Calculation Policy

NEW HARTLEY FIRST SCHOOL

Happy children aiming high!

'A person who never made a mistake, never learned anything new' Albert Einstein

The following calculation policy has been devised to meet requirements of the National Curriculum 2014 for the teaching and learning of mathematics, and is also designed to give pupils a consistent and smooth progression of learning in calculations across the school. The policy has been devised with members of staff using the White Rose Maths Hub Calculation Policy with further material added and adapted. It is a working document and will be revised and amended as necessary.

Age stage expectations: The calculation policy is organised according to age related expectations as set out in the National Curriculum 2014 and the method(s) shown for each year group should be modelled to the vast majority of pupils.

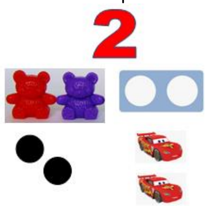
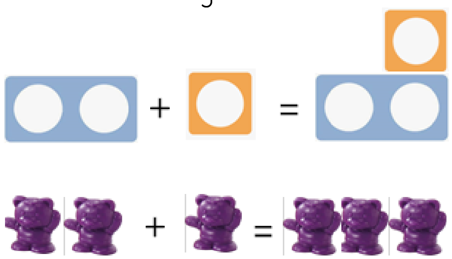
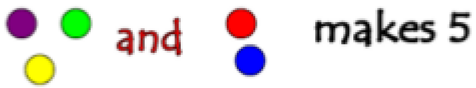
Choosing a calculation method: Before pupils opt for a written method, they should first consider these steps:

- Can I do it in my head using a mental strategy?
- Could I use some jottings to help me?
- Should I use a formal written method to work it out?

Addition- Reception Early learning goals:

Count reliably with numbers from 1 to 20, place them in order.
Say which number is one more than a given number.
Using quantities and objects, they add two single-digit numbers and count on to find the answer

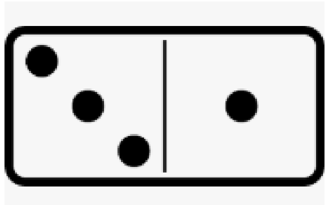
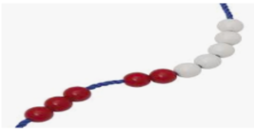
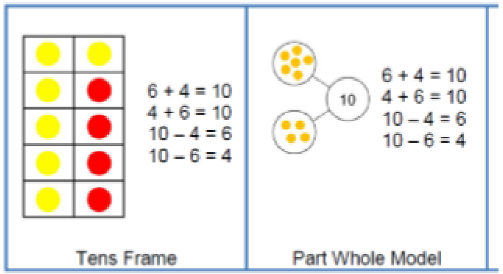
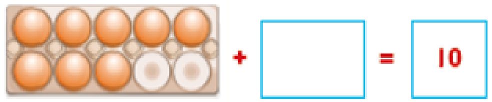
Key Vocabulary:
add, more, and make, sum, total altogether score double one more, two more, ten more…
how many more to make… ?
how many more is… than…?

Objective & Strategy	Concrete	Pictorial	Abstract
Recognise numbers up to 20 and understand the meaning of each number by recognising and knowing their clusters	Children use everyday objects and resources to represent each number up to 20. For example:  	Children are shown different visual representations and recognise what number it represents 	Children are shown a digit and understand what this means e.g. 2
Count on in ones and say which number is one more or less than a given number	Children **physically** move themselves along the numbers e.g. jump or walk  Children use everyday objects, count them out and physically add one more or take one away (one less)	Children use a number line or number track to 20 and count along it forwards or backwards	1,2,3,4,5 One more than 2 is 3 2 + 1 = 3 One less than 4 is 3 4 – 1 = 3
Relate addition to combining two groups of objects using practical resources, role play, stories and songs.	Children physically use concrete resources and manipulatives and add 2 groups together. 	Children see or draw a visual representation to add the two groups together  	The written form is used 2 + 3 = 5

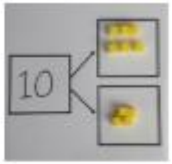
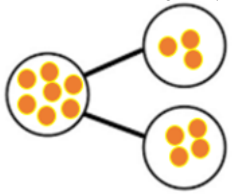
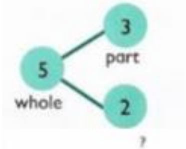
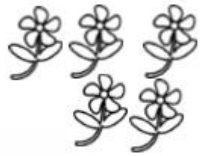
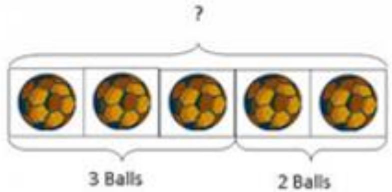
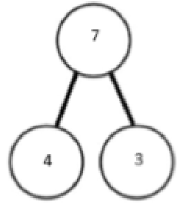
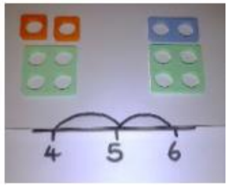
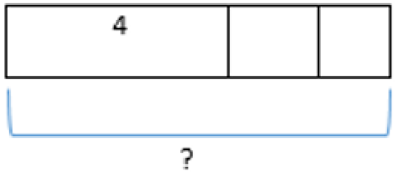
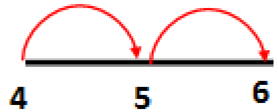
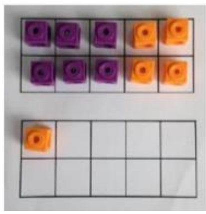
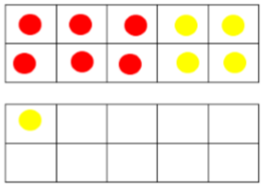
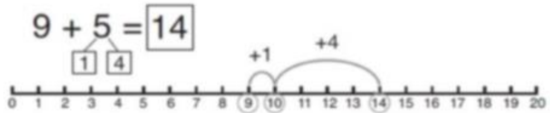
Addition Year 1 statutory requirements:

Count to and across 100, forwards beginning with 0 or 1, or from any given number.
Given a number, identify one more.
Read, write and interpret mathematical statements involving addition (+), and equals (=) signs.
Represent and use number bonds and related subtraction facts within 20
Add one-digit and two-digit numbers to 20, including zero.
Solve one-step problems that involve addition using concrete objects and pictorial representations, and missing number problems.

Key Vocabulary:
+, add, more, plus, make, sum, total altogether score double, near double one more, two more... ten more how many more to make...? How many more is... than...? How much more is...?

<table>
<tr><th>Objective & Strategy</th><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
<tr><td>Identify and represent numbers using objects and pictorial representations (multiple representations)</td><td>Children use a range of equipment and everyday objects to make and represent a number:
</td><td>Children draw different representations of a number:
</td><td>Children then record numbers in their numeral form, linking these to their previous concrete and pictorial representations:
5</td></tr>
<tr><td>Represent & use number bonds and related subtraction facts within 20</td><td>Children use practical equipment and work systematically to find the number bonds (to 5, 10 and 20):

</td><td>Children see and draw images in a tens frame and part whole model to find number bonds and related addition and subtraction facts:

</td><td>

<table><tr><td colspan="2">10</td></tr><tr><td>8</td><td>2</td></tr></table>
8+2=10
2+8=10
10-8=2
10-2=8
Emphasis should be on the language used:
'1 more than 8 is equal to 9'
'2 more than 8 is 10'
'10 is 2 more than 8'</td></tr>
<tr><td>Combine two parts to make</td><td>Children will use lots of different</td><td>Children will use and draw pictures to add</td><td>Digits will be used in recording</td></tr>
</table>

a whole	resources such as Numicon, counters, eggs, shells, teddy bears and everyday objects: 	together 2 numbers as a group or in a bar: 	4 + 3 = 7/ 3 + 4 = 7**and** 7 = 4 + 3/ 7 = 3 + 4 (four is a part, 3 is a part and the whole is seven): 
Use concrete resources and a number line to support the addition of numbers. Know and use strategy of finding the larger number, and counting on in ones from this number	A number line alongside equipment is used: 	A bar model is used which encourages the children to count on: 	The abstract number line: What is 2 more than 4? What is the sum of 4 and 4? What's the total of 4 and 2? 4 + 2 = 
Regrouping to make 10. This is an essential skill for column addition later.	Use a tens frames and counters/cubes or using Numicon e.g. 6 + 5. Begin with the larger number and use the smaller number to make 10: 	Children draw the tens frames and counters/cubes  Use pictures or jumps on a number line.	Children to develop an understanding of equality and the use of the equality symbol to represent this e.g. 6 + □ = 11 6 + 5 = 5 + □ 6 + 5 = □ + 4 

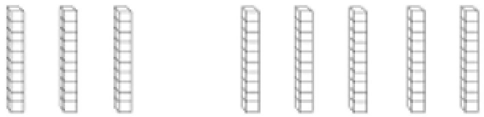
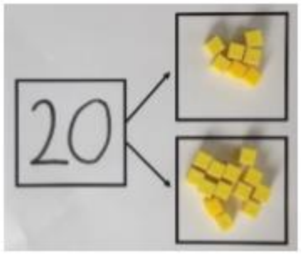
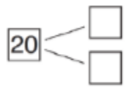
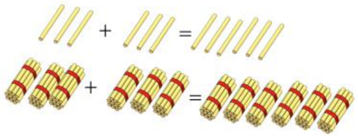
Addition Year 2 statutory requirements:

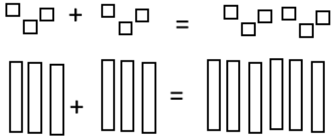
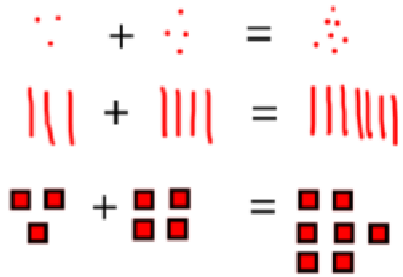
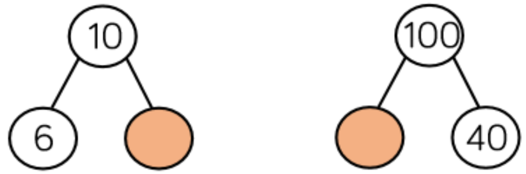
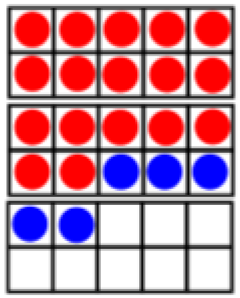
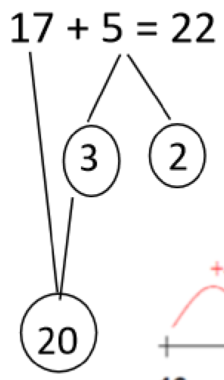
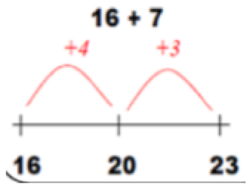
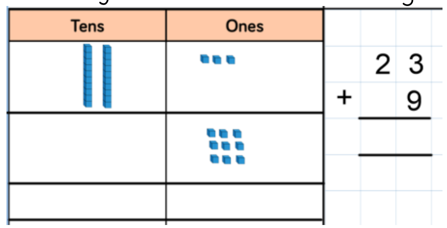
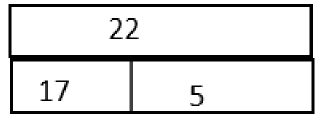
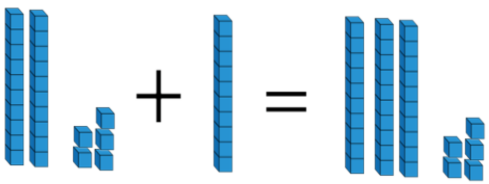
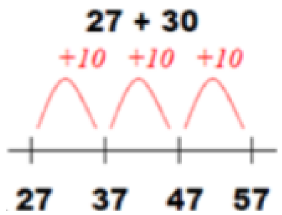
Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts to 100.
Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.
Add numbers using concrete objects, pictorial representations, and mentally, including:

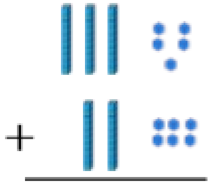
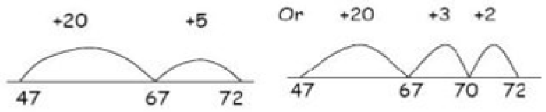
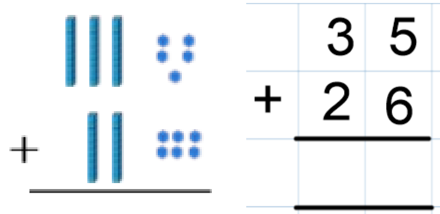
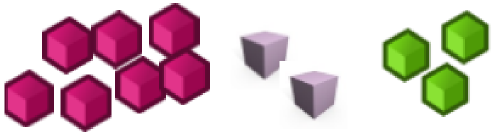
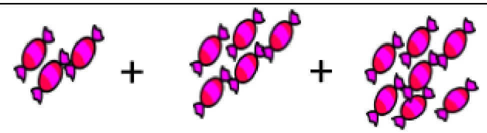
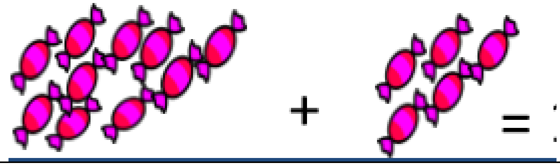
• a two-digit number and ones
• a two-digit number and tens
• two two-digit numbers • adding three one-digit numbers.

Solve problems with addition including those involving numbers, quantities and measure

Key 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…?

Objective & Strategy	Concrete	Pictorial	Abstract
Add multiples of 10	Model using base ten and bead strings: 	Use representations for base ten:  3 tens + 5 tens = ___ tens 30 + 50 =	20 + 30 = 70 = 50 + 20 40 + □ = 60
Use known number facts **Part part whole**	Children explore ways of making numbers within 20: 	Along side of this they use equipment:  □ + □ = 20 20 – □ = □ □ + □ = 20 20 – □ = □ Also show children calculations where = is at the beginning e.g. 20 = ? + ?, 20 = ? – ?	□ + 1 = 16 16 – 1 = □ 1 + □ = 16 16 – □ = 1
Using known facts	Use every day items and base ten: 	Children draw representations of H, T and O:	3 + 4 = 7 which leads to 30 + 40 = 70 which leads to 300 + 400 = 700

			
Add 2 digit number and ones	17 + 5 = 22 Use ten frame to make 'magic ten':  Children explore the pattern. 17 + 5 = 22 27 + 5 = 32 What is changing and why?	Use part part whole and number line to Model:   	Children who are working at a greater depth, will use base ten and alongside this use a formal written method e.g.  Children use a bar model to represent a claculation e.g. 17 + 5 =22  They then explore the related facts 17 + 5 = 22 5 + 17 = 22 22 - 17 = 5 22 - 5 = 17
Add 2 digit number and ten	Explore that the ones digit don't change 	Children draw number lines and add on jumps of ten  	27 + 10 = 37 27 + 20 = 47 27 + □ = 57 Children who are working at a greater depth, will use base ten and alongside this use a formal written method e.g. 

Add two 2-digit numbers	Model using base ten , place value counters and numicon: 35 + 26  Partition both the numbers using the equipment: • Add together the ones. Have we got 10 ones? • Exchange 10 ones for 1 ten. • How many ones do we have? • Add together the tens. How many do we have altogether?	Use number line and bridge ten using part whole if necessary. E.g. 47 + 25  	Children who are working at a greater depth, will use base ten and alongside this use a formal written method e.g.  Children will also be shown how to partition and recombine to find the answer: 25 + 47 20 + 5 40 + 7 20 + 40 = 60 5+ 7 =12 60 + 12 = 72
Add three 1-digit numbers	Use practical equipment. Combine to make 10 first if possible, or bridge 10 then add third digit: 	 Regroup and draw representation. 	Combine the two numbers that make/ bridge ten then add on the third: $4 + 7 + 6 = \boxed{10} + \boxed{7}$ 10 $= \boxed{17}$

Addition Year 3 statutory requirements:

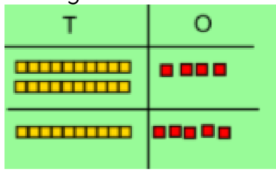
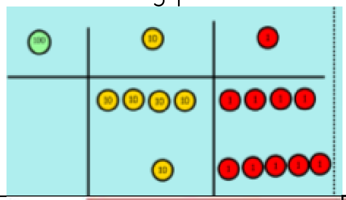
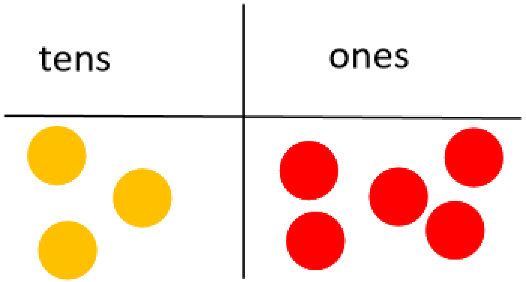
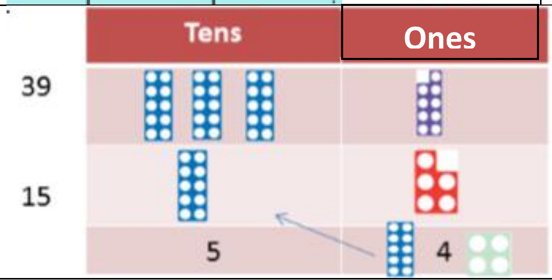
Find 10 or 100 more than a given number.

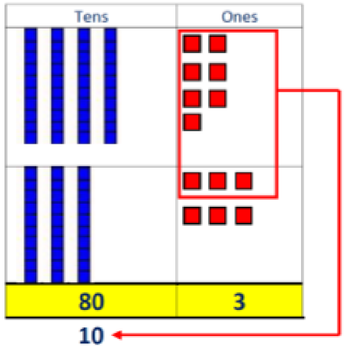
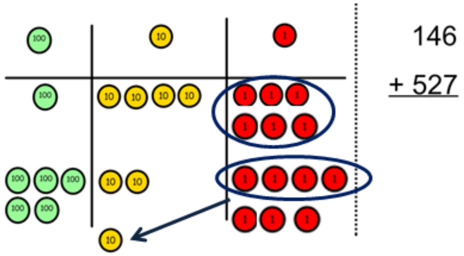
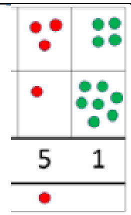
Recognise the place value of each digit in a three-digit number (hundreds, tens, ones)

Add numbers with up to three digits, using formal written methods of columnar addition

<u>Key Vocabulary</u>:

+, 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…? = equals, sign, is the same as

Objective & Strategy	Concrete	Pictorial	Abstract
Column Addition—no regrouping (friendly numbers) **Add two or three 2 or 3digit numbers**	Model using base ten or numicon:  Add together the ones first, then the tens.  Move to using place value counters 	Children move to drawing the counters using a tens and one frame: 	2 2 3 + 1 1 4 3 3 7 Add the ones first, then the tens, then the hundreds
Column addition with regrouping.		Children draw a representation of the grid to further support their understanding, carrying the ten <u>underneath the line</u>.	Start by partitioning the numbers before formal column to show the exchange: 20 5 40 8 60 + 13 = 73 **Then:**

	 Children practise using the equipment to physically exchange ten ones for one ten:  	 	536 + 85 621 1 1 Please note: the addition/subtraction symbols are positioned to the left of the calculation. Each ten/hundred which is carried shut sit in the correct column, underneath.

Addition Year 4 statutory requirements:

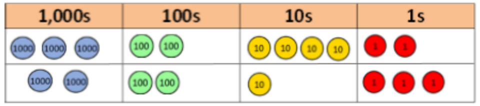
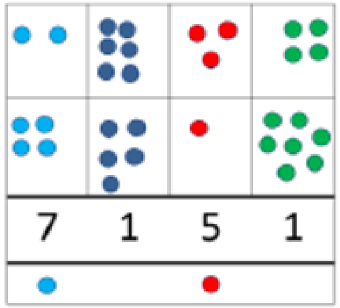
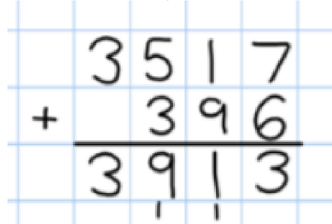
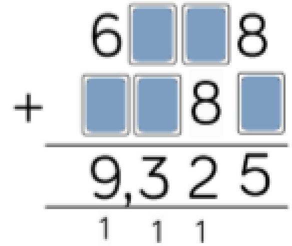
Find 1000 more than a given number.

Add numbers with up to 4 digits using the formal written methods of columnar addition where appropriate.

Solve addition two-step problems in contexts, deciding which operations and methods to use and why,

Key Vocabulary:
add, addition, more, plus, increase sum, total, altogether score double, near double how many more to make…?
= sign, is the same as

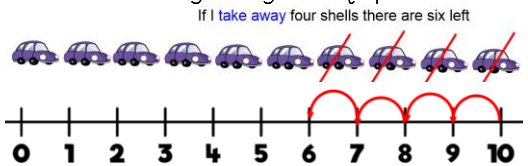
Consolidate learning from Year 3

Objective & Strategy	Concrete	Pictorial	Abstract
Add numbers with up to 4 digits	Children continue to use base ten or place value counters to add, exchanging ten ones for a ten and ten tens for a hundred and ten hundreds for a thousand: E.g. 3,242 + 2,213  	Draw representations using place value counters:  	Continue from previous work to carry hundreds as well as tens. Relate to money and measures:  

Subtraction- Reception

Say which number is one less than a given number.
Using quantities and objects, they subtract two single-digit numbers and count back to find the answer.

Key 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

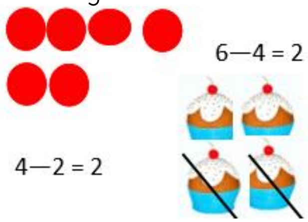
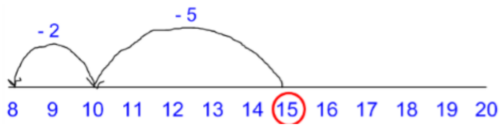
Objective & Strategy	Concrete	Pictorial	Abstract
Count backwards in familiar contexts such as number rhymes or stories	 	Children draw the items themselves as they decrease	Children see the numbers represented 10,9,8,7,6,5,4,3,2,1
Relate subtraction to 'taking away' using concrete objects and role play		Children count back along a number line to take away alongside equipment 	Children will be shown the calculation which will be read out loud 10 – 6 = ?
Say which number is one less than a given number using numbers to 20	Use equipment and remove one to find one less  Children use large numbers and move backwards to find one less	Children count back 1 along a number line 	10 take away 1 is .. 1 less than 8 is 5 – 1 =

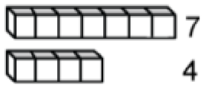
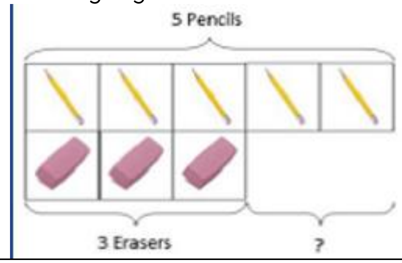
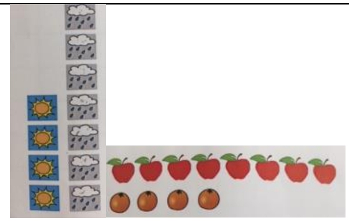
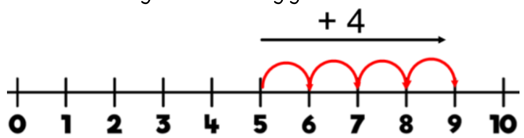
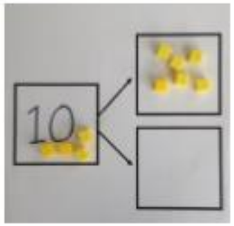
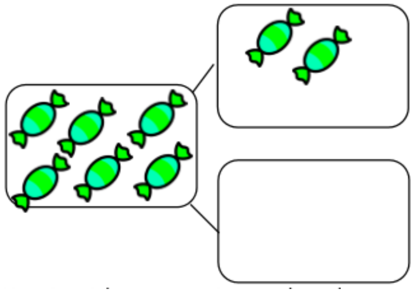
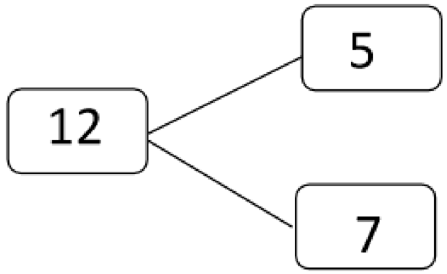
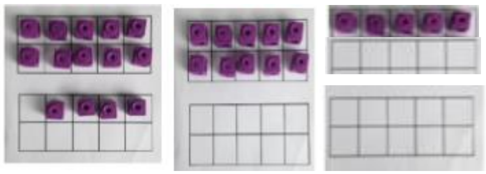
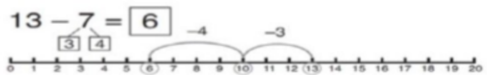
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		

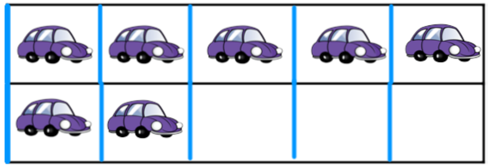
Subtraction Year 1 statutory requirements:

Say which number is one less than a given number.
Represent and use number bonds and related subtraction facts within 20.
Read, write and interpret mathematical statements involving subtraction (-) and equals (=) signs.
Subtract one-digit and two-digit numbers to 20, including zero.
Solve one-step problems that involve subtraction using concrete objects and pictorial representations, and missing number problems

Key Vocabulary:
subtract, take (away), smaller, fewer, minus, less, leave, how many are left/left over? How many have gone? One less, two less, ten less… how many fewer is… than…? How much less is…? Difference between half, halve, first, then and now

Objective & Strategy	Concrete	Pictorial	Abstract
Taking away ones	Use physical objects, counters , cubes etc to show how objects can be taken away: 	Cross out drawn objects to show what has been taken away. 	Emphasis on the use of language and creating subtraction stories to match given pictures:  'There were 7 butterflies and 3 flew away. There were 3 butterflies left.' 7 - 3 = 4 Children can record subtraction calculations formally: 16 – 4 = 12 15 – 9 = 6
Counting back	Move objects away from the group, counting backwards  Move the beads along the bead string as you count backwards. 	Count back in ones using a number line 15 – 7 = 8 	Put 13 in your head, count back 4. What number are you at? 13 – 4 = ?
Find the difference	Compare objects and amounts:	Children find the difference using pictorial representations:	Hannah has 12 sweets and her sister has 5. How many more does Hannah have than her sister?

	 'Seven is 3 more than four' 'I am 2 years older than my sister' Lay objects out in a bar model: 	 Children use a number line, counting on to find the difference: 	
Represent and use number bonds and related subtraction facts within 20 **Part Part Whole model**	Link to addition and the Part Part Whole model, to model the inverse:  If 10 is the whole and 6 is one of the parts, what's the other part? 10 - 6 = 4	Use pictorial representations to show the part. 	Move to using numbers within the part whole model 
Make 10	14 - 9  Make 14 on the ten frame. Take 4 away to make ten, then take 5 more away so that you have taken 9 away altogether.	13 – 7 = 6 Jump back 3 first, then another 4. Use ten as the stopping point. 13—7 	16 – 8 = How many do we take off first to get to 10? How many left to take off?

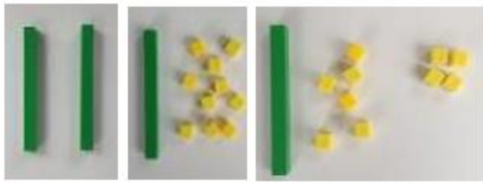
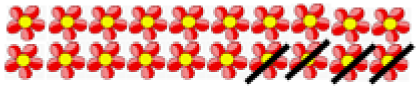
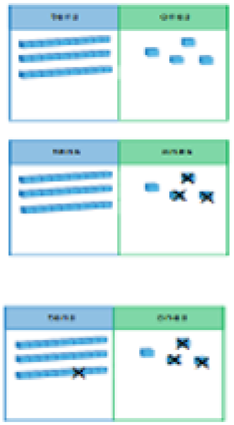
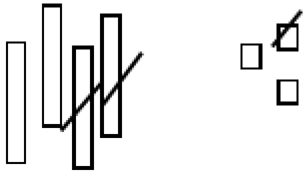
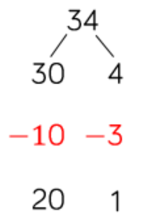
Bar model	5 – 2 = 3 	Children draw their own bar models: 	| 8 | 2 | 10 = 8 + 2 10 = 2 + 8 10—2 = 8 10—8 = 2

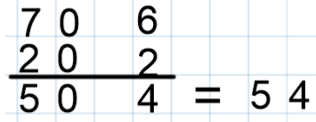
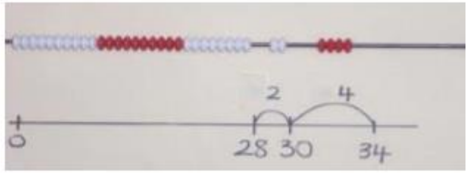
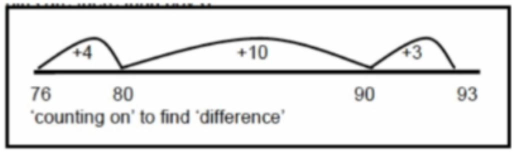
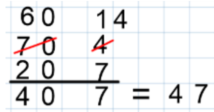
Subtraction Year 2 statutory requirements:

Recall and use subtraction facts to 20 fluently, and derive and use related facts to 100.
Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.
Subtract numbers using concrete objects, pictorial representations, and mentally, including:

- a two-digit number and ones
- a two-digit number and tens
- two two-digit numbers

Key Vocabulary:
subtract, subtraction, take (away), minus, leave, how many are left/left over? one less, two less… ten less… one hundred less, How many fewer is… than…? How much less is…? difference between half, halve
= equals sign, is the same as

Objective & Strategy	Concrete	Pictorial	Abstract
Regroup a ten into ten ones	Use a Place Value chart to show how to change a ten into ten ones, use the term 'take and make' E.g. 20 – 4 = 16 	20 – 4 = 16 	20 – 4 = 16
Partitioning to subtract without regrouping. 'Friendly numbers'	34 - 13 = 21 Use base ten to show how to partition the number when subtracting without regrouping 	Children use representations of the base ten and cross off:  43—21 = 22	34 - 13 = 21  Partition the number 34 into tens and ones. Partition 13 and subtract the ones and the tens. Place the partitioned number back together. They will also be shown this using an expanded column method e.g.

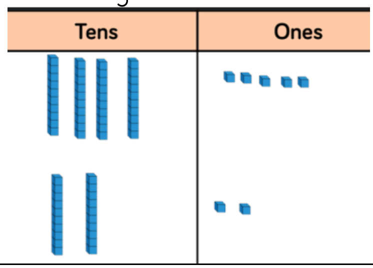
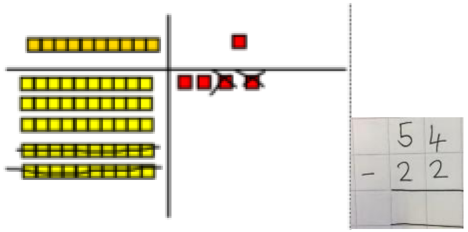
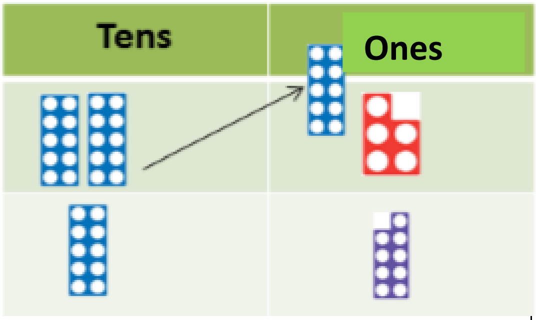
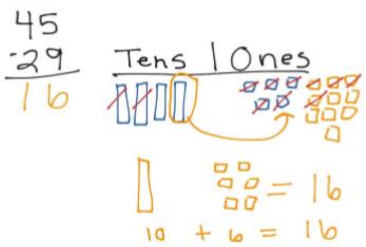
			
Make ten strategy **Progression should be crossing one ten, crossing more than one ten, crossing the hundreds.**	34 - 28 Use bead strings to model counting to next ten and the rest: 	Use a number line to count on to next ten and then the rest: 	Begin by partitioning into tens and ones:  Children working at a greater depth will also then be shown the short method.

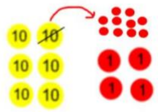
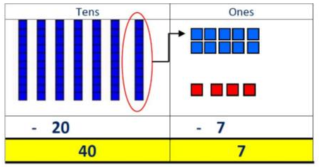
Subtraction Year 3 statutory requirement:

Find 10 or 100 less than a given number.
Recognise the place value of each digit in a three-digit number (hundreds, tens, ones).
Subtract numbers with up to three digits, using formal written methods of column subtraction.
Subtract numbers mentally, including:

- A three-digit number and ones
- A three-digit number and tens
- A three-digit number and hundreds.

Key Vocabulary:
subtract, subtraction, take (away), minus leave, how many are left/left over? one less, two less... ten less... one hundred less how many fewer is... than...? how much less is...? difference between half, halve = equals, sign, is the same as

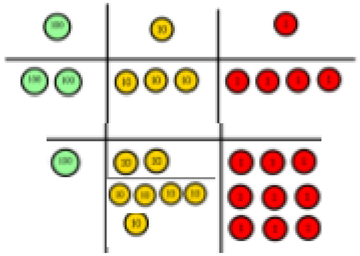
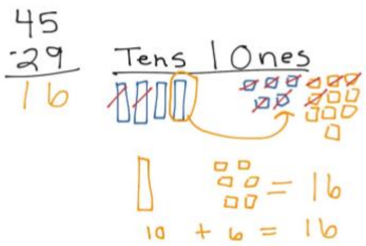
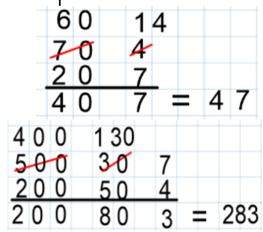
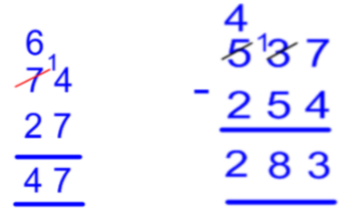
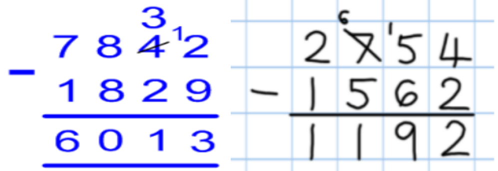
Objective & Strategy	Concrete	Pictorial	Abstract
Column subtraction without regrouping (friendly numbers)	Use base 10 or Numicon to model E.g. 45 – 22 =  	Draw representations to support understanding  	47 − 24 = 23 40 + 7 − 20 + 4 20 + 3 Then: + 47 24 23
Column subtraction with regrouping Note: The exchanged ten or hundred is just as important as any other number, therefore, it should be written as clear and as large as any other number, and placed at the top of the column which has been adjusted.	Begin with base 10 or Numicon. Move to place value counters, modelling the exchange of a ten into ten ones. Use the term **'exchange'**.  	Children may draw base ten or Place Value counters and cross off:  	Begin by partitioning into place value columns: 74 – 27 60 14 ~~70~~ ~~4~~ 20 7 40 7 = 47 Then move onto formal written method: 6 ~~7~~[1]4 27 47 4 ~~5~~[1]3 7 - 2 5 4 2 8 3

	 - 20 7 or  		

Key Vocabulary:
subtract, subtraction, take (away), minus, decrease leave, how many are left/left over? Difference between half, halve how many more/fewer is… than…? How much more/less is…? inverse = equals sign, is the same as

Subtraction Year 4 statutory requirements:

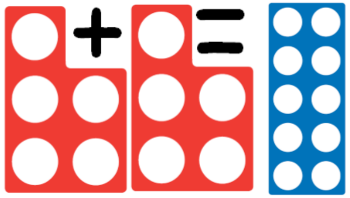
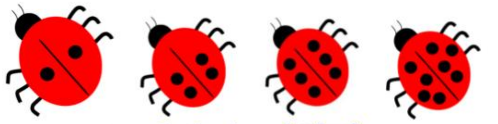
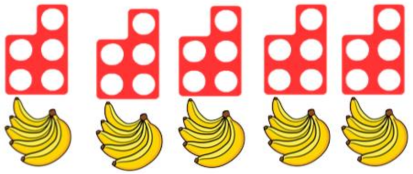
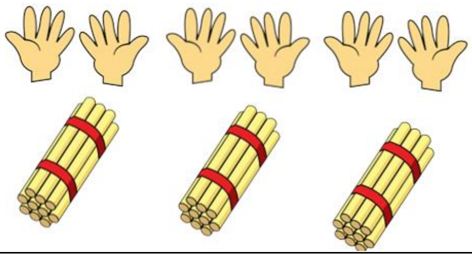
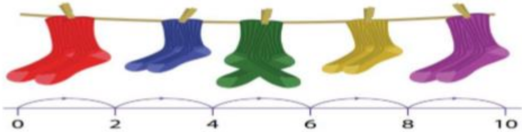
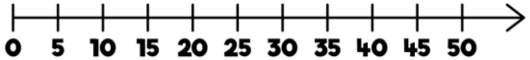
Find 1000 less than a given number.
Subtract numbers with up to four digits, using formal written methods of columnar subtraction where appropriate.
Solve subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Objective & Strategy	Concrete	Pictorial	Abstract
Subtract with up to 4 digits. **Introduce decimal subtraction through context of money** By the end of year 4, pupils should be subtracting numbers up to 4 digits using compact column subtraction method.	Model the process of exchanging using Numicon, base ten and then move to Place value counters: 234 - 179 	Children may draw base ten or Place Value counters and cross off. 	Expanded method  Then move onto formal short compact method  Move onto 4 digit numbers 

Multiplication Early Learning Goal:

They solve problems, including doubling, halving and sharing.

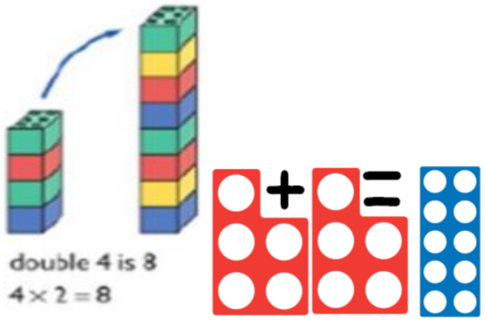
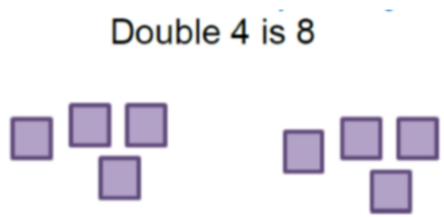
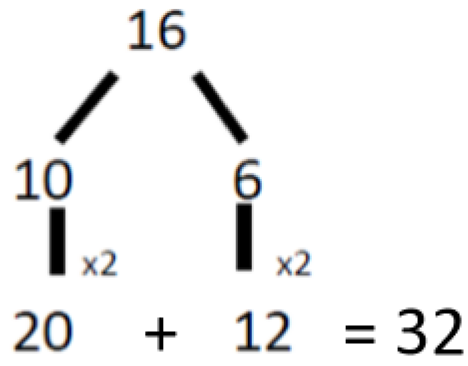
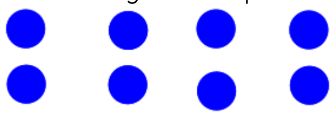
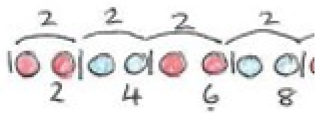
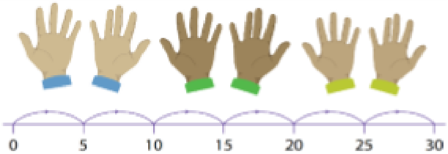
Key Vocabulary:
Double, twice, group, set, 2's, 5's, 10's, multiple

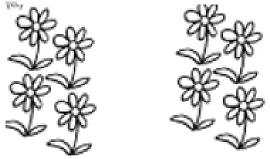
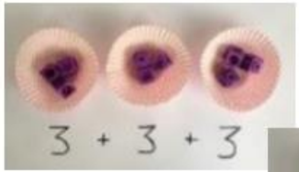
Objective & Strategy	Concrete	Pictorial	Abstract
Use pictorial representations and concrete resources to double numbers to 10.	Use practical activities using manipulatives such as Numicon to double a number 	Draw pictures to show an item has doubled e.g. ladybirds spots  	2 + 2 = 4 **Double 3 equals 6**
Use concrete sources, role play, stories and songs to begin counting in twos, fives and tens.	Use everyday items and objects to count in 2's, 5's and 10's Counting in 2's   **Counting in 5's**  **Counting in 10's** 	Use a number line alongside the objects  Moving on to a numbered number line  	0, 2,?, 6, 8, ?

Multiplication Year 1 Statutory requirement:

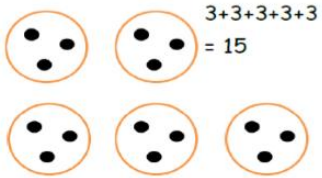
Solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

Key Vocabulary:
lots of, groups of, ×, times, multiply, multiplied by, multiple of, once, twice, three times. . . . . . times as (big, long, wide. . . and so on) repeated addition array row, column, double

Objective & Strategy	Concrete	Pictorial	Abstract
Doubling	Engage in practical activities using manipulatives such as Numicon to double and halve a number: 	Draw pictures to show a number has doubled: 	Partition a number and then double each part before recombining it back together. 
Counting in multiples	Count the groups as children are skip counting, children may use their fingers as they are skip counting:  	Children make representations to show counting in multiples:   	Count in multiples of a number aloud. Write sequences with multiples of numbers: 2, 4, 6, 8, 10 5, 10, 15, 20, 25 , 30
Making equal groups and counting the total	Use manipulatives to create equal groups.	Draw and make representations Draw  to show 2 groups of 3.	2 x 3 = 6

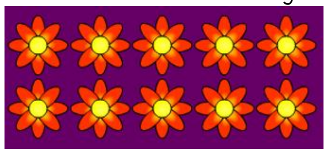
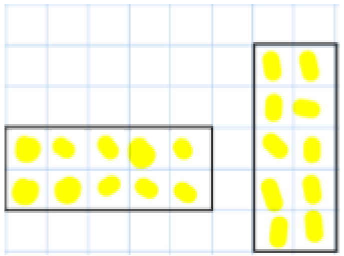
<table>
<tr><td></td><td></td><td>
$\square \times \square = 8$</td><td></td></tr>
<tr><td>**Repeated addition**</td><td>Use different objects to add equal groups:




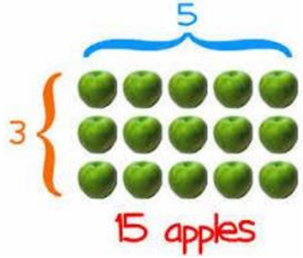

</td><td>Use pictures and drawings alongside number lines:



5 and another 5 and another 5, 3 groups of 5,
5 three times

Move on to a bar model for a more structured approach e.g. 3 add 3 add 3 add 3,
<table><tr><td colspan="4">12</td></tr><tr><td>3</td><td>3</td><td>3</td><td>3</td></tr></table></td><td>Write addition sentences to describe the pictures and objects:

</td></tr>
<tr><td>**Understanding arrays**</td><td>Use objects laid out in arrays to find the answers to 2 lots 5, 3 lots of 2 etc.
</td><td>Children draw their own arrays

Five two times equals ten or two five times</td><td>Children to be able to use an array to write a range of calculations e.g.
2 x 5 = 10
2 + 2 + 2 + 2 + 2 = 10

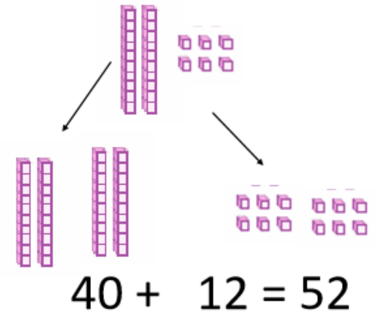
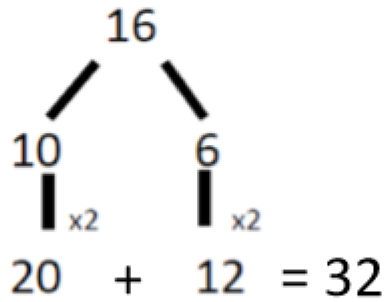
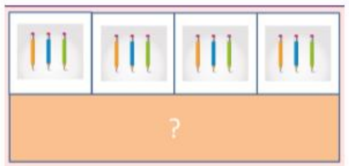
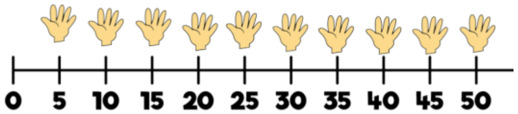
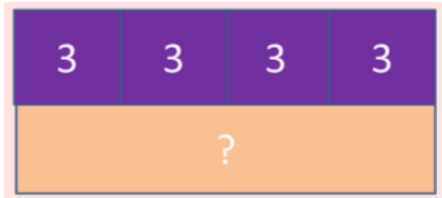
5 x 2 = 10
5 + 5 =10</td></tr>
</table>

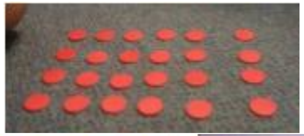
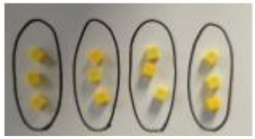
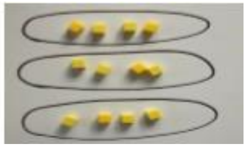
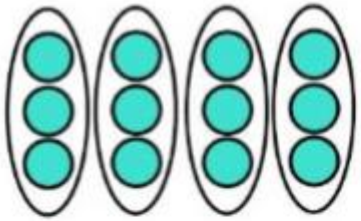
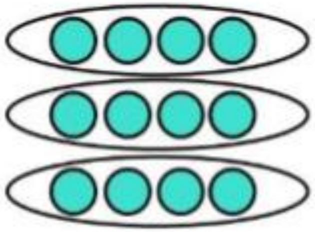
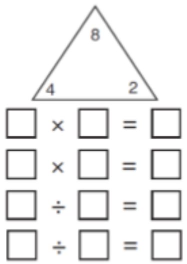
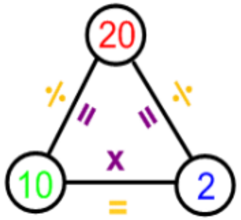
		is ten. Focus of the use of language at this stage before moving on to the abstract use of mathematical symbols to write formal calculations.	

Multiplication Year 2 statutory requirements:

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 multiplication (×), division (÷) and equals (=) signs.
Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.
Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Key Vocabulary:
lots of, groups of, ×, times, multiply, multiplied by multiple of once, twice, three times… ten times… times as (big, long, wide… and so on) repeated addition array row, column double

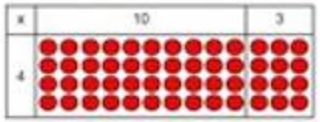
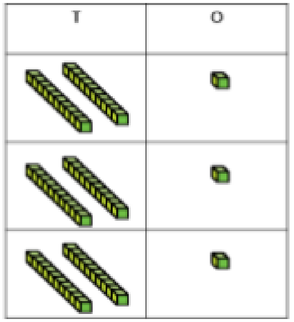
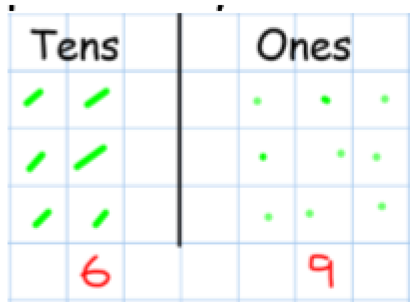
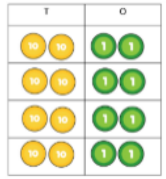
Objective & Strategy	Concrete	Pictorial	Abstract
Doubling	Model doubling using base ten and place value counters E.g. double 26  	Draw pictures and representations to show how to double numbers.	Partition each number and then double each part before recombining it back together 
Counting in multiples of 2, 3, 4, 5, 10 from 0 (repeated addition)	Count the groups as children are skip counting, children may use their fingers as they are skip counting. Use bar models:    	Number lines, counting sticks and bar models should be used to show representation of counting in multiples:   	Write sequences with multiples of numbers: 0, 2, 4, 6, 8, 10 0, 3, 6, 9, 12, 15 0, 5, 10, 15, 20, 25 , 30 1, 3, 5, 7, 9, 11 1, 6, 11, 16, 21 4 x 3 = $\boxed{}$
Multiplication is	Create arrays using counters, cubes and	Children draw their own arrays	Children to be able to use an array to write

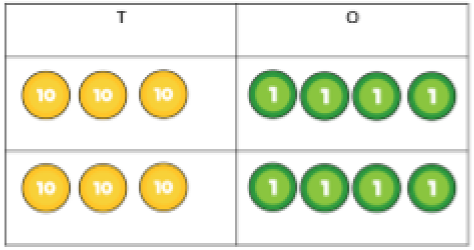
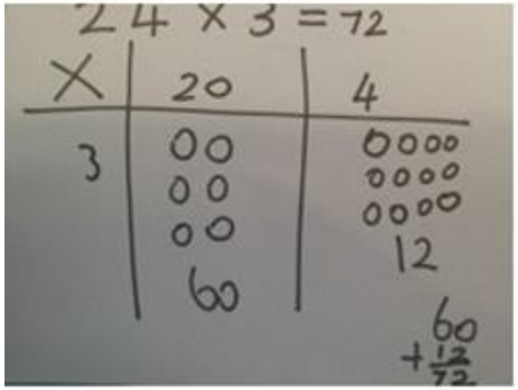
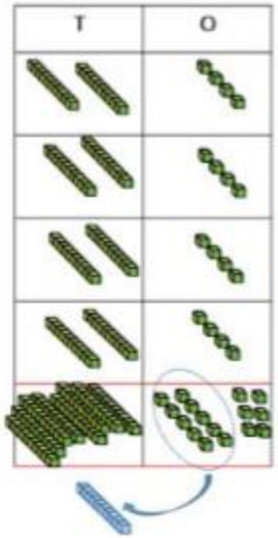
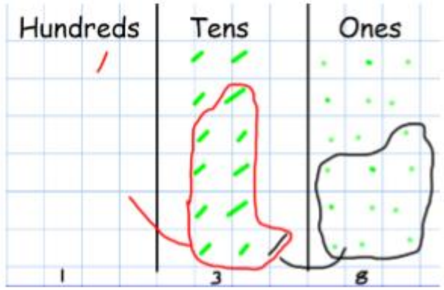
commutative	Numicon:    Pupils should understand that an array can represent different equations and that, as multiplication is commutative, the order of the multiplication does not affect the answer:   3 x 4 (3 **four times**) 4 x 3 (4 **three times**)	3 x 4 (3 four times):   4 x 3 (4 **three times**)	a range of calculations e.g.  5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15
Using the Inverse This should be taught alongside division, so pupils learn how they work alongside each other.	 e.g. 4 x 2 = 8 and 2 x 4 = 8 8 ÷ 2 = 4 8 ÷ 4 = 2 8 divided into groups of 2 = 4 8 divided into groups of 4 = 2	Children draw and complete fact families  	2 x 4 = 8 4 x 2 = 8 8 ÷ 2 = 4 8 ÷ 4 = 2 8 = 2 x 4 8 = 4 x 2 2 = 8 ÷ 4 4 = 8÷ 2 Show all 8 related fact family sentences Very important that the children see and use the = sign at the start of a calculation.

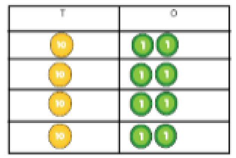
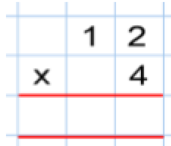
Multiplication Year 3 statutory requirements:

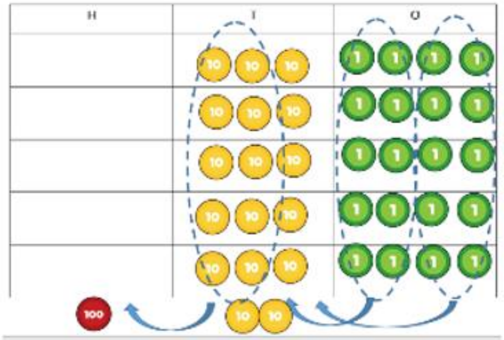
Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.
Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.
Solve problems, including missing number problems, involving multiplication including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.
Note: It is important that when children are multiplying and dividing where digits are moving into a new place value column, they understand why this is happening and what this means e.g. the number is ten times larger or ten times smaller.

Key Vocabulary:
lots of, groups of ×, times, multiply, multiplication, multiplied by, multiple of, product once, twice, three times… ten times… times as (big, long, wide… and so on) repeated addition, array, row, column, double

Objective & Strategy	Concrete	Pictorial	Abstract
Multiply 2 digit by 1 digit (No exchange)	Show the links with arrays to first introduce the grid method:  4 rows of 10, 4 rows of 3 Then move onto base ten and place value counters E.g. 21 x 3  60 3 = 63 e.g. 34 x 2	Children can represent their work with place value counters in a way that they understand. They can draw the counters using colours to show different amounts or just use the circles in the different columns to show their thinking as shown below. 	What calculation is represented? e.g. 22 x 4  $\square \times \square = \square$

<table>
<tr>
<td></td>
<td>
60 8 = 68
34 x 2 = 68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiply 2 digit by 1 digit
(Exchange)</td>
<td>E.g. 24 x 4

Step 1 – Get 4 lots of 4 and 4 lots of twenty
Step 2 – Multiply the units: 4 x 4 = 16. Can I make an exchange? Yes I can take ten ones and make a ten
Step 3 – 2 tens four times, plus my extra ten makes 90
Step 4 – How many tens do I have? 9 How many ones do I have 6?
Step 5 – How many tens and ones do I have altogether? 9 tens add 6 ones = 96</td>
<td>Children to represent the counters/base 10, pictorially e.g. the image below:
</td>
<td>Start with multiplying by one digit numbers and showing the clear addition alongside the grid.
<table><tr><td>×</td><td>30</td><td>5</td></tr><tr><td>7</td><td>210</td><td>35</td></tr></table>210 + 35 = 245

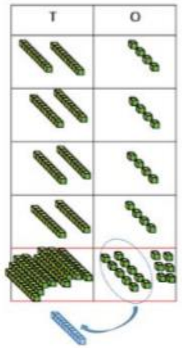
Begin with multiplying TO x O. Use place value counters alongside short compact method
e.g. 12 x 4
 </td>
</tr>
</table>

	Exchanging ten tens for one hundred. 5 x 34 Follow the steps above whilst finally counting how many tens and exchanging for one hundred. How many hundreds, tens and ones do I have altogether? 1 hundred, 7 tens and 0 ones = 170 		

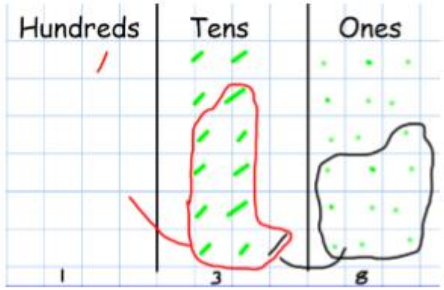
Multiplication Year 4 statutory requirement:

Recall multiplication and division facts for multiplication tables up to 12 × 12
Use place value, known and derived facts to multiply and divide mentally, including: multiply two-digit and three-digit numbers by a one-digit number using formal written layout.
Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.
Note: It is important that when children are multiplying and dividing where digits are moving into a new place value column, they understand why this is happening and what this means e.g. the number is ten times larger or ten times smaller.

Key Vocabulary:
lots of, groups of times, multiply, multiplication, multiplied by, multiple of, product, factor, once, twice, three times... ten times... times as (big, long, wide... and so on) repeated addition array row, column, double

<table>
<tr><th>Objective & Strategy</th><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
<tr>
<td>Grid method recap from year 3 for 2 digits x 1 digit and move to multiplying 3 digit numbers by 1 digit. (year 4 expectation)</td>
<td>E.g. 24 x 4 Start with base ten


Step 1: Get 4 lots of 4, 4 lots of 20
Step 2: 4 x 4 = 16. Can I make an exchange? Yes I can take ten ones and make a ten
Step 3: 4 x 2 tens plus my extra ten makes 9
Step 4: How many tens do I have? 90 How many ones do I have 6?
Step 5: How many tens and ones do I have altogether? 9 tens add 6 ones = 96

Then move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows
E.g. 245 x 4</td>
<td>Children to represent the counters/base 10, pictorially e.g. the image below

</td>
<td>Start with multiplying by one digit numbers and showing the clear addition alongside the grid.
<table><tr><th>×</th><th>30</th><th>5</th></tr><tr><td>7</td><td>210</td><td>35</td></tr></table>
210 + 35 = 245</td>
</tr>
</table>

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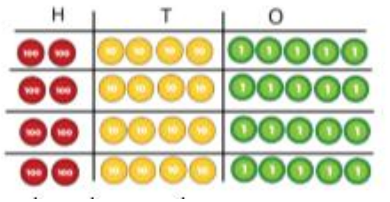
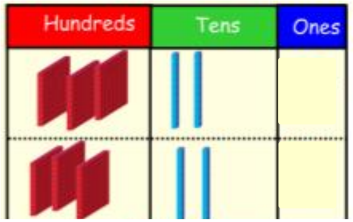
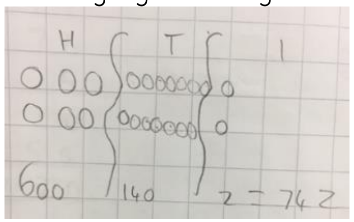
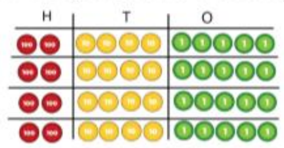
<tr>
<td></td>
<td>


Fill each row with 245
Step 1: Get 4 rows of 245 (245 four times)
Step 2: 5 x 4 = 20. Can I make an exchange? Yes I can take twenty ones and make 2 tens (make the exchange with the counters)
Step 3: 4 tens four times plus my extra 2 tens makes 18 tens (180)
Step 4: How many tens do I have? 18. Can I make an exchange? Yes I can exchange 10 tens for 1 hundred (make the exchange with the counters) which leaves me with 8 tens.
Step 5: How many Hundreds do I have? 8 hundreds plus the extra hundred so 9 hundreds.
Step 6: How many hundreds, tens and ones altogether? 900 + 8 + 0 = 980
</td>
<td></td>
<td></td>
</tr>
<tr>
<td>
Column Multiplication (TO x O and HTO x O)
It is important at this stage that they always multiply the ones first.
</td>
<td>
Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping and then moving on to regrouping. 320 x 2 = 640


</td>
<td>
Children to represent the counters/base 10, pictorially e.g. the image below:


</td>
<td>
Two digit number


30 + 6
x 4
24
+ 120
144

HTU
36
x 4
144
2

Leading to a 3 digit number
<table>
<tr><td>x</td><td>300</td><td>20</td><td>7</td></tr>
<tr><td>4</td><td>1200</td><td>80</td><td>28</td></tr>
</table>
</td>
</tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>Moving on to

327
x 4
28
80
1200
1308

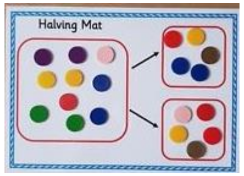
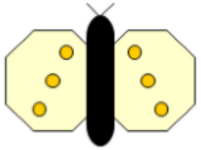
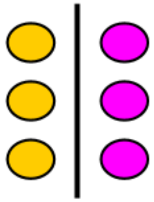
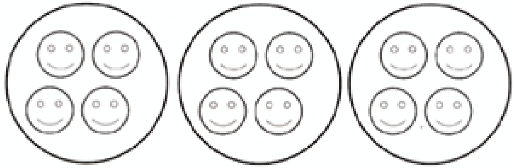
Then

327
× 4
1308
1 2</td></tr>
</table>

Division Early learning goal statutory requirement:

They solve problems, including halving and sharing

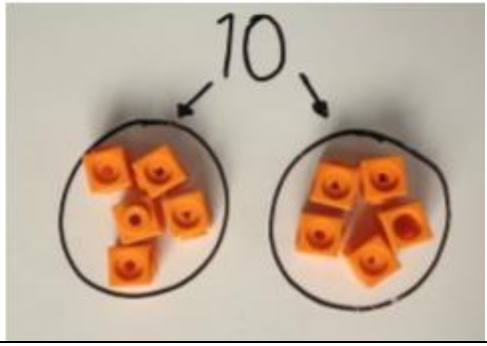
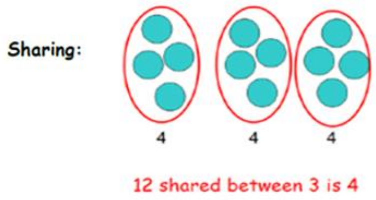
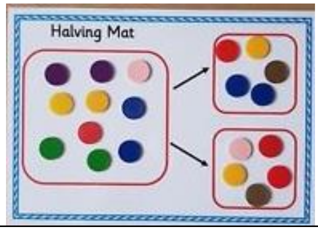
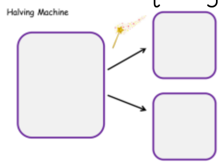
Key Vocabulary:
Share, split, divide, halve, half, groups, lots of

Objective & Strategy	Concrete	Pictorial	Abstract
Use pictorial representations and concrete resources to halve numbers to 10	Use practical activities using manipulatives such as cubes and Numicon to halve a number   Reinforce the concept of halving through everyday routines such as halving an apple, a cake, piece of bread during snack time.	Children draw representations which show halving (Splitting the amount into 2 equal groups)  	Half of 6 is…. I had 10 biscuits and I ate half of them. How many are left?
Share quantities using practical resources, role play, stories and songs.	 Role play example: It is the end of the party and the final two teddies are waiting for their party bags. Provide empty party bags and a small collection of items such as gifts, balloons and slices of cake. Ask the children to share the objects between the two bags.	Children draw representations which show sharing e.g. in the example below they shared 12 faces into 3 equal groups 	12 shared between 3 people is …

Division Year 1 statutory requirement:

solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

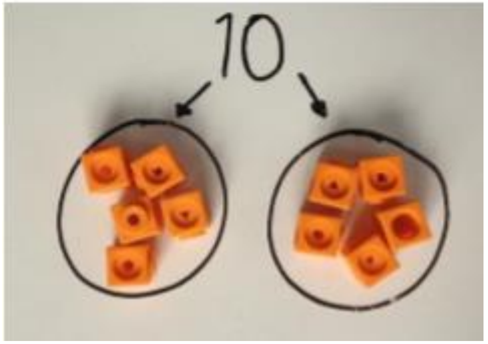
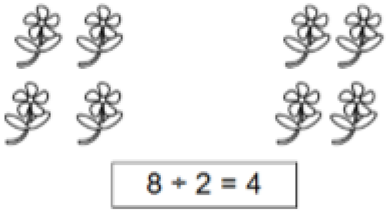
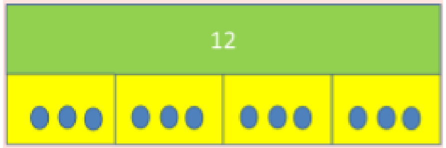
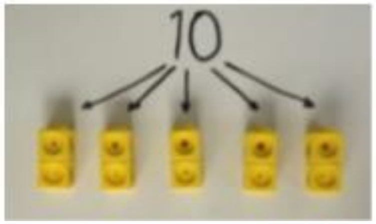
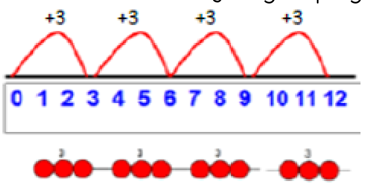
Key Vocabulary:
Division, ÷, divide, divided by, divided into, left, left over, equal groups, half, quarter

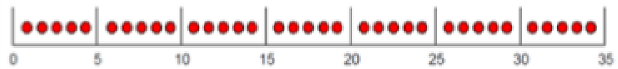
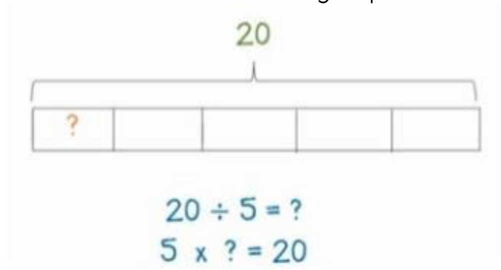
Objective & Strategy	Concrete	Pictorial	Abstract
Understand division as sharing using concrete resources.	I have 10 cubes, can you share them evenly between 2 groups?    	Children use pictures or shapes to share quantities.  8 ÷ 2 = 4  Pictorial representation of sharing 1(example to be taken from year 1 book):	12 ÷ 4 = 3 Share 12 between 4
Use pictorial representations and concrete resources to halve numbers	Children engage in practical activities using manipulatives such as cubes and counters to halve a number:  	Children draw representations and use the halving mat to show halving (Splitting the amount into 2 equal groups  	Half of 12 is…. I had 18 biscuits and I ate half of them. How many are left?

Division Year 2 statutory requirement:

Recall and use division facts for 2, 5 and 10 multiplication tables.
Calculate mathematical statements for multiplication and division within the multiplication tables and write then using the multiplication (x), division ( ) and equals (=) signs.
Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.
Find 1/3; 1/4; 2/4; 3/4 of a length, shape, set of objects or quantity

Key Vocabulary:
share, share equally, one each, two each, three each… group, in pairs, threes… tens equal groups of ÷, divide, divided by, divided into left, left over

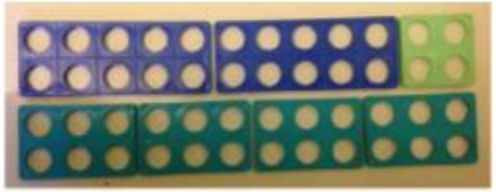
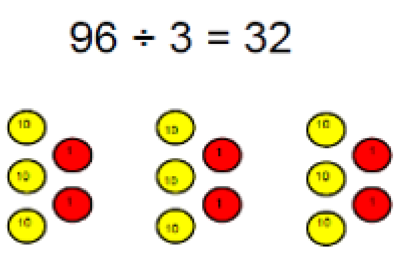
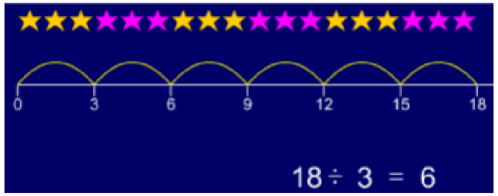
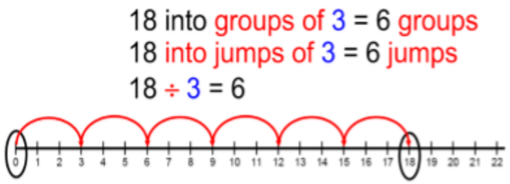
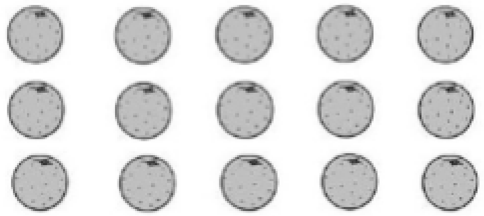
Objective & Strategy	Concrete	Pictorial	Abstract
Understand division as sharing using concrete resources. Whilst teaching division, reinforce the connections between fractions and division and rephrase this calculation as 1/3 of 18 is the same as 18 ÷ 3 = 6	I have 10 cubes, can you share them evenly between 2 groups? 	Children use pictures or shapes to share quantities:  Children use bar modelling to show and support understanding e.g. 12 ÷ 4 = 3 	12 ÷ 4 = 3 Share 12 between 4
Begin to understand division as grouping using concrete resources. Whilst teaching division, reinforce the connections between fractions and division and rephrase this calculation as 1/3 of 18 is the same as 18 ÷ 3 = 6	Divide quantities into equal groups e.g. groups of 2 Use cubes, counters, objects or place value counters to aid understanding: 	12 into groups of 2 12 ÷ 2 = 6  Use number lines for grouping 	28 ÷ 7 = 4 Divide 28 into 7 groups. How many are in each group?

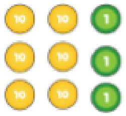
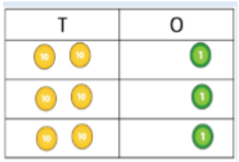
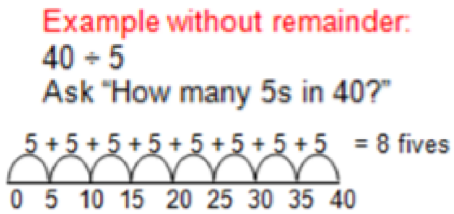
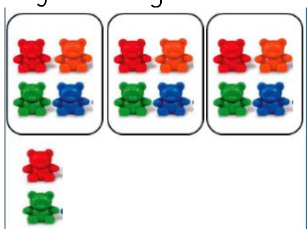
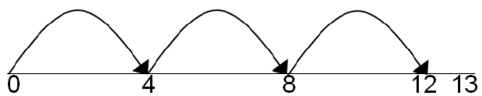
	 	12 ÷ 3 = 4 **Bar Model –** Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group  	

Division Year 3 statutory requirement:

Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
Solve problems, including missing number problems, involving division including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Key Vocabulary:
share, share equally, one each, two each, three each… group, in pairs, threes… tens, equal groups of ÷, divide, divided by, divided into left, left over

Objective & Strategy	Concrete	Pictorial	Abstract
Consolidate understanding of division as *grouping* using concrete resources.	Use cubes, counters, objects or place value counters to aid understanding.  24 divided into groups of 6 = 4  	Children use numbered number lines to divide using grouping.   	How many groups of 6 in 24? 24 ÷ 6 = 4
Division with arrays	Link division to multiplication by creating an array and thinking about the number sentences that can be created. Use this as an opportunity to reinfirce the law of commutativity. Eg 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15	Draw an array and use lines to split the array into groups to make multiplication and division sentences  E.g. 15 ÷ 3 = 5	Find the inverse of multiplication and division sentences by creating eight linking number sentences. 7 x 4 = 28 4 x 7 = 28 28 ÷ 7 = 4 28 ÷ 4 = 7 28 = 7 x 4 28 = 4 x 7 4 = 28 ÷ 7

			7 = 28 ÷ 4
Divide two digit number by one digit with no remainders	Children represent a calculation using base ten and then share the tens and ones e.g. 39 ÷ 3 = 21  Then they move onto place value counters e.g. 63 ÷ 3 .  First they make 63 and then share it into 3 rows. 	Children will use a part whole model and draw in the tens and ones themselves They will also be shown how to use a number line: 	Children use their division knowledge and calculate the answer to questions such as: 96 ÷ 8 96 ÷ 3 96 ÷ 6
Division with remainders (Two digit by 1 digit)	Divide objects between groups and see how much is left over e.g. 14 ÷ 3 =  Use equipment such as place value counters	Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder: 13 ÷ 4  Draw dots and group them to divide an amount and clearly show a remainder.	Complete written divisions and show the remainder using r.  Recorded as: 3 r 5

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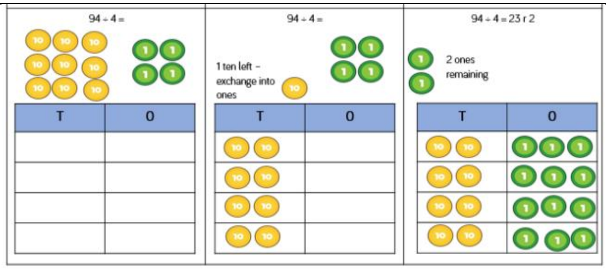
<td>

Step 1 – Build the number and show the groups on the place value chart.
Step 2 - Share the tens
Step 3 - Exchange the spare tens into ones and share the ones</td>
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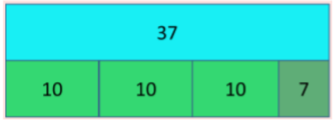
Use bar models to show division with remainders.

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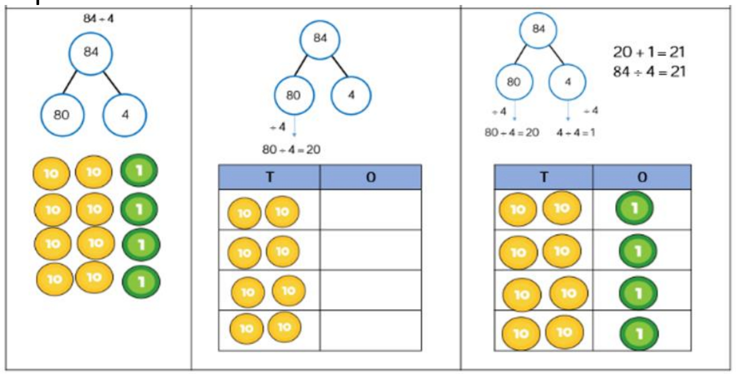
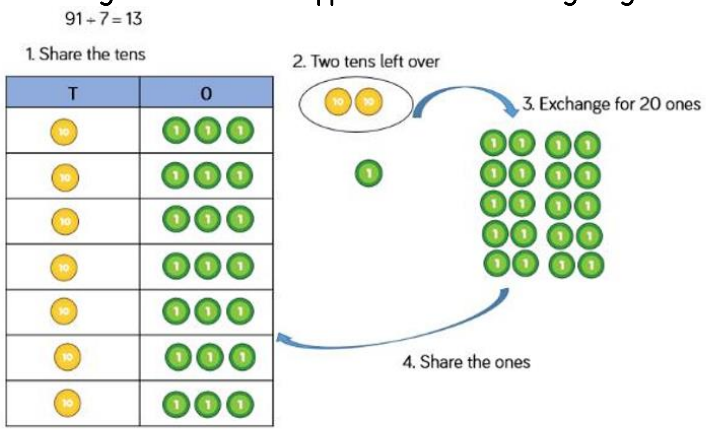
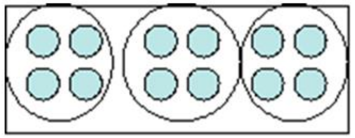
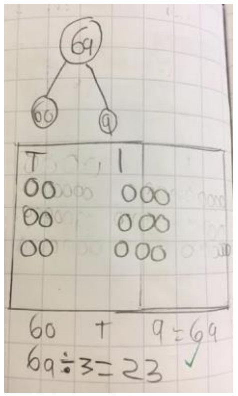
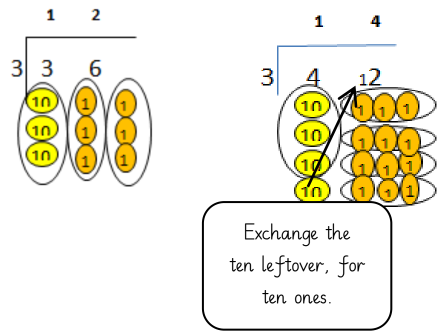
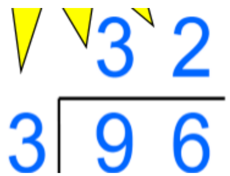
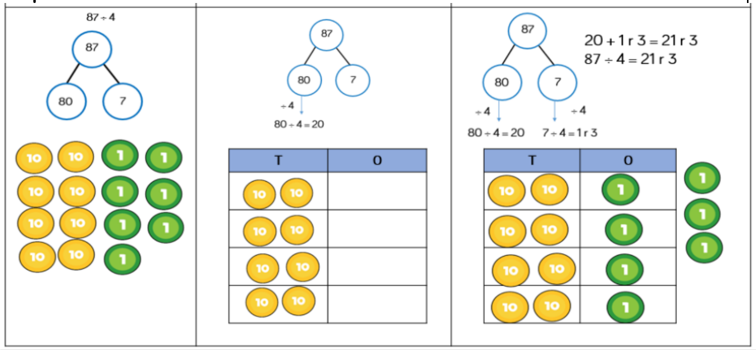
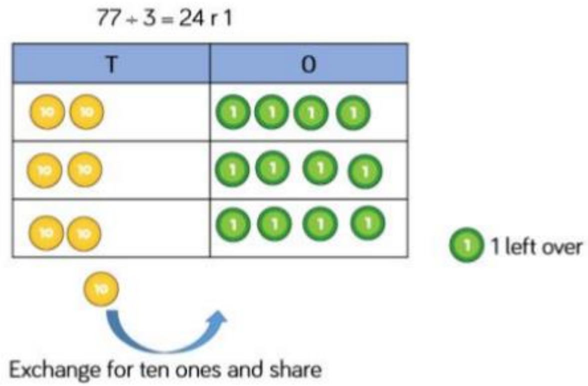
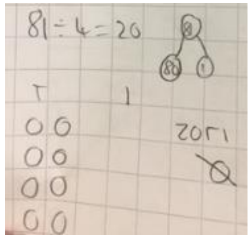
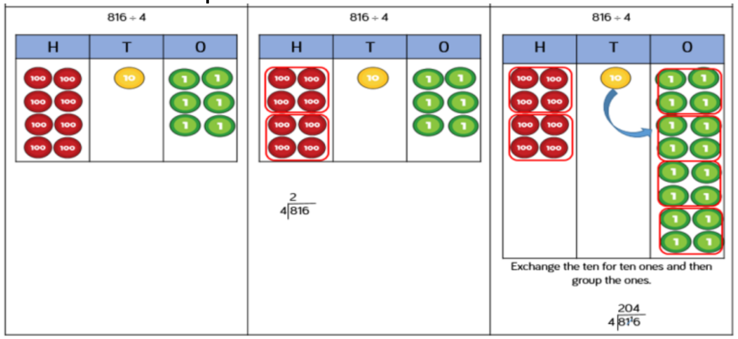
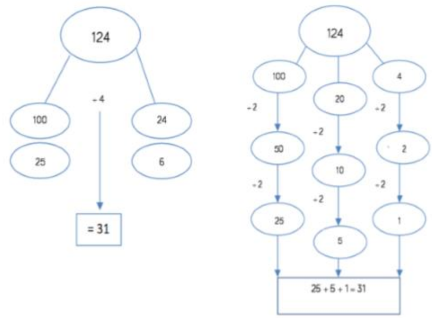
Division Year 4 statutory requirement:

Key Vocabulary:
share, share equally one each, two each, three each… group in pairs, threes… tens equal groups of divide, division, divided by, divided into, remainder, factor, quotient, divisible by, inverse

Year 4 statutory requirement: Note – there isn't a statutory objective for division. However, Y4 statutory multiplication objectives are to (1) recall multiplication and division facts for multiplication tables up to 12 × 12 and (2) multiply two-digit and three-digit numbers by a one-digit number using formal written layout so we will build on the connections between multiplication and division.

Objective & Strategy	Concrete	Pictorial	Abstract
2 digit number divided by 1 digit - Share into equal groups (no remainders) Children build on their knowledge of dividing a two-digit number by a one-digit number from Year 3 by sharing into equal groups.	Children use place value counters to represent a calculation **Step 1** – Build the number and show the groups on the place value chart. **Step 2** - Share the tens **Step 3** - Share the ones  **They use the same approach but exchange e.g.**  	Children continue to draw their own diagrams with dots or circles to help them divide numbers into equal groups.   	Limit numbers to NO remainders in the answer OR carried (each digit must be a multiple of the divisor). Support the written abstract method, with the use of place value counters if this is required to make the link between concrete and abstract e.g:  
2 digit number divided	Children use place value counters to represent a calculation. **Step 1** – Build the number and show the groups on the place value	Children continue to draw their	Limit numbers to no remainders in the final

by 1 digit – Share into equal groups (with remainders)	chart. **Step 2** – Share the tens **Step 3** – Share the ones  They use the same approach but exchange e.g. 	own diagrams with dots or circles to help them share numbers into equal groups.  	answer, but with remainders occurring within the calculation. 1 8 4 | 7 ³2
Divide 3 digit numbers by 1 digit numbers with no remainders initially moving onto with remainders	Children use place value counters and build a number e.g. 816 ÷ 4 = **Step 1** – Build the number **Step 2** – Group the hundreds **Step 3** – Share the tens and ones 	Use a partitioning method and the part whole model to help calculate 124 ÷ 4 	Begin with divisions that divide equally with no reminders e.g. 2 1 8 4 | 8 ³7 2 Move onto a division with a remainder 8 6 r 2 5 | 4 ³3 2