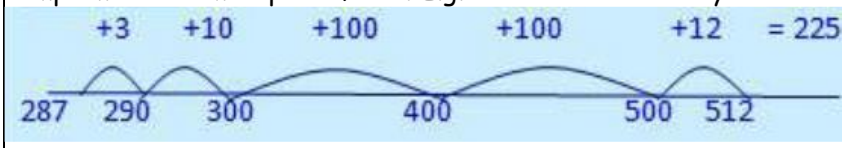
Subtraction (Year4)

Key Vocabulary

equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is…, difference, count on, strategy, partition, tens, ones, take and make, exchange, digit, value, hundreds, inverse.

Key Skills for subtraction in Year 4

- Mentally subtract any pair of two digit numbers.
- Subtract 3 digit numbers from 3 digit numbers using counting on, e.g. 426 – 278 by jumping along a line from 278 to 426
- Practise mental subtraction strategies, eg. Round and adjust (37—9), using place value
- Use counting on in the context of money and also when subtracting from numbers ending in zeros eg 4000-372
- Count backwards through zero, using negative numbers

Use Numicon and Base Ten to provide visual images for 'take and make' for those who need additional support	
Compact column subtraction to subtract numbers with up to 4 digits. Without exchanging (crossing out)	2 6 9 3 - 2 5 2 2 4 4 1 
Compact column subtraction to subtract numbers with up to 4 digits. With exchanging (crossing out and exchanging one counter for another value)	2 6 ~~5~~ 2 - 1 4 2 7 1 2 2 5 
Using the bar model to find missing digits.	
Mental subtraction Counting up	Use counting up with confidence to solve most subtractions, including finding complements to multiples of 100. E.g. 512 – 287 is done by:  Children should be encouraged to do as fewer jumps as possible.

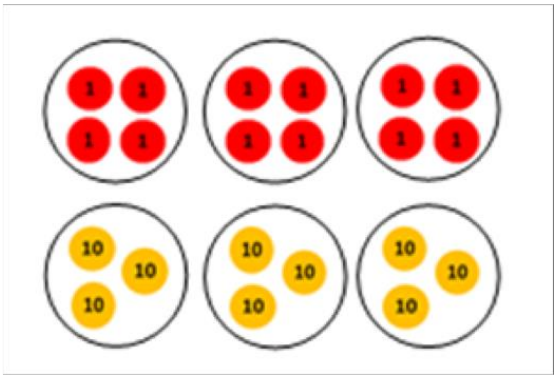
Multiplication (Year4)

Key Vocabulary

groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, sets of, equal, groups, times as big as, once, twice, three times…, partition, grid method, multiple, product, tens, units, value, inverse

Key Skills for multiplication in Year 4

- Multiply 1 and 2 digit numbers by 10, 100 and 1000; to understand place value in decimal numbers with one place.
- Know and recite 2x, 3x, 4x, 5x, 9x, 10x multiplication tables up to 12th multiple; include multiplying by 0 (e.g. 5 x 0 = 0, 7 x 0 = 0) or by 1 (e.g. 5 x 1 = 5, ½ x 1 = ½).
- Multiply 1- digit numbers by 2-digit or friendly 3-digit numbers using grid method.
- Find doubles to double 100 and beyond, using partitioning
- Begin to double amounts of money
- Use doubling as strategy for multiplying by 2, 4, 8
- Count in multiples of 6, 7, 9, 25 and 1000

Partition numbers to multiply mentally with jottings	30 x 3 and then 4 x 3 34 x 3 = 30 4
Use place value counters when multiplying a two-digit number by single digit numbers.	
Expanded short multiplication of a two-digit number by single digit numbers. - Try to move onto condensed when ready.	h t o 3 4 x 3 1 2 (4 x 3) 9 0 (30 x 3) 1 0 2 1 (Please note the placement of the digits when the column boundary is crossed. Always place the carried digit **below**.)

Division (Year4)

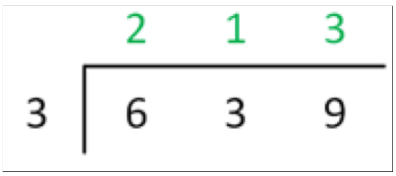
Key Vocabulary

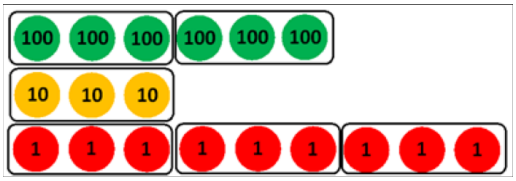
share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, carry, remainder, multiple, divisible by, factor

Key Skills for division in Year 4

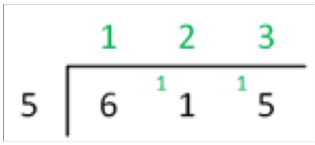
- Use a written method to divide a 2-digit or a 3-digit number by a single-digit number.
- Give remainders as whole numbers.
- Recall multiplication and division facts for all numbers up to 12 x 12.
- Use place value, known and derived facts to multiply and divide mentally, including: multiplying and dividing by 10 and 100 and 1.
- Pupils practise to become fluent in the formal written method of short division with exact answers when dividing by a one-digit number
- Pupils practise mental methods and extend this to three-digit numbers to derive facts, for example 200 × 3 = 600 so 600 ÷ 3 = 200
- Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as three cakes shared equally between 10 children.

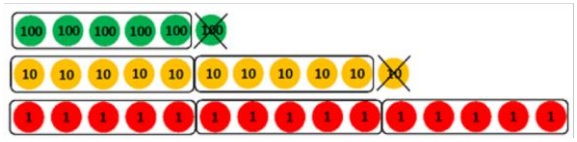
<table>
<tr>
<td>Short division of 2-digit and 3-digit number by single digit numbers.

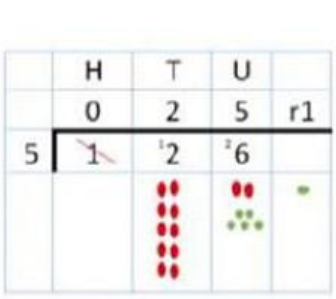
Without regrouping</td>
<td>


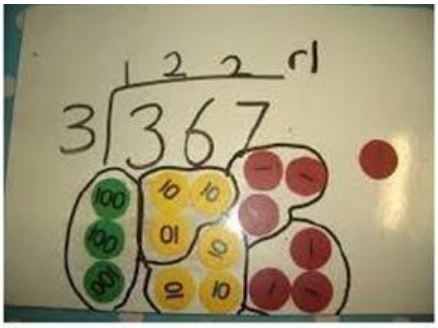


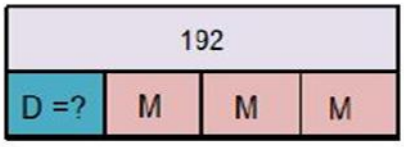
(children could use concrete counters or draw working out as a Pictorial representation alongside the written bus stop method)
</td>
</tr>
<tr>
<td>Short division of 2-digit and 3-digit number by single digit numbers.

With regrouping</td>
<td>




(children could use concrete counters or draw working out as a pictorial representation)




Children can be exposed to remainders at this stage but it should not act as a specific teaching point until Year 5.
</td>
</tr>
<tr>
<td>Divide using the bar model</td>
<td>
Desmond and Melissa collect cards. They have 192 cards in all. Melissa has three times as many cards as Desmond. How many cards does Desmond have?


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

Year 5

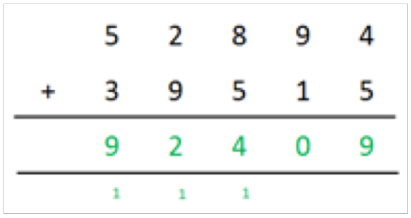
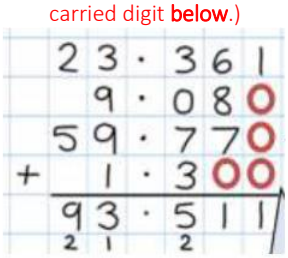
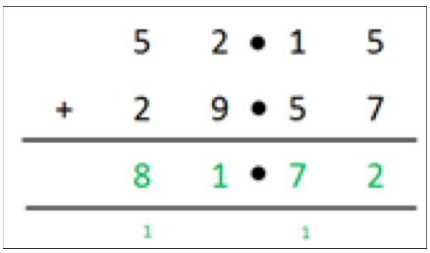
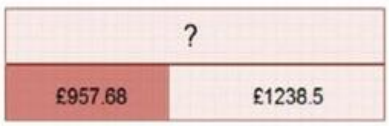
Addition (Year5)

Key Vocabulary

add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, ones, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', regroup, expanded, compact, thousands, hundreds, digits, inverse, decimal places, decimal point, tenths, hundredths, thousandths.

Key Skills for addition in Year 5

- Locate 5 and 6 digit numbers on a landmarked line; use this to compare/order numbers.
- Round to the nearest 10, 100, 1000 and 10,000.
- Use rounding to check accuracy.
- Understand a one-place decimal number as a number of tenths and a two-place decimal as a number of hundredths.
- Add 0.1 or 0.01 to any decimal number with confidence.
- Add and subtract mentally with confidence – where the numbers are less than 100 or the calculation relies upon simple addition and place value.
- Confidently add numbers with more than 4-digits using a secure written method, including adding 'piles' of numbers
- Use inverse to check calculations

Adding numbers with more than 4 digits. *Can continue to use counters to model the process (see y4).*	 5 2 8 9 4 + 3 9 5 1 5 9 2 4 0 9 1 1 1 (Please note the placement of the digits when the column boundary is crossed. Always place the carried digit **below**.)
Adding numbers with more than 4 digits including decimals. Using place value charts and place value counters is key when understanding adding decimals.	(Please note the placement of the digits when the column boundary is crossed. Always place the carried digit **below**.)  23·361 9·080 59·770 + 1·300 93·511  5 2 • 1 5 + 2 9 • 5 7 8 1 • 7 2 1 1 Teach children to line up the decimal point and then empty decimal places should be filled with zero to show the place value of each column.
Estimate answer by rounding **prior to** written strategy.	52,894 + 39,515 50,000 + 40,000 = 90,000
Using the **bar model** to find missing digits	This is not a form of getting the correct answer but helping to guide children to the correct operation. MacDonalds sold £9957.68 worth of hamburgers and £1238.5 worth of chicken nuggets. How much money did they take altogether?  ?

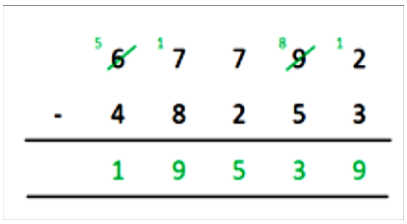
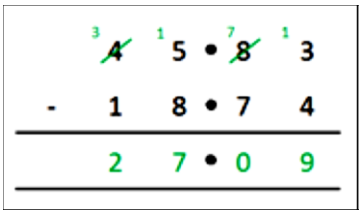
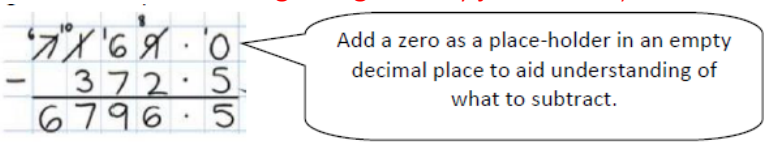
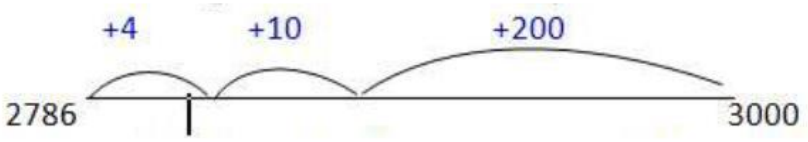
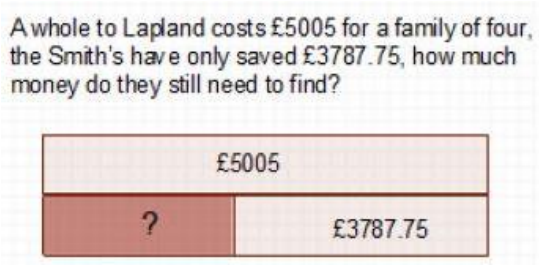
Subtraction (Year5)

Key Vocabulary

equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is…, difference, count on, strategy, partition, tens, ones, take and make, exchange, digit, value, hundreds, inverse, tenths, hundredths, decimal point, decimal.

Key Skills for subtraction in Year 5

- Count backwards through zero, using negative numbers.
- Add or subtract 0.1 or 0.01 to/from any decimal number with confidence e.g. 5.83 + 0.01 or 4.83 – 0.1.
- Children need to utilise and consider a range of subtraction strategies, jottings and written methods before choosing how to calculate.
- Subtract larger numbers using column subtraction or by counting up.
- Begin to subtract decimal numbers using counting up: 6.2 – 3.5.
- **Decide which mental methods to use and explain why. Do they always need a written method?**

Subtract with at least 4 digit numbers	 (Please note the placement of the digits when exchanging- always place the exchanged digit neatly just above.)
Subtract with money, measures and decimals with at least two decimal places.	 (Please note the placement of the digits when exchanging- always place the exchanged digit neatly just above.) 
Use **counting on** for subtractions where the larger number is a multiple or near multiple of 1000, or for decimals.	
Using **the bar model** to find missing digits.	

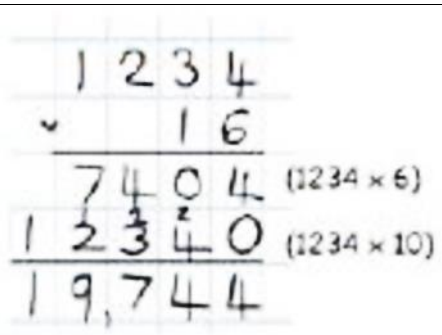
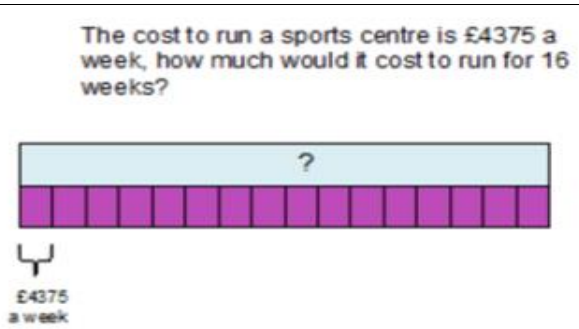
Multiplication (Year5)

Key Vocabulary

groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, sets of, equal groups, times as, big as, once, twice, three times…, partition, grid method, multiple, product, tens, units, value, inverse, square, factor , integer , decimal , short/long multiplication, 'carry'

Key Skills for multiplication in Year 5

- Know and recite all times tables including division facts.
- Multiply 2- and 3-digit numbers by numbers ≤12 using grid method; multiply 2-digit by 2-digit numbers using grid method.
- Identify multiples and factors, using knowledge of multiplication tables up to 12 x 12
- Scale up or down by a factor of 2, 5 or 10
- Multiply integers and decimals by 10, 100, 1000
- Recognise and use squared, cubes and their notations

Multiply up to **4 digit numbers by 2 digit numbers** using **long multiplication** method.	 *(Please note the placement of the digits when the column boundary is crossed. It must be smaller, so it is not confused with other digits. Use of different colours could be a useful strategy.)* *****Expanded short multiplication provides a scaffold for ALL children.***
Children need to be taught to **approximate** first to check the reasonableness of their answers.	So 56 x 27 could be 60 x 30 = 1800 Children can do 6 x 3 x 10 x 10 to complete their estimation mentally.
Using the **bar model** to support multiplication	

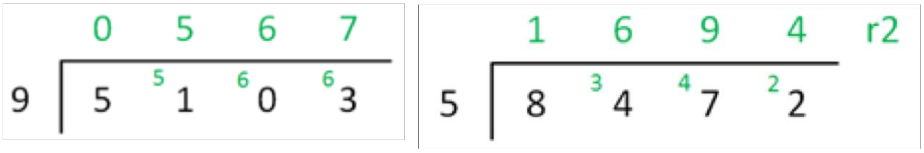
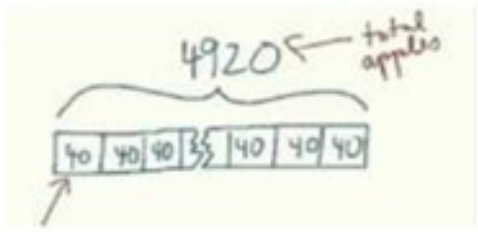
Division (Year5)

Key Vocabulary

share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, carry, remainder, multiple, divisible by, factor quotient, prime number, prime factors, composite number (non-prime)

Key Skills for division in Year 5

- Recall multiplication and division facts for all numbers up to 12 x 12 accurately (as in Y4).
- Multiply and divide numbers mentally, drawing upon known facts.
- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two number.
- Solve problems involving multiplication and division where larger numbers are decomposed into their factors.
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.
- Use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.
- Work out whether a number up to 100 is prime, and recall prime numbers to 19
- 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
- Use multiplication and division as inverses. Interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (e.g. 98 ÷ 4 = 24 r 2 = 241/2 = 24.5 ≈ 25).

Divide up to 4 digit numbers by 1 digit numbers using short division. When numbers have remainders – in preparation for year 6 - display remainders as fractions.	 1694 2/5 The use of concrete apparatus can be used as a scaffold for ALL children (see Year 4)#
Using the bar model to support division. Use this alongside then bus stop method, especially when problem solving.	**Bar Model to support understanding of problem solving:** Frank has 4920 apples. He needs to put them into baskets of 40. How many baskets does he need? 

Year 6

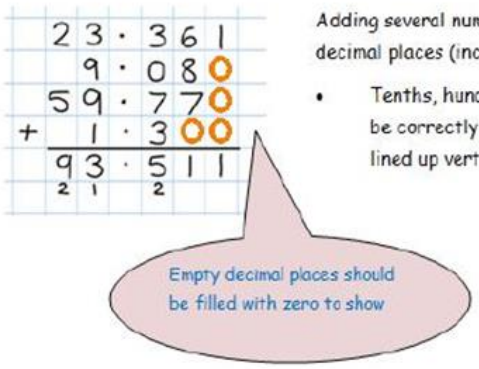
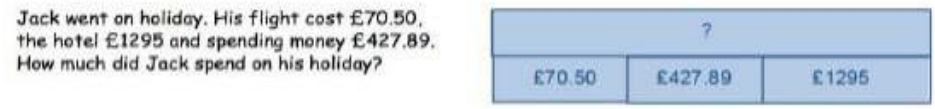
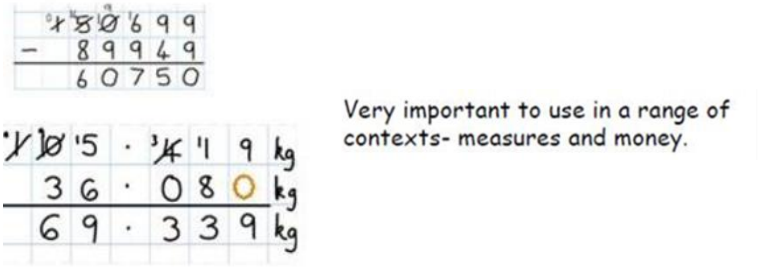
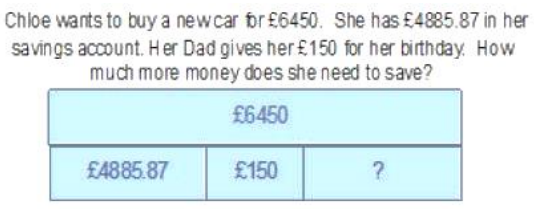
Addition and Subtraction (Year 6)

Key Vocabulary

add, addition, sum, total, increase, inverse, altogether, compact column addition, column boundary
subtract, subtraction, minus, decrease, leave, difference, column boundary, exchange, place holder

Key Skills for addition and subtraction in Year 6

- Perform mental calculations, including with mixed operations and large numbers of increasing complexity
- Use their knowledge of the order of operations to carry out calculations involving the four operations
- Use column addition to add and subtract numbers with up to 6 digits
- solve problems involving addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- Add and subtract several large numbers using the written method
- Add and subtract decimal numbers using the written method
- Can use a range of strategies
- Use estimation and inverse to check the validity of an answer

Adding several numbers with up to 3 decimal places.	*(Please note the placement of the digits when the column boundary is crossed. Place the carried digit below.)* 
Using the bar model to support addition.	
Column subtraction. Subtracting with increasingly more complex numbers including decimals. Empty columns are filled with a place holder of zero.	(Please note the placement of the digits when the column boundary is crossed. Place the carried digit below.) 
Using the model to support subtraction. Used alongside the column subtraction.	

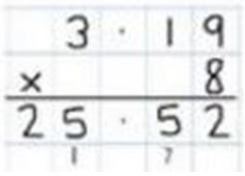
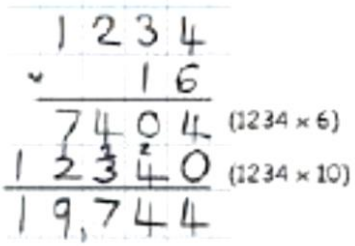
Multiplication (Year6)

Key Vocabulary

lots of, groups of, repeat, times, multiply, multiplied by, multiple of, factor, prime number, product, short multiplication, long multiplication.

Key Skills for multiplication in Year 6

- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
    - Use short multiplication to multiply a 1-digit number by a number with up to 4 digits
    - Use long multiplication to multiply a 2-digit by a number with up to 4 digits
    - Use short multiplication to multiply a 1-digit number by a number with one or two decimal places, including amounts of money
    -
- use their knowledge of the order of operations to carry out calculations involving the four operations
- use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve problems involving multiplication and division

Short multiplication with up to 2 decimal places.	 *(Please note the placement of the digits when the column boundary is crossed. Place the carried digit below.)*
Long multiplication multiplying 4 digits by a 2 digit number. *Multiply by the ones in the first row and the tens in the second row. * remind children of the place holder in row 2 (As with Y5)	 *(Please note the placement of the digits when the column boundary is crossed. Place the carried digit below.)*
Use bar model to support multiplication, where needed.	

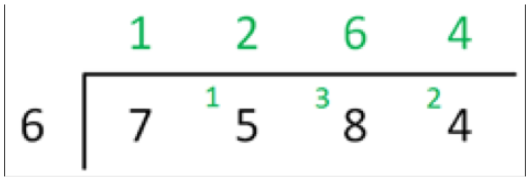
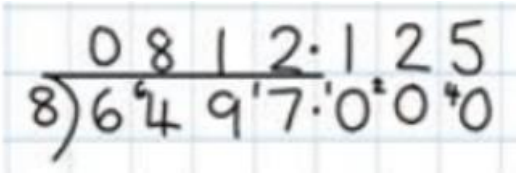
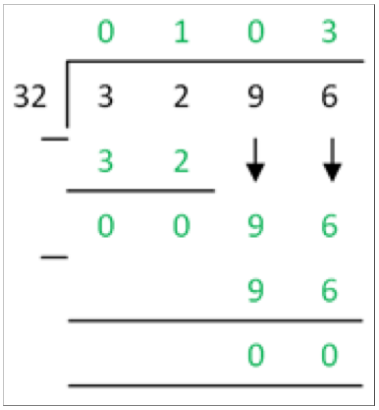
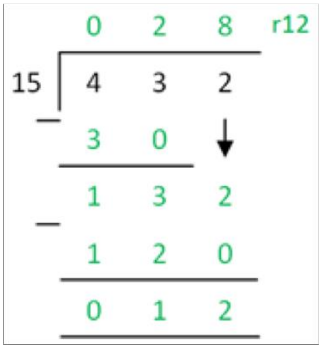
Division (Year6)

Key Vocabulary

divided by, divided into, left over, remainder, how many groups, factor, divisible by, divisibility, inverse, divider, dividend, quotient, short division, long division.

Key Skills for division in Year 6

- Perform mental calculations, including with mixed operations and large numbers.
- divide numbers up to 4-digits by a two-digit whole number using the formal written method of short division where appropriate for the context
- 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 written division methods in cases where the answer has up to two decimal places.

Short division to divide by a 1 digit number. Pupils should continue to use this method, but with numbers to at least 4 digits. Show remainders as fractions or decimals. Begin to look at real life examples where rounding the remainder is necessary.	  (Please note the placement of the digits when carried across.)
Long division *Use subtract and then bring down the next digit method.	 Complete a running order at the side of the calculation. 
Using the bar model to support division	Paul and David hire a car together at a cost of £297.50. Paul pays 6 times more than David. How much does David pay?