Great and Little Shelford CE (A) Primary School Calculation Policy
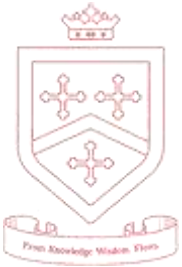
Year 1 Addition
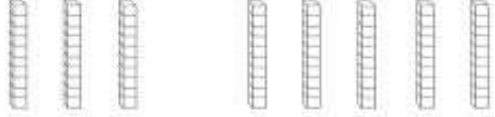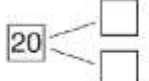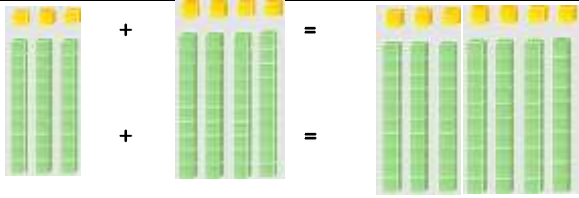
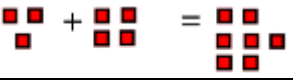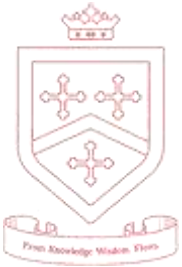| Objective	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part-whole model.	Use part whole model. Use cubes to add two numbers together as a group or a bar.	Use picture to add two numbers together as a group or in a bar.	$4 + 3 = 7$ $3 + 4 = 7$ $7 = 4 + 3$ $7 = 3 + 4$ Use the part-part 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 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.	$12 + 5 = 17$ Place the larger number in your head and count on the smaller number to find the answer.
Regrouping to make 10. This is an essential skill for column addition later.	$9 + 5 = 14$ Start the bigger number and use the smaller number to make 10. Use ten frames.	Use pictures or a number line. Regroup or partition the smaller number using the part-whole model to make 10. $9 + 5 = 14$	$9 + 5 = 14$ If I am at nine, how many more do I need to make 10. How many more do I add on now?
Represent and use number bonds and related subtraction facts within 20.	2 more than 5.		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

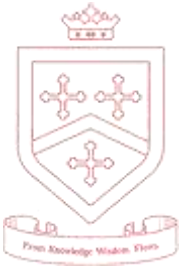| Objective	Concrete	Pictorial	Abstract
Adding multiples of 10.	$50 = 30 + 20$ Model using Base 10 and bead strings.	3 tens + 5 tens = ☐ tens $30 + 50 = ☐$ Use representations for base ten.	$20 + 30 = 50$ $80 = 30 + 50$ $40 + ☐ = 60$
Using known number facts. Part-whole.	Children explore ways of making numbers within 20.	20 ☐ ☐ ☐ + ☐ = 20 20 − ☐ = ☐ ☐ + ☐ = 20 20 − ☐ = ☐	☐ + 9 = 20 20 − 9 = ☐ 9 + ☐ = 20 20 − ☐ = 9
Using known facts.	+ = + =	.. + .. = .. || + ||| = ||||| ■ + ■ = ■ Children draw representations of H, T and O.	$3 + 4 = 7$ leads to $30 + 40 = 70$ leads to $300 + 400 = 700$
Bar model.	$3 + 4 = 7$	$3 + 4 = 7$	23 | 24 ? $23 + 24 = 27$

Year 2 Addition
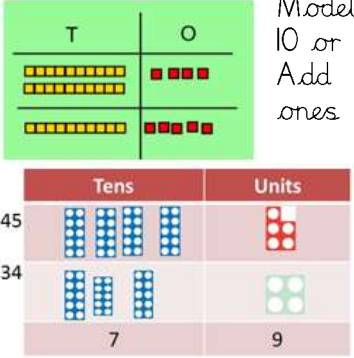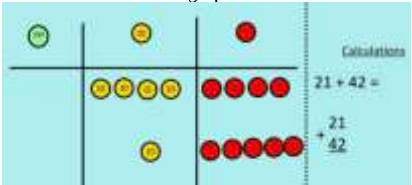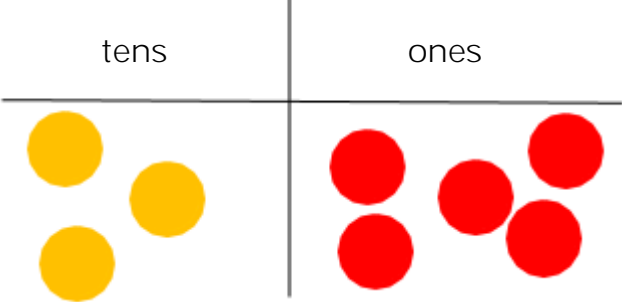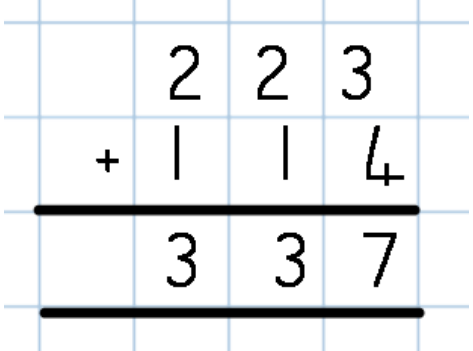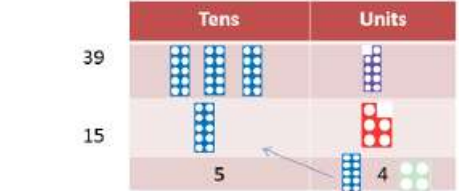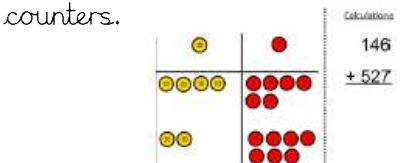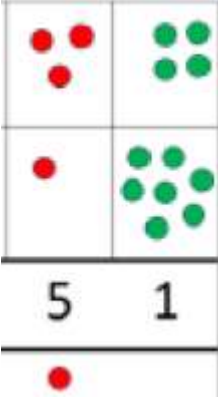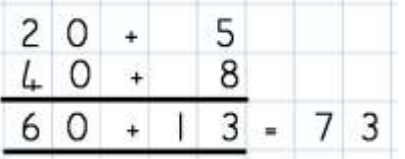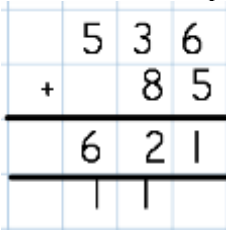
Objective	Concrete	Pictorial	Abstract
Add a 2-digit number and ones.	17 + 5 = 22 Use tens frames to make 'magic ten'. Children explore the pattern: 17 + 5 = 22 27 + 5 = 32	Use part whole and number line to model.	17 + 5 = 22 Explore related facts: 17 + 5 = 22 5 + 17 = 22 22 – 17 = 5 22 – 5 = 17
Add a 2-digit number and tens.	25 + 10 = 35 Explore that the ones digit does not change.	27 + 30 = 57 +10 +10 +10 27 37 47 57	27 + 10 = 37 37 + 10 = 47 47 + 10 = 57
Add two 2-digit numbers.	Model using Base 10, place value counters and Numicon.	Use a number line and bridge ten using part-whole if necessary.	25 + 47 20 + 5 40 + 7 20 + 40 = 60 5 + 7 = 12 60 + 12 = 72
Add three 1-digit numbers.	Combine to make ten first if possible, or bridge 10 then add the third digit.	Regroup and draw representation.	7 + 2 + 3 = 10 + 2 = 12 10 Combine the two numbers that make/bridge ten then add on the third.

Year 3 Addition
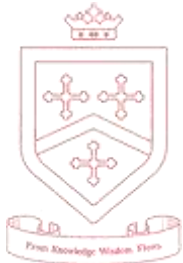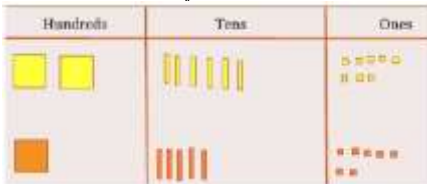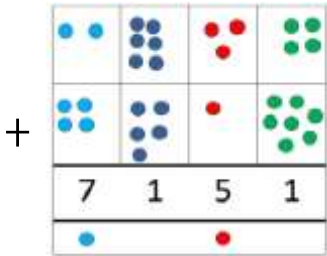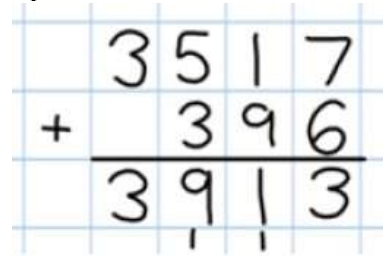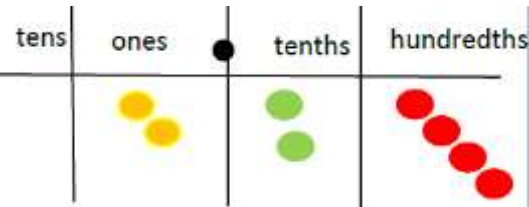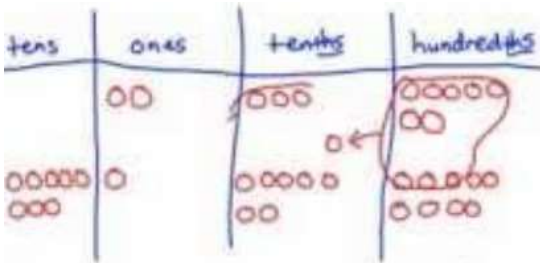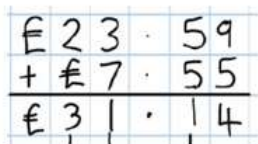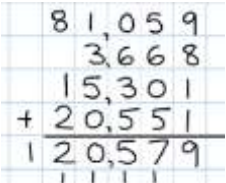
Objective	Concrete		Pictorial		Abstract
Column addition – no regrouping. Add two or three 2 or 3-digit numbers.		Model using Base 10 or Numicon. Add together the ones first, then the tens. Move to using place value counters. 	Children move to drawing the counters using a tens and ones frame. tens ones 		 Add the ones first, then the tens, then the hundreds.
Column addition with regrouping.	 Exchange ten ones for a ten. Model using Numicon and place value counters. 146 + 527		Children can draw a representation of the grid to further support their understanding, exchanging the ten underneath the line.	20 + 5 40 + 8 60 + 13 = 73 partitioning numbers before formal column to show the exchange.	Start by 536 + 85 621
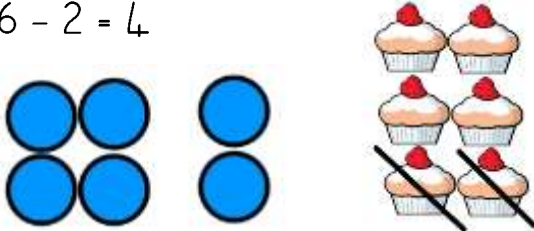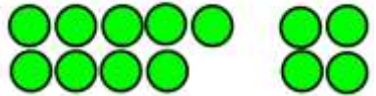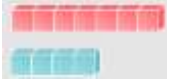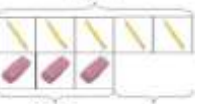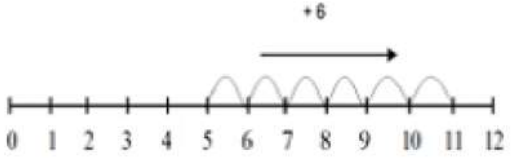
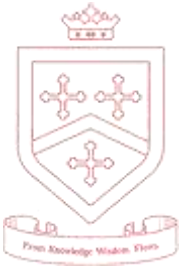| Objective	Concrete	Pictorial	Abstract
Y4 – Add numbers with up to 4 digits.	Children continue to use Base 10 or place value counters to add, exchanging ten ones for a ten and ten tens for a hundred and ten hundreds for a thousand.	Draw representations using a place value grid.	Continue from previous work to exchange hundreds as well as tens.
Y5 – 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.	2.37 + 81.79	Relate to money and measures.
Y6 – Add several numbers of increasing complexity. Including adding money, measure and decimals with different numbers of decimal points.	As Year 5.	As Year 5.	 Add zeros for place holders.

Year 1 Subtraction
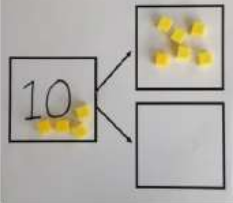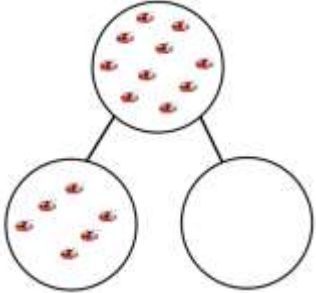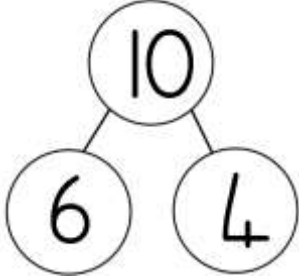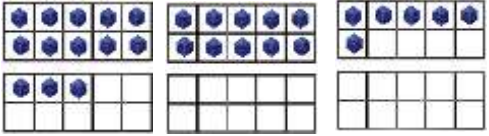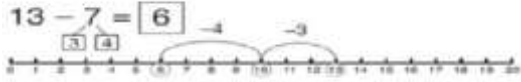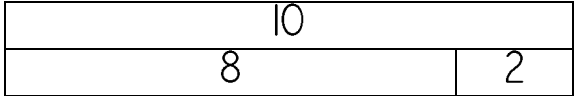
Objective	Concrete	Pictorial	Abstract
Taking away ones.	Use physical objects, counters, cubes etc to show how objects can be taken away. $6 - 2 = 4$	Cross out drawn objects to show what has been taken away. $6 - 2 = 4$ First / Next / Then	$6 - 2 = 4$ $4 = 6 - 2$
Counting back.	Move objects away from the group, counting backwards. Move the beads along the bead string as you count backwards.	Count back in ones using a number line. $13 - 4 = 9$	Put 13 in your head, count back 4. What number are you at?
Find the difference.	Compare objects and amounts. Seven is 3 more than 4. "I am 2 years older than my sister." Lay objects to represent a bar model.	Count on using a number line to find the difference. +6	Hannah has 11 sweets and her sister has 5. How many more does Hannah have than her sister?
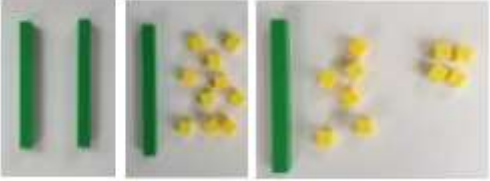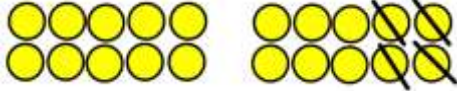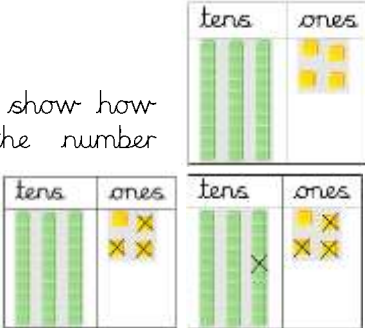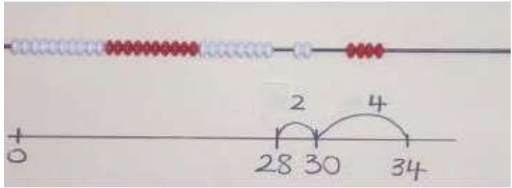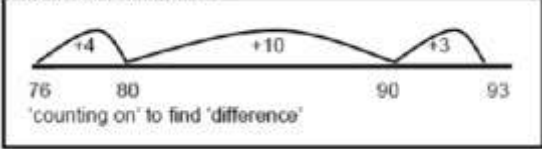
Year 1 Subtraction

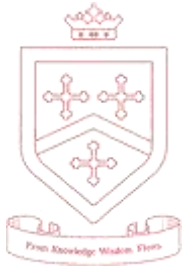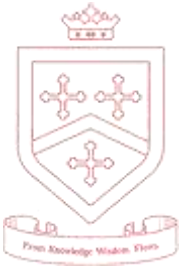| Objective	Concrete	Pictorial	Abstract
Represent and use number bonds and related subtraction facts within 20. Part-whole model.	Link to addition. Use part-whole model to model the inverse. If 10 is the whole and 6 is one of the parts, what is the other part? 10 – 6 = 4	Use pictorial representations to show the part.	Move to using numbers within the part whole model.
Represent and use number bonds and related subtraction facts within 20. Make 10	13 – 7 Make 13 on the ten frame. Take away 3 to make 10, then take away 3 more so that you have taken away 7.	13 – 7 13 – 7 = 6 Jump back 3 first, then another 4. Use ten as the stopping point.	13 – 7 How many do we take away first to get to 10? How many left to take away?
Represent and use number bonds and related subtraction facts within 20. Bar model	10 – 2 = 8		10 8 2 10 = 8 + 2 10 = 2 + 8 10 - 2 = 8 10 - 8 = 2
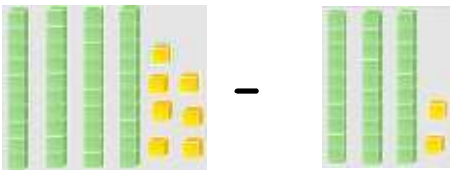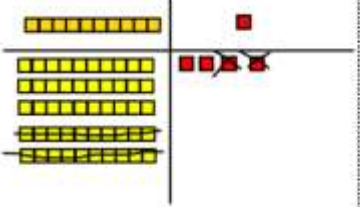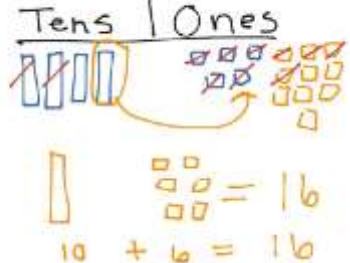
Year 2 Subtraction

Objective	Concrete	Pictorial	Abstract
Regroup a ten into ten ones.	Use a place value chart to show how to change a ten into ten ones, use the term 'exchange'.	$20 - 4 =$	$20 - 4 = 16$
Partition to subtract without regrouping.	$34 - 13 = 21$ Use Base 10 to show how to partition the number when subtracting without regrouping.	Children draw representations of Base 10 and cross off. $34 - 13 = 21$	$34 - 13 = 21$
Make ten strategy. Progression should be crossing one ten, crossing more than one ten, crossing the hundreds.	$34 - 28 = 6$ Use a bead string to model counting to the next ten and the rest.	'counting on' to find 'difference' Use a number line to count on to the next ten and then the rest.	$93 - 76 = 17$

Year 3 Subtraction

Objective	Concrete	Pictorial	Abstract
Column subtraction without regrouping.	Use Base 10 or Numicon to model. 47 - 32	Draw representations to support understanding.	Intermediate step may be needed to lead to clear subtraction understanding.
Column subtraction with regrouping.	Begin with Base 10 or Numicon. Move to place value counters, modelling the **exchange** of a ten to ten ones.	Children may draw Base 10 or place value counters and cross off.	Begin by partitioning into place value columns. Then move to the formal method.

Year 4, 5, 6 Subtraction

Objective	Concrete	Pictorial	Abstract
Subtracting tens and ones. Y4 – subtract with up to 4 digits. Introduce decimal subtraction through the context of money.	234 - 179 Model process of exchange using Numicon, Base 10 and then move to place value counters.	Children to draw place value counters and show their exchange – see Year 3.	
Y5 – Subtract with at least 4 digits, including money and measures. Subtract with decimal values, including mixtures of integers and decimals and aligning the decimal.	As Year 4.	Children to draw place value counters and show their exchange – see Year 3.	 Use zeros for place holders.
Y6 – Subtract with increasingly large and more complex numbers and decimal values.			

Year 1 Multiplication
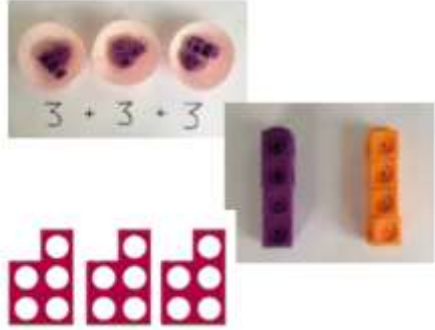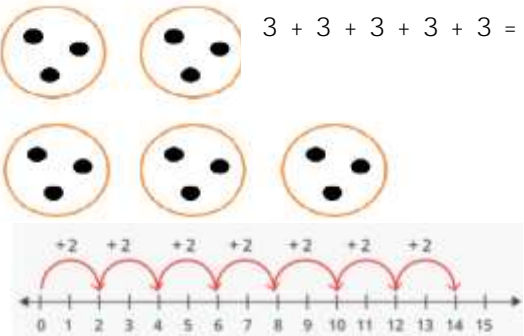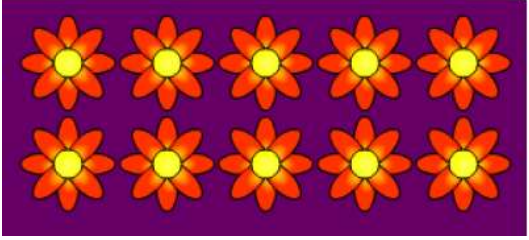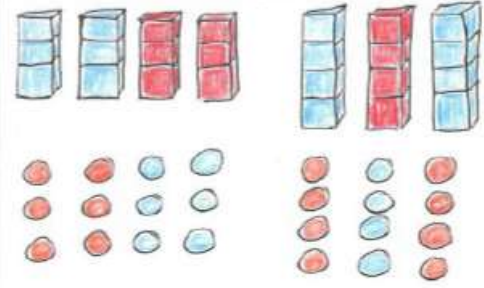
Objective	Concrete	Pictorial	Abstract
Doubling	Use practical activities using manipulatives including cubes and Numicon to demonstrate doubling.	Draw pictures to show how to double numbers. Double 4 is 8.	
Counting in multiples.	Count the groups as children are skip counting, children may use their fingers as they are skip counting.	Children make representations to show counting in multiples.	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25, 30
Making equal groups and counting the total.	Use manipulatives to create equal groups.	Draw and make representations. $2 \times 4 = 8$	$2 \times 4 = 8$

Year 1 Multiplication
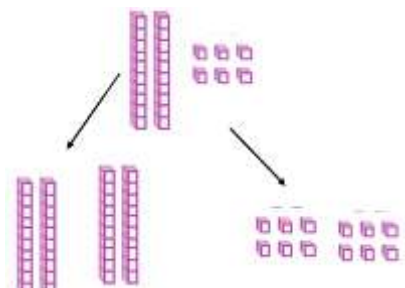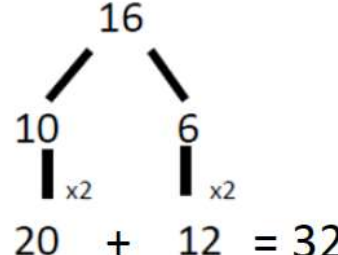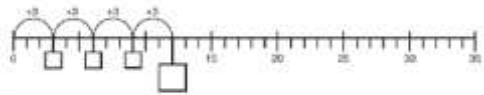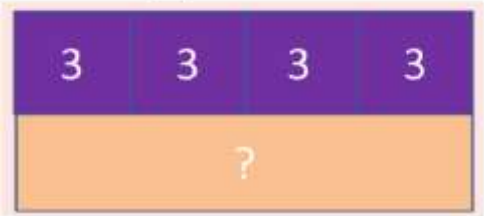
Objective	Concrete	Pictorial	Abstract
Repeated addition.	Use different objects to add equal groups.	Use pictorial representations, including number lines, to solve problems. $3 + 3 + 3 + 3 + 3 = 15$	Write addition equations to describe objects with pictures. $2 + 2 + 2 + 2 + 2 = 10$
Understanding arrays.	Use objects laid out in arrays to find the answers to 2 lots of 5, 3 lots of 2 etc.	Draw representations of arrays to show understanding.	$3 \times 2 = 6$ $2 \times 5 = 10$
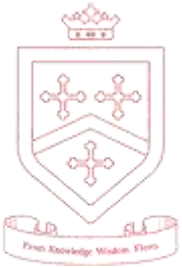
Year 2 Multiplication
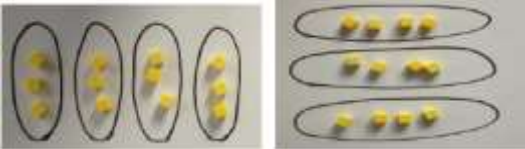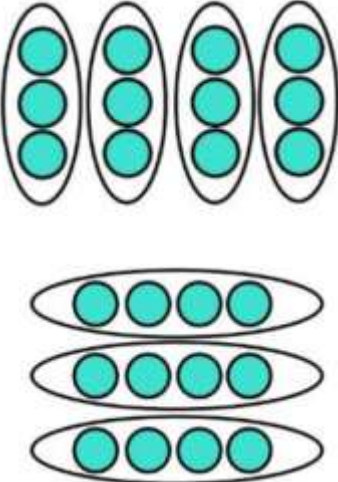
Objective	Concrete	Pictorial	Abstract
Doubling	Model doubling using Base 10 and place value counters. Double 26 40 + 12 = 52	Draw pictures and representations to show how to double numbers.	Partition a number and then double each part before recombining it back together. 16 10 6 x2 x2 20 + 12 = 32
Counting 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. 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 40 ?	Number lines and bar models should be used to show representations of counting in multiples. 3 3 3 3 ?	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 × 3 = ☐

Year 2 Multiplication
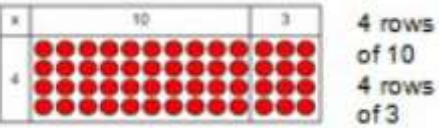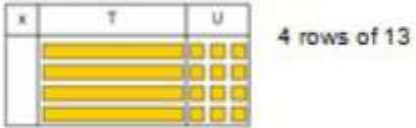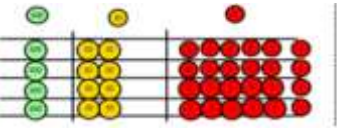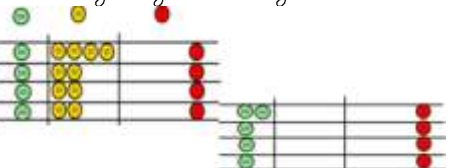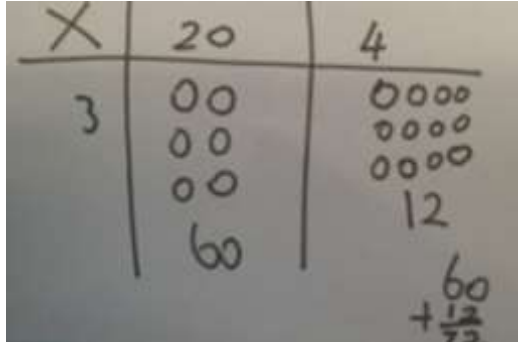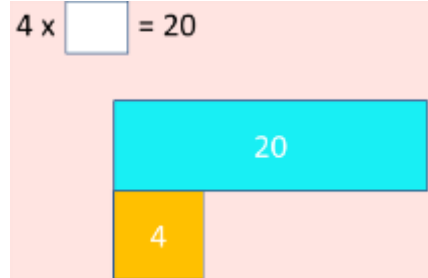
Objective	Concrete	Pictorial	Abstract
Multiplication is commutative.	Create arrays using counters, cubes and Numicon. Children should understand that an array can represent different equations and that, as multiplication is commutative, the order of the multiplication does not affect the answer.	Use representation of arrays to show different calculations and explore commutativity.	$12 = 3 \times 4$ $12 = 4 \times 3$ Use an array to write multiplication equations and reinforce repeated addition. $5 + 5 + 5 = 15$ $3 + 3 + 3 + 3 + 3 = 15$ $5 \times 3 = 15$ $3 \times 5 = 15$
Using the inverse. This should be taught alongside division, so children learn how they work alongside each other.		$\square \times \square = \square$ $\square \times \square = \square$ $\square \div \square = \square$ $\square \div \square = \square$	Show all 8 related fact family equations. $2 \times 4 = 8 \qquad 8 \div 2 = 4$ $4 \times 2 = 8 \qquad 8 \div 4 = 2$ $8 = 2 \times 4 \qquad 4 = 8 \div 2$ $8 = 4 \times 2 \qquad 2 = 8 \div 4$

Year 3 Multiplication
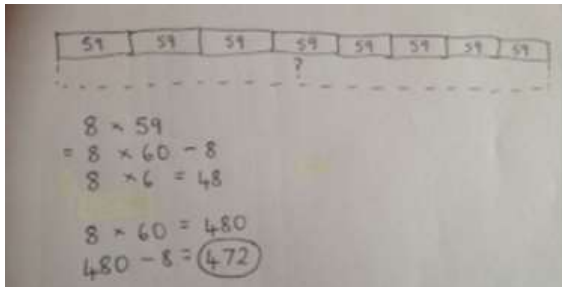
Objective	Concrete	Pictorial	Abstract
Grid method	Show the links with arrays to first introduce the grid method. 4 rows of 10 4 rows of 3 Move onto Base 10 to move towards a more compact method. 4 rows of 13 Move onto place value counters to show how we are finding groups of a number. We are multiplying by 4 so need 4 rows. Calculations 4 x 126 Fill each row with 126. Calculations 4 x 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. The can draw counters using colours to show different amounts or just use the circles in the different columns to show their thinking as shown. $24 \times 3 = 72$ Bar models are used to explore missing numbers. $4 \times \boxed{} = 20$ 20 4	Start with multiplying by 1-digit numbers and showing the clear addition alongside the grid. $35 \times 7 = 245$ | ×	30	5
7	210	35 | $210 + 35 = 245$ Moving forward, multiply by a 2-digit number showing the different rows within the grid method. $18 \times 13 = 234$ |	10	8
10	100	80
3	30	24	
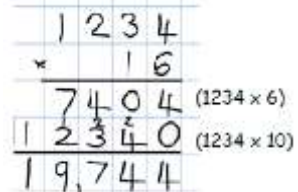
Year 4 Multiplication
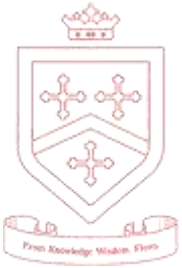
Objective	Concrete	Pictorial	Abstract
Grid method recap from Year 3 for 2-digits by 1-digit. Move to multiplying 3-digit numbers by 1-digit.	See Year 3.	See Year 3.	See Year 3.
Column multiplication.	Children can continue to be supported by Base 10 and place value counters at this stage of multiplication. This is initially done where there is no regrouping. $321 \times 2 = 642$ It is important at this stage that children always multiply the ones first.	 The grid method may be used to show how this relates to a formal written method. Bar modelling and number lines can support children when solving problems with multiplication alongside the formal written methods.	 This may lead to a compact method.

Year 5, 6 Multiplication

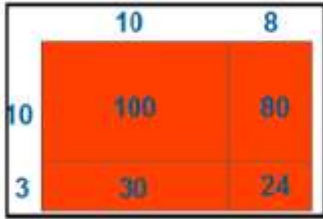| Objective	Concrete	Pictorial	Abstract
Column multiplication for 3 and 4 digits by 1-digit.	See Year 4.	See Year 4.	See Year 4.
Column multiplication	Manipulatives may still be used with the corresponding long multiplication method modelled alongside.	Continue to use bar modelling to support problem solving.	18 x 3 on the first row. (8 x 3 = 24, exchanging the 2 for 20, then 1 x 3) 18 x 10 on the 2nd row. Show multiplying by 10 by putting a zero in the units first.
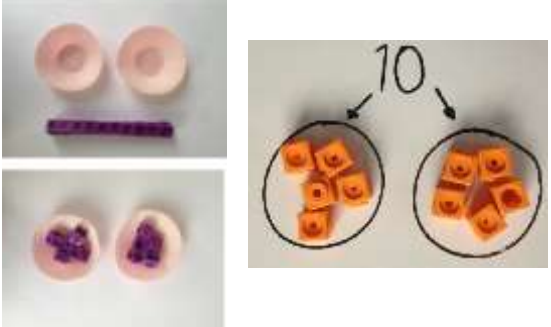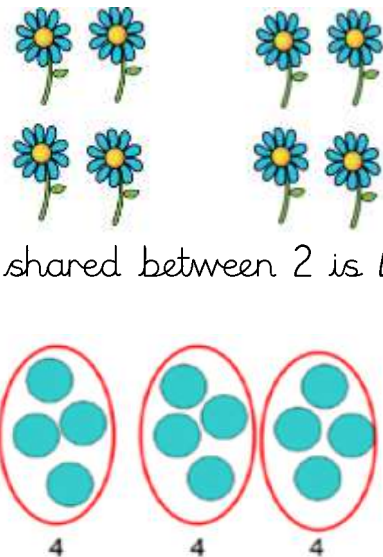
Year 6 Multiplication

Objective	Concrete	Pictorial	Abstract
Multiply 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 answer.

Year 1 Division
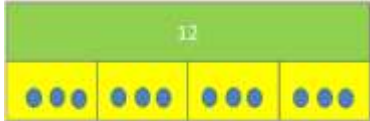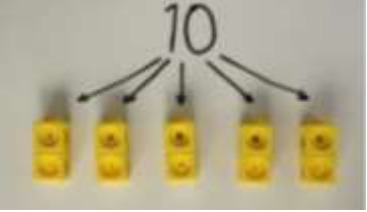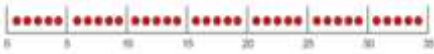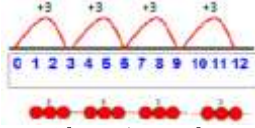
Objective	Concrete	Pictorial	Abstract
Division as sharing.	I have 10 cubes, can you share them equally into 2 groups?	Children use pictures or shapes to share quantities. 8 shared between 2 is 4. 12 shared between 3 is 4.	12 shared between 3 is 4.
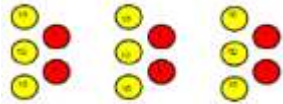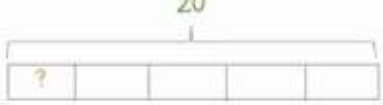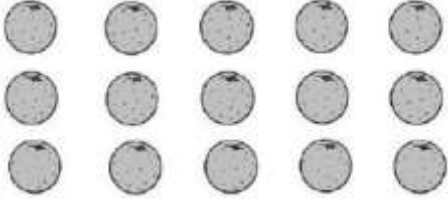
Year 2 Division

Objective	Concrete	Pictorial	Abstract
Division as sharing.	See Year 1.	Children use pictures or shapes to share quantities. $8 \div 2 = 4$ Children use bar modelling to show and support understanding. $12 \div 3 = 4$	$12 \div 3 = 4$
Division as grouping.	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.	Use number lines for grouping. $12 \div 4 = 3$ Think of the bar model as a whole. Split it into the number of groups you are dividing by and work out how many would be within the group. $20 \div 5 = ?$ $5 \times ? = 20$	$28 \div 7 = 4$ Divide 28 into 7 groups. How many are in each group?

Year 3 Division
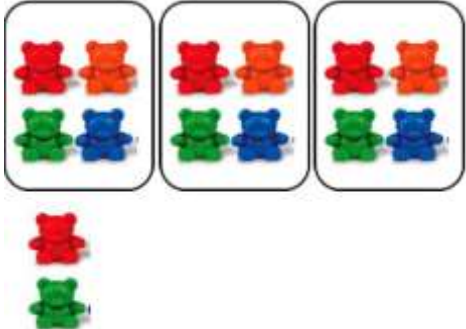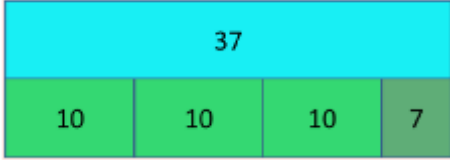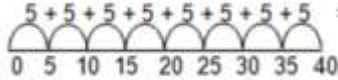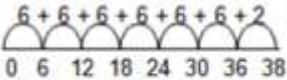
Objective	Concrete	Pictorial	Abstract
Division as grouping.	Use cubes, counters, objects or place value counters to aid understanding. 24 divided into groups of 6 = 4 96 ÷ 3 = 32	Continue to use bar modelling to aid solving division problems. 20 ÷ 5 = ? 5 × ? = 20	How many groups of 6 in 24? 24 ÷ 6 = 4
Division with arrays.	Link division to multiplication by creating an array and thinking about the equations that can be created. e.g. 15 ÷ 3 = 5 5 × 3 = 15 15 ÷ 5 = 3 3 × 5 = 15	Draw an array and use lines to split the array into groups to make multiplication and division equations.	Find the inverse of multiplication and division equations by creating eight linking equations. 15 ÷ 3 = 5 5 × 3 = 15 15 ÷ 5 = 3 3 × 5 = 15 5 = 15 ÷ 3 15 = 5 × 3 3 = 15 ÷ 5 15 = 3 × 5

Year 3 Division

Objective	Concrete	Pictorial	Abstract
Division with remainders.	$14 \div 3 =$ 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. remainder 2 Use bar models to show division with remainders. 37 10 10 10 7 Example without remainder: 40 ÷ 5 Ask "How many 5s in 40?" 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 8 fives 0 5 10 15 20 25 30 35 40 Example with remainder: 38 ÷ 6 6 + 6 + 6 + 6 + 6 + 6 + 2 = 6 sixes with a remainder of 2 0 6 12 18 24 30 36 38 For larger numbers, when it becomes inefficient to count in single multiples, bigger jumps can be recorded using known facts.	Complete written divisions and show the remainder using r. $29 \div 8 = 3 \ r5$ dividend divisor quotient remainder

Year 4, 5, 6 Division

Objective	Concrete	Pictorial	Abstract
Divide at least 3-digit numbers by 1-digit. Short division.	96 ÷ 3 tens ones 3 2 3 Use place value counters to divide using the bus stop method alongside. Calculations 42 ÷ 3 Start with the biggest place value, we are sharing 40 into three groups. We can put one ten in each group and we have one left over. We exchange this ten for ten ones and then share the ones equally among the groups. We look at how much is in one group so the answer is 14.	Children 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 Finally move into decimal places to divide the total accurately. 1 4 . 6 16 21 3 5	5 1 1 . 0

Long Division

Step 1 – A remainder in the ones.

```
      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 (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.

```
      h t o
    0 6 1
  4 ) 2 4 7
    - 4
      3
```
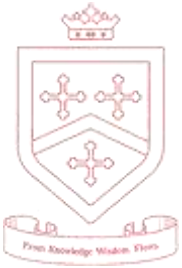
When dividing the ones, 4 goes into 7 one time. Multiply 1 x 4 = 4, write that four under the 7, and subtract. This finds the remainder of 3.
Check: 4 x 61 + 3 = 247

```
    th h t o
    0 4 0 2
  4 ) 1 6 0 9
    - 8
      1
```

When dividing the ones, 4 goes into 9 twice. Multiply 2 x 4 = 8, write that 8 under the 9, and subtract. This finds us the remainder of 1.
Check: 4 x 402 + 1 = 1,609

Year 6 Division

Long Division		

Step 2 – A remainder in the tens.

1. Divide	2. Multiply and Subtract	3. Drop down the next digit
Two goes into 5 twice, or 5 tens ÷ 2 = 2 whole tens – but there is a remainder!	To find it, multiply 2 x2 = 4, write that 4 under the 5, 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 and Subtract	3. Drop down the next digit
Divide 2 into 18. Place 9 into the quotient.	Multiply 9 x 2 = 18, write that 18 under the 18, and subtract.	This division is over since there are no more digits in the dividend. The quotient is 29.
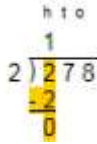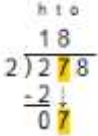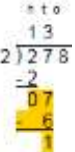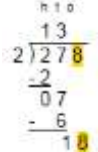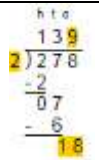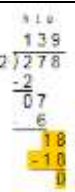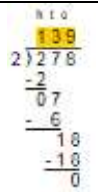
Year 6 Division

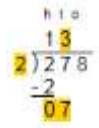| Long Division		

Step 3 – A remainder in any of the place values.

1. Divide	2. Multiply and Subtract	3. Drop down the next digit
Two goes into 2 once, or 2 hundreds ÷ 2 = 1 hundred.	Multiply 1 x 2 = 2, write that 2 under the 2, and subtract to find the remainder of zero.	Next, drop down the 7 of the tens next to the zero.

1. Divide	2. Multiply and Subtract	3. Drop down the next digit
Divide 2 into 7. Place 3 into the quotient.	Multiply 3 x 2 = 6, write that 6 under the 7, and subtract to find the remainder of 1 ten.	Next, drop down the 8 of the ones next to the 1 leftover ten.

1. Divide	2. Multiply and Subtract	3. Drop down the next digit
Divide 2 into 18. Place 9 into the quotient.	Multiply 9 x 2 = 18, write that 18 under the 18, and subtract to find the remainder of zero.	There are no more digits to drop down. The quotient is 139.

This policy has been largely adapted from the White Rose Maths Hub Calculation Policy with further material added. It is a working document and will be revised and amended as necessary.