Wisborough Green Calculation Policy

At Wisborough Green Primary School we are using the ‘White Rose Hub’ format as a basis for our planning. We have tweaked the planning to suit our school. We are also part of ‘The Mastery Maths Approach’ and we are currently working on embedding the Five ideas within our maths teaching, these are:

Fluency

Coherence

Representation and Structure

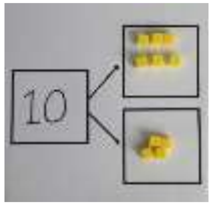
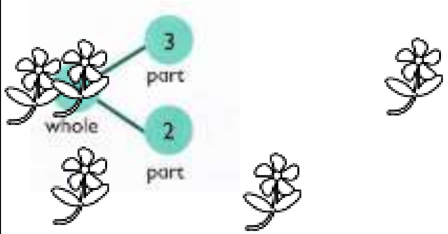
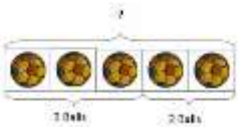
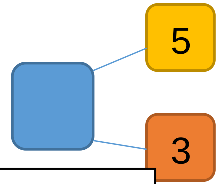
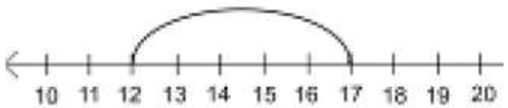
Mathematical Thinking

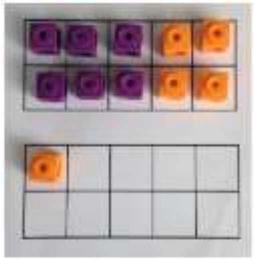
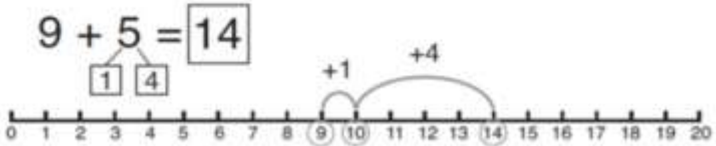
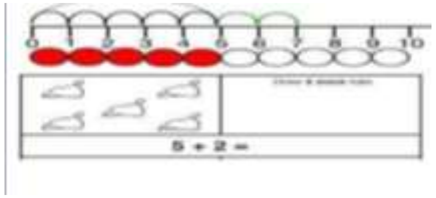
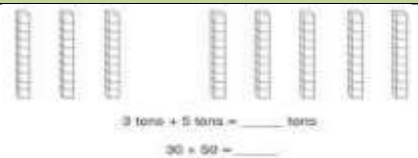
Variation

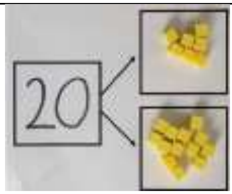
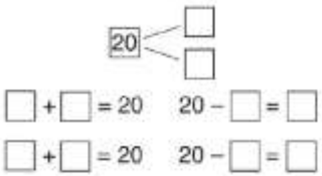
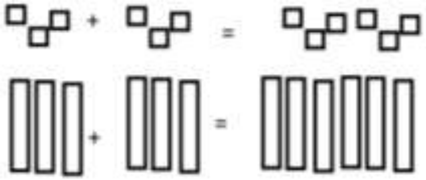
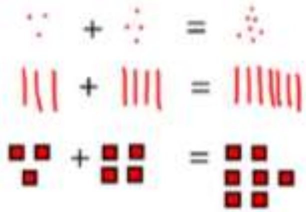
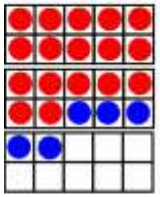
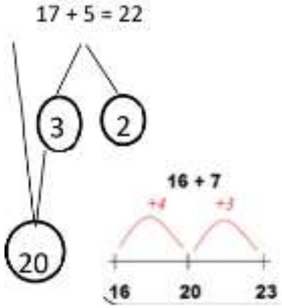
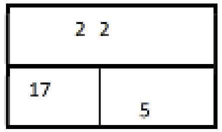
The aim is that when children leave Wisborough Green they:

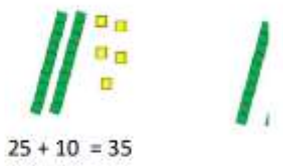
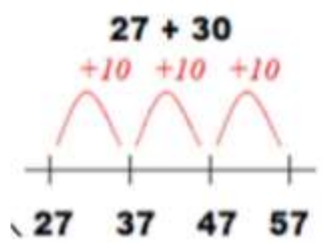
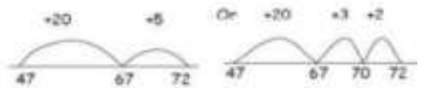
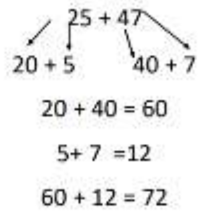
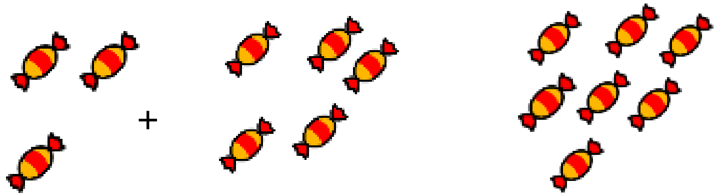
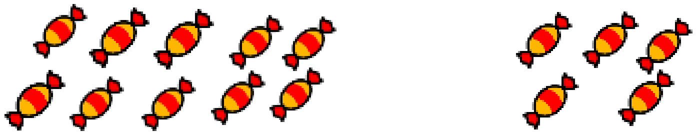
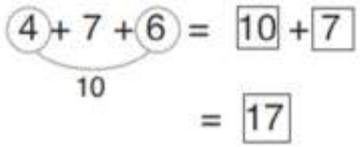
- have a secure knowledge of number facts and a good understanding of the four calculation operations (addition, subtraction, multiplication and division)
- make use of jottings, pictures and diagrams to help record their thinking and support their mathematical understanding especially when working mentally.
- have an efficient, reliable, written method of calculation for each operation that they are able to apply with confidence when they are unable to perform a calculation mentally

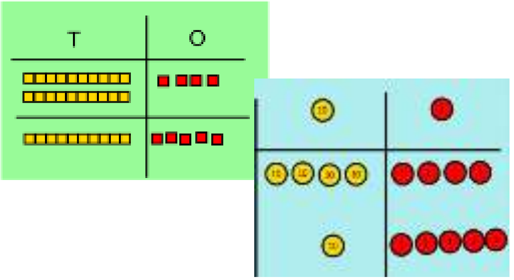
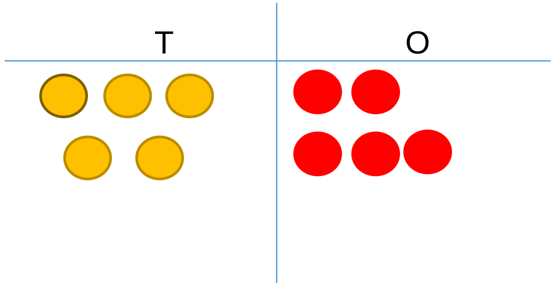
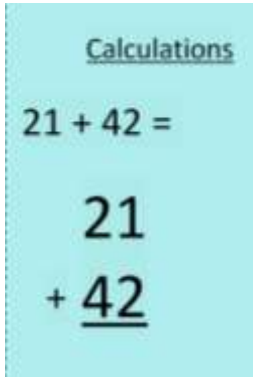
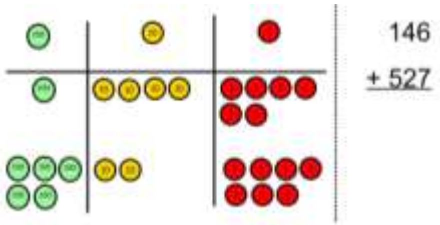
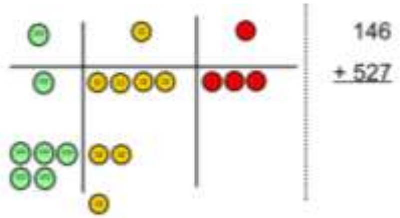
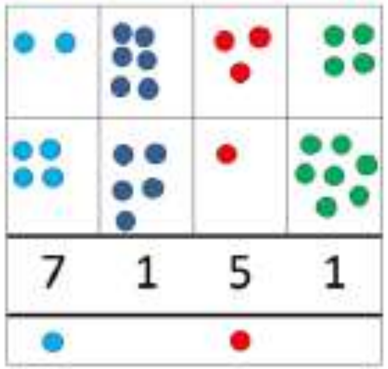
Addition

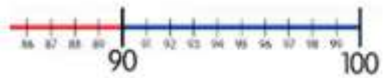
Objectives and Strategies	Concrete	Pictorial	Abstract
Year One			
Combining two parts to make a whole: part- whole model	   Use cubes to add two numbers together as a group or in a bar. 	  Use pictures to add two numbers together as a group or in a bar. 	4 + 3 = 7 10= 6 + 4  Use the part-part whole diagram as shown above to move into the abstract.
Starting at the larger 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.

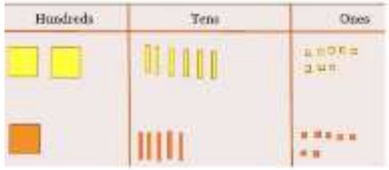
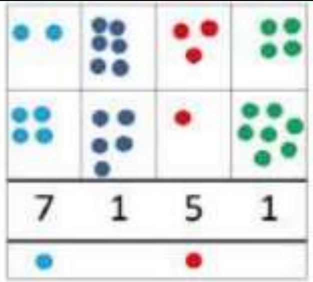
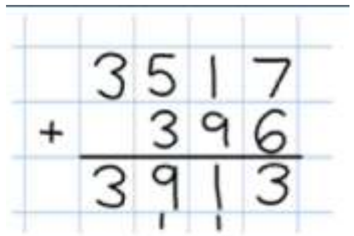
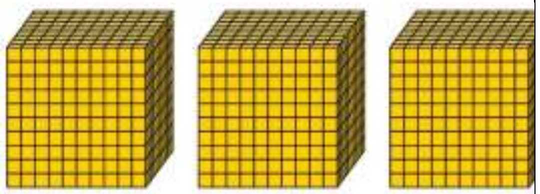
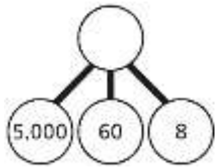
Regrouping to make 10.	 6 + 5 = 11  Start with the bigger number and use the smaller number to make 10.	 Use pictures or a number line. Regroup or partition the smaller number to make 10.  	7 + 4= 11 If I am at seven, how many more do I need to make 10. How many more do I add on now?
Represent & use number bonds and related subtraction facts within 20	 Start with the bigger number and use the smaller number to make 10. Use ten frames.	 	Include missing number questions: 8 = ? + 3 5 + ? = 8 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.'
Objectives and Strategies	Concrete	Pictorial	Abstract
Year 2 Addition			
Adding multiples of ten	 Model using dienes and bead strings	 Use representations for base ten.	20 + 30 = 50 70 = 50 + 20 $40 + \square = 60$

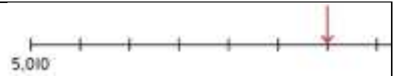
Use known number facts part, part whole	 Children explore ways of making numbers within 20		Explore commutativity of addition by swapping the addends to build a fact family. Explore the concept of the inverse relationship of addition and subtractions and use this to check calculations. 
Using known facts		 Children draw representations of H,T and O	3 + 4 = 7 *leads to* 30 + 40 = 70 *leads to* 300 + 400 = 700
Add a 2-digit number and ones	Children explore the pattern. 17 + 5 =22  27 + 5 = 32 17 + 5 = 22 Use ten frame to make 'magic ten	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  Lead into recording in column format, to reinforce place values and prepare children for

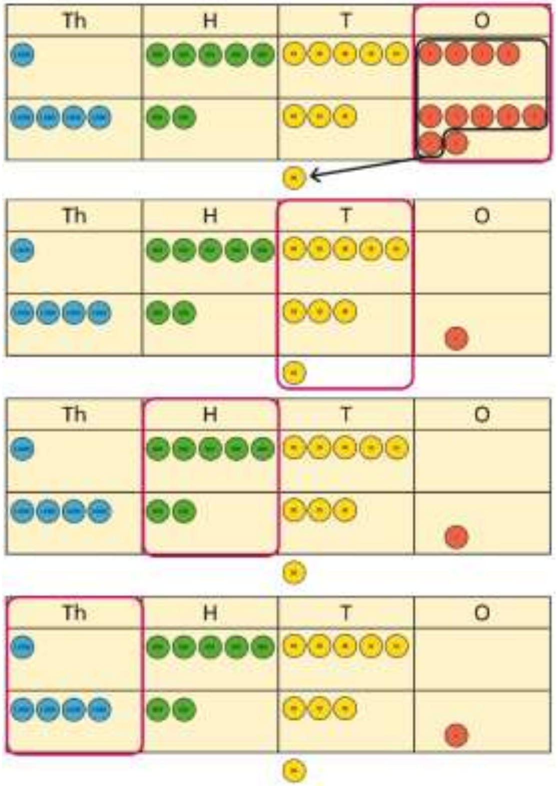
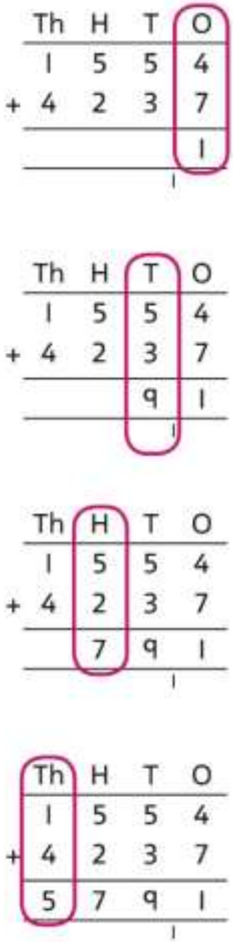
			formal written methods with larger values.
Add a 2-digit number and tens	25 + 10 = 35  Explore that the ones digit does not change	 	27 + 10 = 37 27 + 20 = 47 27 + ☐ = 57
Add two 2-digit numbers	 Model using dienes, place value counters and numicon	 Use a number line and bridge ten using part whole if necessary.	
Add three 1-digit numbers	4 + 7 + 6= 17 Put 4 and 6 together to make 10. Add on 7.  Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit	Add together three groups of objects. Draw a picture to recombine the groups to make 10.  	 Combine the two numbers that make 10 and then add on the remainder.

Objectives and Strategies	Concrete	Pictorial	Abstract
Year Three Addition			
Column method- no regrouping	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. 	
Column method- regrouping	Make both numbers on a place value grid.  Add up the units and exchange 10 ones for one 10. 	Children can draw a pictoral representation of the columns and place value counters to further support their learning and understanding. 	Start by partitioning the numbers before moving on to clearly show the exchange below the addition. 20 + 5 40 + 8 60 + 13 = 73 536 + 85 621 1 1

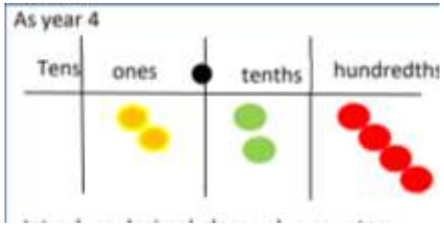
	Add up the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added. This can also be done with Base 10 to help children clearly see that 10 ones equal 1 ten and 10 tens equal 100. As children move on to decimals, money and decimal place value counters can be used to support learning.		As the children move on, introduce decimals with the same number of decimal places and different. Money can be used here. 72.8 + 54.6 127.4 1 1 £ 2 3 . 5 9 + £ 7 . 5 5 £ 3 1 . 1 4 1 1 1 2 3 . 3 6 1 9 . 0 8 0 5 9 . 7 7 0 + 1 . 3 0 0 9 3 . 5 1 1 2 1 2
Estimate the answers to questions and use inverse operations to check answers	 Estimating 98 + 17 = ? 100 + 20 = 120	 Use number lines to illustrate estimation.	Building up known facts and using them to illustrate the inverse and to check answers: 98 + 18 = 116 116 – 18 = 98 18 + 98 = 116 116 – 98 = 18
Objective and Strategies	Concrete	Pictorial	Abstract
Year 4 Addition			

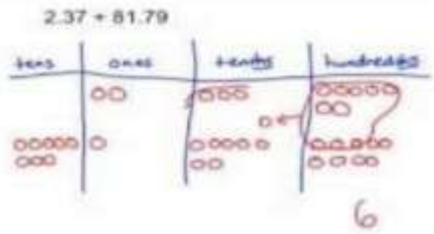
Y4—add numbers with up to 4 digits	 Children continue to use dienes or place value counters to add, exchanging ten ones for a ten and ten tens for a hundred and ten hundreds for a thousand.	 Draw representations using place value grid.	 Continue from previous work to carry hundreds as well as tens. Relate to money and measures.
Understanding numbers to 10,000	Use place value equipment to understand the place value of 4-digit numbers.  4 thousands equal 4,000. 1 thousand is 10 hundreds.	Represent numbers using place value counters once children understand the relationship between 1,000s and 100s.  2,000 + 500 + 40 + 2 = 2,542	Understand partitioning of 4-digit numbers, including numbers with digits of 0.  5,000 + 60 + 8 = 5,068 Understand and read 4-digit numbers on a number line.

			
Choosing mental methods where appropriate	Use unitising and known facts to support mental calculations. Make 1,405 from place value equipment. Add 2,000. Now add the 1,000s. 1 thousand + 2 thousands = 3 thousands 1,405 + 2,000 = 3,405	Use unitising and known facts to support mental calculations.  I can add the 100s mentally. 200 + 300 = 500 So, 4,256 + 300 = 4,556	Use unitising and known facts to support mental calculations. 4,256 + 300 = ? 2 + 3 = 5 200 + 300 = 500 4,256 + 300 = 4,556

Column addition with exchange	Use place value equipment on a place value grid to organise thinking. Ensure that children understand how the columns relate to place value and what to do if the numbers are not all 4-digit numbers. Use equipment to show 1,905 + 775.  Why have only three columns been used for the second row? Why is the thousands box empty? Which columns will total 10 or more?		Use a column method to add, including exchanges.  Include examples that exchange in more than one column.

<table>
<tr><th>Objectives and Strategies</th><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
<tr><td colspan="4">Year Five and Six Addition</td></tr>
<tr>
<td>Y5—add numbers with more than 4 digits. Add decimals with 2 decimal places, including money.

Y6—add several numbers of increasing complexity, including adding money, measure and decimals with different numbers of decimal points.</td>
<td>

Introduce decimal place value counters and model exchange for addition.</td>
<td>
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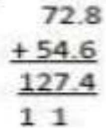
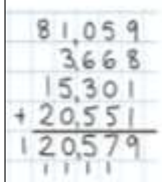
<td>

Insert zeros for place holders.
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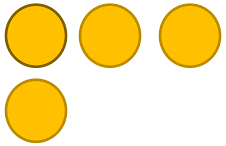
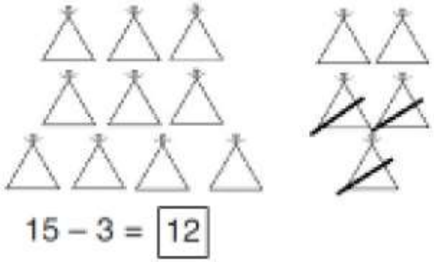
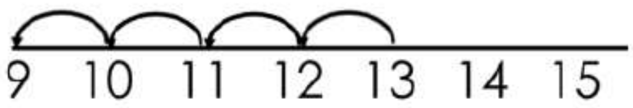
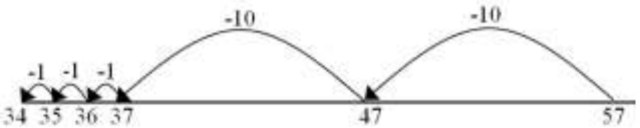
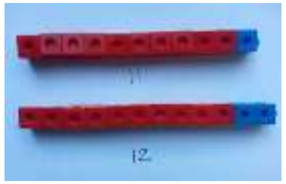
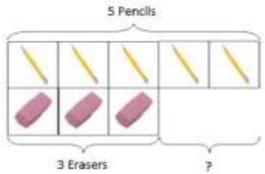
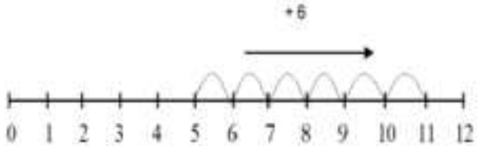
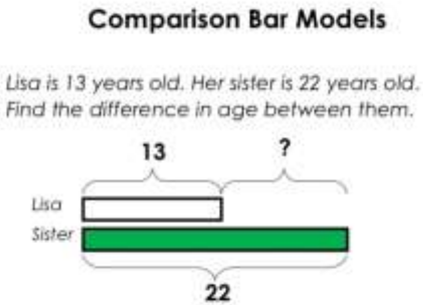
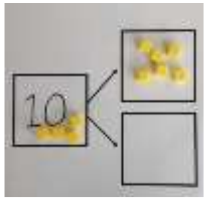
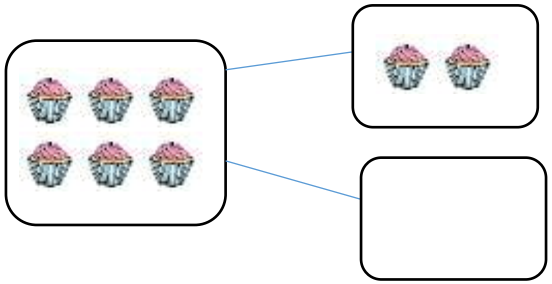
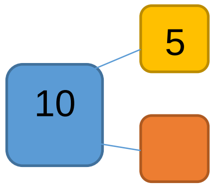
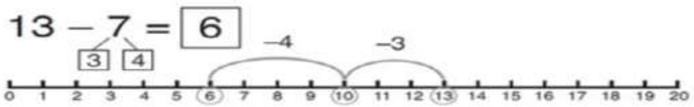
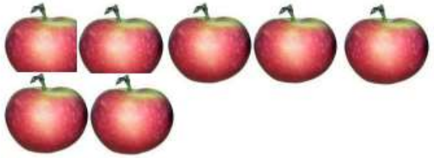
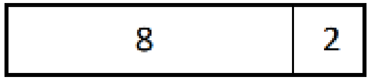
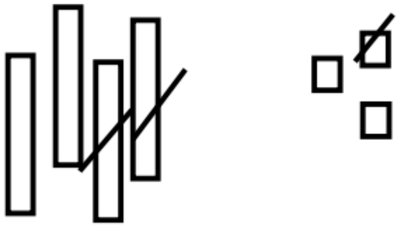
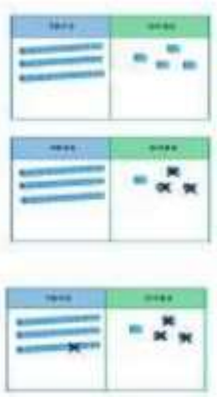
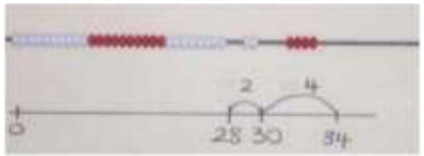
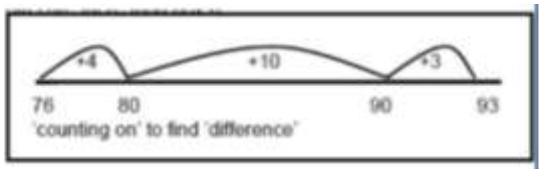
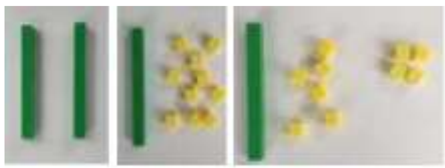
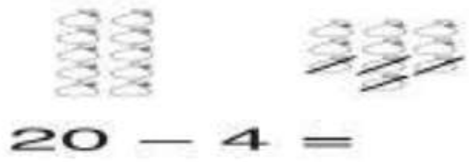
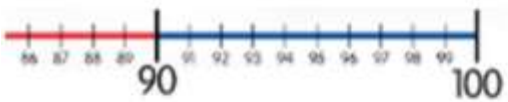
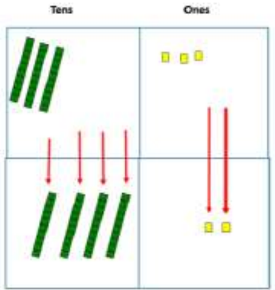
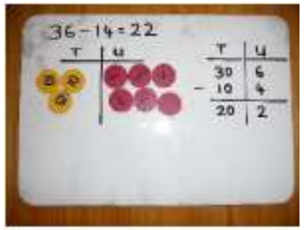
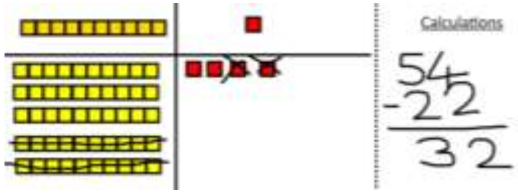
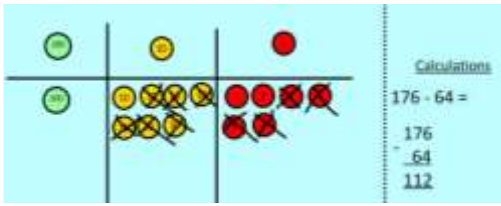
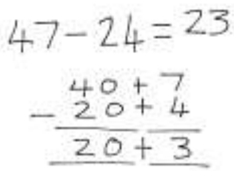
Subtraction

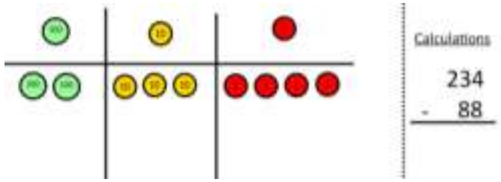
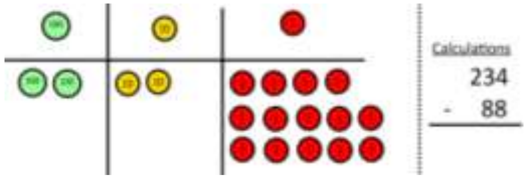
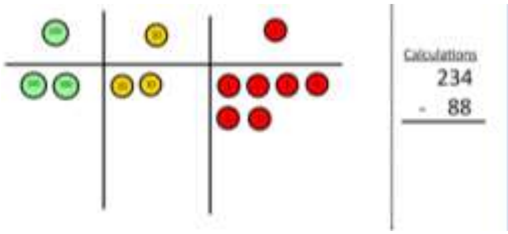
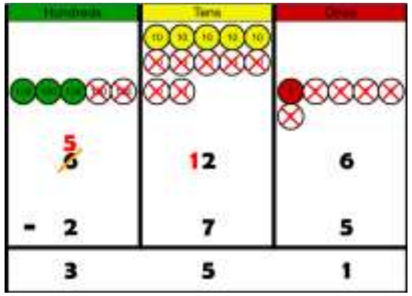
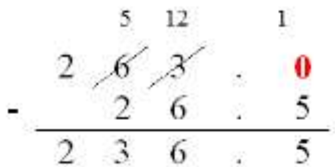
Objectives and Strategies	Concrete	Pictorial	Abstract
Year One Subtraction			
Taking away ones	Use physical objects, counters, cubes etc to show how objects can be taken away.  6 – 2 = 4 	Cross out drawn objects to show what has been taken away. 	18 - 3 =15 8 - 2 = 6
Counting back	Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones.  13 – 4 Use counters and move them away from the group as you take them away counting backwards as you go.	Count back on a number line or number track  Start at the bigger number and count back the smaller number showing the jumps on the number line.  This can progress all the way to counting back using two 2 digit numbers.	Put 13 in your head, count back 4. What number are you at? Use your fingers to help.

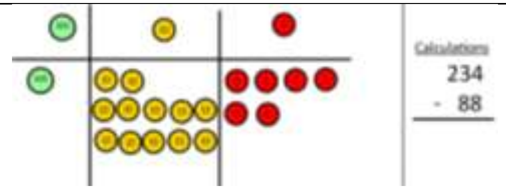
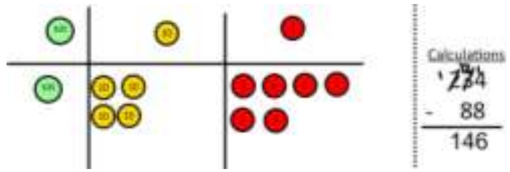
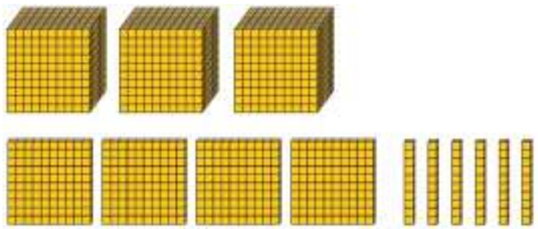
			
Find the difference	Compare amounts and objects to find the difference.  Use cubes to build towers or make bars to find the difference  Use basic bar models with items to find the difference	 Count on to find the difference. Draw bars to find the difference between 2 numbers. 	Hannah has 23 sandwiches, Helen has 15 sandwiches. Find the difference between the number of sandwiches.
	 Link to addition- use the part whole model to help explain the inverse between addition and subtraction. If 10 is the whole and 6 is one of the parts. What is the other part? 10 - 6 =	Use a pictorial representation of objects to show the part-part-whole model. 	 Move to using numbers within the part-whole model.

Make 10	14 – 9 =  Make 14 on the ten frame. Take away the four first to make 10 and then takeaway one more so you have taken away 5. You are left with the answer of 9.	 Start at 13. Take away 3 to reach 10. Then take away the remaining 4 so you have taken away 7 altogether. You have reached your answer.	16 – 8= How many do we take off to reach the next 10? How many do we have left to take off?
Bar Model	 5 —2 = 3		 10 = 8 + 2 10 = 2 + 8 10—2 = 8 10—8 = 2
Objectives and Strategies	Concrete	Pictorial	Abstract
Year Two Subtraction			
Partitioning to subtract without regrouping. ‘Friendly numbers’	34—13 = 21	Children draw representations of Dienes and cross off. 	43—21 = 22

	 Use Dienes to show how to partition the number when subtracting without regrouping.		
Make ten strategy. Progression should be crossing one ten, crossing more than one ten, crossing the hundreds.	34—28=  Use a bead bar or 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.	93—76 = 17
Regroup a ten into ten ones	 Use a PV chart to show how to change a ten into ten ones, use the term 'take and make'		20—4 = 16

Objectives and Strategies	Concrete	Pictorial	Abstract
Year Three Subtraction			
Subtract numbers mentally, including: three digit number + ones three digit number + tens three digit number + hundreds			Vary the position of the answer and question. Expose children to missing number questions and vary the missing part of the calculation. 678 = ? - 1 688 – 10 = ? 678 = ? – 100
Column method without regrouping	 Use Base 10 to make the bigger number then take the smaller number away. Show how you partition numbers to subtract. Again make the larger number first. 	Draw the Base 10 or place value counters alongside the written calculation to help to show working.  	 This will lead to a clear written column subtraction. 

Column method with regrouping	Use Base 10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with two exchanges. Make the larger number with the place value counters  Start with the ones, can I take away 8 from 4 easily? I need to exchange one of my tens for ten ones.  Now I can subtract my ones.  Now look at the tens, can I take away 8 tens easily? I need to exchange one hundred for ten tens.	 Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you make.  When confident, children can find their own way to record the exchange/regrouping. Just writing the numbers as shown here shows that the child understands the method and knows when to exchange/regroup.	 Children can start their formal written method by partitioning the number into clear place value columns.  Moving forward the children use a more compact method. This will lead to an understanding of subtracting any number including decimals. 

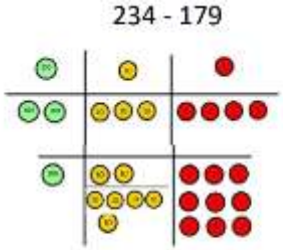
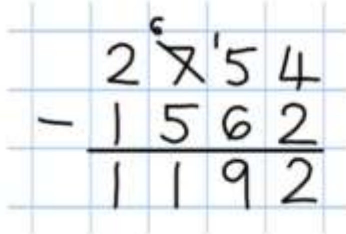
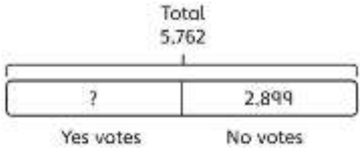
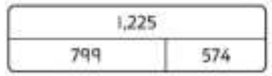
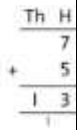
<table>
<tr>
<td></td>
<td>
Now I can take away eight tens and complete my subtraction

Show children how the concrete method links to the written method alongside your working. Cross out the numbers when exchanging and show where we write our new amount.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objectives and Strategies</td>
<td>Concrete</td>
<td>Pictorial</td>
<td>Abstract</td>
</tr>
<tr>
<td colspan="4">Year 4 Subtraction</td>
</tr>
<tr>
<td>Choosing mental methods where appropriate</td>
<td>Use place value equipment to justify mental methods.
</td>
<td>Use place value grids to support mental methods where appropriate.

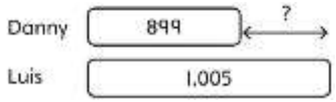
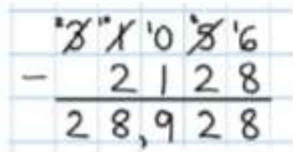
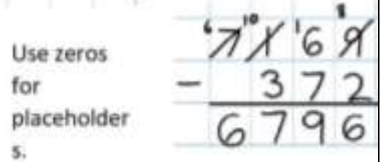
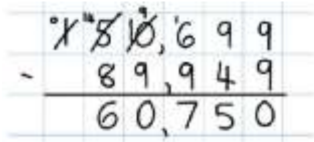
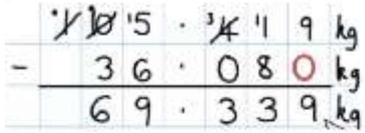
7,646 − 40 = 7,606</td>
<td>Use knowledge of place value and unitising to subtract mentally where appropriate.

3,501 − 2,000

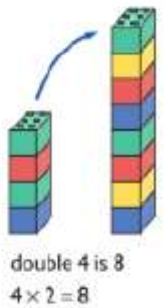
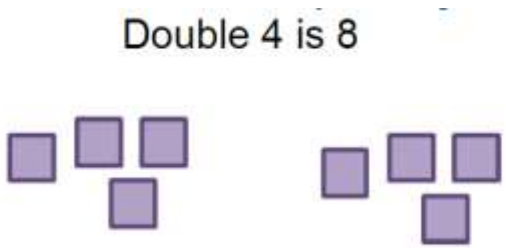
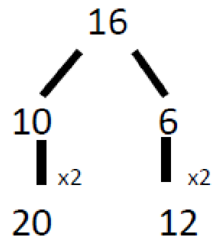
3 thousands − 2 thousands = 1 thousand

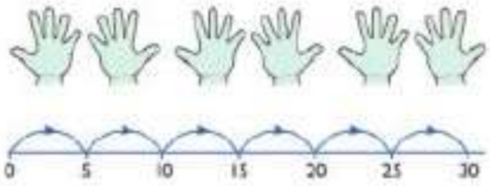
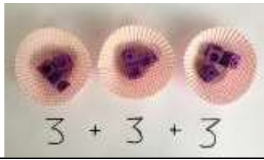
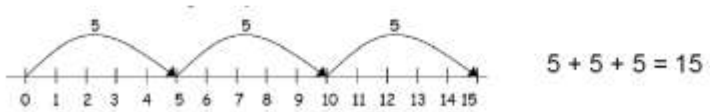
3,501 − 2,000 = 1,501</td>
</tr>
</table>

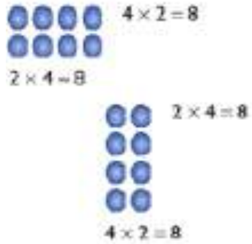
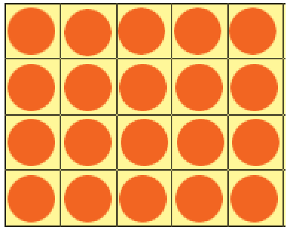
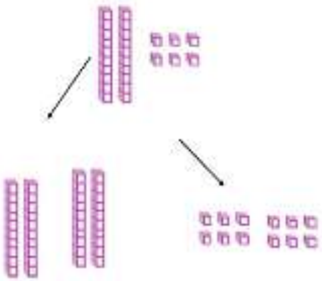
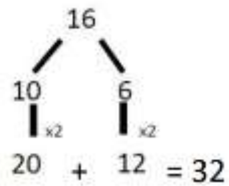
	What number will be left if we take away 300?		
Subtracting tens and ones. Year 4 subtract with up to 4 digits. Introduce decimal subtraction through context of money	 Model process of exchange using Numicon, Base Ten and then move to PV counters.	Children to draw PV counters and show their exchange—see Y3	 Use the phrase 'take and make' for exchange
Representing subtractions and checking strategies		Use bar models to represent subtractions where a part needs to be calculated.  I can work out the total number of Yes votes using 5,762 − 2,899. Bar models can also represent 'find the difference' as a subtraction problem.	Use inverse operations to check subtractions. I calculated 1,225 − 799 = 574. I will check by adding the parts.  

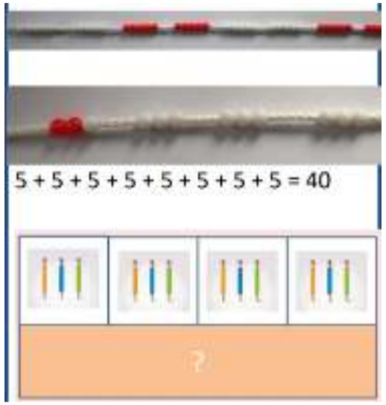
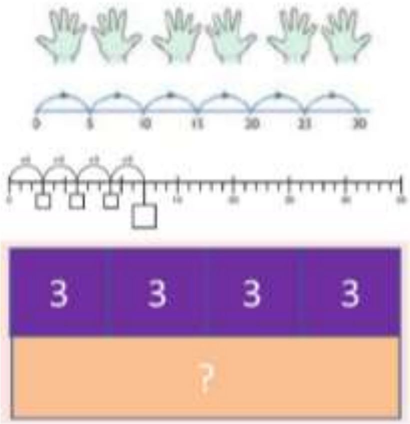
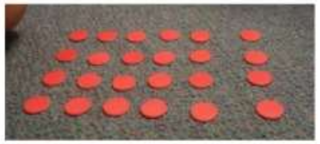
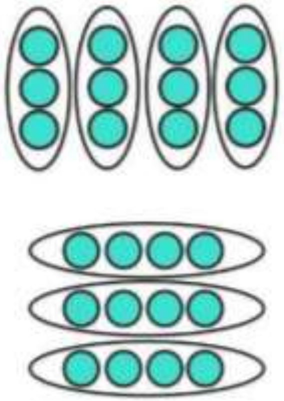
			The parts do not add to make 1,225. I must have made a mistake.
Objectives and Strategies	Concrete	Pictorial	Abstract
Year Five and Six Subtraction			
Year 5- Subtract with at least 4 digits, including money and measures. Subtract with decimal values, including mixtures of integers and decimals and aligning the decimal Up to 3 decimal places Year 6—Subtract with increasingly large and more complex numbers and decimal values (up to 3 decimal place).		Children to draw PV counters and show their exchange—see Y3 Children to draw PV counters and show their exchange—see Y3	 

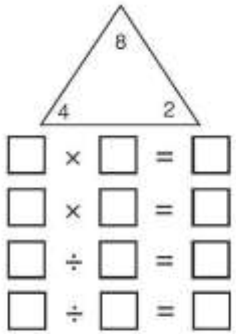
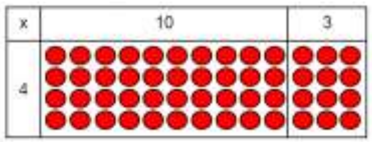
Multiplication

Objectives and Strategies	Concrete	Pictorial	Abstract
Year One Multiplication			
Doubling	Use practical activities to show how to double a number. 	Draw pictures to show how to double a number. 	 Partition a number and then double each part before recombining it back together.

Counting in multiples	  Count in multiples supported by concrete objects in equal groups.	 Use a number line or pictures to continue support in 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
Repeated addition	   Use different objects to add equal groups.	 	Write addition sentences to describe objects and pictures. 

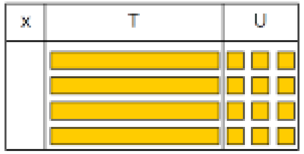
Arrays-showing commutative multiplication	Create arrays using counters/ cubes to show multiplication sentences.  	Draw arrays in different rotations to find **commutative** multiplication sentences.   Link arrays to area of rectangles.	Use an array to write multiplication sentences and reinforce repeated addition.  5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15
Objectives and Strategies	Concrete	Pictorial	Abstract
Year Two Multiplication			
Doubling	 Model doubling using dienes and PV counters. 40 + 12 = 52	Draw pictures and representations to show how to double numbers	Partition a number and then double each part before recombining it back together. 

Counting in multiples of 2, 3, 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. 	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 $4 \times 3 = \square$
Multiplication is commutative	Create arrays using counters and cubes and Numicon.    Pupils should understand that an array can represent different equations and that, as multiplication is commutative, the order of the	Use representations of arrays to show different calculations and explore commutativity. 	12 = 3 × 4 12 = 4 × 3 Use an array to write multiplication number sentences and reinforce repeated addition.  5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15

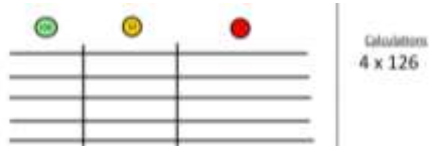
<table>
<tr><td></td><td>multiplication does not affect the answer.
 </td><td></td><td></td></tr>
<tr><td>Using the Inverse
This should be taught alongside division, so pupils learn how they work alongside each other.</td><td></td><td></td><td>2 x 4 = 8
4 x 2 = 8
8 ÷ 2 = 4
8 ÷ 4 = 2
8 = 2 x 4
8 = 4 x 2
2 = 8 ÷ 4
4 = 8÷ 2
Show all 8 related fact family sentences.</td></tr>
<tr><td>Objectives and Strategies</td><td>Concrete</td><td>Pictorial</td><td>Abstract</td></tr>
<tr><td colspan="4">Year Three Multiplication</td></tr>
<tr><td>Grid Method</td><td>Show the link with arrays to first introduce the grid method.

4 rows of 10
4 rows of 3

Move on to using Base 10 to move towards a more compact method.

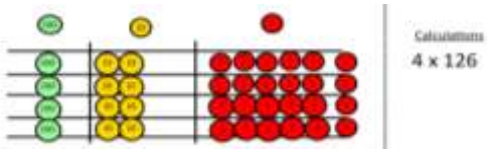
4 rows of 13</td><td>Children can represent the work they have done with PV counters in a way that they understand.</td><td>Start with multiplying by one digit numbers and showing the clear addition alongside the grid.
<table><tr><td>×</td><td>30</td><td>5</td></tr><tr><td>7</td><td>210</td><td>35</td></tr></table>210 + 35 = 245</td></tr>
</table>



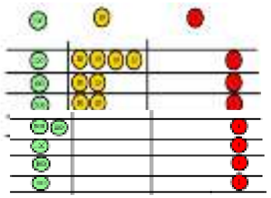
Move on to PV counters to show how we are finding groups of a number.We are multiplying by 4 so we need 4 rows.



Fill each row with 126.

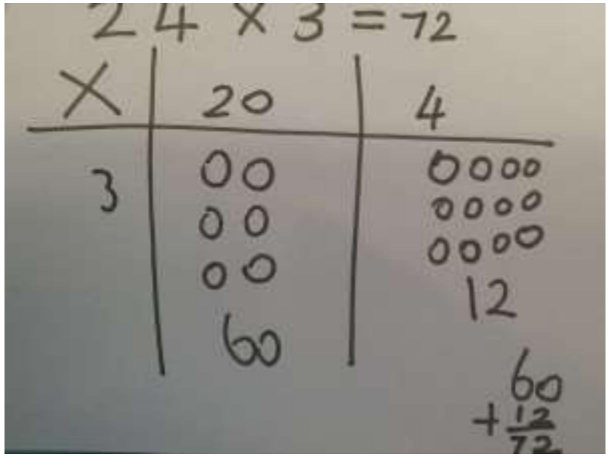


Add up each column, starting with the ones making any exchanges needed.



Then you have your answer.

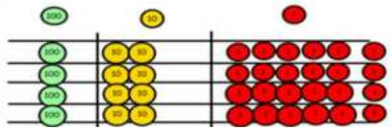
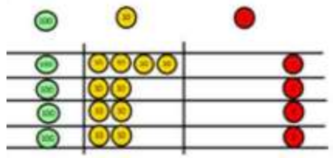
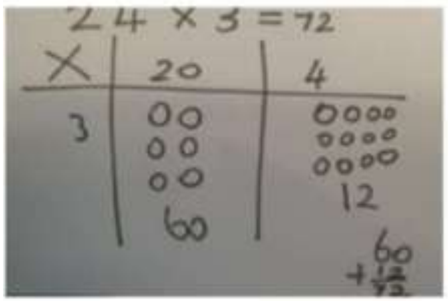
They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.

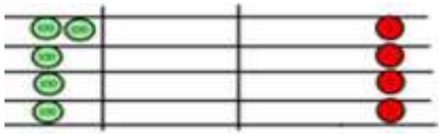
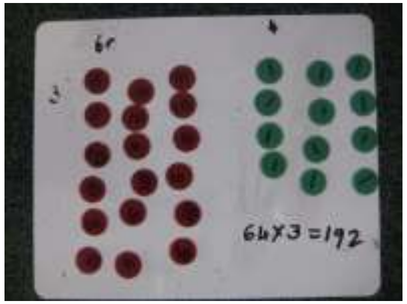
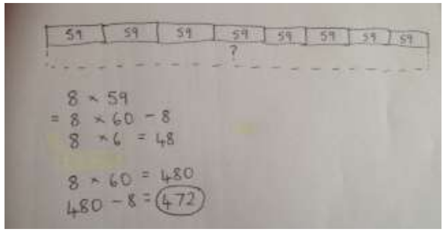
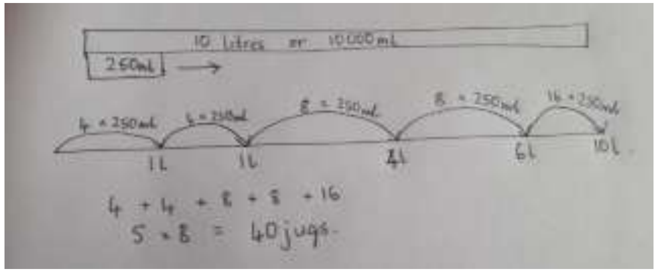


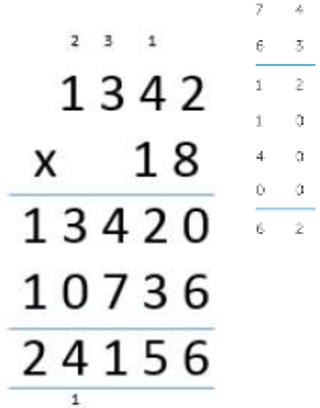
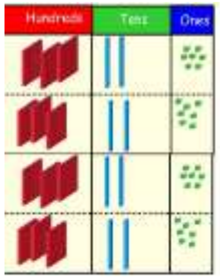
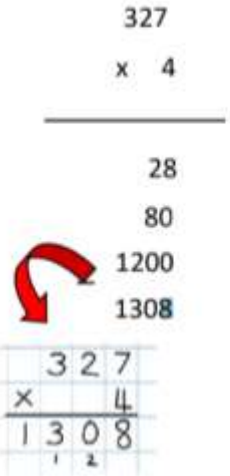
Moving forward, multiply by a 2 digit number showing the different rows within the grid method.

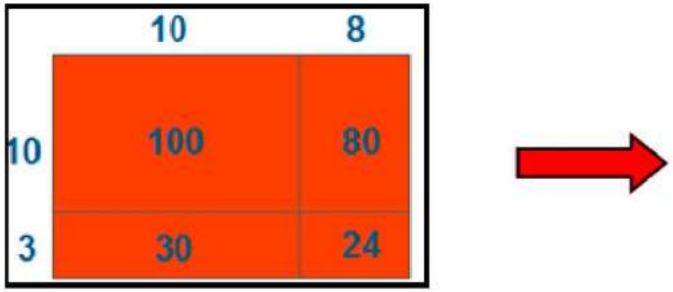
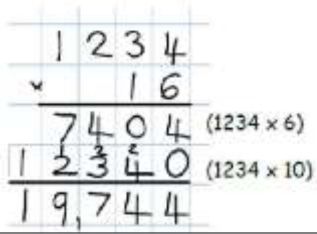
	10	8
10	100	80
3	30	24

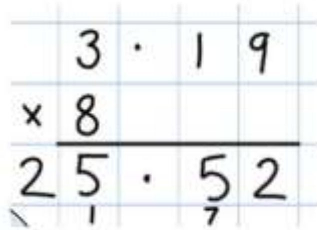
X	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16

Solve problems, including missing number problems, integer scaling problems,			Three times as high, eight times as long ? x 5 = 20 20 ÷ ? = 5 3 hats and 4 coats, how many different outfits?
Objectives and Strategies	Concrete	Pictorial	Abstract
Year Four Multiplication			
Grid Method Recap from Year 3 for 2-digits x 1-digit. Move to multiplying 3-digit by 1-digit,	Use PV counters to show how we are making groups of a number. We are multiplying by 4 so we need 4 rows.  Fill in each row with 126  Add up each column starting with the ones and exchange if needed.	Children to draw their work using place value counters to help them understand. Children can draw the counters using different colours or they can draw them in the appropriate columns. 	Start multiplying by using 1 digit numbers and show the clear addition next to the grid. × | 30 | 5 7 | 210 | 35 210 + 35 = 245

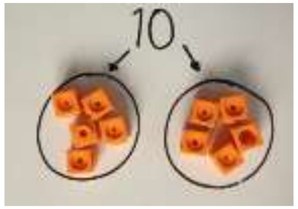
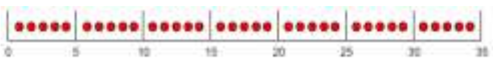
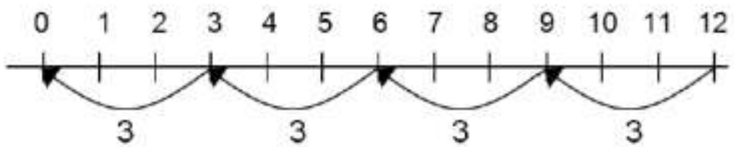
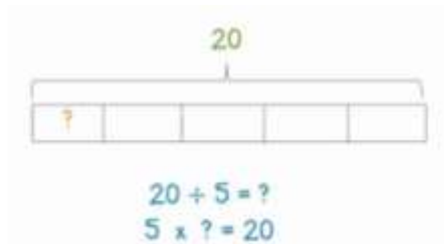
			
Column multiplication	Children can continue to be supported by PV counters at the stage of multiplication.  It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.	Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.   	Start with long multiplication, reminding the children about lining up their numbers clearly in columns. If it helps, children can write out what they are solving next to their answer. 32 x 24 8 (4 x 2) 120 (4 x 30) 40 (20 x 2) 600 (20 x 30) 768 This moves to the more compact method

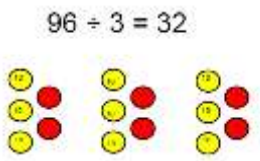
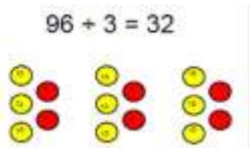
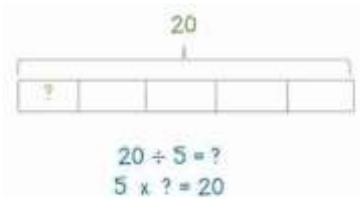
			
Objectives and Strategies	Concrete	Pictorial	Abstract
Year Five and Six Multiplication			
Column Multiplication for 3 and 4-digits x 1 digit.	 It is important at this stage that they always Multiply the ones first. Children can continue to be supported by PV counters at the stage of multiplication. This initially done where there is no regrouping. 321 x 2 = 642	x | 300 | 20 | 7 4 | 1200 | 80 | 28	

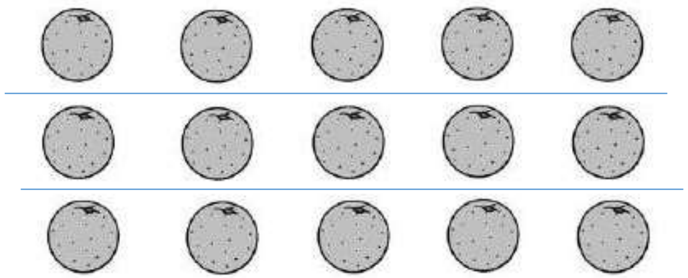
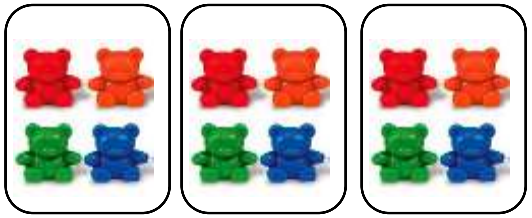
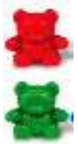
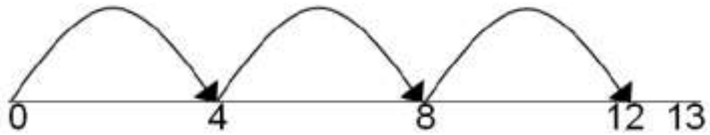
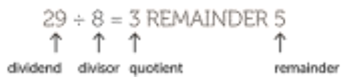
Column multiplication	Manipulatives may still be used with the corresponding long multiplication modelled alongside.	Continue to use bar modelling to support problem solving. 	 18 x 3 on the first row (8 x 3 =24, carrying the 2 for 20, then 1 x 3) 18 x 10 on the 2nd row. Show multiplying by 10 by putting zero in units first 
Multiplying decimals up to 2 decimal places by a single digit.			Remind children that the single digit belongs in the units column. Line up the decimal points in the question and the answer.

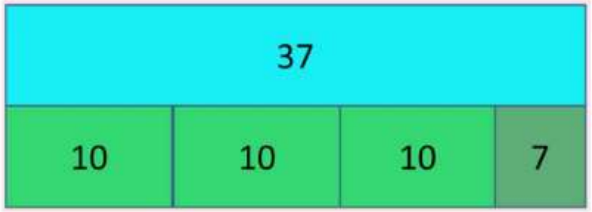
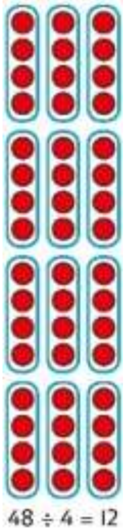
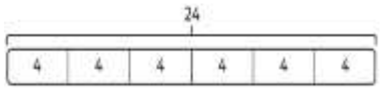
			 3 · 1 9 × 8 2 5 · 5 2 1 7

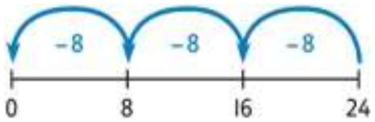
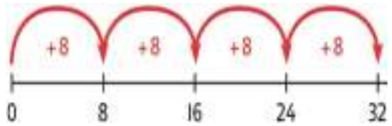
Division

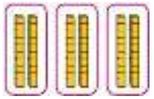
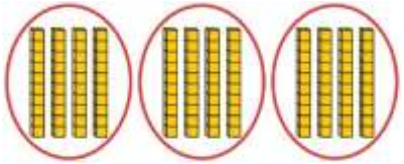
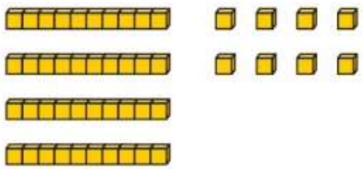
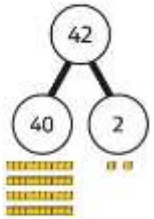
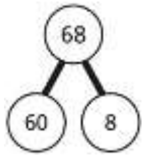
Objectives and Strategies	Concrete	Pictorial	Abstract
Year One Division			
Sharing objects into groups	 I have 10 cubes, can you share them equally in 2 groups?  	Children use pictures or shapes to share quantities.  $\boxed{8 \div 2 = 4}$	Share 9 buns between three people. $9 \div 3 = 3$
Division as grouping	Divide quantities into equal groups. Use cubes, counters, objects or PV counters to aid understanding.   	Use a number line to show jumps in groups. The number of jumps equals the number of groups.  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.  	$28 \div 7 = 4$ Divide 28 into 7 groups. How many are in each group?

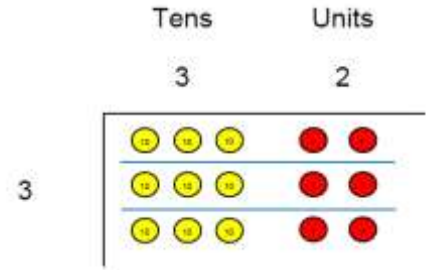
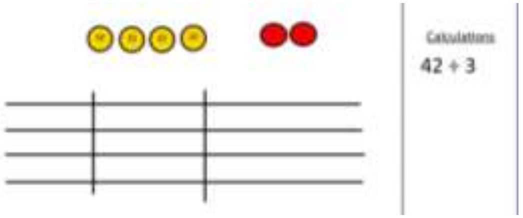
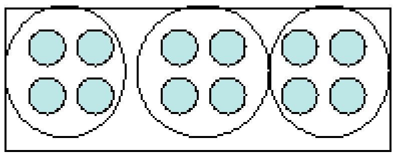
			
Objectives and Strategies	Concrete	Pictorial	Abstract
Year Two Division			
Division as grouping	Use cubes, counters, objects or PV counters to aid understanding.  24 divided into groups of 6 = 4 	Continue to use bar modelling to aid solving division problems. 	How many groups of 6 in 24? 24 ÷ 6 = 4

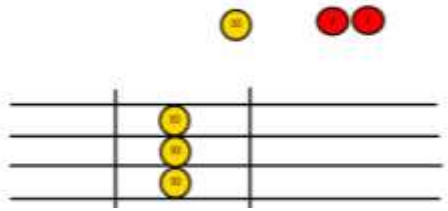
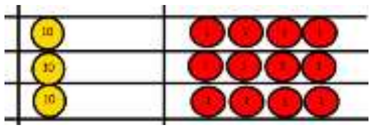
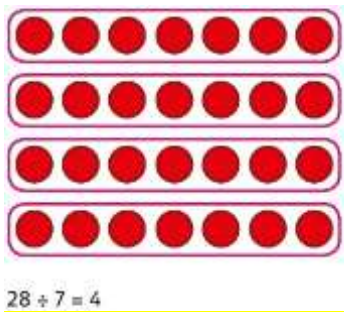
Division within arrays	 Link division to multiplication by creating an array and thinking about the number sentences that can be created. Eg 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15	 Draw an array and use lines to split the array into groups to make multiplication and division sentences.	Find the 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
Objectives and Strategies	Concrete	Pictorial	Abstract
Year Three Division			
Division with a remainder	14 ÷ 3 = Divide objects between groups and see how much is left over  	Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.  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. 

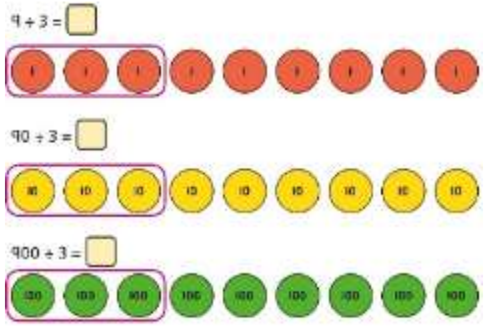
			
Using times-tables knowledge to divide	Use knowledge of known times-tables to calculate divisions.  24 divided into groups of 8. There are 3 groups of 8.	Use knowledge of known times-tables to calculate divisions.  48 divided into groups of 4. There are 12 groups.	Use knowledge of known times-tables to calculate divisions. I need to work out 30 shared between 5. I know that 6 × 5 = 30 so I know that 30 ÷ 5 = 6. A bar model may represent the relationship between sharing and grouping. 

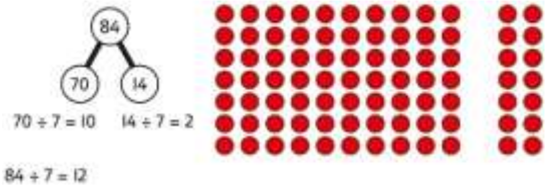
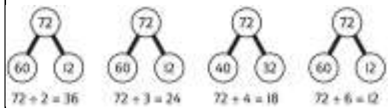
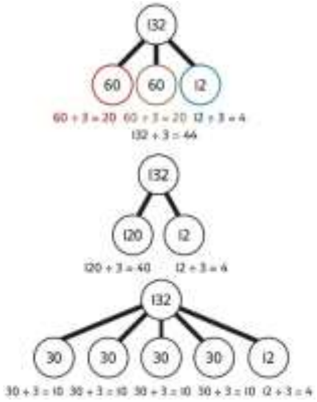
		4 × 12 = 48 48 ÷ 4 = 12	24 ÷ 4 = 6 24 ÷ 6 = 4 Children understand how division is related to both repeated subtraction and repeated addition.  24 ÷ 8 = 3  32 ÷ 8 = 4

Using known facts to divide multiples of 10	Use PV equipment to understand how to divide by unitising. Make 6 ones divided by 3.  Now make 6 tens divided by 3.  What is the same? What is different?	Divide multiples of 10 by unitising.  12 tens shared into 3 equal groups. 4 tens in each group.	Divide multiples of 10 by a single digit using known times-tables. 180 ÷ 3 = ? 180 is 18 tens. 18 divided by 3 is 6. 18 tens divided by 3 is 6 tens. 18 ÷ 3 = 6 180 ÷ 3 = 60
2-digit number divided by 1-digit number, no remainders	Children explore dividing 2-digit numbers by using PV equipment.  48 ÷ 2 = ?	Children explore which partitions support particular divisions. 	Children partition a number into 10s and 1s to divide where appropriate.  60 ÷ 2 = 30 8 ÷ 2 = 4

			30 + 4 = 34 68 ÷ 2 = 34
Objectives and Strategies	Concrete	Pictorial	Abstract
Year Four Division			
Divide at least 3-digit numbers by 1 digit Short division	 Use place value counters to divide using the bus stop method alongside  42 ÷ 3=	Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.  Encourage them to move towards counting in multiples to divide more efficiently.	Begin with divisions that divide equally with no remainder. 2 1 8 3 4 | 8 7 2 Move onto divisions with a remainder. 8 6 r 2 3 5 | 4 3 2

	Start with the biggest PV, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.  We exchange this ten for ten ones and then share the ones equally among the groups.  We look how much in 1 group so the answer is 14.		
Understanding the relationship between multiplication and division, including times-tables	Use objects to explore families of multiplication and division facts.  4 × 6 = 24 24 is 6 groups of 4. 24 is 4 groups of 6.	Represent divisions using an array.  	Understand families of related multiplication and division facts. I know that 5 × 7 = 35 so I know all these facts: 5 × 7 = 35 7 × 5 = 35 35 = 5 × 7 35 = 7 × 5 35 ÷ 5 = 7 35 ÷ 7 = 5

	24 divided by 6 is 4. 24 divided by 4 is 6.		7 = 35 ÷ 5 5 = 35 ÷ 7
Dividing multiples of 10 and 100 by a single digit	Use PV equipment to understand how to use unitising to divide.  8 ones divided into 2 equal groups 4 ones in each group 8 tens divided into 2 equal groups 4 tens in each group 8 hundreds divided into 2 equal groups	Represent divisions using place value equipment.  9 ÷ 3 = 3 9 tens divided by 3 is 3 tens. 9 hundreds divided by 3 is 3 hundreds.	Use known facts to divide 10s and 100s by a single digit. 15 ÷ 3 = 5 150 ÷ 3 = 50 1500 ÷ 3 = 500

	4 hundreds in each group		
Dividing 2-digit and 3-digit numbers by a single digit, using flexible partitioning	Use PV equipment to explore why different partitions are needed. 42 ÷ 3 = ? I will split it into 30 and 12, so that I can divide by 3 more easily.	Represent how to partition flexibly where needed. 84 ÷ 7 = ? I will partition into 70 and 14 because I am dividing by 7.  	Make decisions about appropriate partitioning based on the division required.  Understand that different partitions can be used to complete the same division. 

Objectives and Strategies	Concrete	Pictorial	Abstract
		Year Five and Six Division	

Long Division

```
  h t o
  0 4 1 R1
4 ) 1 6 5
```

4 does not go into 1 (hundred). So combine the 1 hundred with the 6 tens (160).

4 goes into 16 four times.

4 goes into 5 once, leaving a remainder of 1.

```
  th h t o
  0  4 0 0 R7
8 ) 3  2 0 7
```

8 does not go into 3 of the thousands. So combine the 3 thousands with the 2 hundreds (3,200).

8 goes into 32 four times (3,200 ÷ 8 = 400)
8 goes into 0 zero times (tens).
8 goes into 7 zero times, and leaves a remainder of 7.

$$\begin{array}{rr} & \text{h}\ \ \text{t}\ \ \text{o} \\ & 0\ 6\ 1 \\ 4\,) & \overline{2\ 4\ 7} \\ & \underline{-\ 4} \\ & 3 \end{array}$$

When dividing the ones, 4 goes into 7 one time. Multiply $1 \times 4 = 4$, write that four under the 7, and subract. This finds us the remainder of 3.

Check: $4 \times 61 + 3 = 247$

$$\begin{array}{rr} & \text{th}\ \ \text{h}\ \ \text{t}\ \ \text{o} \\ & 0\ 4\ 0\ 2 \\ 4\,) & \overline{1\ 6\ 0\ 9} \\ & \underline{-\ 8} \\ & 1 \end{array}$$

When dividing the ones, 4 goes into 9 two times. Multiply $2 \times 4 = 8$, write that eight under the 9, and subract. This finds us the remainder of 1.

Check: $4 \times 402 + 1 = 1{,}609$

1. Divide.	2. Multiply & subtract.	3. Drop down the next digit.
t o 2 2) 5 8	t o 2 2) 5 8 - 4 1	t o 2 9 2) 5 8 - 4 ↓ 1 8
Two goes into 5 two times, or 5 tens ÷ 2 = 2 whole tens -- but there is a remainder!	To find it, multiply 2 × 2 = 4, write that 4 under the five, and subtract to find the remainder of 1 ten.	Next, drop down the 8 of the ones next to the leftover 1 ten. You combine the remainder ten with 8 ones, and get 18.

1. Divide.	2. Multiply & subtract.	3. Drop down the next digit.
t o 2 9 2) 5 8 - 4 1 8	t o 2 9 2) 5 8 - 4 1 8 - 1 8 0	t o 2 9 2) 5 8 - 4 1 8 - 1 8 0
Divide 2 into 18. Place 9 into the quotient.	Multiply 9 × 2 = 18, write that 18 under the 18, and subtract.	The division is over since there are no more digits in the dividend. The quotient is 29.

1. Divide.	2. Multiply & subtract.	3. Drop down the next digit.
h t o 1 2) 2 7 8 Two goes into 2 one time, or 2 hundreds ÷ 2 = 1 hundred.	h t o 1 2) 2 7 8 -2 0 Multiply 1 × 2 = 2, write that 2 under the two, and subtract to find the remainder of zero.	h t o 1 8 2) 2 7 8 -2 ↓ 0 7 Next, drop down the 7 of the tens next to the zero.
Divide.	**Multiply & subtract.**	**Drop down the next digit.**
h t o 1 3 2) 2 7 8 -2 0 7 Divide 2 into 7. Place 3 into the quotient.	h t o 1 3 2) 2 7 8 -2 0 7 - 6 1 Multiply 3 × 2 = 6, write that 6 under the 7, and subtract to find the remainder of 1 ten.	h t o 1 3 2) 2 7 8 -2 0 7 - 6 1 8 Next, drop down the 8 of the ones next to the 1 leftover ten.
1. Divide.	**2. Multiply & subtract.**	**3. Drop down the next digit.**
h t o 1 3 9 2) 2 7 8 -2 0 7 - 6 1 8 Divide 2 into 18. Place 9 into the quotient.	h t o 1 3 9 2) 2 7 8 -2 0 7 - 6 1 8 - 1 8 0 Multiply 9 × 2 = 18, write that 18 under the 18, and subtract to find the remainder of zero.	h t o 1 3 9 2) 2 7 8 -2 0 7 - 6 1 8 - 1 8 0 There are no more digits to drop down. The quotient is 139.