Waterloo
Primary Academy

Maths Written Calculation Policy

Approved & Adopted: 27 February 2020
Responsible Personnel: Mrs K. Robinshaw
Policy Last Reviewed/Approved: September 2023
Review Period: Annual
Review Date: September 2024

Zest
Academy
Trust

Introduction

In accordance with our school aims, Waterloo Primary Academy aims to provide a variety of experiences which will encourage our pupils to reach their full mathematical potential by developing a positive and confident attitude towards mathematics.
The teaching of mathematics across the whole school adheres to the National Curriculum mathematics programmes of study 2014 and uses the NCETM spines and resources to support a mastery approach to mathematics. The document below outlines how mathematics is taught at Waterloo.

Our Mastery Curriculum

A Mastery Curriculum is designed to enable all pupils to gain a deep and conceptual understanding of maths through secure learning at each stage.

A Mastery curriculum **at a greater depth** identifies key concepts and misconceptions so pupils can solve problems synoptically, allowing them to make connections and transfer knowledge.

Assessment

Rigorous daily assessment, using our school Learning Evaluation Forms (LEFs), systematically identifies pupils who are in need of additional support and informs planning. Remedial action is swiftly taken which positively impacts children's knowledge and understanding.
Evidence in books, along with information taken from the LEFs, informs termly assessment of the objectives

taught.

Pupils will:

- become highly numerate and fluent in number work
- become confident in their ability to be successful in maths
- have a self-concept of themselves as mathematicians
- appreciate that effort matters when used to practise intelligently
- become secure in their knowledge of the How? What? and Why?

Teachers will:

- plan to use mastery stem sentences and variation to allow children to develop their knowledge and understanding
- employ skilful questioning to gain depth in learning
- sequence knowledge in planning and teaching for learning progression
- ensure pupils think mathematically and systematically to develop their procedural and metacognitive knowledge
- have an infectious and visible passion for maths

In Lessons:

We recognise the importance of establishing a secure foundation in mental calculation and recall of number facts before standard written methods are introduced. We use accurate mathematical vocabulary in our teaching and pupils are expected to use it in their verbal and written explanations.

Pupils are provided with a variety of opportunities to develop and extend their Mathematical skills, including:

- whole class teaching
- group work

- paired work
- individual work

Pupils engage in:

- consolidation of basic skills and number facts
- mathematical discussion
- the development of mental strategies
- written methods
- practical work
- investigational work
- problem solving
- maths games

We set work that is challenging, motivating and encourages the pupils to think about how they learn and to talk about what they have been learning.
Mathematics contributes to many subjects and it is important the pupils are given opportunities to apply and use Mathematics in real contexts. Our Learning Means the World topics provide rich opportunities for pupils to develop their numeracy skills. There are regular and carefully planned opportunities for measuring in science and technology, consideration of the properties of shape and geometric patterns appear in technology and art, and there are options to collect and present data in history and geography. Additional enrichment opportunities are also provided for pupils to further develop mathematical thinking e.g. through cooking, music, and maths investigations and games.

Introduction to Calculations

The following calculation policy follows a mastery. The calculation policy focuses on the links between, and also the progression through, Concrete, Pictorial and Abstract stages. Pupils need to be taught to decide what approach they will take when faced with a calculation, to ensure that they select the most appropriate method for the numbers involved. They will be taught to consider questions such as:

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

Concrete, visual and abstract (CPA Model)

Pupils' conceptual understanding and fluency is strengthened if they experience concrete, visual and abstract representations of a concept during a topic or lesson. Moving between the concrete and the abstract helps pupils to connect abstract symbols with familiar contexts, thus providing the opportunity to make sense of, and develop fluency in the use of abstract symbols.

Aims of this policy:

- to ensure consistency and progression in our approach to calculation
- to ensure that pupils develop an efficient, reliable, formal written method of calculation for all operations

- to ensure that pupils can use these methods accurately with confidence and understanding

How?

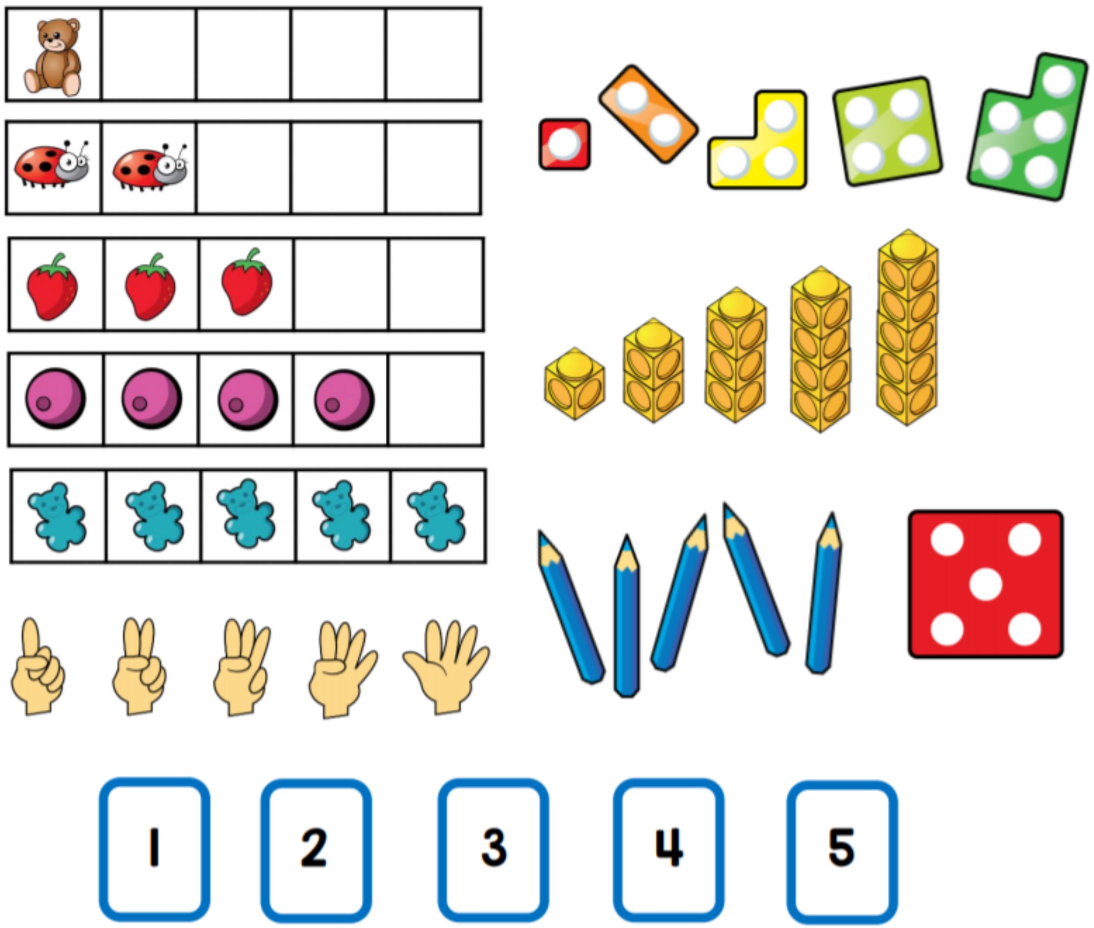
- use this calculation policy as the basis for planning but ensure the use of previous or following years' guidance is considered, to allow for personalised learning
- always use Assessment for Learning to identify suitable next steps in calculation for different groups of pupils
- if at any time pupils are making significant errors, return to the previous stage in calculation
- always use suitable resources, models and images to support pupils' understanding of calculation and place value
- encourage pupils to make sensible choices about the methods they use when solving problems

The following tables show clear and precise steps through the stages of concrete, pictorial and abstract for each learning objective or strategy. Each calculation strand has been colour-coded and split into year groups with exception the of EYFS, which stands alone.

Addition
Subtraction
Multiplication
Division

EYFS

Key Representations



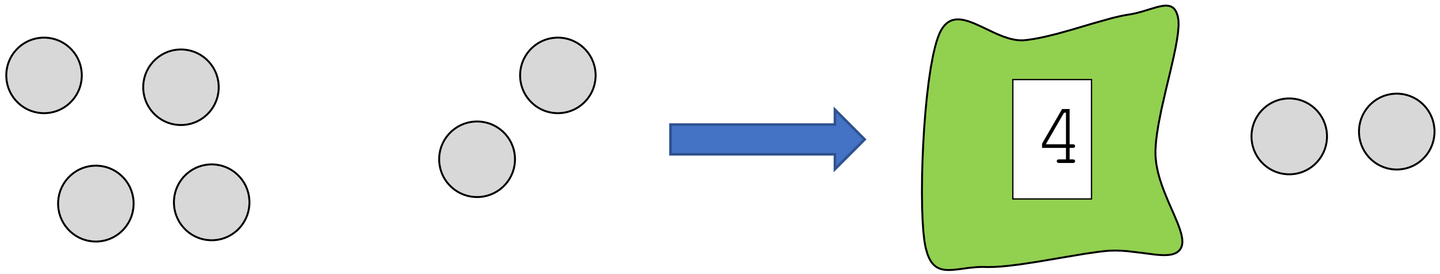
EYFS - Addition

Pupils engage in a wide variety of songs, rhymes, games and activities. They begin to relate addition to **combining two groups of objects**, first by counting all and then by **counting on** from the largest number.

They find one more than a given number.

In practical activities and through discussion, pupils begin to use the vocabulary involved in addition. 'You have five apples and I have three apples. How many apples do we have altogether?

To support pupils in moving from a 'counting all' strategy to one involving counting on, they should still have two groups of objects but one should be covered, so that it cannot be counted. For example, when calculating 4 + 2, count out the two groups of counters as before, then cover up the larger group with a cloth.



For most pupils, it is beneficial to place the digit card on top of the cloth to remind them of the number of counters underneath. They can then start their count at 4, and touch count 5 and 6 in the same way as before, rather than having to count all of the counters separately as before.
Those who are ready, may record their own calculations.
EYFS - Subtraction

Pupils engage in a variety of counting songs, rhymes and practical activities.

In practical activities and through discussion, pupils begin to use the vocabulary associated with subtraction.

They find one less than a given number.

They begin to relate subtraction to 'taking away', using objects to count 'How many are left?' after some have been taken away.

'Take two apples away. How many are left?'

6 – 2 = 4

Pupils begin to count back from a given number.

EYFS - Multiplication

Pupils will engage in a wide variety of songs and rhymes, games and activities.

In practical activities and through discussion, pupils begin to solve problems involving doubling.

'Three apples for you and three apples for me. How many apples altogether?'

EYFS - Division

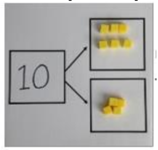
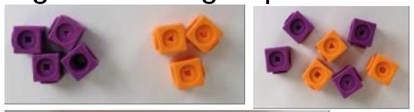
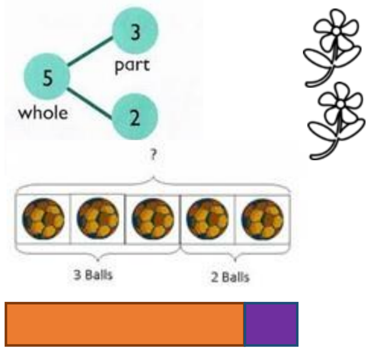
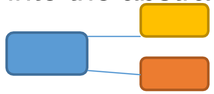
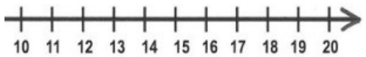
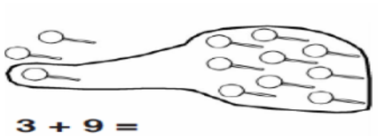
Pupils engage in a wide variety of songs, rhymes, games and activities.

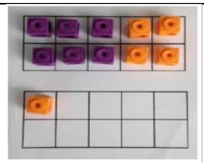
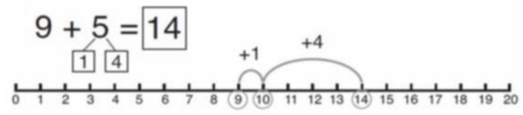
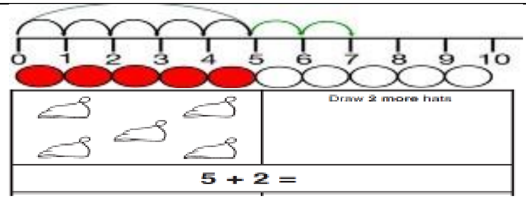
In practical activities and through discussion, pupils begin to solve problems involving halving and sharing.

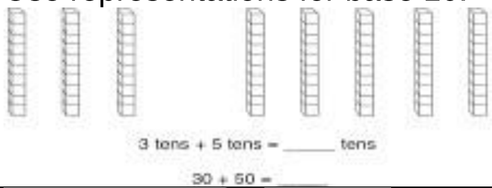
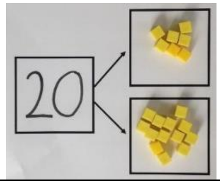
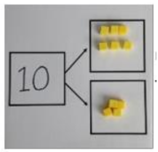
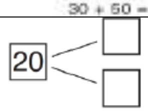
Share the apples between two people.

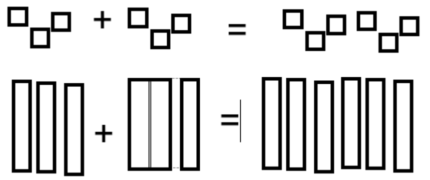
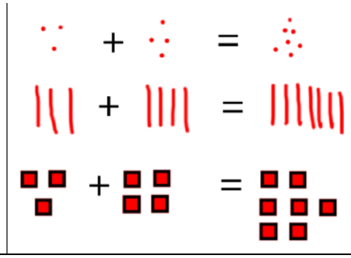
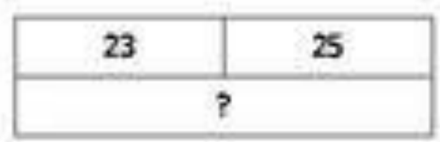
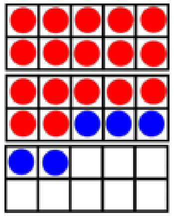
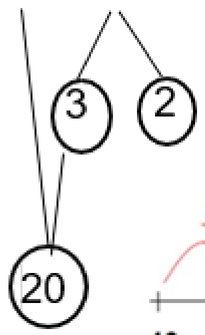
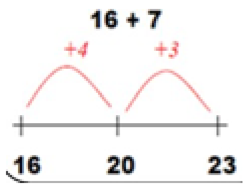
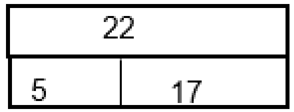
'Half of the apples for you and half of the apples for me.'

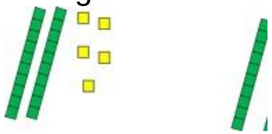
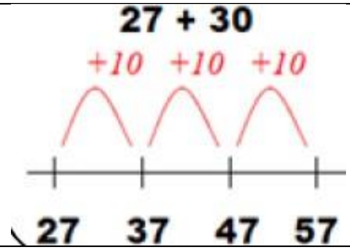
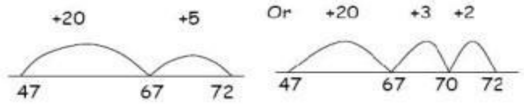
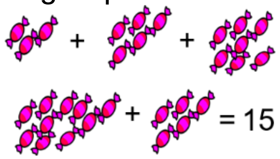
Addition: Year 1 to Year 6

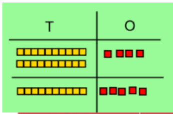
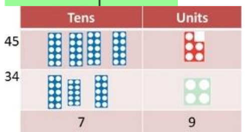
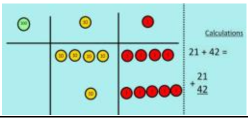
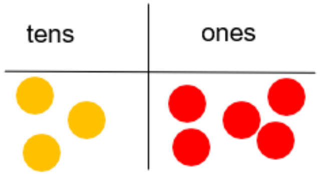
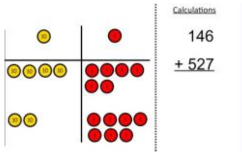
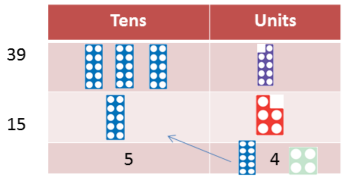
Year 1 Objective & Strategy	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part – whole model.	Use part-part whole model.  Use cubes to add two numbers together as a group or in a bar.  	Use pictures to add two numbers together as a group or in a bar. 	4 + 3 = 7 10 = 4 + 6 Use the part-part whole diagram as shown 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 one by one 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 Put the larger number into 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.*	6 + 5 = 11 Start with the bigger number and use the smaller number to make ten.  Use ten frames	Use pictures or a number line. Regroup or partition the smaller number using the part-part whole model to make ten. 	7 + 4 = 11 If I am at seven, how many more do I need to make ten? How many more do I add on now?

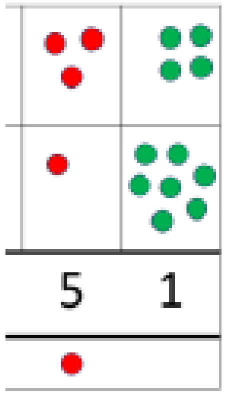
			
Represent and use number bonds and related subtraction facts within 20.	2 more than 5 		Emphasis should be on the language ‘1 more than 5 is equal to 6’ ‘2 more than 5 is 7’ ‘8 is 3 more than 5’

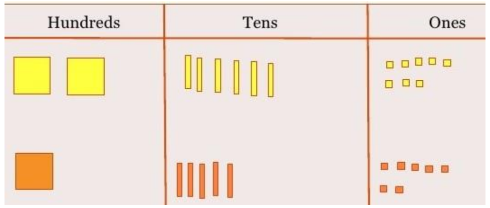
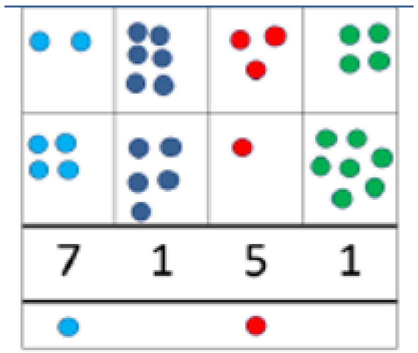
Year 2 Objective & Strategy	Concrete	Pictorial	Abstract
Adding multiples of ten	50 = 20 + 30 Model using dienes and bead strings 	Use representations for base 10. 	20 + 30 = 50 70 + 50 + 20 40 + ?? = 60
Use known number facts Part – part whole	Pupils explore ways of making numbers within 20 	 □ + □ = 20 20 – □ = □ □ + □ = 20 20 – □ = □	□ + 1 = 16 16 – 1 = □ 1 + □ = 16 16 – □ = 1

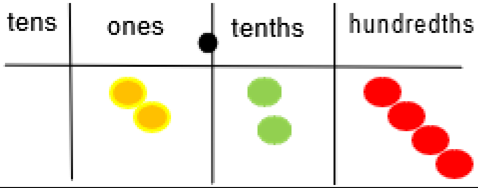
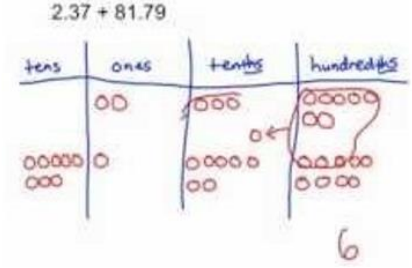
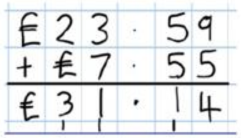
Using known number facts		Pupils draw representations of H, T and O 	3 + 4 = 7 *leads to* 30 + 40 = 70 *leads to* 300 + 400 = 700
Bar Model	3 + 4 = 7 	7 + 3 = 10 	23 + 25 = 48 
Add a two-digit number and ones	17 + 5 = 22 Use ten frames to make 'magic ten'  Pupils explore the pattern 17 + 5 = 22 27 + 5 = 32	Use part – part whole and number lines to model. 17 + 5 = 22  	17 + 5 = 22  Explore related facts 17 + 5 = 22 5 + 17 = 22 22 – 17 = 5 22 – 5 = 17

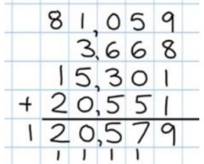
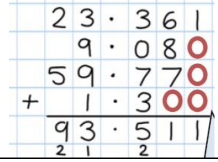
Add a two-digit number and tens	25 + 10 = 35 Explore that the ones digit does not change. 		27 + 10 = 37 27 + 20 = 47 27 + ?? - 57
Add two two-digit numbers	Model using dienes, place value counters and numicon. 	Use number lines and bridge ten using part whole if necessary. 	25 + 47 20 + 5 40 + 7 20 + 40 = 60 5+ 7 =12 60 + 12 = 72
Add three one-digit numbers	7 + 2 + 3 = 12 Combine to make ten first if possible, or bridge ten then add third digit. 	Regroup and draw representation. 	Combine two numbers to make/ bridge ten then add third. 4 + 7 + 6 = $\boxed{10}$ + $\boxed{7}$ 10 = $\boxed{17}$

Year 3 Objective & Strategy	Concrete	Pictorial	Abstract
Add two or three two- or three-digit numbers Column addition – no regrouping (friendly numbers)	Add together the ones first, then the tens. Model using dienes or numicon.   Move on to using place value counters  	Pupils move to drawing the counters using tens and one frame.  	Add the ones first, then the tens, then the hundreds. $\begin{array}{r} 2\ 2\ 3 \\ +\ 1\ 1\ 4 \\ 3\ 3\ 7 \end{array}$
Column addition with regrouping.	Exchange ten ones for a ten. Model using dienes, place value counters and numicon.   	Pupils can draw a representation on the grid to further support their understanding, carrying the ten **underneath** the line.	Start by partitioning the numbers before formal column to show the exchange. $\begin{array}{lll} 20 & + & 5 \\ 40 & + & 8 \\ \hline 60 & + & 13 \quad = 73 \end{array}$

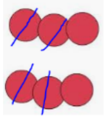
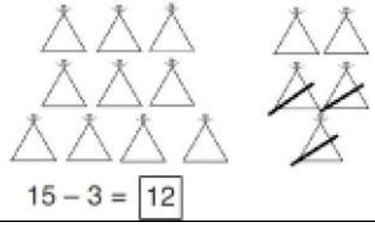
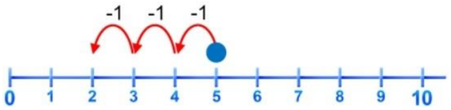
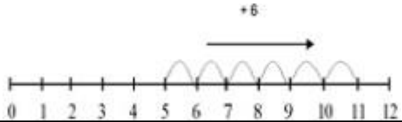
			536 + 85 621 1 1

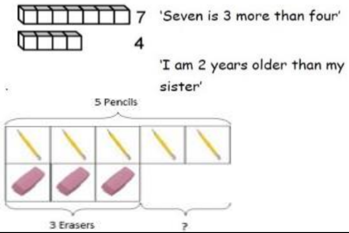
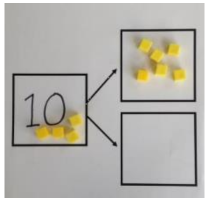
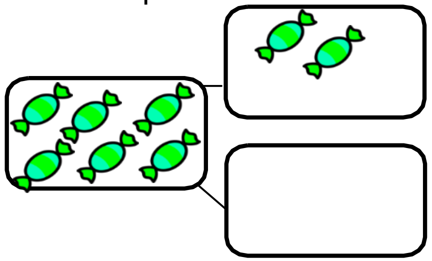
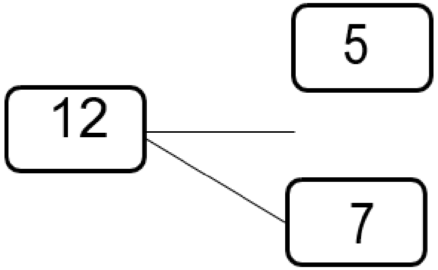
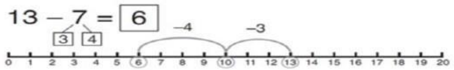
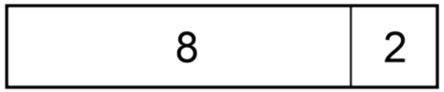
Year 4 Objective & Strategy	Concrete	Pictorial	Abstract
Add numbers with up to four digits	Pupils continue to use dienes or place value counters to add, exchanging ten ones for a ten, ten tens for a hundred and ten hundreds for a thousand. 	Draw representations using a place value grid. 	Continue from previous work to carry hundreds as well as tens. Relate to money and measures.

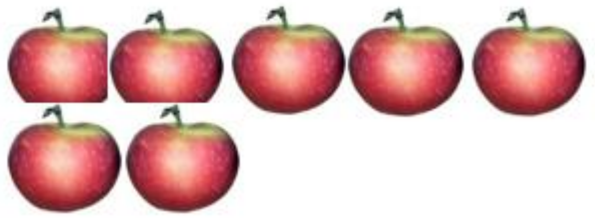
Year 5 Objective & Strategy	Concrete	Pictorial	Abstract
Add numbers with more than four digits	As Year 4	As Year 4	As Year 4
Add decimals with two decimal places, including money.	Introduce decimal place value counters and model exchange for addition.  	 	72.8 + 54.6 127.4 1 1 

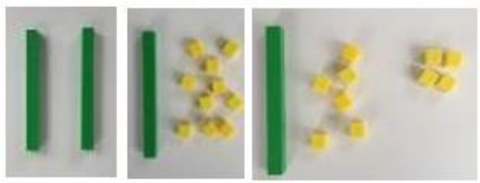
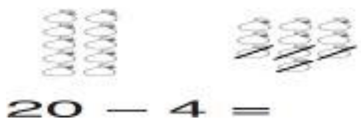
Year 6 Objective & Strategy	Concrete	Pictorial	Abstract
Add several numbers of increasing complexity including adding money, measures and decimals with different numbers of decimal points.	As Year 5	As Year 5	 Insert zeros for place holders. 

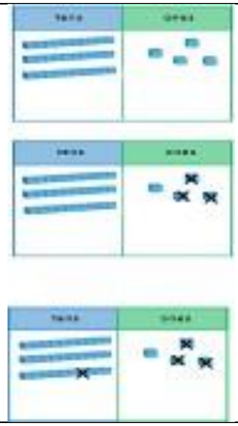
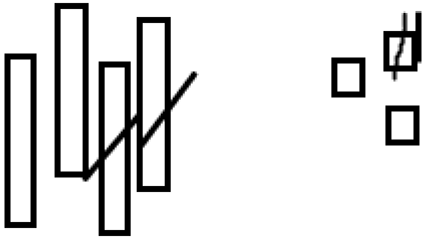
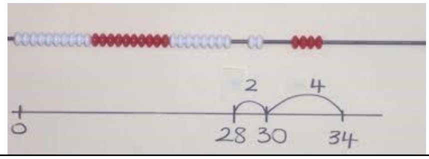
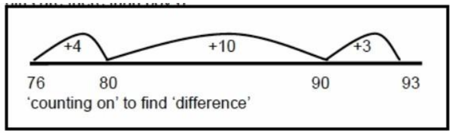
Subtraction: Year 1 to Year 6

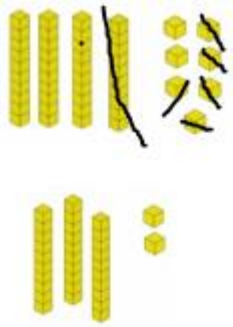
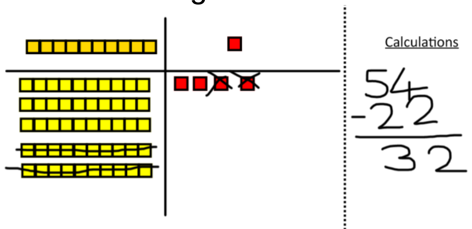
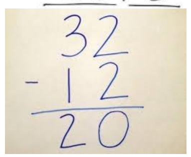
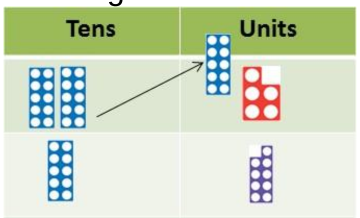
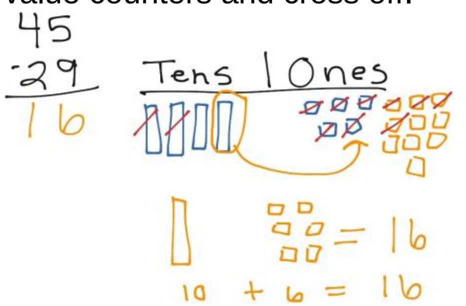
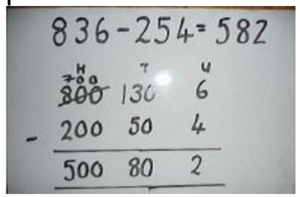
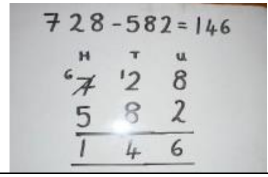
Year 1 Objective & Strategy	Concrete	Pictorial	Abstract
Taking away ones	Use physical objects, counters, cubes etc. to show how objects can be taken away. 6 – 4 = 2 4 – 2 = 2  	Cross out drawn objects to show what has been take away. 	7 – 4 = 3 16 – 9 = 7
Counting back	Move objects away from the group, counting backwards.  Move the bead along the bead string as you count backwards. 	Count back in ones using a number line. 5 – 3 = 2 	Put 13 in your head, count back 4. What number are you at?
Find the difference	Compare objects and amounts. Lay objects to represent bar model.	Count on using a number line to find the difference. 	Hannah has 12 sweets and her sister has 5. How many more does Hannah have than her sister?

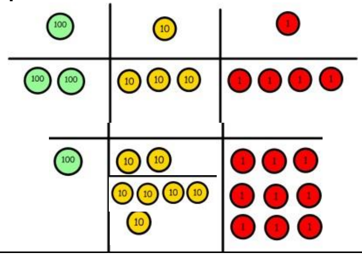
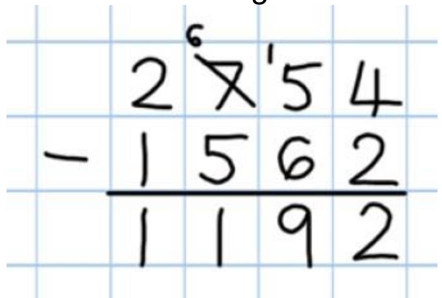
			
Represent and use number bonds and related subtraction facts within 20. Part – part whole model.	Link to addition. Use the part – part whole model to model inverse. If 10 is the whole and 6 is one of its parts, what is the other part? 10 – 6 = 4 	Use pictorial representations to show the part. 	Move to using numbers within the part whole model. 
Make 10	14 – 5 = 9 Make 14 on a ten frame. Take 4 away to make ten, then take one more away so you have taken 5 in total. 	13 – 7 = 6 Jump back 3 first, then another 4. Use 10 as the stopping point. 	16 – 8 = 8 How many do we take off first to get to ten? How many left to take off?
Bar model	5 – 2 = 3	10 – 2 = 8 	 10 = 8 + 2 10 = 2 + 8 10 – 8 = 2

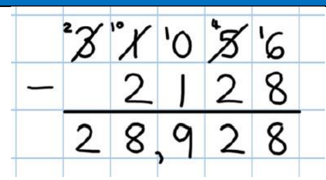
			10 – 2 = 8

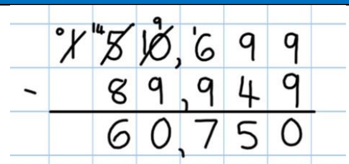
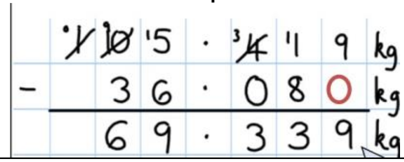
Year 2 Objective & Strategy	Concrete	Pictorial	Abstract
Regroup a ten into ten ones	Use a place value grid to show how to change a ten into ten ones, using the term ‘take and make’ 		20 – 4 = 16
Partitioning to subtract without regrouping. *‘Friendly numbers’*	31 -13 = 21 Using dienes to show how to partition the number when subtracting without regrouping.	43 – 21 = 22 Pupils draw representations of dienes and cross off.	34 – 21 = 13

			
Make ten strategy. *Progression should be crossing one ten, crossing more than one ten, crossing the hundreds.*	34 – 28 = 6 Use a bead bar or bead string to model counting to next ten and then the rest.  	Use a number line to count on the next ten and then the rest.  	93 – 76 = 17

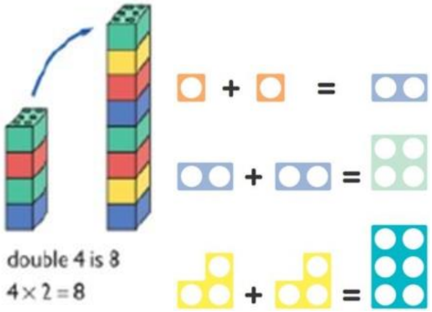
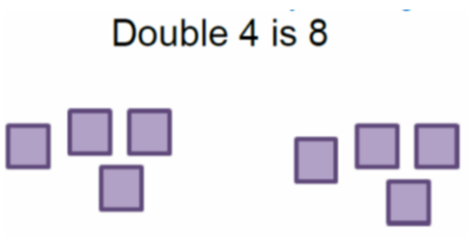
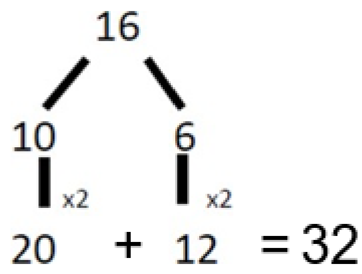
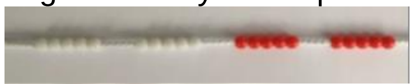
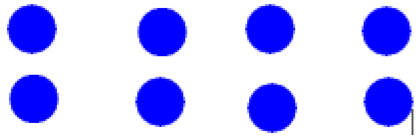
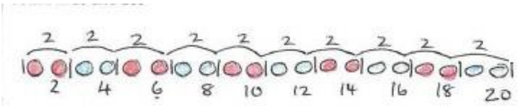
Year 3 Objective & Strategy	Concrete	Pictorial	Abstract
Column subtraction without regrouping. *'friendly numbers'*	Use dienes of numicon to model. 47 – 15 = 32 	Draw representations to support understanding. 	An intermediate step may be needed to lead to clear subtraction understanding. 47 − 24 = 23 40 + 7 − 20 + 4 20 + 3 
Column subtraction with regrouping.	Begin with dienes or numicon. Move to place value counters, modelling the exchange of a ten for ten ones. Use the phrase 'take and make' for exchange. 	Pupils may draw dienes or place value counters and cross off. 	Begin by partitioning in to place value columns.  Then move to formal method. 

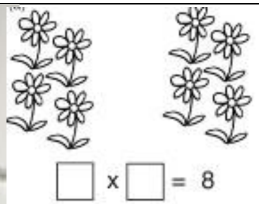
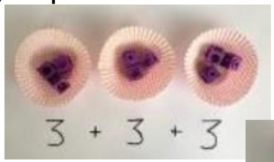
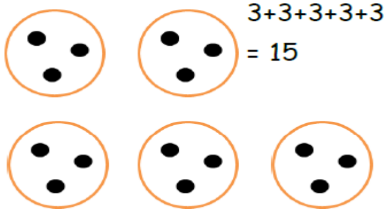
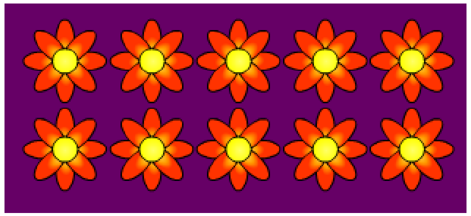
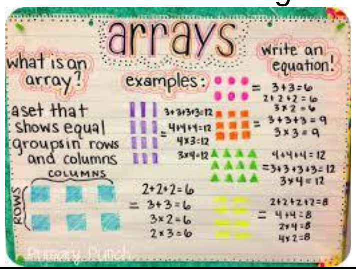
Year 4 Objective & Strategy	Concrete	Pictorial	Abstract
Subtract tens and ones up to four-digit numbers. *Introduce decimal subtraction through context of money.*	234 – 179 Model process of exchange using dienes, numicon and place value counters. 	Pupils to draw dienes or place value counters and show their exchange – as Year 3.	Use the phrase 'take and make' for exchange. 

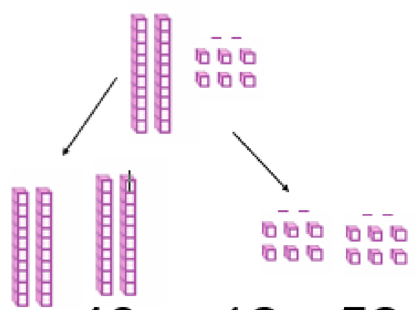
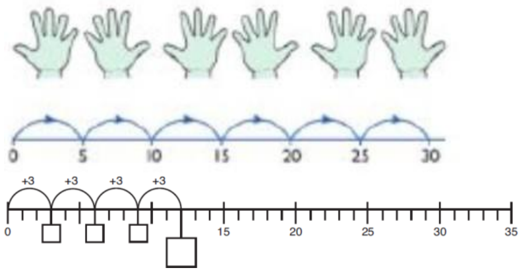
Year 5 Objective & Strategy	Concrete	Pictorial	Abstract
Subtract with at least four digits, including money and measures. *Subtract with decimal values, including mixtures of integers and decimals and aligning the decimal.*	As Year 4	Pupils to draw dienes and place value counters and show their exchange – as Year 3	

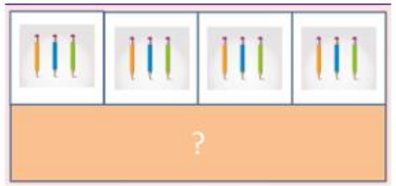
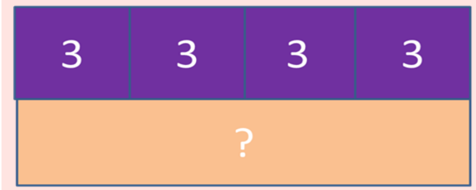
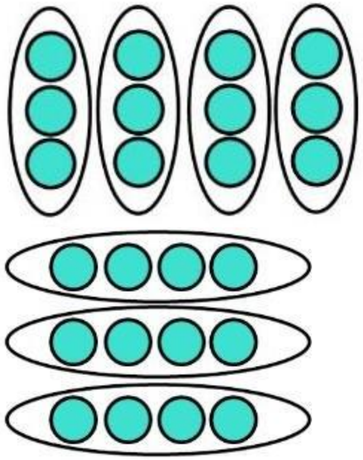
Year 6 Objective & Strategy	Concrete	Pictorial	Abstract
Subtract with increasingly large and more complex numbers and decimal values.	As Year 4 and Year 5	As Year 4 and Year 5	 Use zeros for place holders. 

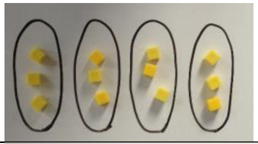
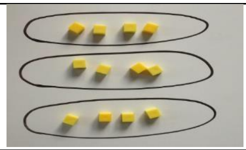
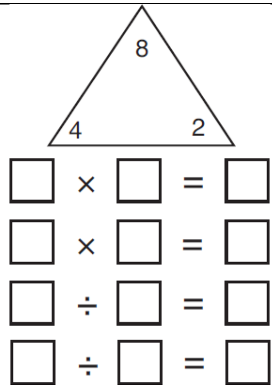
Multiplication: Year 1 to Year 6

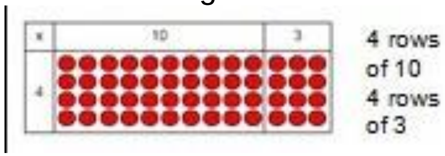
Year 1 Objective & Strategy	Concrete	Pictorial	Abstract
Doubling.	Practical activities using manipulatives including cubes and numicon to demonstrate doubling. 	Draw pictures to show how to double numbers. 	Partition a number and then double each part before recombining it back together. 
Counting in multiples.	Count the groups as pupils do skip counting. Pupils may use their fingers as they are skip counting.  	Pupils 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 x 4 = 8

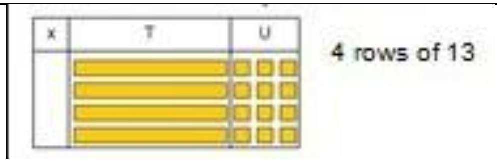
	 	Draw  to show 2 x 3 = 6	
Repeated addition.	Use different objects to add equal groups.   	Use pictorial representations including number lines to solve problems.  There are 3 sweets in one bag. How many sweets are in 5 bags altogether? 	Write addition sentences to describe objects and pictures. 
Understanding arrays.	Use objects laid out in arrays to find the answers to 2 lots of 5, 3 lots of 3 etc. 	Draw representations of arrays to show understanding. 	3 x 2 = 6 2 x 5 = 10

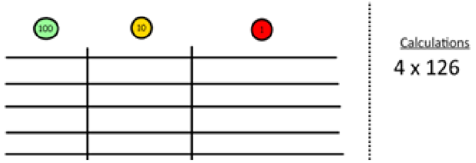
Year 2 Objective & Strategy	Concrete	Pictorial	Abstract
Doubling.	Model doubling using dienes and place value counters.  40 + 12 = 52	As Year 1	As Year 1
Counting in multiples of 2, 3, 4, 5, 10 from 0 (repeated addition).	Count the groups as pupils are skip counting. Pupils may use their fingers as they skip count. 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

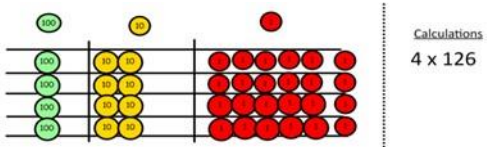
	 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 40   	 	$4 \times 3 = \boxed{}$
Multiplication is commutative.	Create arrays using counters, cubes and numicon.    Pupils should understand that an array can represent different equations and that, as multiplication is commutative, the order of the multiplication does not affect the answer.	Use representations of arrays to show different calculations and explore commutativity. 	12 = 3 x 4 12 = 4 x 3 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

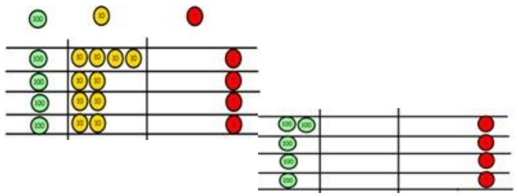
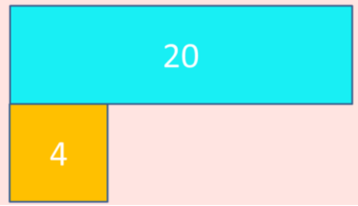
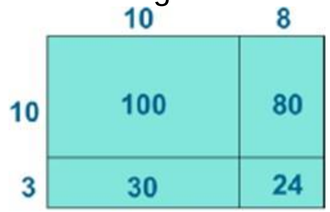
	 		
Using inverse. This should be taught alongside division, so pupils learn how they work alongside each other.			Show all 8 related fact family sentences 2 x 4 = 8 4 x 2 = 9 8 ÷ 2 = 4 8 ÷ 4 = 2 8 = 2 x 4 8 = 4 x 2 2 = 8 ÷ 4 4 = 8 ÷2

Year 3 Objective & Strategy	Concrete	Pictorial	Abstract
Grid method	Show the links with arrays to first introduce the grid method.  Move onto base ten to move towards a more compact method.	Pupils can represent their work with place value counters in a way that they understand. They can draw the counters using colours to show different amounts or just use circles in the different columns to show their thinking.	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

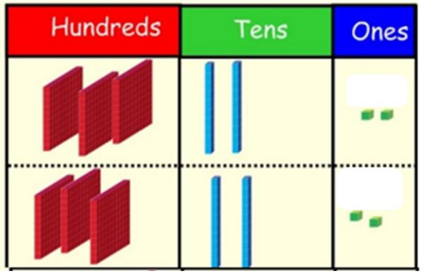
<table>
<tr>
<td></td>
<td>

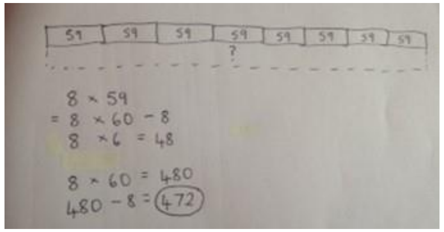
Move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows.


Fill each row with 126


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

Then you have the answer.</td>
<td>Bar models are used to explore missing numbers.
4 x ☐ = 20

</td>
<td>Moving forward, multiplying by a two-digit number showing the different rows within the grid method.

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

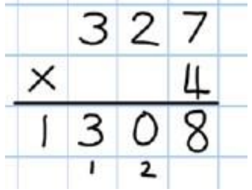
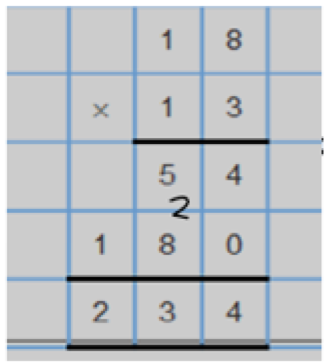
<table>
<tr><th>Year 4
Objective & Strategy</th><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
<tr><td>Multiplying three-digit numbers by one-digit.

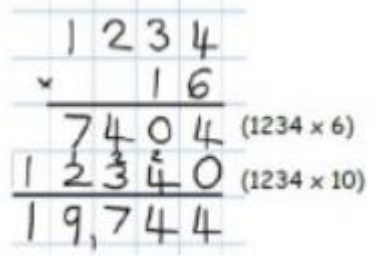
Recap grid method from Year 3 for two-digits x one-digit.</td><td>As Year 3</td><td>As Year 3</td><td>As Year 3</td></tr>
<tr><td>Column multiplication.</td><td>Pupils can continue to be supported by place value counters at this stage of multiplication. This is initially done where there is no regrouping
322 x 2 = 644
It is important at this stage that pupils always multiply the ones first.


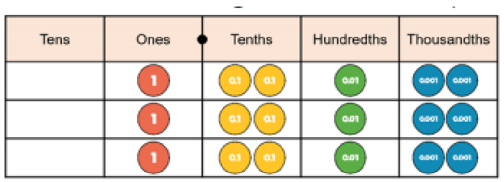
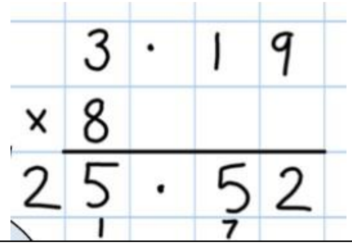
The corresponding long multiplication is modelled alongside.</td><td>Bar modelling and number lines can support pupils when solving problems with multiplication alongside formal written methods.


The grid method may be used to show how this relates to a formal written method.
<table><tr><td>x</td><td>300</td><td>20</td><td>7</td></tr><tr><td>4</td><td>1200</td><td>80</td><td>28</td></tr></table></td><td>327
x 4
28
80
1200
1308

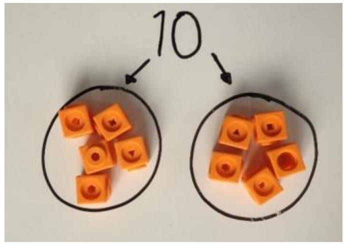
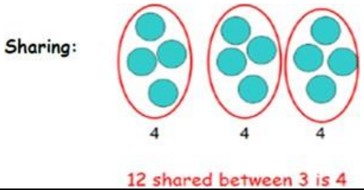
This may lead to a compact method.</td></tr>
</table>

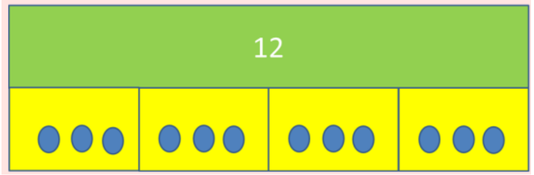
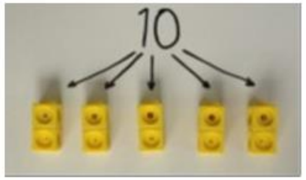
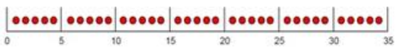
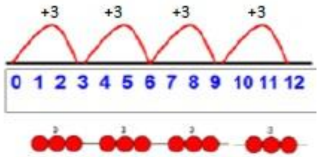
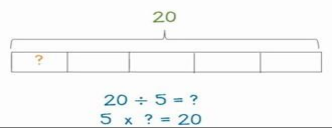
Year 5 Objective & Strategy	Concrete	Pictorial	Abstract
Column multiplication for three- and four-digit x one-digit.	As Year 4	As Year 4	As Year 4 but will lead on to a compact method. 
Column multiplication including long multiplication for two-digit numbers.	Manipulatives may still be used with the corresponding long multiplication modelled alongside.	Use grid method  Continue to use bar models 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 second row. Show multiplying by 10 by putting the zero in the ones first.

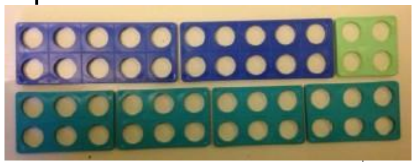
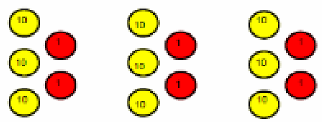
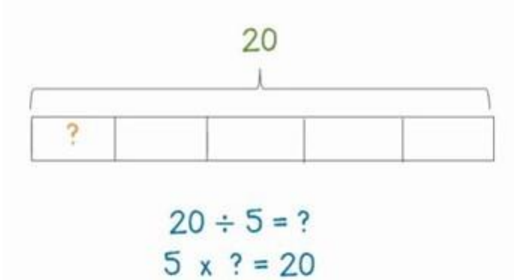
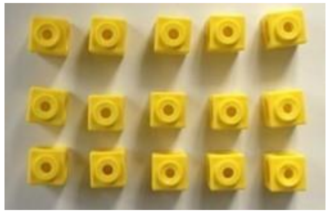
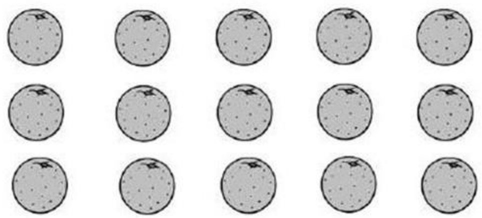
			

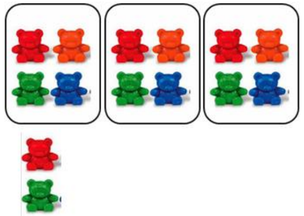
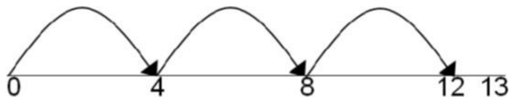
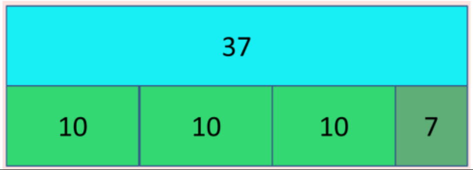
Year 6 Objective & Strategy	Concrete	Pictorial	Abstract
Column multiplication for three- and four-digit x one-digit.	As Year 4	As Year 4	As Year 5
Column multiplication including long multiplication for two-digit numbers.	As Year 5	As Year 5	As Year 5
Multiplying decimals up to two decimal places by a single digit.	Use place value counters to show the multiplication. 1.212 x 3 	Pupils can represent their work with place value counters in a way that they understand. They can draw the counters using colours to show different amounts or just use circles in the different columns to show their thinking.	Remind pupils that the single digit belongs in the ones column. Line up the decimal points in the question and the answer. 

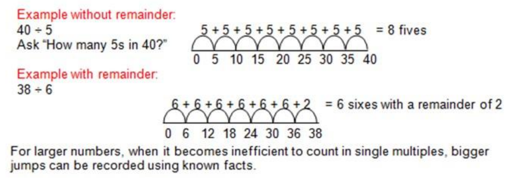
Division: Year 1 to Year 6

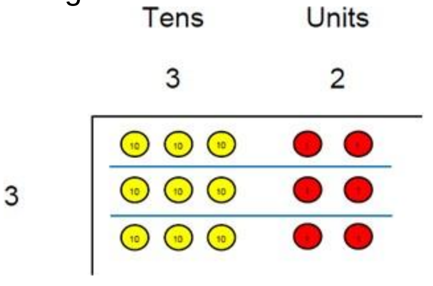
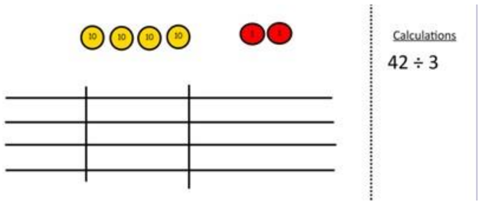
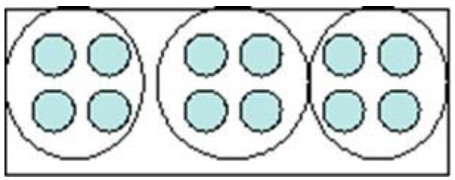
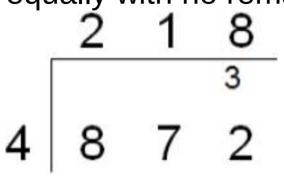
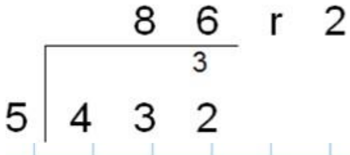
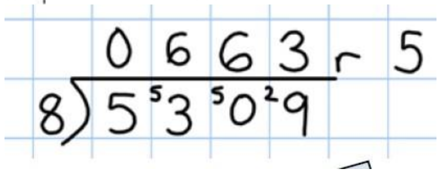
Year 1 Objective & Strategy	Concrete	Pictorial	Abstract
Division as sharing. *Use Gordons ITPs for modelling*	I have 10 cubes, can I share them equally into two groups?    	Pupils use pictures or shapes to share quantities. 8 shared between 2 is 4   	12 shared between 3 is 4

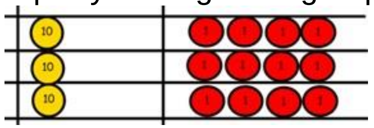
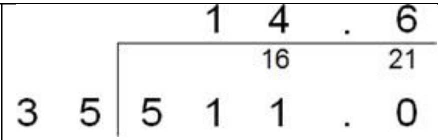
Year 2 Objective & Strategy	Concrete	Pictorial	Abstract
Division as sharing.	As Year 1	As Year 1 but progress to using bar modelling to show and support understanding.  12 ÷ 4 = 3	12 ÷ 4 = 3
Division as grouping.	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.   	Use number lines for grouping.  12 ÷ 3 = 4 Think of the bar as a whole. Split into the number of groups you are dividing by and work out how many would be within each group.  	28 ÷ 7 = 4 Divide 28 into 7. How many are in each group?

Year 3 Objective & Strategy	Concrete	Pictorial	Abstract
Division as grouping.	Use cubes, counters, objects or place value counters to aid understanding. 24 divided into groups of 6 equals 4  96 ÷ 3 = 32 	Continue to use bar modelling to aid solving division problems.  	How many groups of 6 in 24? 24 ÷ 6 = 4
Division with arrays.	Link division to multiplication by creating arrays and thinking about the number sentences that can be created. 	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 eight linking number sentences. 7 x 4 = 28 4 x 7 = 28 28 ÷ 7 = 4

			$28 \div 4 = 7$ $28 = 7 \times 4$ $28 = 4 \times 7$ $4 = 28 \div 7$ $7 = 28 \div 4$
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 are needed to jump to find the 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. 

Year 4 Objective & Strategy	Concrete	Pictorial	Abstract
Divide at least three-digit numbers by one-digit. Short division.	96 ÷ 3 = Use place value counters to divide using the bus stop method alongside.  42 ÷ 3 =  Start with the biggest place value, we are sharing 10 into 3 groups.	Pupils 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.  Move onto divisions with a remainder.   Finally move into decimal places to divide the total accurately.

	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 amongst the groups.  We look at how much is in each group and the answer is 14.		

Year 5 Objective & Strategy	Concrete	Pictorial	Abstract
Divide at least three-digit numbers by one-digit. Short division.	As Year 4	As Year 4	As Year 4

Year 6 Objective & Strategy	Concrete	Pictorial	Abstract
Divide at least three-digit numbers by one-digit. Short division.	As Year 4	As Year 4	As Year 4
Divide numbers up to four digits by one- and two-digit numbers. 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 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.		

Step 1 - continued

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

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

Check: 4 × 61 + 3 = 247

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

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

Check: 4 × 402 + 1 = 1,609

Step 2 – a remainder in the tens

1. Divide.	2. Multiply & subtract.	3. Drop down the next digit.
t o 2 2) 5 8 Two goes into 5 two times, or 5 tens ÷ 2 = 2 whole tens -- but there is a remainder!	t o 2 2) 5 8 - 4 1 To find it, multiply 2 × 2 = 4, write that 4 under the five, and subtract to find the remainder of 1 ten.	t o 2 9 2) 5 8 - 4 ↓ 1 8 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 Divide 2 into 18. Place 9 into the quotient.	t o 2 9 2) 5 8 - 4 1 8 - 1 8 0 Multiply 9 × 2 = 18, write that 18 under the 18, and subtract.	t o 2 9 2) 5 8 - 4 1 8 - 1 8 0 The division is over since there are no more digits in the dividend. The quotient is 29.

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

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.

The Mathematics Policy at Waterloo Primary Academy will be reviewed and modified on a regular basis. It is possible to add amendments to this document prior to a review and these will be incorporated into the next issue.

To add suggestions and comments, please complete the information on this sheet, adding the date and signing where indicated.

Date	Proposed Amendment	Signed