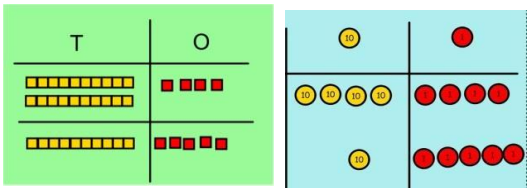
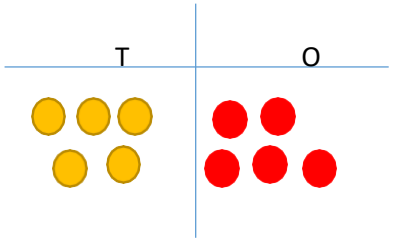
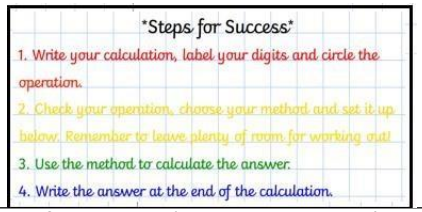
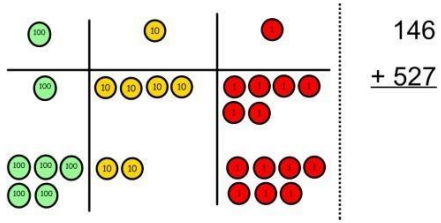
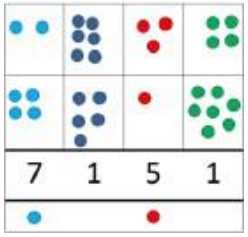
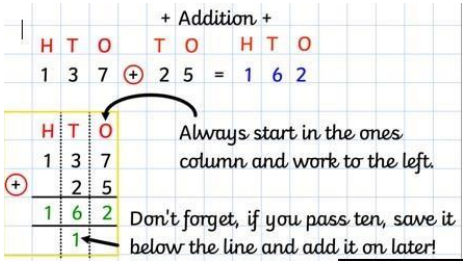
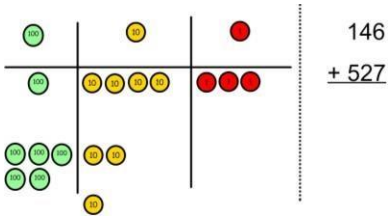
Calculation policy
2023-2024

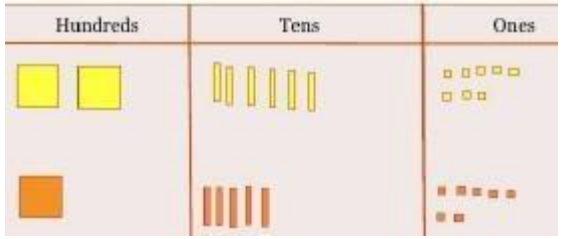
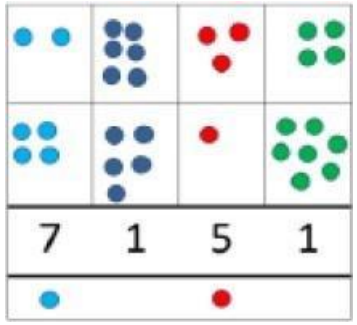
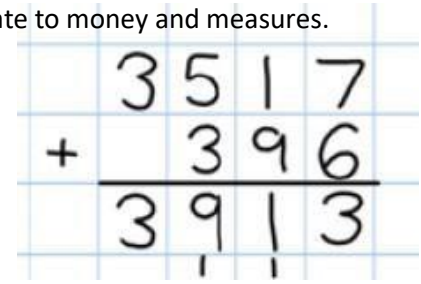
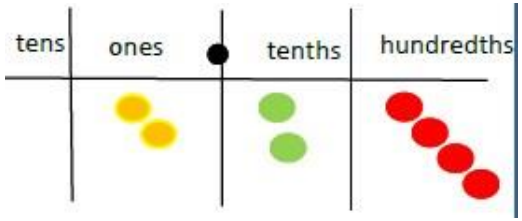
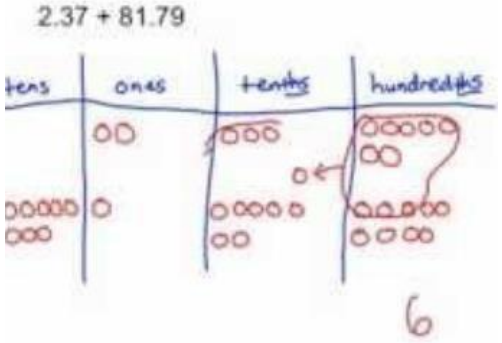
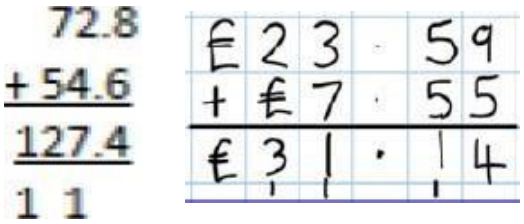
This policy has been adapted from the White Rose Calculation policy with further material added from other sources such as NCTEM and Maths No problem. It should be used to support children to develop a deep understanding of number and calculation. It is a working document which gets reviewed regularly.

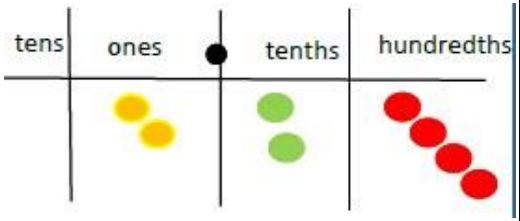
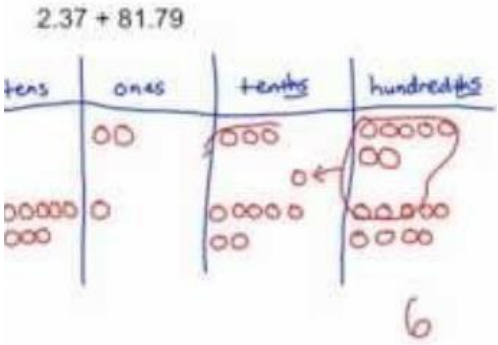
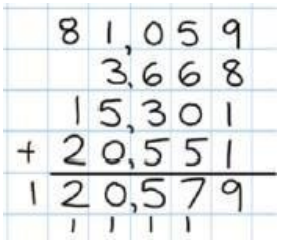
Addition – Year 3

Objective & Strategy	Concrete	Pictorial	Abstract
Column Addition – no regrouping (friendly numbers) Add 2 or 3 digit numbers.	24 + 15 =  Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters.	After practically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions. 	Add the ones first, then the tens, then the hundreds: 2 2 3 + 1 1 4 3 3 7 Children use the 'steps to success' to format their calculation: 
Column Addition – with regrouping.	Make both numbers on a place value grid.  Add up the units and exchange 10 ones for one 10.	Children can draw a pictorial representation of the columns and place value counters to further support their learning and understanding. 	Children follow the 'Steps to Success' to regroup and form the calculation correctly: 

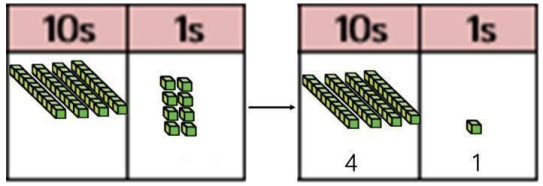
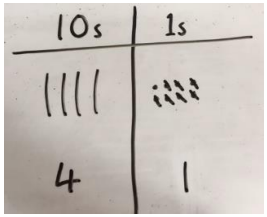
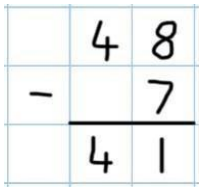
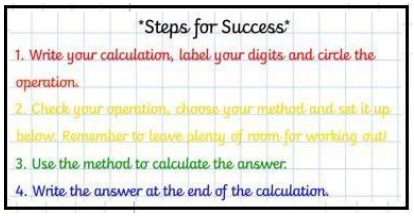
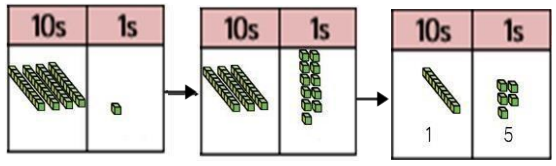
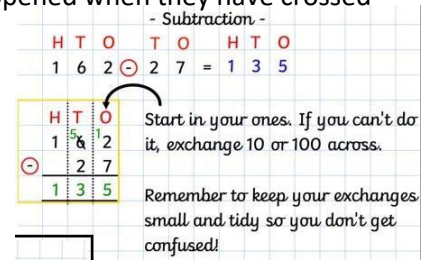
	 Add up the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added. This can also be done with Base 10 to help children clearly see that 10 ones equal 1 ten and 10 tens equal 100. As children move on to decimals, money and decimal place value counters can be used to support learning.		

Addition – Years 4-6

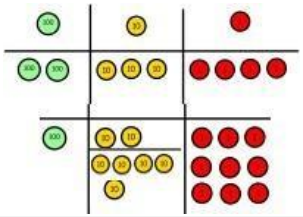
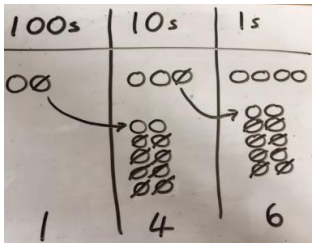
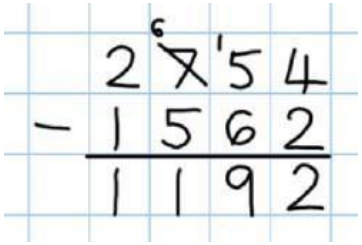
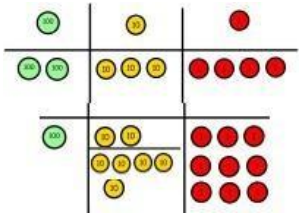
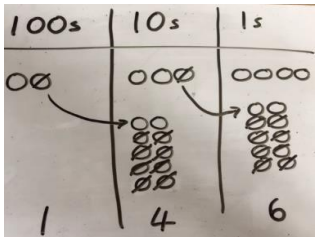
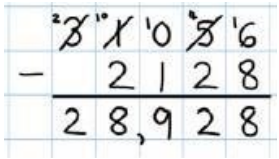
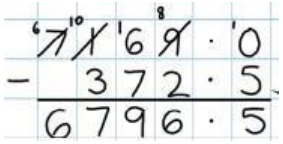
Objective & Strategy	Concrete	Pictorial	Abstract
Year 4 Add numbers with up to 4 digits	Children continue to use dienes or place value counters to add, exchanging ten ones for a ten, ten tens for a hundred and ten hundreds for a thousand. 	Draw representations using place value grid. 	Continue from previous work to carry hundreds as well as tens. Relate to money and measures. 
Year 5 Add numbers with more than 4 digits. Add decimals with 2 decimal places, including money.	(As year 4) Introduce decimal place value counters and model exchange for addition 	(As year 4) 	(As year 4) 

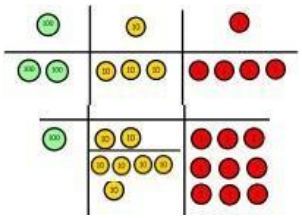
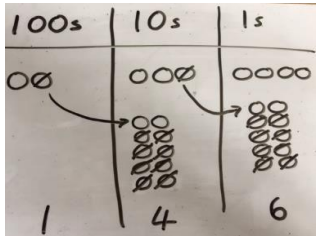
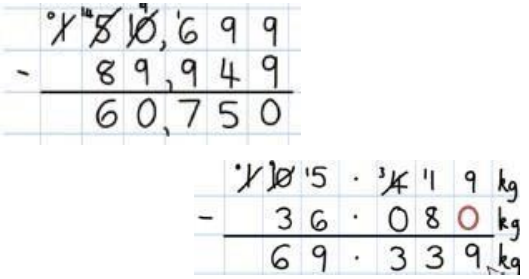
Year 6 Add several numbers of increasing complexity. Include adding money, measure and decimals with different numbers of decimal points.	(As year 5) Introduce decimal place value counters and model exchange for addition. 	(As year 5) 	Insert zeros for place holders. 

Subtraction – Year 3

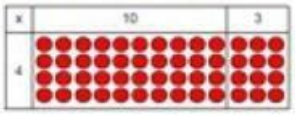
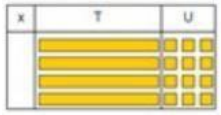
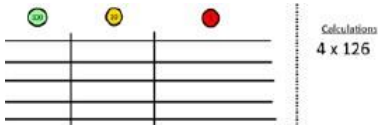
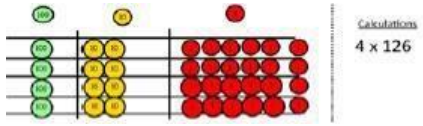
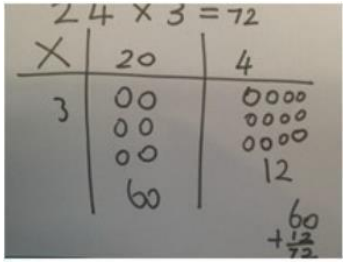
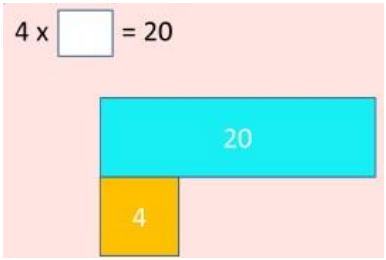
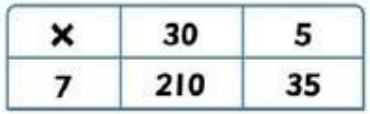
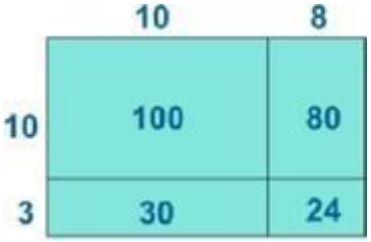
Objective & Strategy	Concrete	Pictorial Children	Abstract
Column subtraction without regrouping. (friendly numbers)	Column method using base ten.  	to represent the base 10 pictorially.  	Column method or children could count back 7.  Children use their 'Steps to Success' to format the question correctly: 
Column subtraction with regrouping.	Column method using base 10 and having to exchange. 41 – 26 =  	Represent the place value counters pictorially; remembering to show what has been exchanged.	Formal column method using 'Steps to Success'. Children must understand what has happened when they have crossed out digits. 

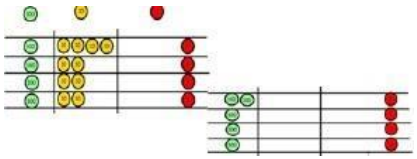
Subtraction – Years 4-6

Objective & Strategy	Concrete	Pictorial	Abstract
Year 4 Subtracting tens and ones – up to 4 digits. (introduce decimal subtraction through context of money)	Model process of exchange using numicon, base ten and then move to place value counters. 234 – 179 = 	Represent the place value counters pictorially; remembering to show what has been exchanged. 	Formal column method. Children must understand what has happened when they have crossed out digits. 
Year 5 Subtract with at least 4 digits, including money and measures. (subtract with decimal values, including mixtures of integers and decimals and aligning the decimal)	Model process of exchange using numicon, base ten and then move to place value counters. 234 – 179 = 	Represent the place value counters pictorially; remembering to show what has been exchanged. 	Formal column method. Children must understand what has happened when they have crossed out digits. Use zeros for place holders.  

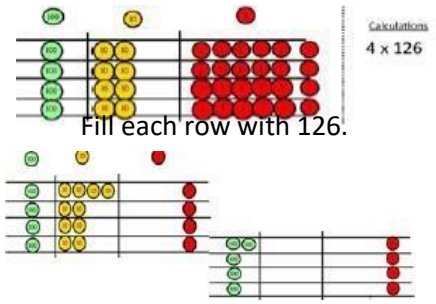
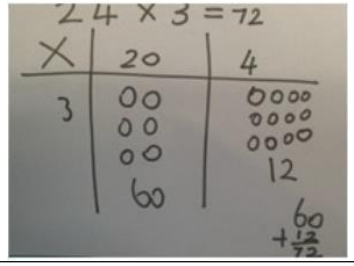
Year 6 Subtract with increasingly large, more complex, numbers and decimal values.	Model process of exchange using numicon, base ten and then move to place value counters. 234 – 179 = 	Represent the place value counters pictorially; remembering to show what has been exchanged. 	Increasingly large and more complex numbers 

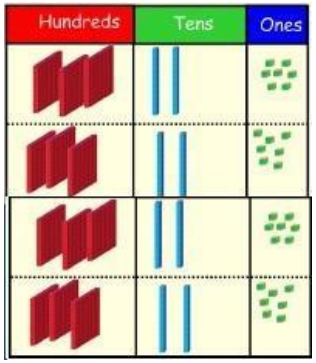
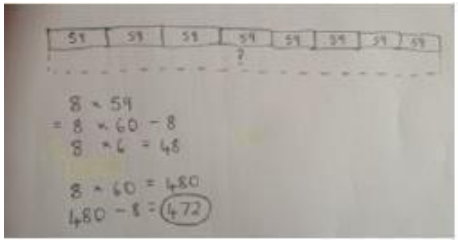
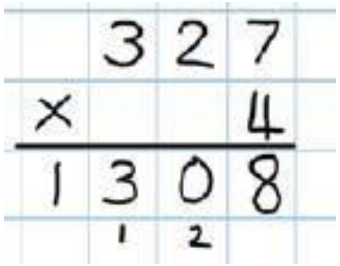
Multiplication – Year 3

Objective & Strategy	Concrete	Pictorial	Abstract
The 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 onto place value counters to show how we are finding groups of a number. We are multiplying by 4, so we need 4 rows…  Fill each row with 126…  Add up each column, starting with the ones making any exchanges needed.	Children can represent their work with place value counters in a way that they understand. They can draw the counters using colour to show different amounts or just use the circles in the different columns to show their thinking.  Bar models are used to explore missing numbers.  	Begin with multiplying by one digit numbers and showing the clear addition alongside.  210 + 35 = 245 Moving forward, multiply by a 2 digit number, showing the different rows within the grid method. 

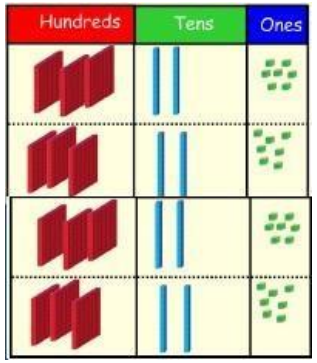
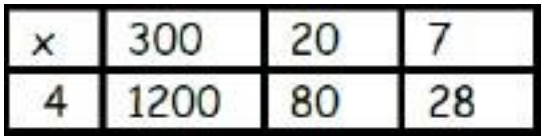
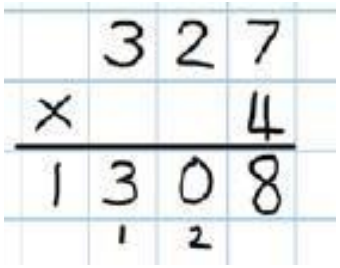
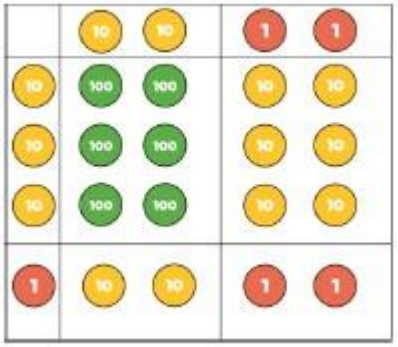
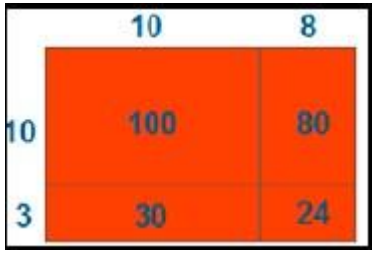
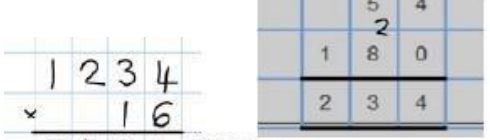
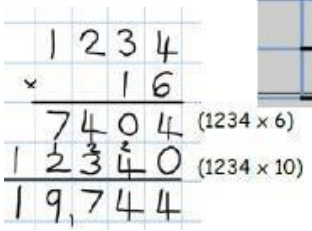
	 Then you have your answer.		
Rapid Recall (multiplication and division)	• Multiplication and division facts for 2, 5, 10, 3, 4 and 8 times tables. Strategies • 'Double-double'/'half-half' links within the listed times tables. • Associativity (pushing numbers around) • Using what I already know		

Multiplication – Year 4

Objective & Strategy	Concrete	Pictorial	Abstract
The grid method (recap from Year 3 for 2-digit x 1 digit). Children progress to multiplying 3 -digit numbers by 1 digit (Year 4 expectation).	Use place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows.  Fill each row with 126. Add up each column, starting with the ones making any exchanges needed.	Children can represent their work with place value counters in a way that they understand. They can draw the counters using colour to show different amounts or just use the circles in the different columns to show their thinking.  	Multiply 3 digit by 1 digit numbers using the grid method. | x	300	20	7 | | --- | --- | --- | --- | | 4 | 1200 | 80 | 28 | 1200 + 80 + 28 = 1,308

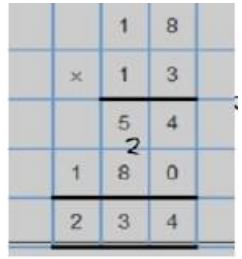
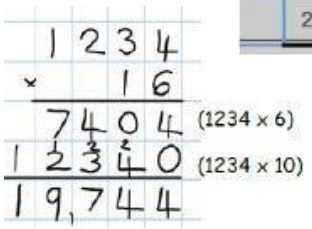
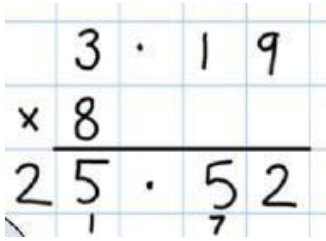
Column Multiplication.	Children can continue to be supported by place value counters at this stage of multiplication. This is initially done where there is no regrouping.  321 x 2 = 642 It is important at this stage that they always multiply the ones column first. The corresponding long multiplication is modelled alongside this method.	The grid method may be used to show how this relates to a formal written method (see abstract column). | x	300	20	7
4	1200	80	28	 Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.  	The grid method can then be progressed onto the compact method/short method. 

Multiplication – Year 5

Objective & Strategy	Concrete	Pictorial	Abstract
Column Multiplication (3 and 4 digits x 1 digit).	Children can continue to be supported by place value counters at this stage of multiplication. This is initially done where there is no regrouping. 	The grid method may be used to show how this relates to a formal written method (see abstract column). 	The grid method can then be progressed onto the compact method/ short method. 
Column Multiplication – Long multiplication.	Manipulatives may still be used with the corresponding long multiplication modelled alongside. (22 x 31) 	 Continue to use bar modelling to support problem solving.	Progress to using the column method for long multiplication.  

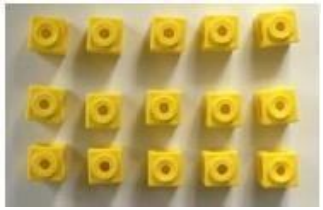
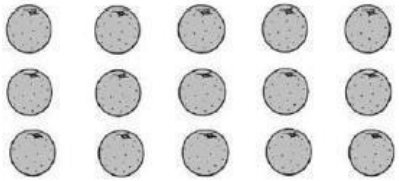
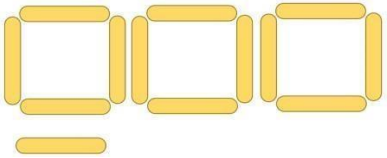
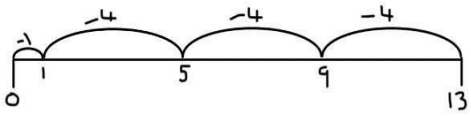
Rapid Recall - mastering number KS2 (multiplication and division)	Square numbers to 144 Establish whether a number is prime Recall all prime numbers up to 19 <u>Strategies</u> X by 9 X/÷ by 10/100/1000 – including decimals Use what you know to… x/÷ by 5/50/25 x by ½

Multiplication – Year 6

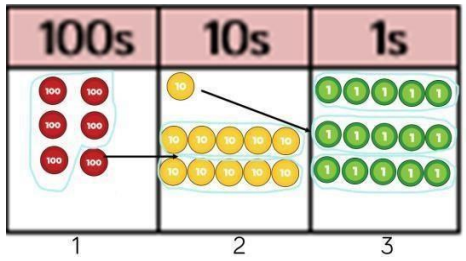
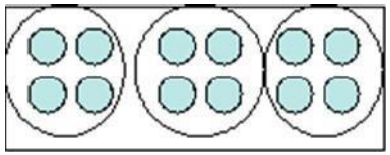
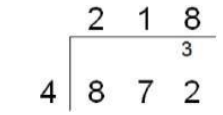
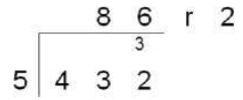
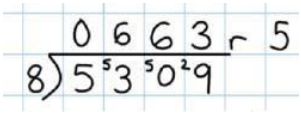
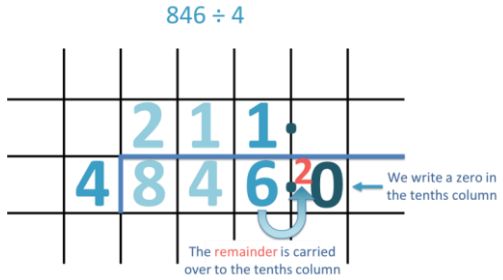
Objective & Strategy	Concrete	Pictorial	Abstract
Column Multiplication – Long multiplication.	Manipulatives may still be used with the corresponding long multiplication modelled alongside.	 Continue to use bar modelling to support problem solving.	Progress to using the column method for long multiplication.  
Multiplying decimals up to 2 decimal places by a single digit.			Remind children that the single digit belongs in the ones column. Line up the decimal points in the question and answer. 

			When appropriate, children can use their place value knowledge to make the number being multiplied 10, 100 or 1000 times bigger and then multiply and make the answer 10, 100 or 1000 times smaller $319 \overset{(\times 100)}{} \times 8 = 2552 \overset{(\div 100)}{} = 25.52$

Division – Year 3

Objective & Strategy	Concrete	Pictorial	Abstract
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:  15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15	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
Division with remainders	This can be done with lollipop sticks or Cuisenaire rods: 13 ÷ 4  Use of lollipop sticks to form wholes-squares are made because we are dividing by 4. There are 3 whole squares, with 1 left over.	Children to represent the lollipop sticks pictorially:  There are 3 whole squares, with 1 left over.	13 ÷ 4 = 3 remainder 1 Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line:  '3 groups of 4, with 1 left over'

Division – Years 4-6

Objective & Strategy	Concrete	Pictorial	Abstract
Short division with a remainder Year 4 Up to 3 digits by 1 digit Year 5 Up to 4 digits by a 1 digit with remainders Year 6 Up to 4 digits by a 1 digit and then progress to long division (next objective)	Short division using place value counters to group: 615 ÷ 5  1. Make 615 with place value counters. 2. How many groups of 5 hundreds can you make with 6 hundred counters? 3. Exchange 1 hundred for 10 tens. 4. How many groups of 5 tens can you make with 11 ten counters? 5. Exchange 1 ten for 10 ones. 6. How many groups of 5 ones can you make with 15 ones?	Children can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups:  However, children should be encouraged to move towards counting in multiples to divide more efficiently.	Begin with divisions that divide equally with no remainders:  Move onto divisions with a remainder:   Year 5/6 Children can then progress onto expressing the remainder as fractions (e.g. 5/8) and decimals (e.g. 663.625). 

Long division without remainder

YEAR 6 DIVISION

Calculate 4320÷32= 135

		1	3	5
32	4	3	2	0
	3	2		
	1	1	2	
		9	6	
		1	6	
		1	6	0

Children can write some multiples of 32 for extra help:

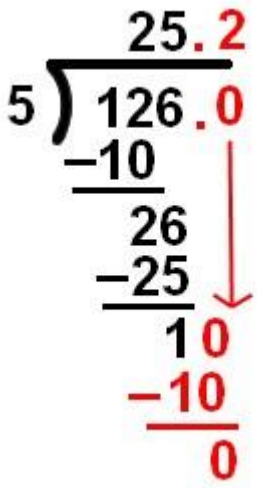
32	64	96	128	160	192

Long division with remainder

Calculate 215÷14= 15 r5

		1	5
14	2	1	5
–	1	4	
		7	5
–		7	0
			5

14	28	42	56	70	84

Long division with decimal remainders	 When there is a remainder which you need to write as a decimal, bring down the 0 in the from then tenths column, and repeat the process as before	