LONG MEADOW SCHOOL

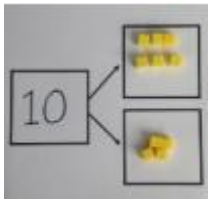
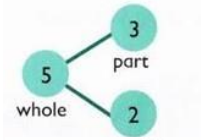
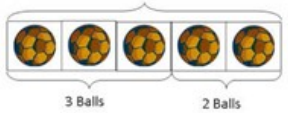
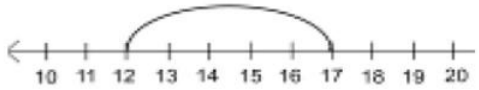
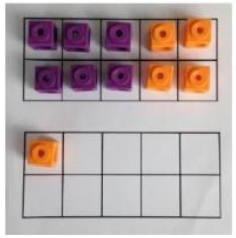
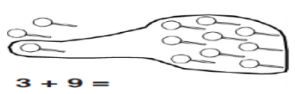
MATHEMATICS CALCULATION POLICY

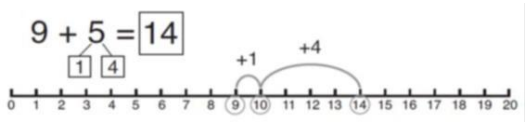
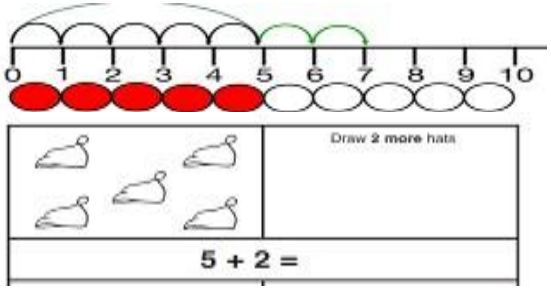
Date of last review:	January 2025
Date of next review:	January 2028
Type of policy:	Non-Statutory
Frequency of review:	Every 3 years
Governor committee:	Governing Body

This policy has been developed to ensure progression and consistency across the school. A range of variations have been included to support the pupils in their understanding of number and calculation. This document should be used to support children to develop a deep understanding of number and calculation. It has been designed to teach children through the use of concrete, pictorial and abstract representations.

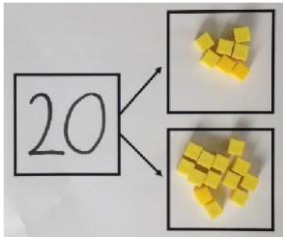
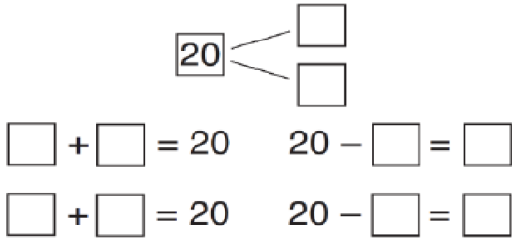
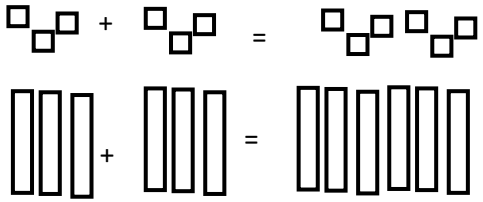
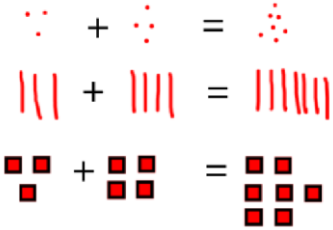
- Concrete representation - using objects to introduce a skill or idea to develop conceptual understanding.
- Pictorial representation - children can relate using concrete representations to pictorial representations, such as a diagram or picture of the problem.
- Abstract representation - problems be represented by using mathematical notation

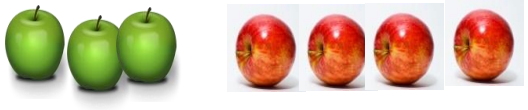
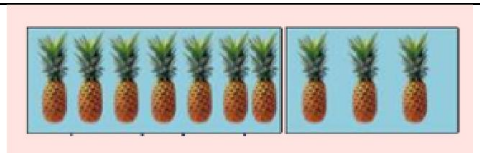
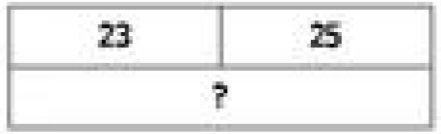
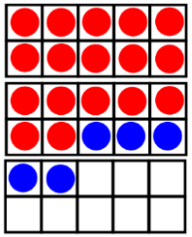
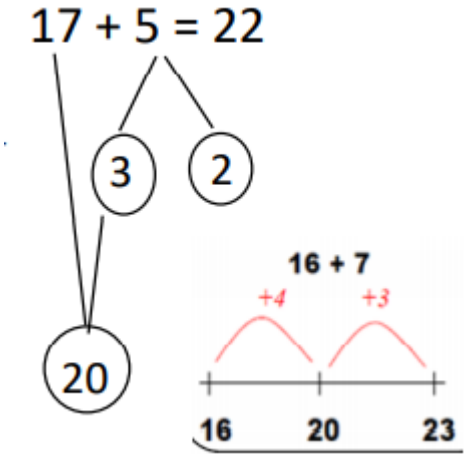
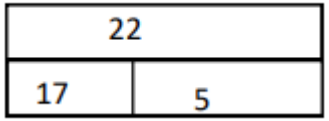
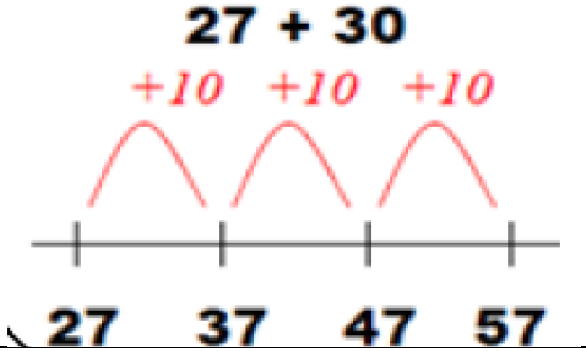
Year 1 Addition

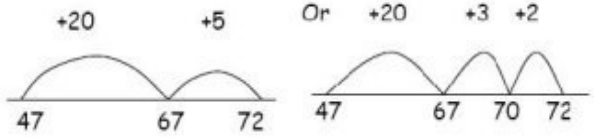
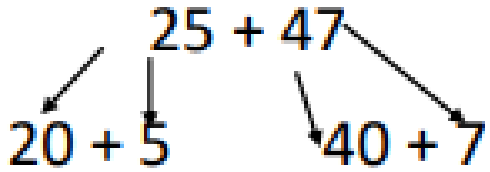
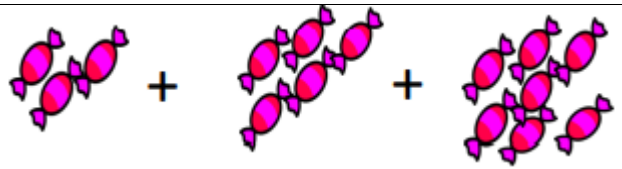
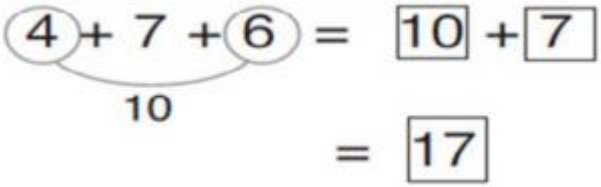
Objective & Strategy	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part-part whole model	   Use cubes to add two numbers together as a group or in a bar. 	   Use pictures to add two numbers together as a group or in a bar. 	4 + 3 = 7 10= 6 + 4  Use the part-part whole diagram as shown above to move into the abstract.
Starting at the bigger number and counting on	Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer. 	12 + 5 = 17  Start at the larger number on the number line and count on in ones or in one jump to find the answer.	5 + 12 = 17 Place the larger number in your head and count on the smaller number to find your answer.
Regrouping to make 10	6 + 5 = 11 Start with the bigger number and use the smaller number to make 10.  	 Use pictures or a number line. Regroup or partition the smaller number using the part-part whole	7 + 4 = 11 If I am at seven, how many more do I need to make 10. How many more do I add on now?

		model to make 10. 	
Represent & use number bonds and related subtraction facts within 20	2 more than 5 is 7. 		Emphasis should be on the language. *'1 more than 5 is equal to 6.'* *'2 more than 5 is 7.'* *'8 is 3 more than 5.'*

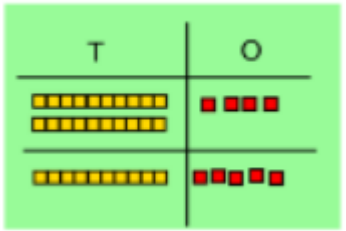
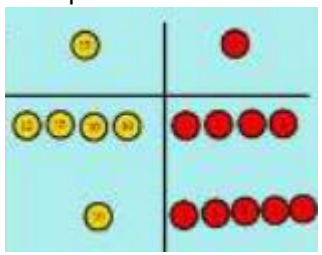
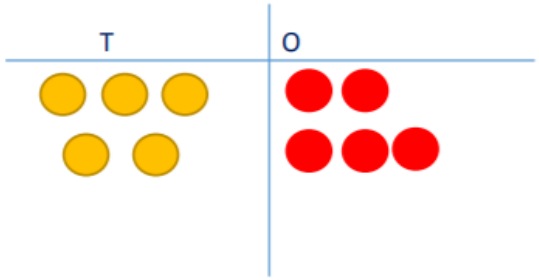
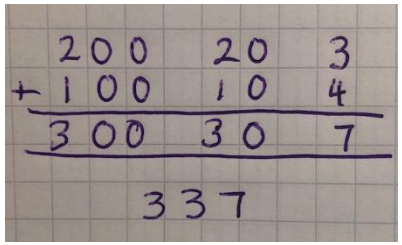
Year 2 Addition

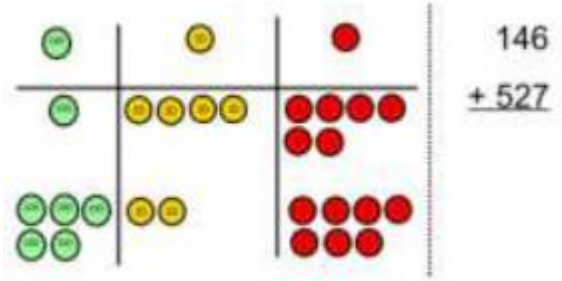
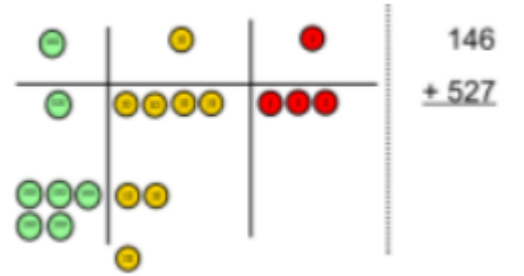
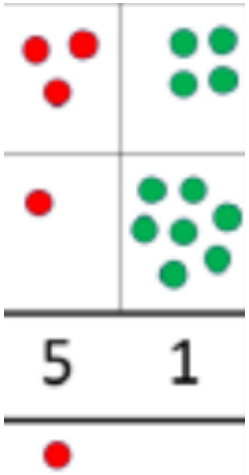
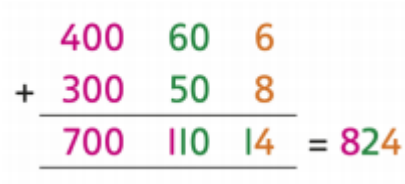
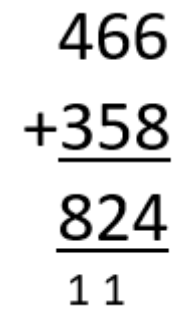
Objective & Strategy	Concrete	Pictorial	Abstract
Adding multiples of 10	 Model using dienes and bead strings.	Use representations for base ten.  3 tens + 5 tens = _____ tens 30 + 50 = _____	20 + 30 = 50 70 = 50 + 20 40 + □ = 60
Use known number facts: part-part whole	Children explore ways of making numbers within 20. 		
Using known facts.		 Children draw representations of tens and ones.	3 + 4 = 7 *leads to* 30 + 40 = 70 *leads to* 300 + 400 = 700

Bar model	Arrange items in a bar.  3 + 4 = 7	 7 + 3 = 10 Draw items in a bar.	23 + 25 = 48 
Add a two-digit number and ones	17 + 5 = 22  Use ten frame to make ten. Children explore the pattern. 17 + 5 = 22 27 + 5 = 32	Use part-part whole and number line to model. 	17 + 5 = 22 Explore related facts 17 + 5 = 22 5 + 17 = 22 22—17 = 5 22—5 = 17 
Add a two-digit number and tens	 25 + 10 = 35 Explore that the ones digit does not change.		27 + 10 = 37 27 + 20 = 47 27 + □ = 57

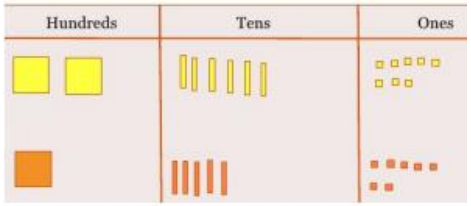
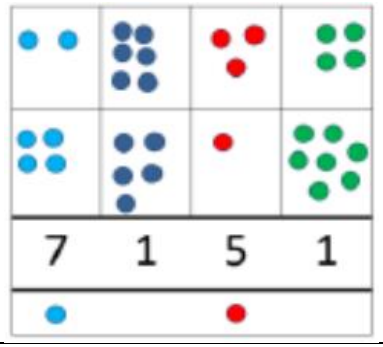
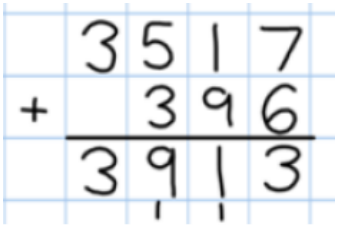
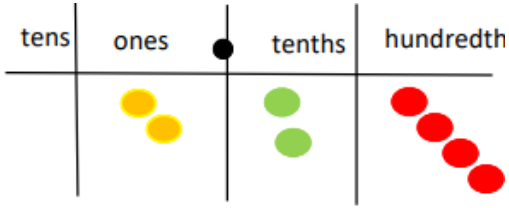
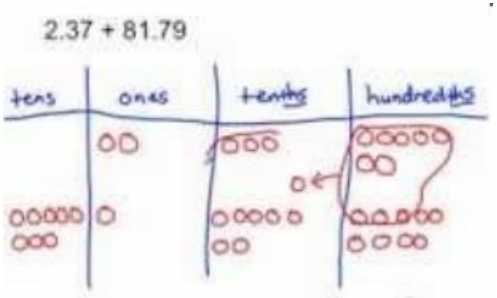
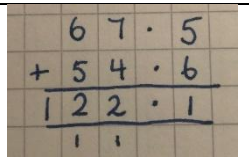
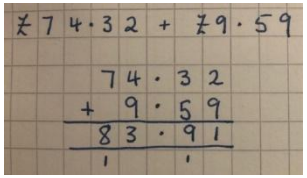
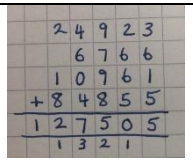
Add two 2-digit numbers	 Model using Dienes, place value counters and Numicon.	 Use number line and bridge ten using part whole if necessary.	 20 + 40 = 60 5 + 2 = 7 60 + 12 = 72
Add three 1-digit numbers	4 + 7 + 6 = 17 Combine making 10 first if possible then add third digit. Put 4 and 6 together to make 10. Add on 7.  Use beadstrings or cubes.	 Regroup and draw representation, making groups of 10 if possible. 	 Combine the two numbers that make 10 and then add on the remainder.

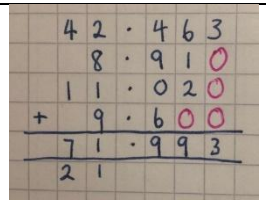
Year 3 Addition

Objective & Strategy	Concrete	Pictorial	Abstract
Column addition: no regrouping Add two or three 2 or 3-digit numbers	 Add together the ones first then add the tens.  Use the Dienes or Numicon first before moving onto place value counters. 	After practically using concrete resources, children can draw the counters to help them to solve additions. 	Add the ones first, then the tens, then the hundreds. Start by partitioning the numbers then move onto formal column.  2 2 3 + 1 1 4 3 3 7

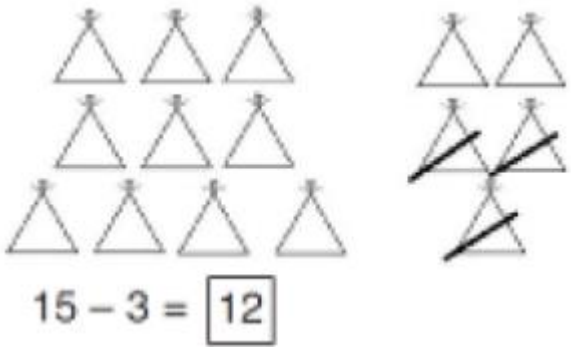
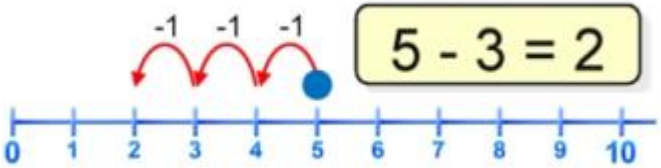
Column addition: regrouping	Make both numbers on a place value grid.  Add up the units and exchange 10 ones for one 10.  	Children can draw a representation of the grid to further support their understanding, carrying the ten.  	Start by partitioning the numbers then move onto formal column to show the exchange.  

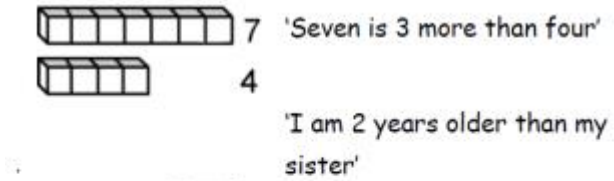
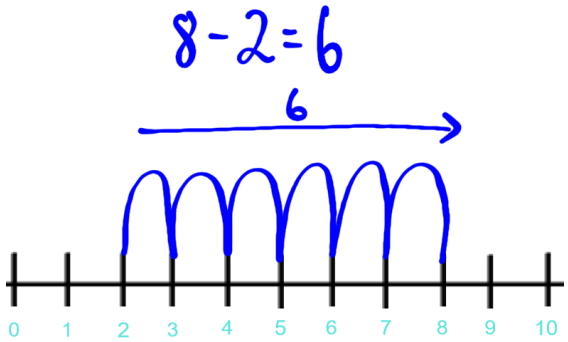
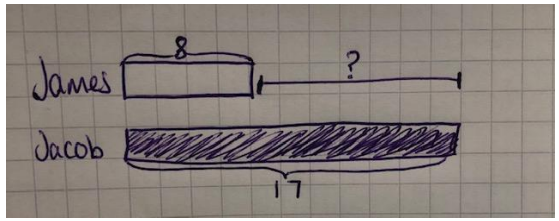
Year 4 – 6 Addition

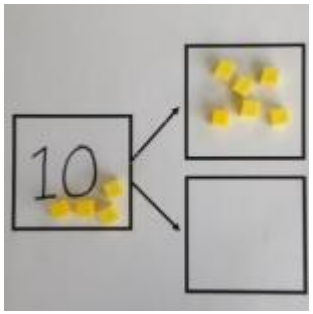
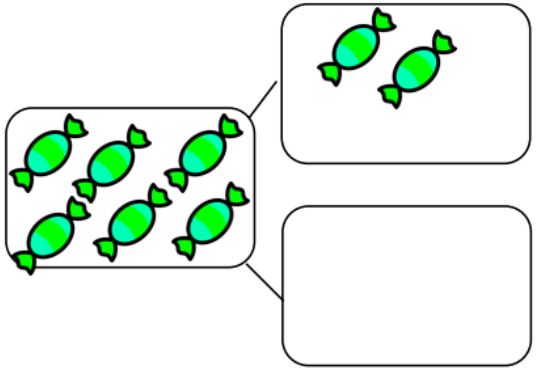
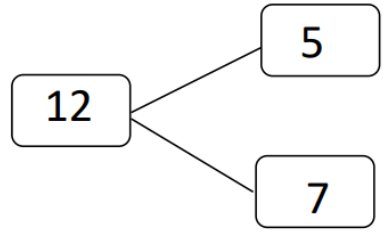
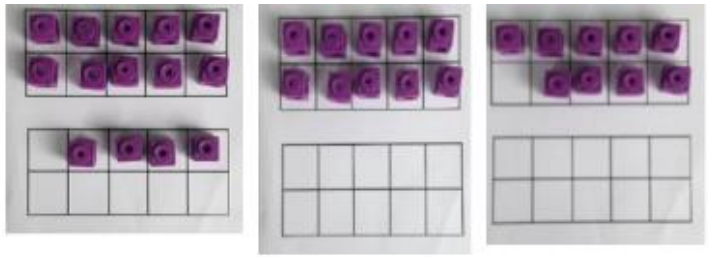
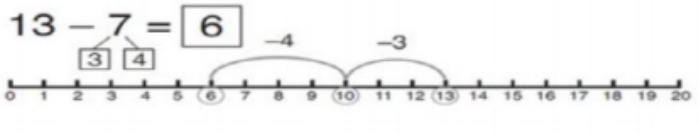
Objective & Strategy	Concrete	Pictorial	Abstract
Year 4 Add numbers with up to 4-digits	As Year 3, using Dienes or place value counters. 	As Year 3. 	As Year 3 (formal column) but exchanging 100s as well as 10s.  Link to money and measures.
Year 5 Add numbers with more than 4 digits Add decimals with 2 decimal places, including money	As Year 4 but introduce decimals using place value counters and model exchanging. 	As Year 4. 	 
Year 6 Add several numbers of increasing complexity, including adding money, measures. Add decimals with different	As Year 5.	As Year 5.	 Use zeros for place holders.

numbers of decimal places.			

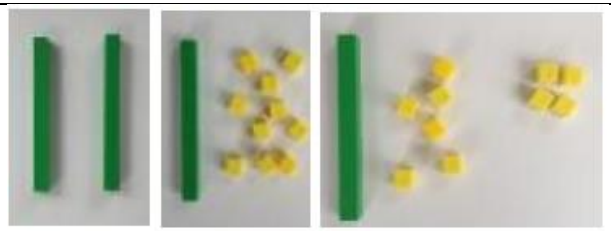
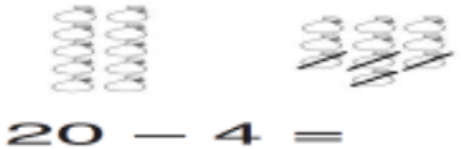
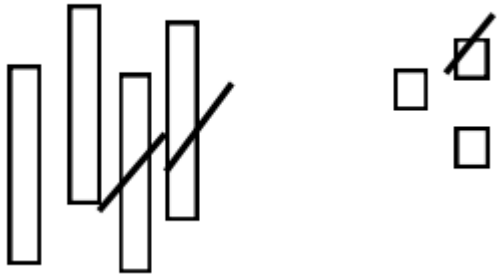
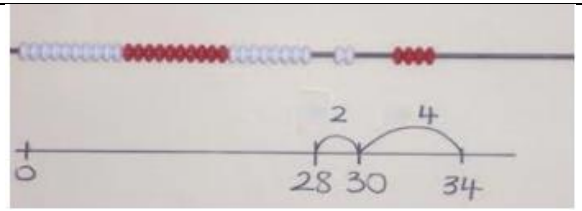
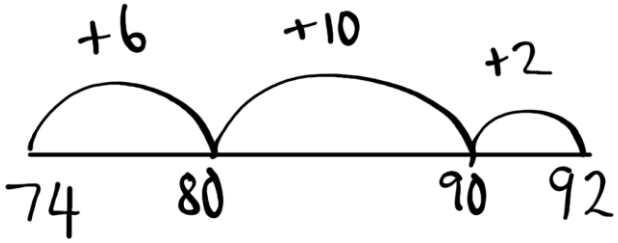
Year 1 Subtraction

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.	7 – 4 = 3 16 – 9 = 7
Counting back	Move objects away from the group, counting backwards.  	 Count back in ones using a number line.	Put 13 in your head, count back 4. What number are you at?

	Move the beads along the bead string as you count backwards.		
Find the difference	Compare objects and amounts.  Lay objects to represent bar model.	Count on using a number line to find the difference.  Draw bars to find the difference between two numbers.  James is 8 years old. His brother Jacob is 17 years old. Find the difference in age between them.	Hannah has 12 sweets and her sister has 5. How many more does Hannah have than her sister?

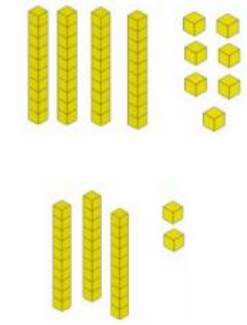
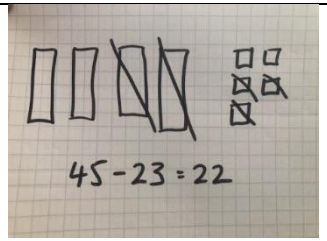
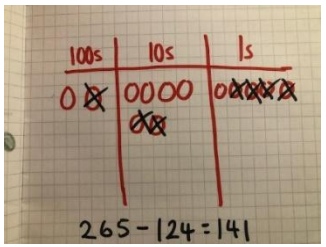
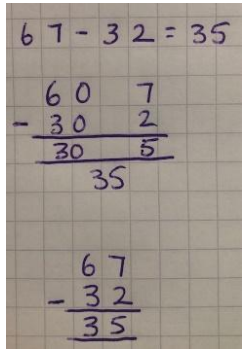
Represent and use number bonds and related subtraction facts within 20: part-part whole model	 Link to addition. Use part-part whole model to model the inverse. If 10 is the whole and 6 is one of the parts, what is the other part? 10 – 6 = 4	 Use pictorial representations to show the part.	Move to using numbers within the part whole model. 
Make 10	14 – 9 = 5  Make 14 on the ten frame. Take 4 away to make ten, then take one more away so that you have taken 5.	13 – 7 = 6 Jump back 3 first, then another 4. Use ten as the stopping point. 	16 – 8 = 8 How many do we take off first to get to 10? How many left to take off?

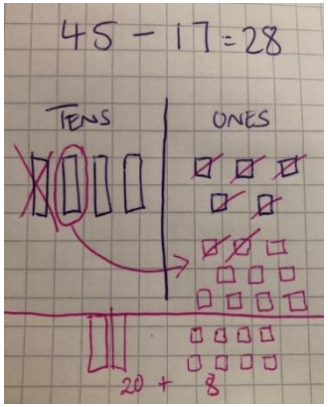
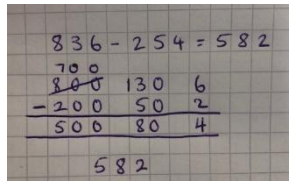
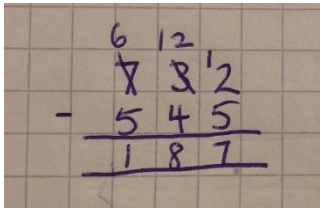
Year 2 Subtraction

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 Dienes or place value counters.	Draw representations and cross off. 	20—4 = 16
Partitioning to subtract without re-grouping	   34 – 13 = 21 Use Dienes/PV counters to show how to partition the number when subtracting without regrouping.	43 – 21 = 22 	43 – 21 = 22
Make ten strategy *Progression should be crossing one ten, crossing more than one*	 Use a bead strings to model counting to next ten and the rest.		92 – 74 = 18

ten, crossing the hundreds.		Use a number line to count on to next ten and then the rest.	

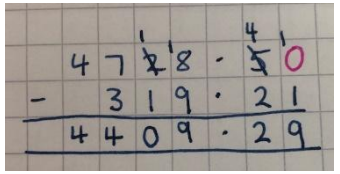
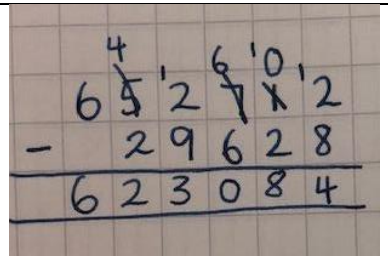
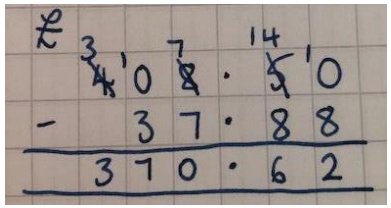
Year 3 Subtraction

Objective & Strategy	Concrete	Pictorial	Abstract
Column subtraction: no regrouping	47 – 32 = 15 Use Dienes, Numicon, place value counters, making the larger number first then taking away the smaller number. 	  Draw representations.	Start by partitioning the numbers then move onto formal column. 

Column subtraction: regrouping	Model exchange of 10 into 1s: Dienes, place value counters, Numicon. 		Start by partitioning the numbers then move onto formal column to show the exchange.  

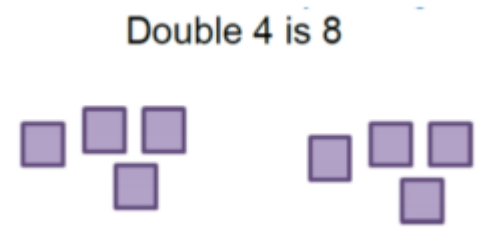
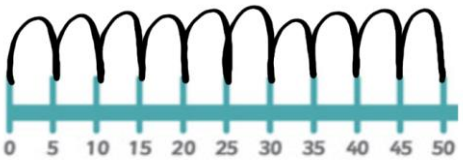
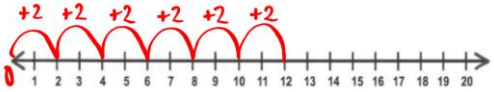
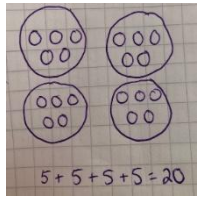
Year 4 – 6 Subtraction

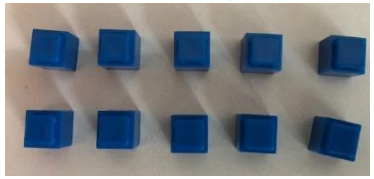
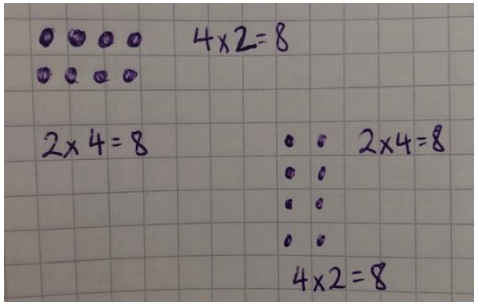
Objective & Strategy	Concrete	Pictorial	Abstract
Year 4 Subtract using formal column methods with numbers up to 4-digits	As Year 3.	As Year 3.	As Year 3. Link to money and measures.

Year 5 Subtract with at least 4-digits, including money and measures	As Year 4.	As Year 4.	Subtract with decimal values, including mixtures of integers and decimals and aligning the decimal.  Use zeros for place holders.
Year 6 Subtract with increasingly large and more complex numbers and decimal values			 

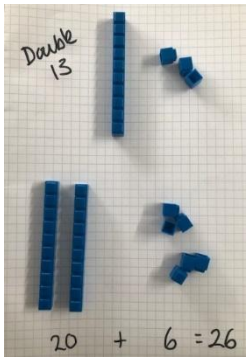
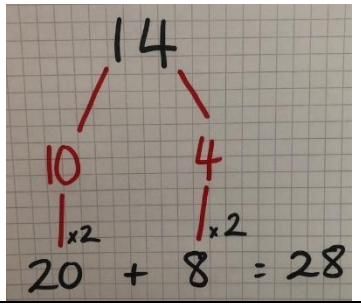
Year 1 Multiplication

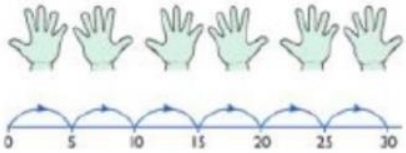
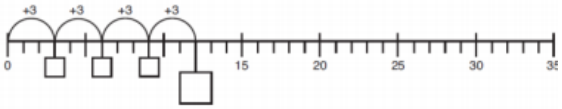
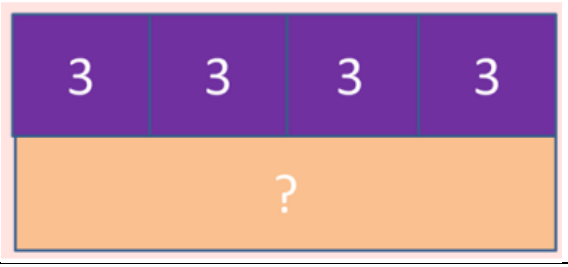
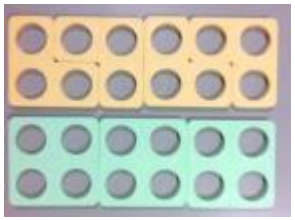
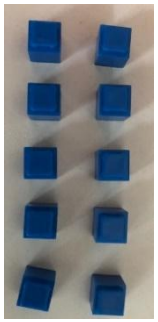
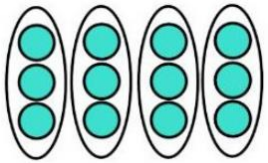
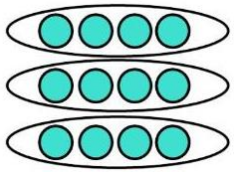
Objective & Strategy	Concrete	Pictorial	Abstract

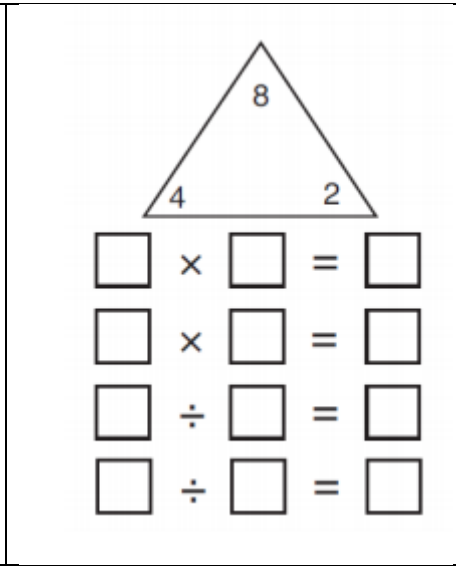
Doubling	Practical activities to demonstrate doubling. 	Draw pictures to show how to double a number. 	Double 4 is ____
Counting in multiples of 2, 5 and 10 	Count in multiples supported by concrete objects in equal groups.	 Draw representations. Can include jumps on a number line.	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25, 30
Repeated addition  	Use various objects to add equal groups.	 Draw pictures including number lines to solve problems. There are 5 marbles in one bag. How marbles are there altogether in 4 bags? 	Write addition sentences to describe objects and pictures. 

Arrays	Create arrays using cubes or counters. Use objects laid out in arrays to find the answers to 2 lots 5, 3 lots of 2 etc. 	Draw arrays in different rotations. 	3 x 2 = 6 2 x 5 = 10

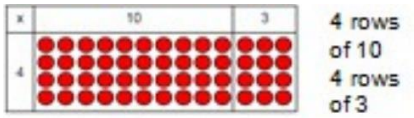
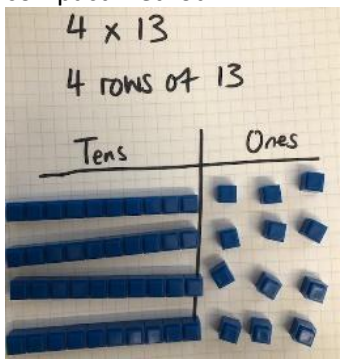
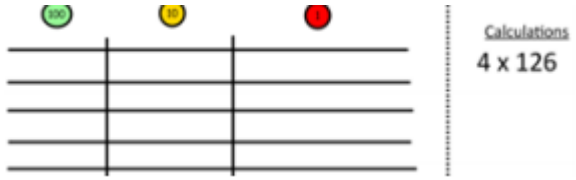
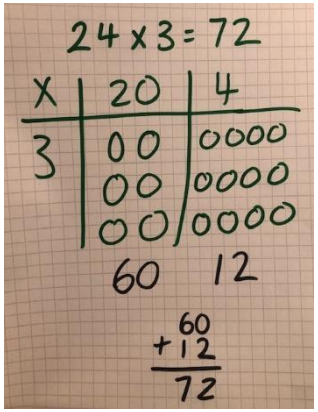
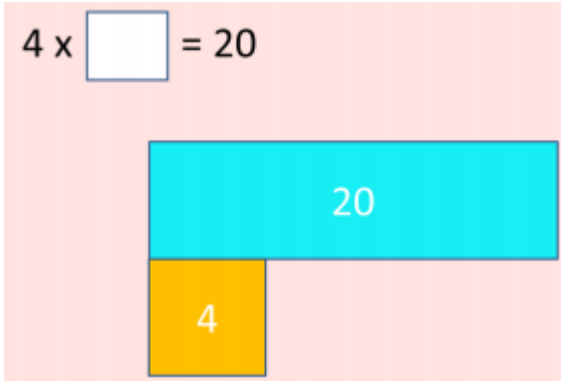
Year 2 Multiplication

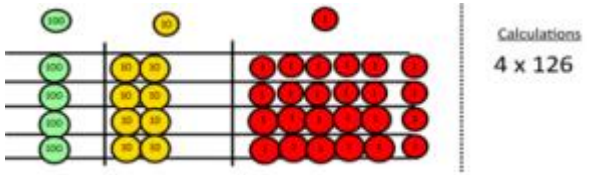
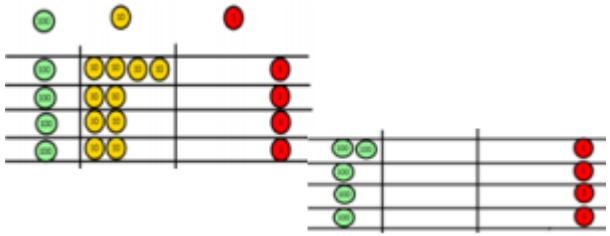
Objective & Strategy	Concrete	Pictorial	Abstract
Doubling	Use dienes, place value counters. 	As Year 1.	Partition a number and then double each part before recombining it back together. 

Counting in multiples of 2, 3, 4, 5, 10 from 0 (repeated addition)	 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 40 As Year 1, link to repeated addition.	Number lines, counting sticks and bar models should be used to show representation of counting in multiples.   	Count in multiples of a number aloud. 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 3 x 5 = ☐
Multiplication is commutative	Create arrays as in Year 1. 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.  	Use representations of arrays to show different calculations and explore commutativity.  	12 = 3 × 4 12 = 4 x 3 4 x 3 = 12 3 x 4 = 12 Use arrays to write repeated addition sentences.  5 + 5 + 5 =15 3 + 3 + 3 + 3 + 3 = 15

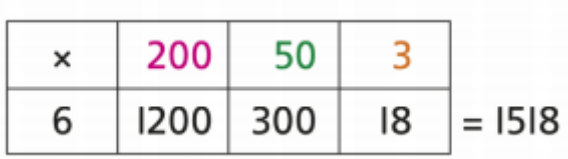
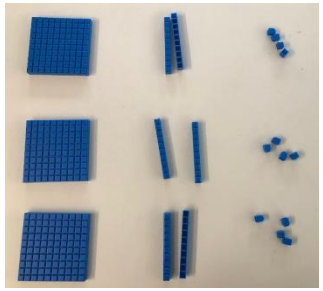
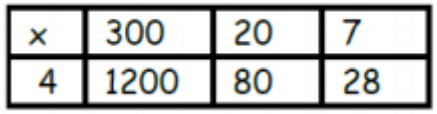
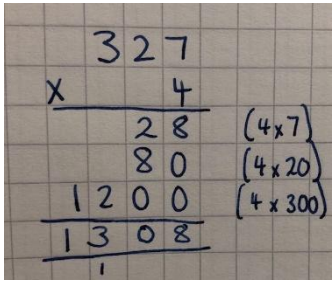
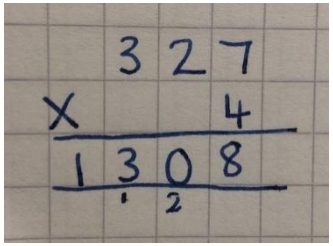
Using the inverse *Teach alongside division so children learn how they work with each other.*			2 x 4 = 8 4 x 2 = 8 8 ÷ 2 = 4 8 ÷ 4 = 2 8 = 2 x 4 8 = 4 x 2 2 = 8 ÷ 4 4 = 8 ÷ 2 Show all 8 related fact family sentences.

Year 3 Multiplication

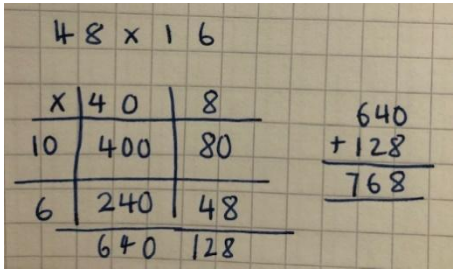
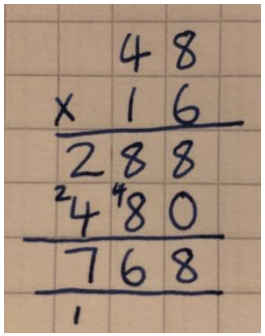
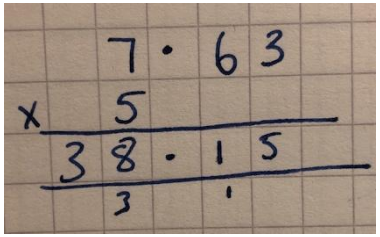
Objective & Strategy	Concrete	Pictorial	Abstract
Grid method	Show the links with arrays to first introduce the grid method.  Move onto base ten to move towards a more compact method.  Move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows.  	 Bar model are used to explore missing numbers.  	

	Fill each row with 126.  Add up each column, starting with the ones making any exchanges needed. 		

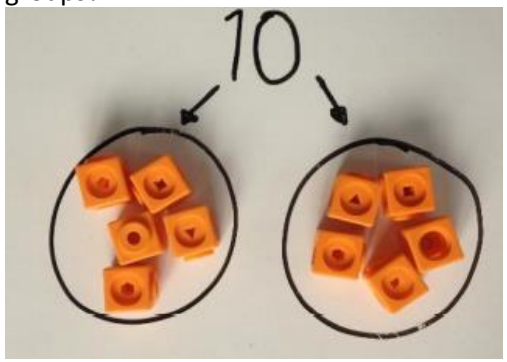
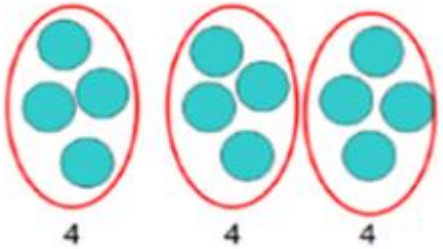
Year 4 Multiplication

Objective & Strategy	Concrete	Pictorial	Abstract
Grid method	As Year 3 but moving onto multiplying 3-digit numbers by a 1-digit number.	As Year 3 but moving onto multiplying 3-digit numbers by a 1-digit number.	
Column multiplication Short multiplication	Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping (321 x 2 = 642)  It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.	The grid method may be used to show how this relates to a formal written method.  Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.	If it helps, children can write out what they are solving next to their answer.  Then move onto a more compact method. 

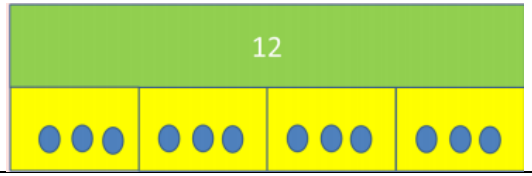
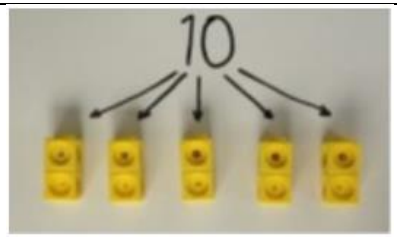
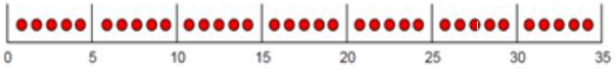
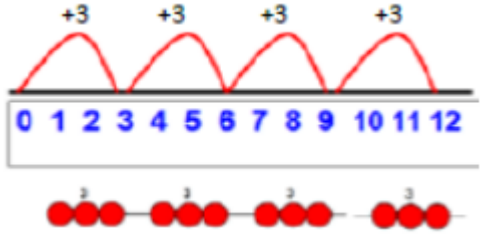
Year 5 – 6 Multiplication

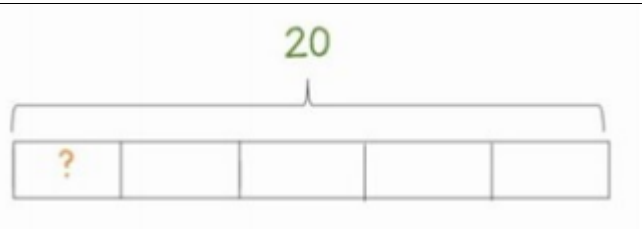
Objective & Strategy	Concrete	Pictorial	Abstract
Year 5 Column multiplication Long Multiplication	As Year 4 but with numbers up to 4 digits by a one- or two-digit number.	As Year 4.  The grid method may be used to show how this relates to a formal written method.	As Year 4 but including long multiplication. 
Year 6 Column multiplication including decimals			Consolidate Year 5. 

Year 1 Division

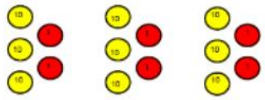
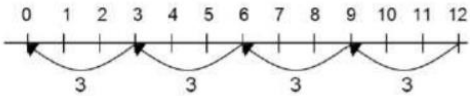
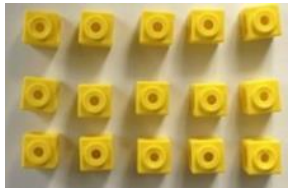
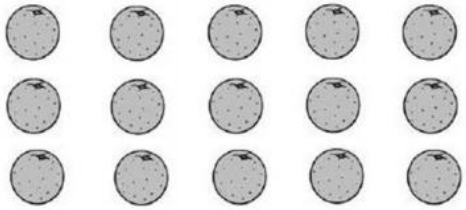
Objective & Strategy	Concrete	Pictorial	Abstract
Division as sharing	  I have 10 cubes; can you share them equally in 2 groups? 	Children use pictures or shapes to share quantities.  8 shared between 2 is 4.  12 shared between 3 is 4.	Share 9 cakes between 3 people.

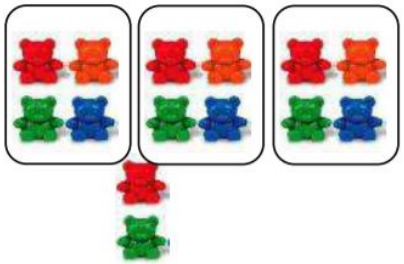
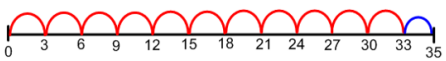
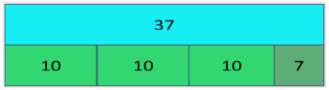
Year 2 Division

Objective & Strategy	Concrete	Pictorial	Abstract
Division as sharing	As Year 1.	As Year 1 but children use bar modelling to show and support understanding. 12 ÷ 4 = 3 	12 ÷ 4 = 3
Division as grouping	 Divide quantities into equal groups. Use cubes, counters, objects or place value counters to support understanding. 	Use a number line for grouping.  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.	30 ÷ 5 = 6 Divide 30 into 5 groups. How many are in each group?

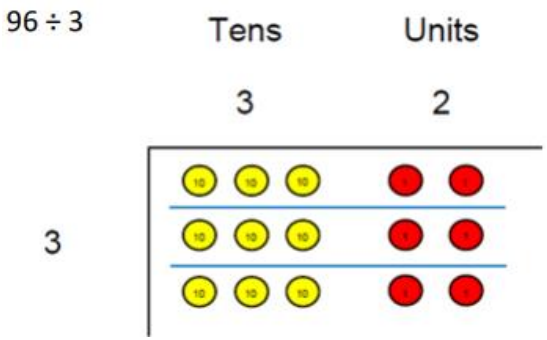
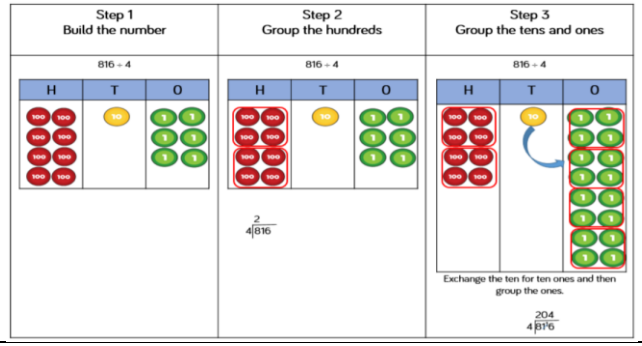
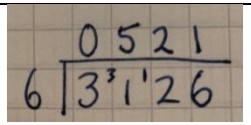
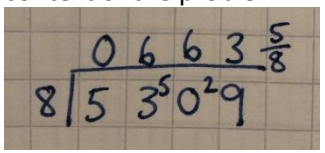
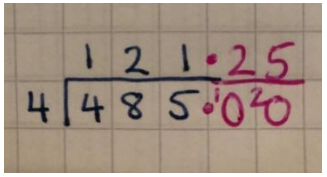
Year 3 Division

Objective & Strategy	Concrete	Pictorial	Abstract
Division as grouping	Use cubes, counters, objects or place value counters. 96 ÷ 3 = 32 	As Year 3 with the bar model. Use a number line to show jumps in groups. The number of jumps equals the number of groups. 	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.  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. 	Find the inverse of multiplication and division sentences by creating four linking number sentences. 7 x 4 = 28 4 x 7 = 28 28 ÷ 7 = 4 28 ÷ 4 = 7

Division with remainders	14 ÷ 3 = Divide objects between groups and see how much is left over. 	Equal jumps in a number line then see how many more you need to jump to find the remainder. 35 ÷ 3 = 11 r1  Draw dots and group them to divide an amount and clearly show a remainder.  Use bar models to show division with remainders. 	Complete written divisions and show the remainder using r.  Introduce the vocabulary of division: dividend, divisor, quotient, remainder.

Year 4 – 6 Division

Objective & Strategy	Concrete	Pictorial	Abstract
Year 4	Consolidate Year 3. Children need to be secure in division facts (linked to multiplication facts) and their understanding of division, with and without remainders.	Consolidate Year 3.	Consolidate Year 3.

Year 5 Short division Divide numbers up to 4-digits by a 1-digit number.	96 ÷ 3  Include examples with remainders. Divide a three-digit number, then moving to a four-digit number, by a one-digit number by using partitioning and place value counters.  	Encourage them to move towards counting in multiples to divide more efficiently. Use various representations to show the different ways to express remainders.	 Include money and measures. Express remainder as a fraction or decimal or as a rounded number depending on the context of the problem.  
Year 6 Short division Divide numbers with decimal places			Consolidate Year 5 and divide numbers with decimal places.

Long division Divide by 2-digit numbers including decimals by drop down method.	Write the first 5 multiples of the divisor (you may need more). Underline the first two digits in the dividend. Work out how many lots of the divisor goes into the target number (write this in the quotient). Subtract the 'lots of' number to get a remainder. Drop down then next digit. Repeat step until all digits have been dropped down. Express remainder as a fraction or decimal or as a rounded number depending on the context of the problem.