Infant, Junior School and Camp Education

Progression in Calculation Policy

2019

This document explains how to teach calculation with understanding, and not just as a process that is to be remembered. The Written Calculation Policy clarifies progression in calculation with examples that are 'mathematically transparent', in other words the way the calculation works is clear and supports the development of mathematical concepts.

The Aims of the Curriculum:

The National Curriculum for Mathematics aims to ensure that all children:

- Become **fluent** in the fundamentals of mathematics, including through varied and frequent practise with increasingly complex problems over time, so that children develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.

- **Reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language

- Can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Aims of the Policy:

- To ensure consistency and progression in our approach to calculation and enable a smooth transition between year groups and phases.

- To ensure that children develop an efficient, reliable, formal written method of calculation for all operations.

- To ensure that children can use these methods accurately with confidence and understanding.

- To ensure children understand important concepts and make connections within mathematics.

- To ensure children show high levels of fluency in performing written and mental calculations.

- To ensure that children are ready for the next stage of learning and have been given strong foundations in mental methods, the use of practical equipment, allowed to explore jottings in a range of forms and then to move onto more formal recording using a strong knowledge of place value, number lines labelled or blank, partitioning before eventually using compact written methods.

- To ensure that children are competent in fluency, reasoning and problem solving and can make informed and appropriate choices about the methods they wish to use (mental or written) to solve mathematical problems efficiently and effectively.

Introduction

The policy is set out in operations, addition, subtraction, multiplication and division. Within each specific area there is a progression of skills, knowledge and layout for written methods. The calculation strategies which will be used will reflect this ideology – moving from concrete to pictorial and then abstract recording leading to more formal written methods. Mental methods and strategies will work in partnership with these methods.

It is important to always show the links between operations and not teach them in isolation or without showing, in practical problem solving activities and across all mathematical topics, how these operations can be applied.

It is important that staff always use correct mathematical language and encourage this from every pupil. This will take place in class discussions as well as through oral and written feedback, next steps and target setting.

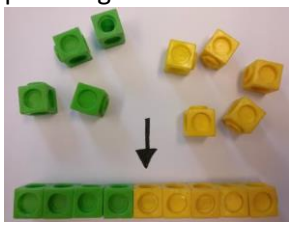
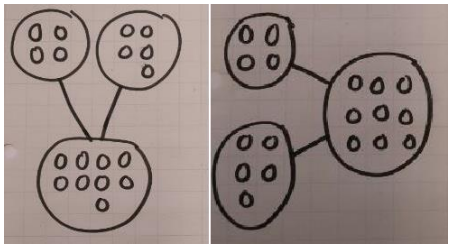
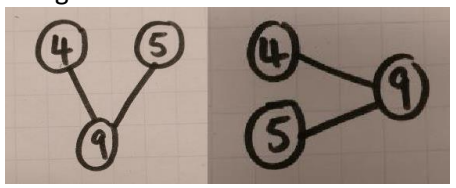
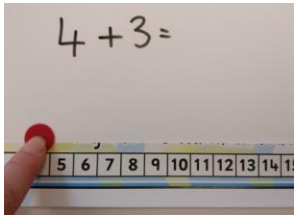
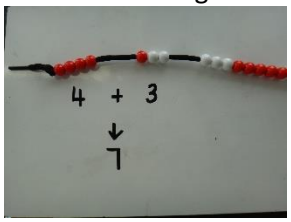
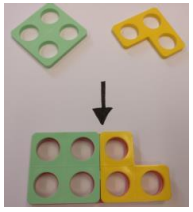
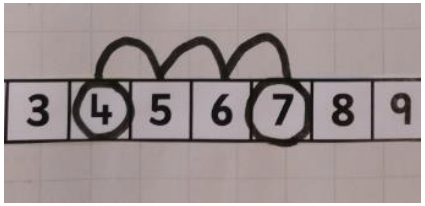
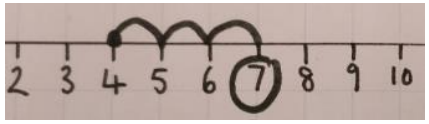
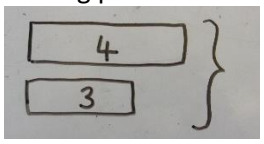
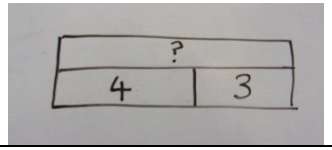
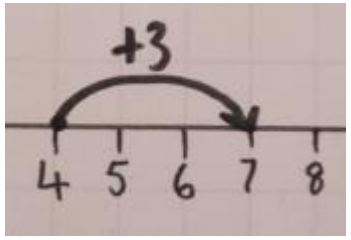
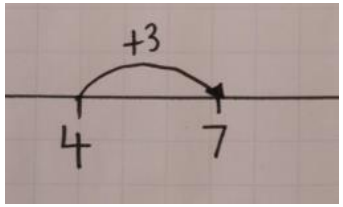
We have chosen not to identify which year group should use which method because we wish staff and children to have the freedom to take the next steps on their mathematical journey when they are ready to do so and if the policy is followed, there should not be a problem with progression as children move through the school.

All staff have the responsibility to make sure that children have the depth of knowledge and experiences required to move onto the next stage of their development rather than pushing them on too quickly. This leads to misconceptions and poor mathematical foundations and eventually, in later years, children will not be able to make the required progress.

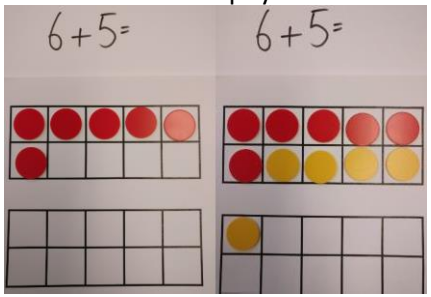
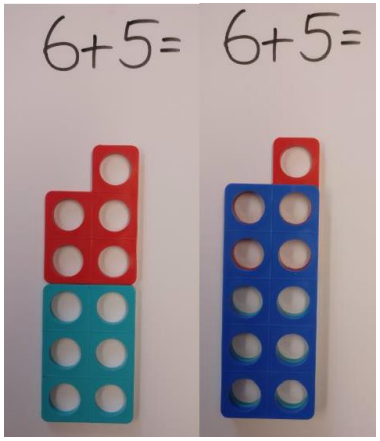
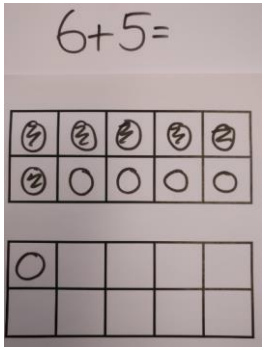
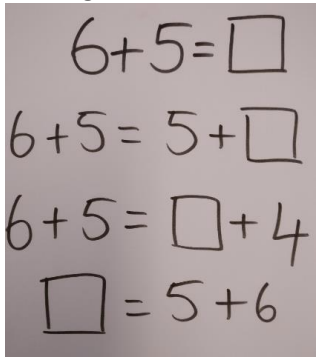
Ultimately we aim to enable children to make informed choices about the methods they use both mental and written that are the most efficient and this includes recognised compact methods.

IJS & CE Progression in Calculation Policy 2019

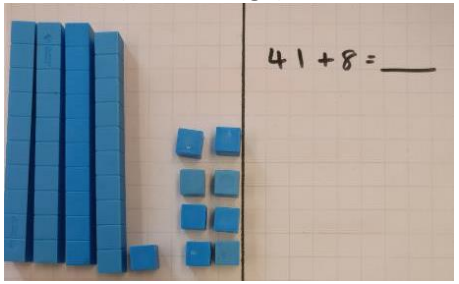
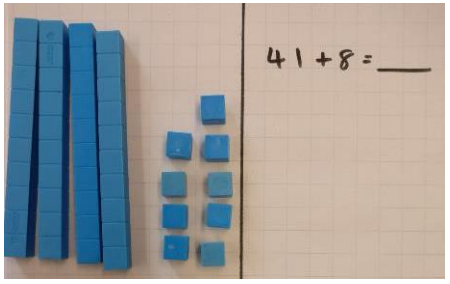
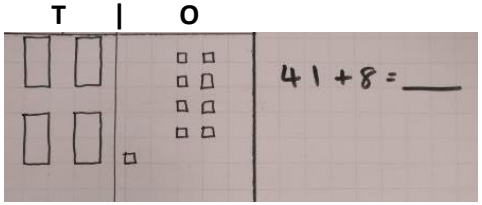
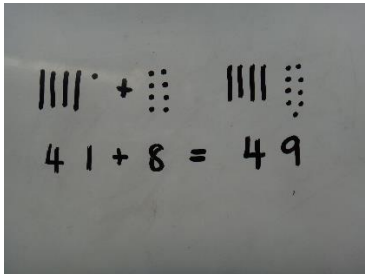
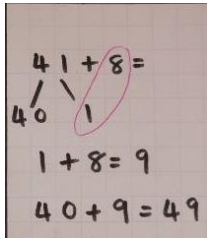
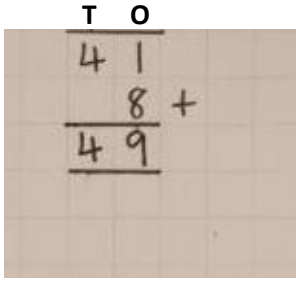
Addition

Vocabulary	Concrete	Pictorial	Abstract
abstract addition altogether base ten bead strings calculation combine concrete counters ENL – empty number line equal exchange hundreds multilink numicon number line number track ones* partition pictorial place value PPW – part-part-whole record sum tens tens frame thousands total	**PPW** – use manipulatives to put two parts together 	**PPW** – draw the concrete method 	**PPW** – record the pictorial method using numbers 
	Number track – count on from one of the numbers  **Bead String –** making groups of beads and then counting them altogether  **Numicon** –find the piece that fits 	**Number track** – count on in ones  **Marked number line** –count on in ones or chunks  **Bar model –** comparison and showing parts of a whole  	**Empty number line** – ENL – count on (in ones or chunks)  

IJS & CE Progression in Calculation Policy 2019

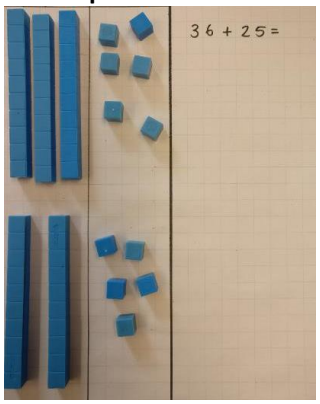
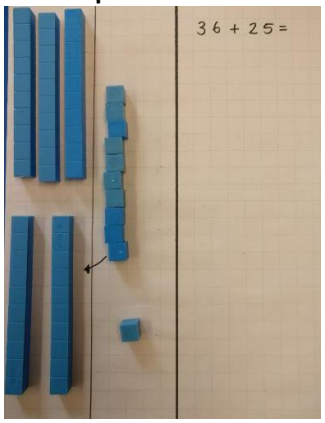
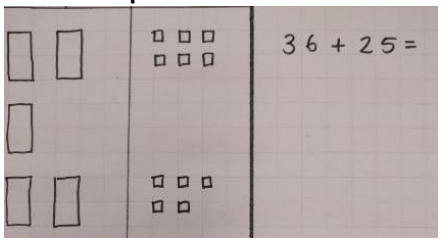
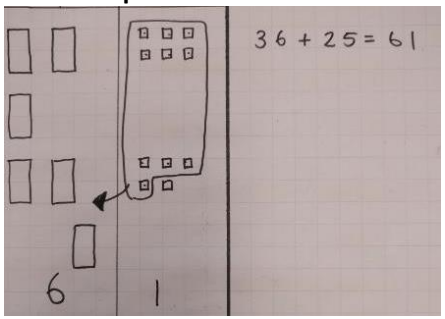
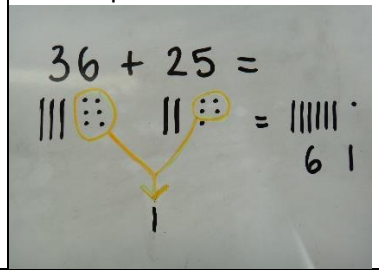
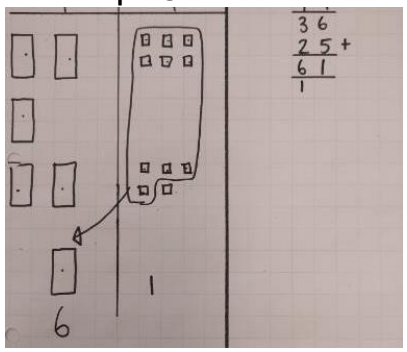
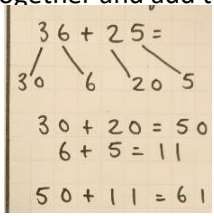
	Vocabulary	Concrete	Pictorial	Abstract
Addition	***NOTE: some textbooks/ children may still refer to 'units' or 'u' instead of 'ones'**	**Tens frames** – use physical counters  **Numicon** – lay tens on top 	**Tens frames** – draw the concrete method 	**Record pictorial method** – calculation equality missing numbers 

IJS & CE Progression in Calculation Policy 2019

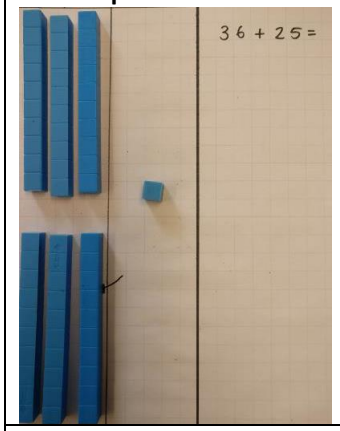
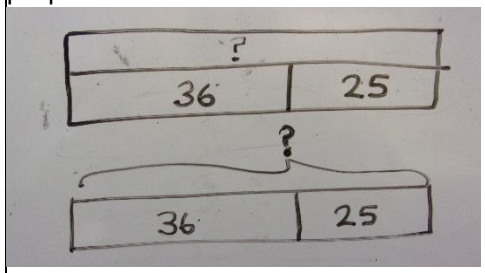
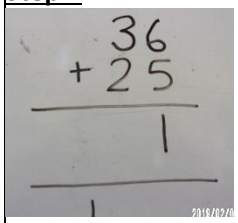
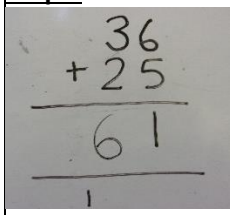
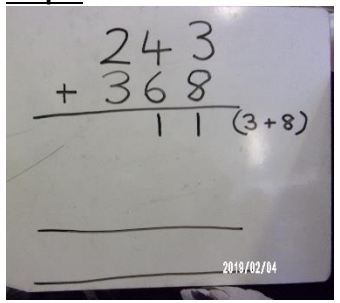
	Vocabulary	Concrete	Pictorial	Abstract
Addition		**Base ten** – combine partitioned numbers (no exchange)  	**Base ten** – draw the concrete method – partition and combine  **Rods and dots –** different representation of Base ten where rods = 10's and dots = 1's – combine and count 	**Abstract calculation** – partition and combine numbers efficiently  **Abstract calculation** – record using the formal column method alongside the pictorial method. 

IJS & CE Progression in Calculation Policy 2019

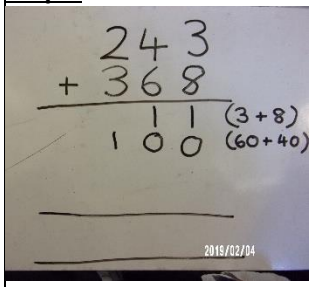
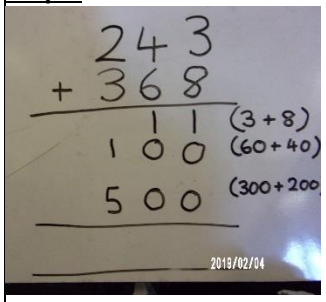
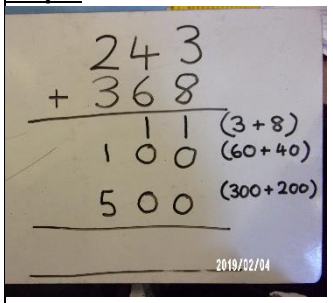
Addition

Vocabulary	Concrete	Pictorial	Abstract
	Base ten – combine partitioned sections and **exchange** when you make ten. Children need a strong understanding that 1 ten is the same as 10 ones. **Step 1** T | O  **Step 2** T | O  	**Base ten** – draw the concrete method – partition, combine and exchange. **Step 1** T | O  **Step 2** T | O  **Rods and dots** – where there are more than 10 dots, exchange 10 dots for a rod which equals a 10  	**Abstract calculation** – record the formal column method alongside the pictorial method. T | O  **Abstract calculation** – partition and combine like terms (add the ones together and add the tens together) 

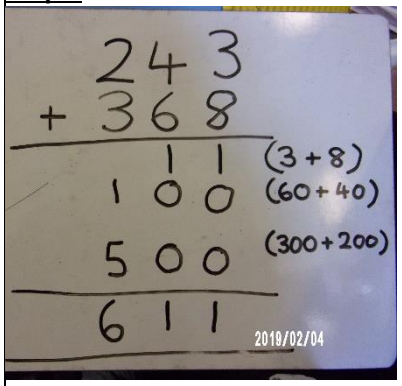
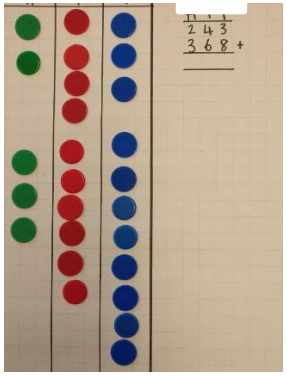
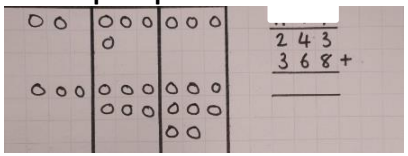
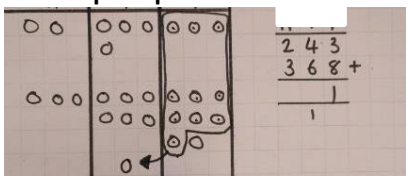
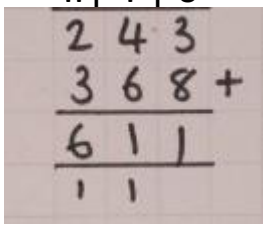
IJS & CE Progression in Calculation Policy 2019

	Vocabulary	Concrete	Pictorial	Abstract
Addition		**Step 3** **T | O** 	**Bar model –** make sure all sections are proportional 	**Step 1**  **Step 2** 
				Compact method – showing the written calculation of each row **Step 1** 

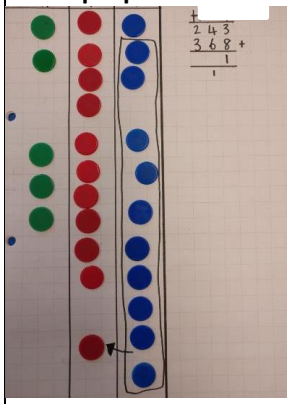
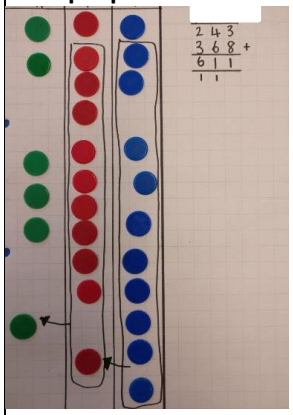
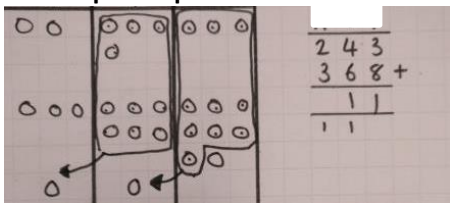
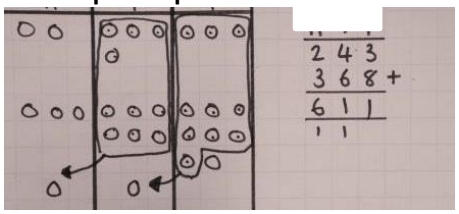
IJS & CE Progression in Calculation Policy 2019

	Vocabulary	Concrete	Pictorial	Abstract
Addition				**Step 2**  **Step 3**  **Step 4** 

IJS & CE Progression in Calculation Policy 2019

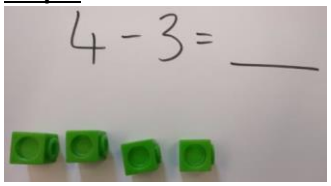
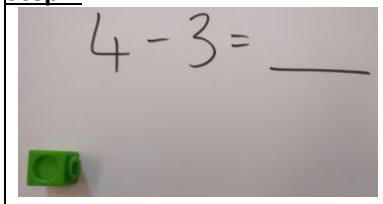
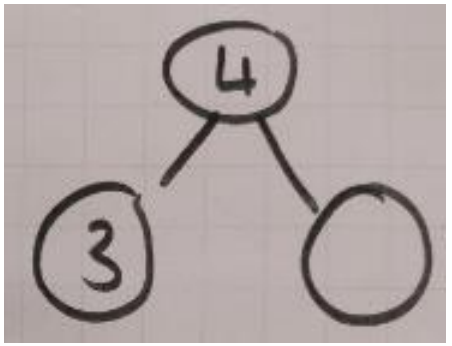
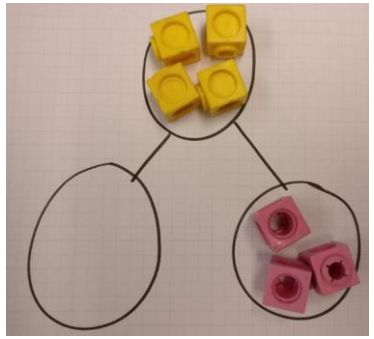
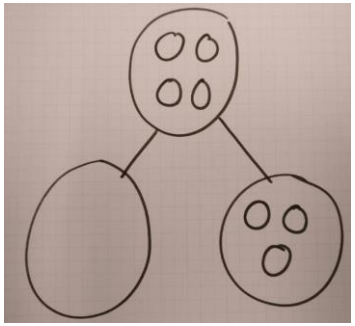
Addition	Vocabulary	Concrete	Pictorial	Abstract
				Step 5 
		Place value counters (either use colour coding or labelling) – partition, combine and exchange. **Step 1** H | T | O 	**Place value counters** – draw the concrete method – partition, combine and exchange. **Step 1** H | T | O  **Step 2** H | T | O 	**Abstract calculation** – record the formal written method eventually without the pictorial method alongside 

IJS & CE Progression in Calculation Policy 2019

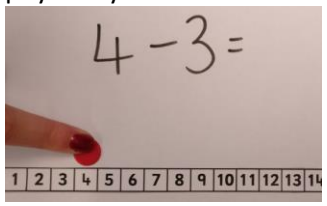
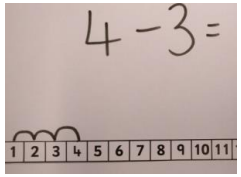
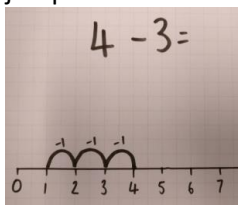
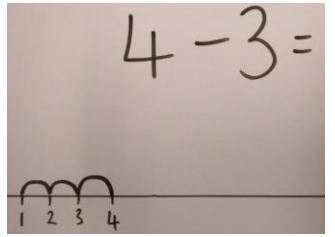
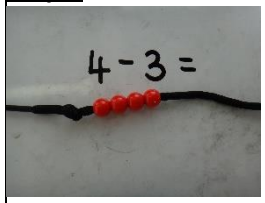
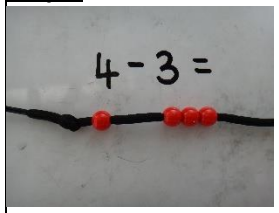
	Vocabulary	Concrete	Pictorial	Abstract
Addition		**Step 2** **H | T | O**  **Step 3** **H | T | O** 	**Step 3** **H | T | O**  The exchanging of the units to tens and tens to hundreds **must go underneath the answer line** **Step 4** **H | T | O** 	

IJS & CE Progression in Calculation Policy 2019

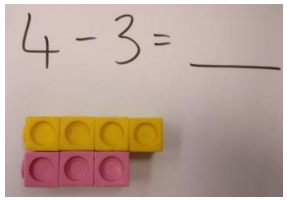
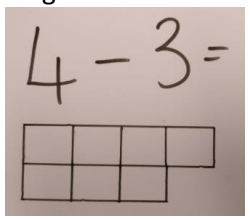
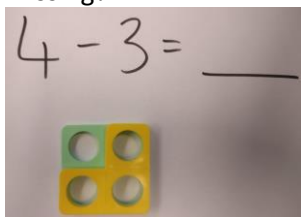
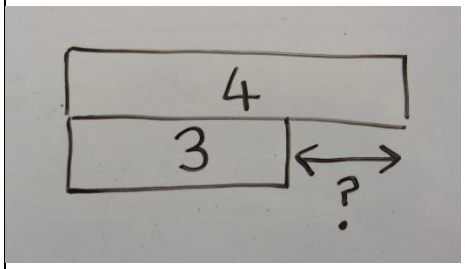
Subtraction

Vocabulary	Concrete	Pictorial	Abstract
abstract base ten bead strings calculation concrete counters decrease difference equal exchange fewer hundreds less minus multilink numicon number line number track ones partition pictorial place value PPW – part-part-whole record subtract subtrahend take away tens thousands total units*	**Manipulatives** – make the number and remove what is being subtracted **Step 1**  **Step 2** 	Draw the concrete method – draw the number and cross out what is being subtracted 	**PPW** – record numbers 
	PPW – use manipulatives. What is the missing piece? 	**PPW** – draw the concrete method. What is needed to make the whole? 	As above

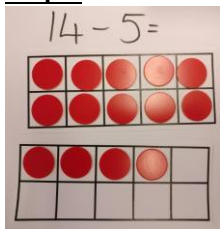
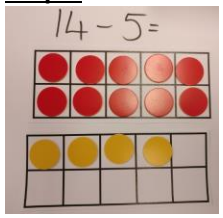
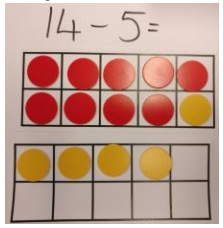
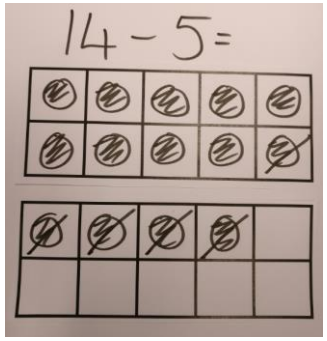
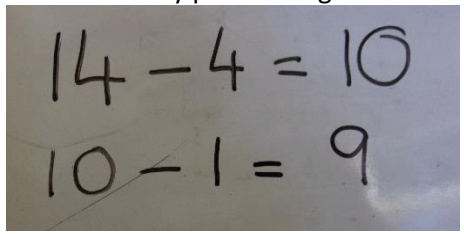
IJS & CE Progression in Calculation Policy 2019

	Vocabulary	Concrete	Pictorial	Abstract
Subtraction		**Number track** – use a counter to physically count back 	**Number track** – draw the concrete method – count back in ones  Marked number line – draw the jumps – count back in ones or chunks 	**Empty number line** – ENL – count back (in ones) 
		Bead String – count the correct number of beads then slide/count the beads to physically remove the subtracting number **Step 1**  **Step 2** 		

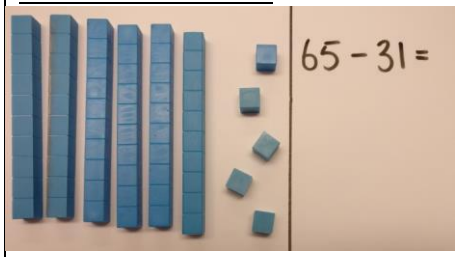
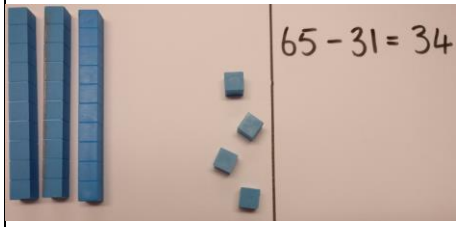
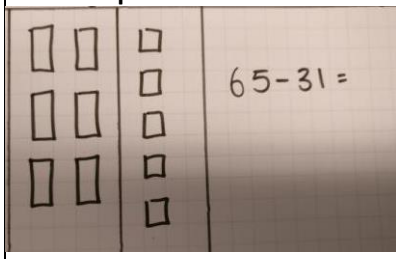
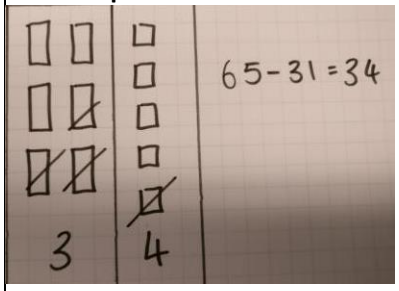
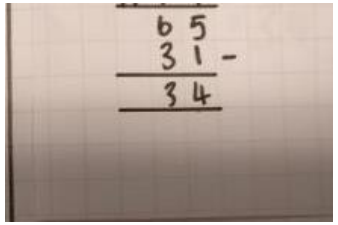
IJS & CE Progression in Calculation Policy 2019

	Vocabulary	Concrete	Pictorial	Abstract
Subtraction		**Difference** – use manipulatives Make both numbers and lay them next to each other, what is the difference? 	**Difference** – draw the concrete method. What is the difference in length? 	**Difference** – find the difference between 8 and 5 9 and 6, 8 and 5, 7 and 4 – why do they have the same difference?
		Numicon – find both numbers and lay them on top of each other. What is missing?  Or use the numicon and pegs to physically remove the number left **Step 1**  **Step 2**  **Step 3** 	**Bar model –** comparing to parts and finding the difference 	

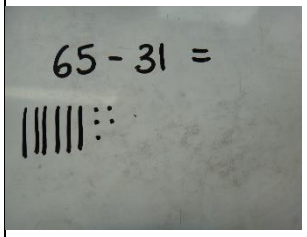
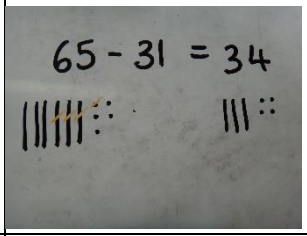
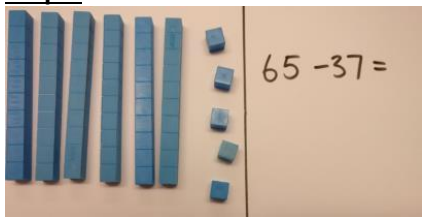
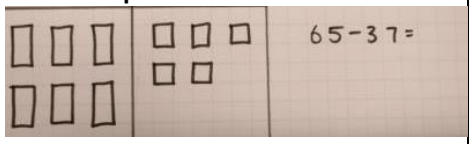
IJS & CE Progression in Calculation Policy 2019

	Vocabulary	Concrete	Pictorial	Abstract
Subtraction		**Tens frame** – use physical counters. Make a ten before breaking a ten. 14 - 5 = 14 - 4 - 1 **Step 1**  **Step 2**  **Step 3** 	**Tens frame** – draw the concrete method 	Record pictorial working. Show how to make ten by partitioning. 

IJS & CE Progression in Calculation Policy 2019

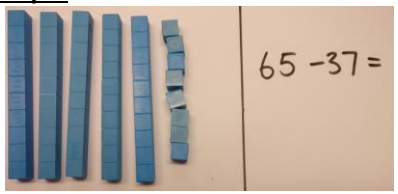
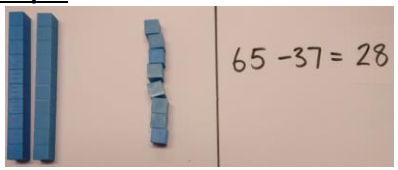
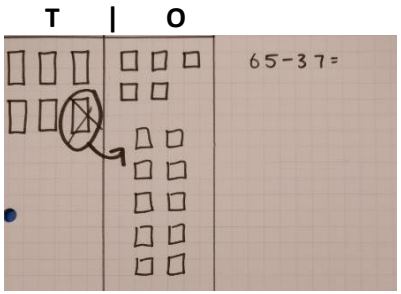
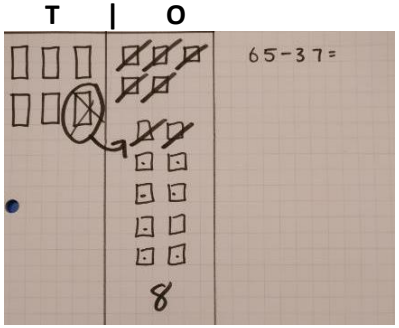
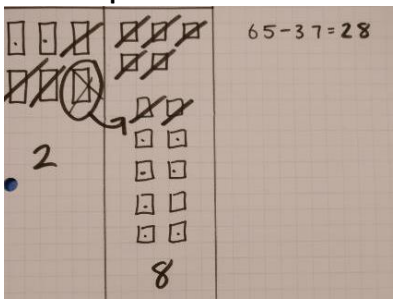
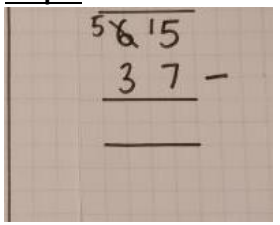
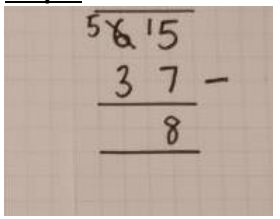
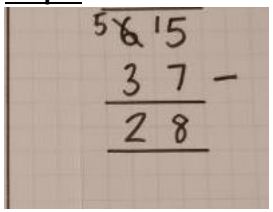
	Vocabulary	Concrete	Pictorial	Abstract
Subtraction		**Base ten** – partition and remove the number that is being subtracted (no exchanging) **Step 1** T O  **Step 2** T O 	**Base ten** – draw the concrete method – partition and remove the number that is being subtracted **Step 1** T | O  **Step 2** T | O 	**Abstract calculation** – record the formal column method alongside the pictorial method. 

IJS & CE Progression in Calculation Policy 2019

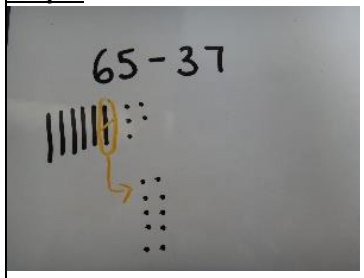
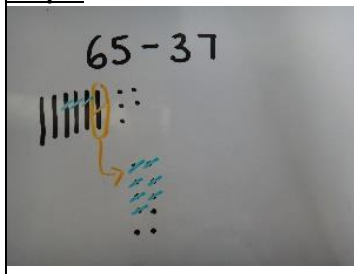
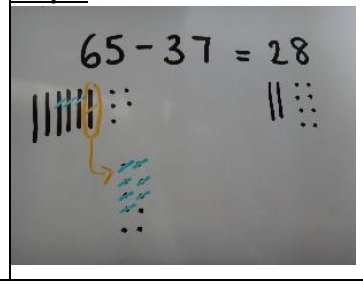
Subtraction	Vocabulary	Concrete	Pictorial	Abstract
			Rods and dots – draw the first number and cross out the number being subtracted **Step 1**  **Step 2** 	
		Base ten – partition and remove the number that is being subtracted, exchanging when necessary. **Step 1** 	**Base ten** – draw the concrete method. Partition, remove the number that is being subtracted and exchange where necessary. **Step 1** T | O 	**Abstract calculation** – record the formal column method alongside the pictorial method. Children must understand that we still have 41 when we exchange because 41 = 30 + 11

IJS & CE Progression in Calculation Policy 2019

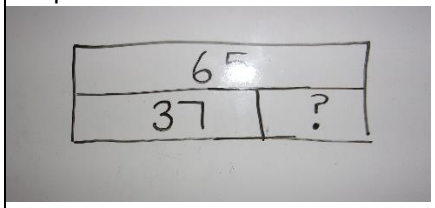
Subtraction

Vocabulary	Concrete	Pictorial	Abstract
	Step 2  **Step 3**  **Step 4**  	**Step 2**  **Step 3**  **Step 4**  	**Step 1**  **Step 2**  **Step 3** 

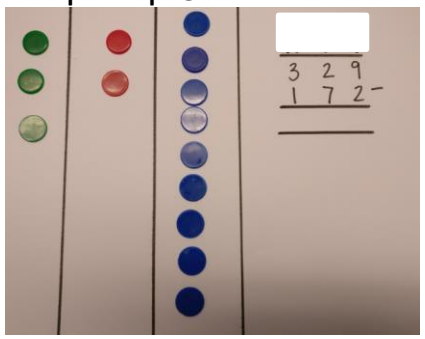
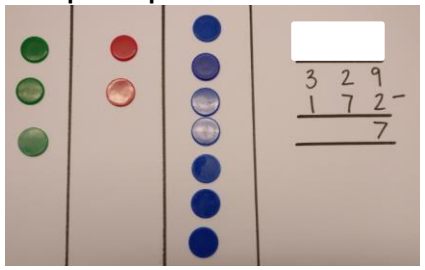
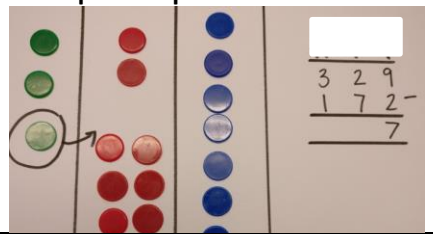
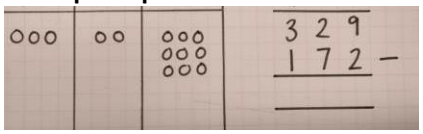
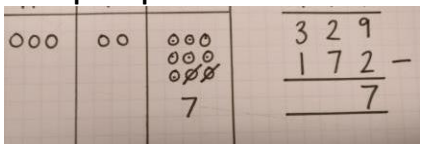
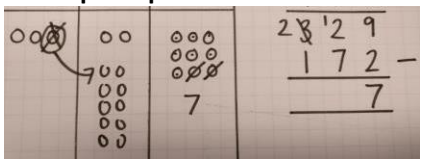
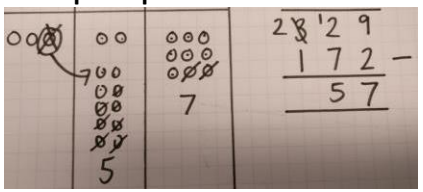
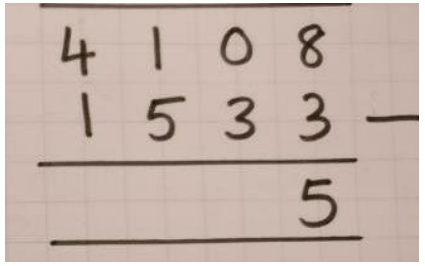
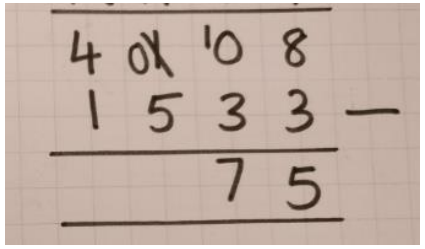
IJS & CE Progression in Calculation Policy 2019

	Vocabulary	Concrete	Pictorial	Abstract
Subtraction			**Rods and dots** – where exchanging of the tens rod needs to occur, cross this out and exchange into 10 dots 'ones'. Then cross out the number being subtracted and re-draw the reminding rods and dots to provide the tens and ones. **Step 1**  **Step 2**  **Step 3** 	

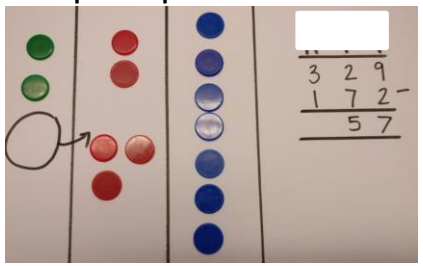
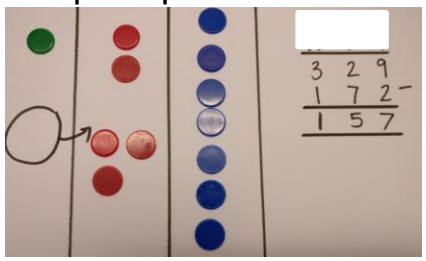
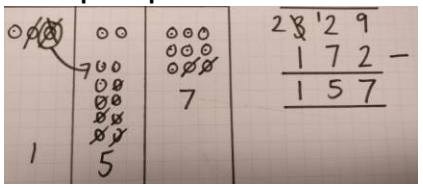
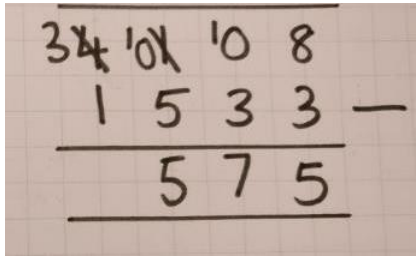
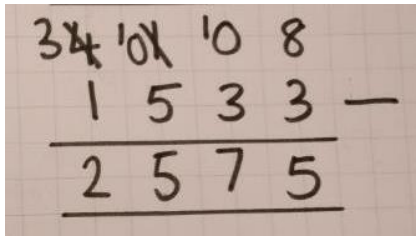
IJS & CE Progression in Calculation Policy 2019

	Vocabulary	Concrete	Pictorial	Abstract
Subtraction			**Bar model –** parts of a whole - finding the difference between the whole and the part 	

IJS & CE Progression in Calculation Policy 2019

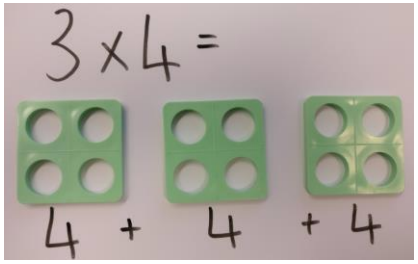
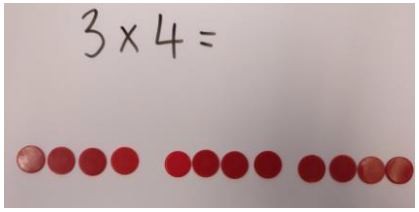
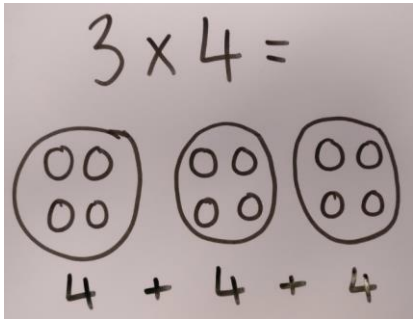
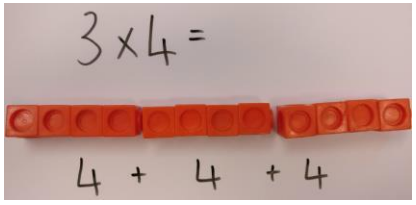
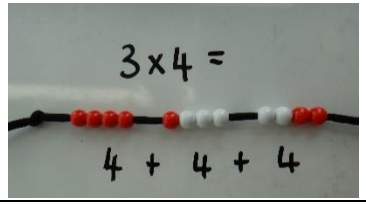
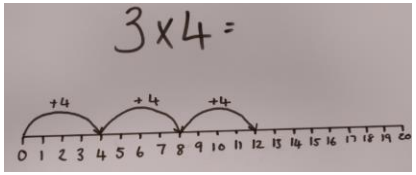
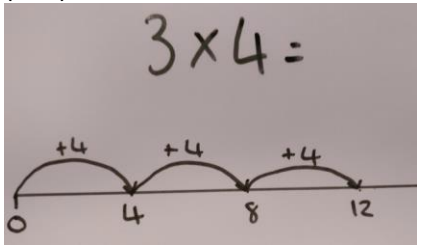
	Vocabulary	Concrete	Pictorial	Abstract
		Place value counters – partition and remove the number that is being subtracted, exchanging when necessary. **Step 1** H | T | O  **Step 2** H | T | O  **Step 3** H | T | O 	**Place value counters** – draw the concrete method. Partition and remove the number that is being subtracted, exchanging when necessary. **Step 1** H | T | O  **Step 2** H | T | O  **Step 3** H | T | O  **Step 4** H | T | O 	**Abstract calculation** – record the formal written method eventually without the pictorial method alongside. Children **must** understand what has happened when they cross out digits **Step 1**  **Step 2** 

IJS & CE Progression in Calculation Policy 2019

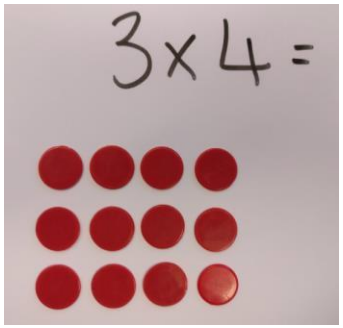
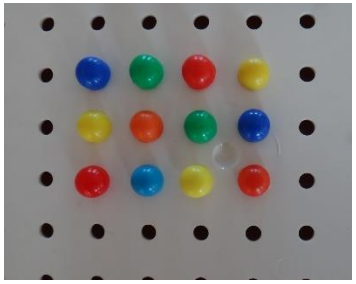
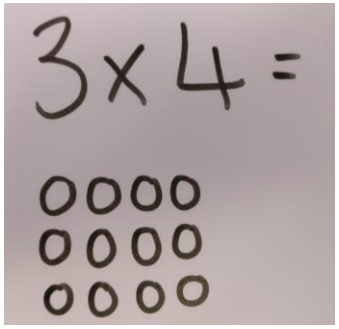
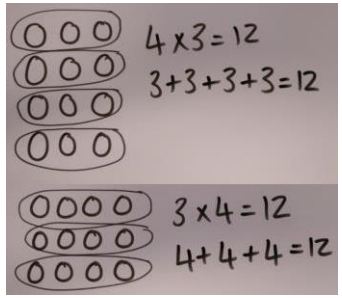
	Vocabulary	Concrete	Pictorial	Abstract
Subtraction		**Step 4** H | T | O  **Step 5** H | T | O 	**Step 5** H | T | O 	**Step 3**  **Step 4** 

IJS & CE Progression in Calculation Policy 2019

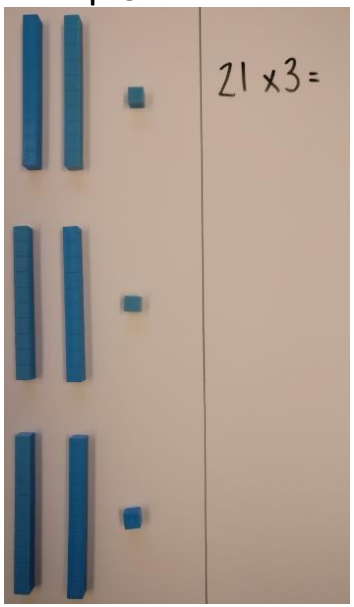
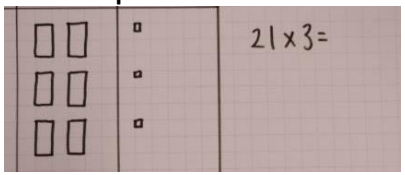
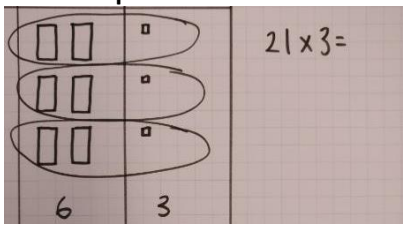
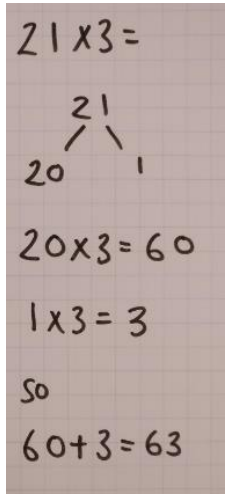
Multiplication

Vocabulary	Concrete	Pictorial	Abstract
abstract arrange array base ten bead strings calculation combine concrete counters double equal equal groups exchange groups of hundreds lots of multilink multiply numicon number facts number line number track ones / units* partition pictorial place value PPW – part-part-whole product record repeated addition tens	**Repeated addition** – use Numicon and counters.  	**Repeated addition** – draw the concrete method. 	Record multiplication alongside repeated addition
	Repeated addition – use multilink  **Bead string** – group the beads into 4's to calculate 	**Repeated addition** – make equal jumps along the number line 	**Repeated addition** – make equal jumps along an empty number line (ENL) 

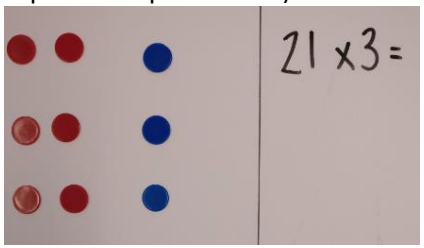
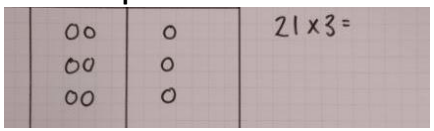
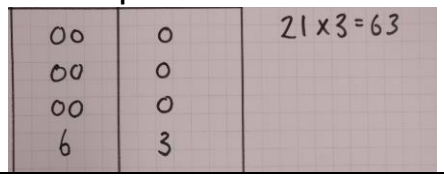
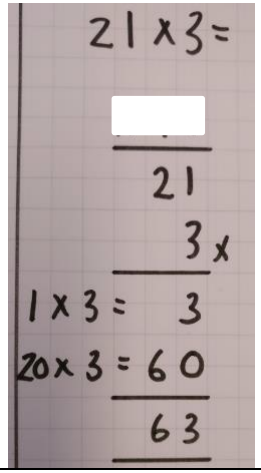
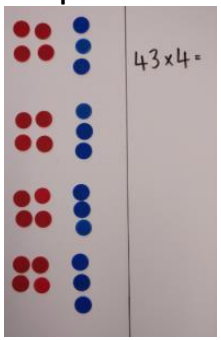
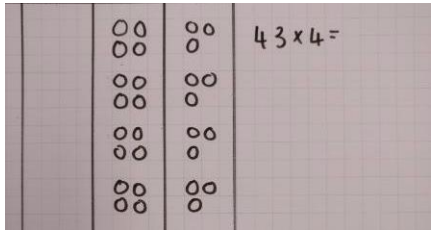
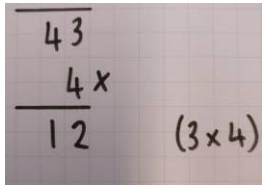
IJS & CE Progression in Calculation Policy 2019

	Vocabulary	Concrete	Pictorial	Abstract
Multiplication		**Arrays** – use counters. Arrange the groups in rows and columns  **Peg Board** – use pegs to make the array 	**Arrays** – draw the concrete method highlighting commutativity 3 x 4 = 4 x 3  **Bar models –** make sure all sections are proportional (also can be used for division)	**Arrays** – use arrays to find multiple information 

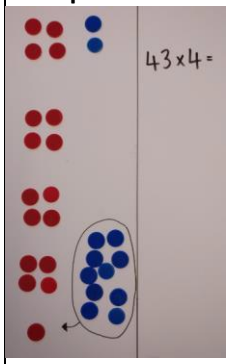
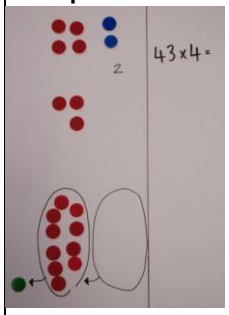
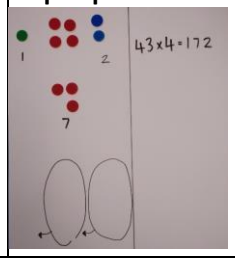
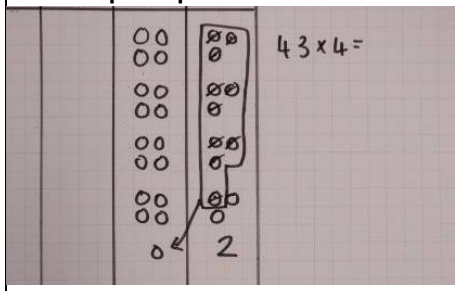
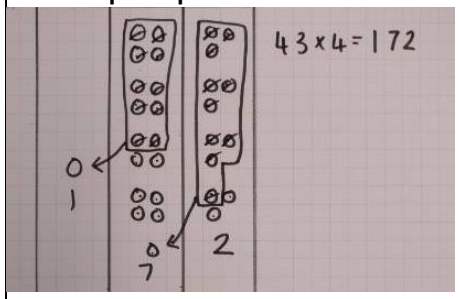
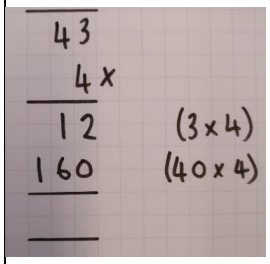
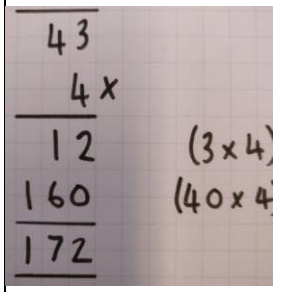
IJS & CE Progression in Calculation Policy 2019

Multiplication	Vocabulary	Concrete	Pictorial	Abstract
		Base ten – 2-digit x 1-digit. Partition the 2-digit number and make groups of that number **T | O** 	**Base ten** – draw the concrete method using a place value grid. **Step 1** **T | O**  **Step 2** **T | O** 	**Partitioning** - partition the 2-digit number into tens and ones and either -use known facts -number line 

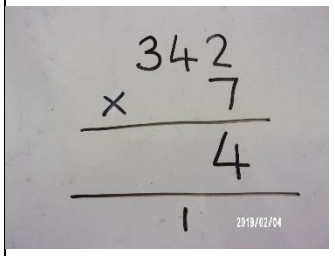
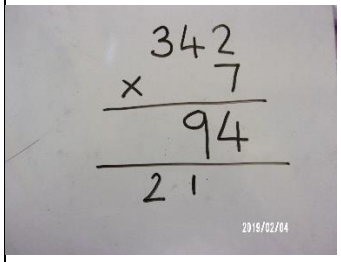
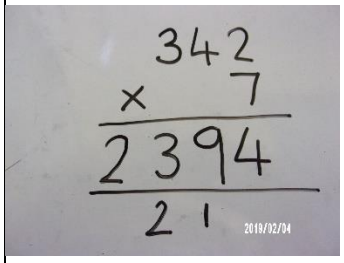
IJS & CE Progression in Calculation Policy 2019

	Vocabulary	Concrete	Pictorial	Abstract
Multiplication		**Place value counters** – 2-digit x 1-digit (no exchange). Partition the 2-digit number and combine the correct number of equal groups. (Specific coloured counters represent a place value) 	**Place value counters** – draw the concrete method using a place value grid. Partition the 2-digit number and combine the correct number of equal groups. **Step 1** T | O  **Step 2** T | O 	**Begin formal written method** – partition the 2-digit number, multiply the tens and ones separately and then combine. 
		Place value counters – 2-digit x 1-digit (with exchange). Partition the 2-digit number and combine the correct number of equal groups and exchange where necessary. **Step 1** T | O 	**Place value counters** – 2-digit by 1-digit (with exchange) – draw the concrete method using a place value grid. **Step 1** H | T | O 	**Formal written method –** short multiplication (expanded) **Step 1** 

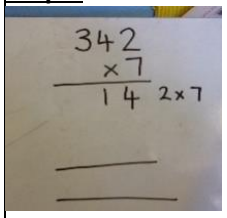
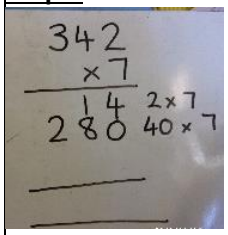
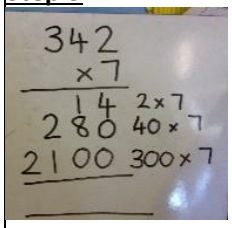
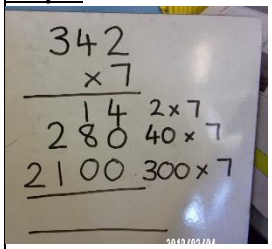
IJS & CE Progression in Calculation Policy 2019

	Vocabulary	Concrete	Pictorial	Abstract
Multiplication		**Step 2** T | O  **Step 3** T | O  **Step 4** H | T | O  	**Step 3** H | T | O  **Step 4** H | T | O  	**Step 2**  **Step 3** 

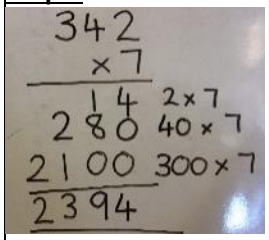
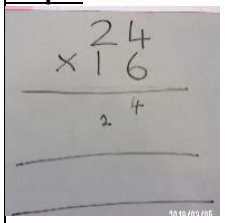
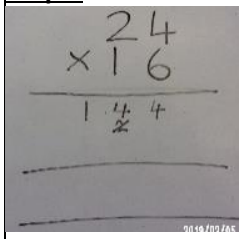
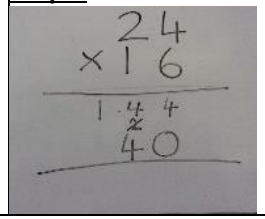
IJS & CE Progression in Calculation Policy 2019

	Vocabulary	Concrete	Pictorial	Abstract
Multiplication				**Short multiplication –** **<u>Step 1</u>**  **<u>Step 2</u>**  **<u>Step 3</u>** 

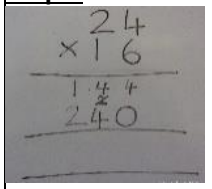
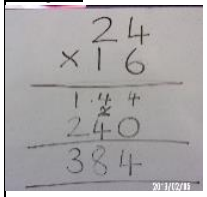
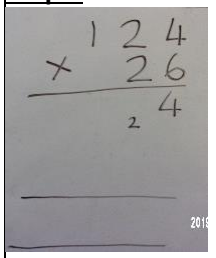
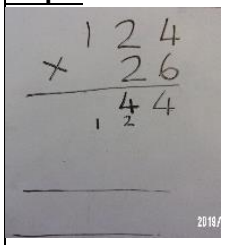
IJS & CE Progression in Calculation Policy 2019

	Vocabulary	Concrete	Pictorial	Abstract
Multiplication				**Long multiplication –** expanded **Step 1**  **Step 2**  **Step 3**  **Step 4** 

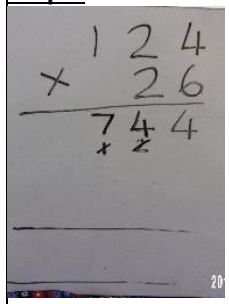
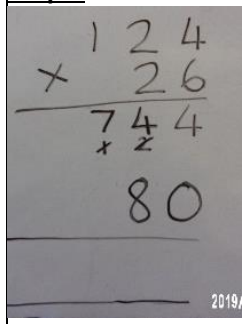
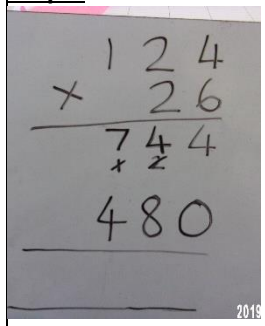
IJS & CE Progression in Calculation Policy 2019

Multiplication	Vocabulary	Concrete	Pictorial	Abstract
				Step 5  **Long multiplication –** Compact - 2-digit x 2-digit **Step 1**  **Step 2**  **Step 3** 

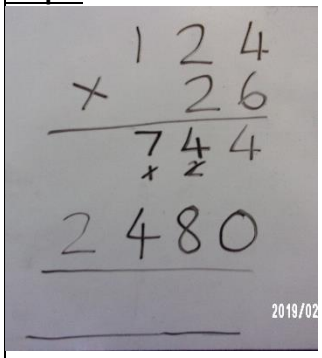
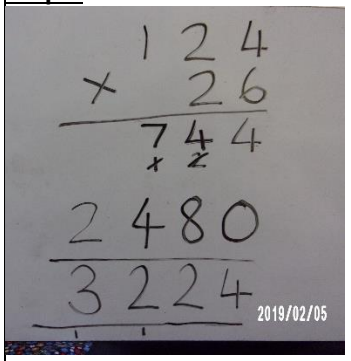
IJS & CE Progression in Calculation Policy 2019

	Vocabulary	Concrete	Pictorial	Abstract
Multiplication				**Step 4**  **Step 5**  **Compact** – 3-digit x 2-digit **Step 1**  **Step 2** 

IJS & CE Progression in Calculation Policy 2019

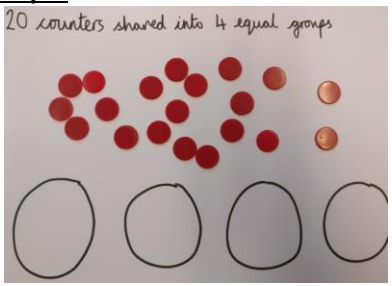
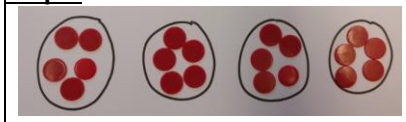
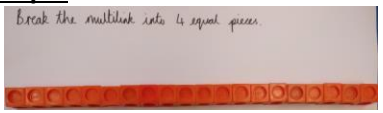
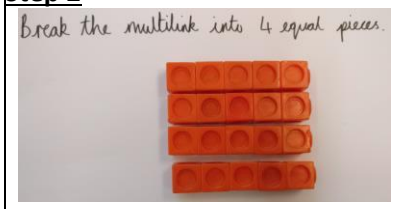
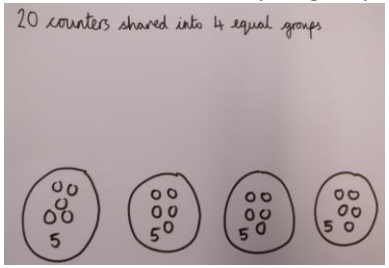
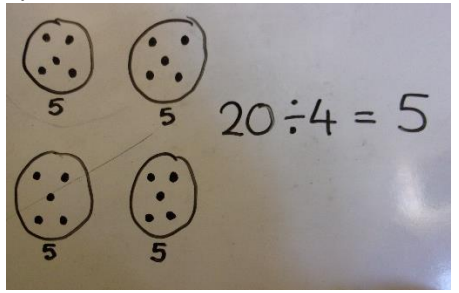
	Vocabulary	Concrete	Pictorial	Abstract
Multiplication				**Step 3**  **Step 4**  **Step 5** 

IJS & CE Progression in Calculation Policy 2019

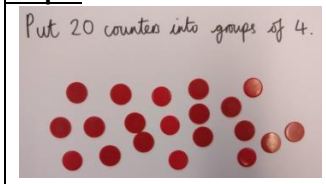
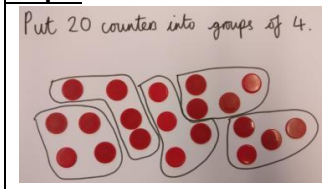
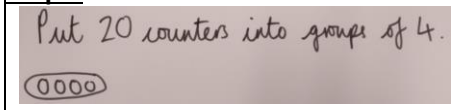
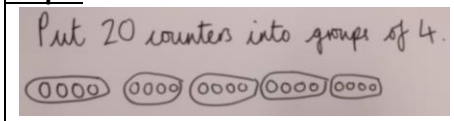
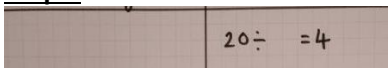
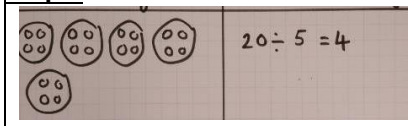
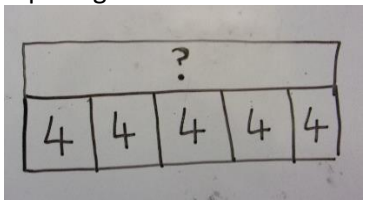
	Vocabulary	Concrete	Pictorial	Abstract
Multiplication				**Step 6**  **Step 7** 

IJS & CE Progression in Calculation Policy 2019

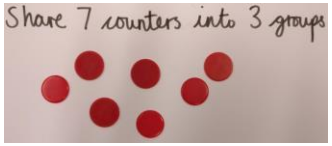
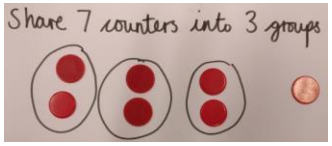
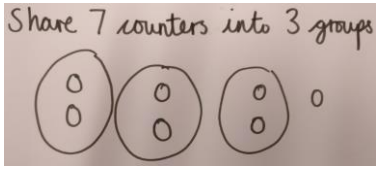
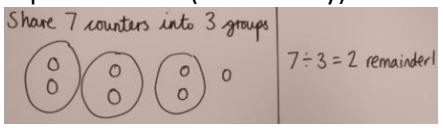
Division

Vocabulary	Concrete	Pictorial	Abstract
abstract arrange array base ten calculation concrete counters divide division equal equal groups exchange grouping half halve hundreds long division multilink numicon number facts number line number track ones/units* partition pictorial place value PPW – part-part-whole product record remainder repeated subtraction	**Sharing** – share counters into equal groups. **Step 1**  **Step 2**  **Sharing** - share multilink into equal groups and arrange them in rows (beginnings of arrays) **Step 1**  **Step 2**  	**Sharing** – draw the concrete method. Share number into equal groups  	**Sharing** - record division using correct symbol. 

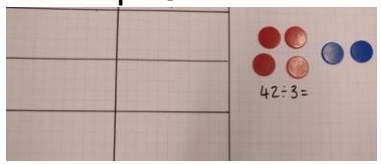
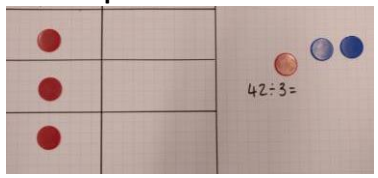
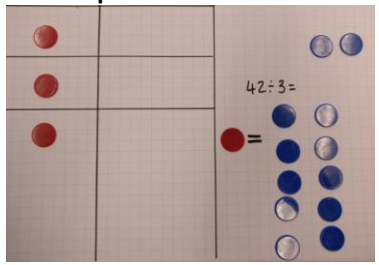
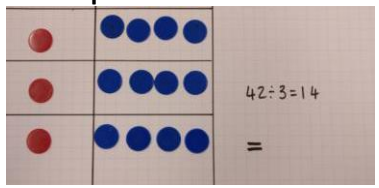
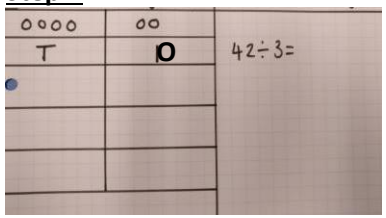
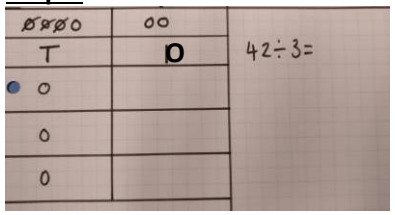
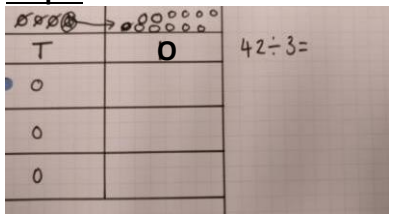
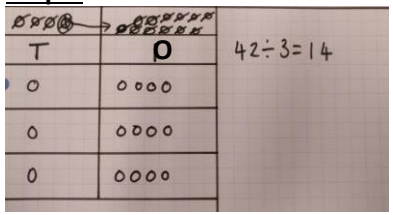
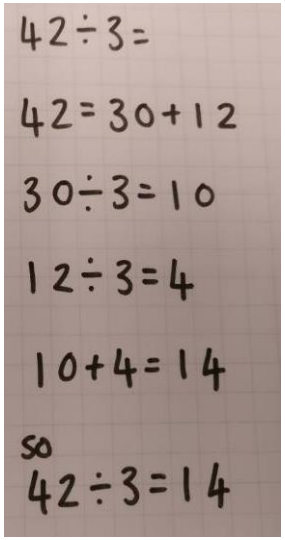
IJS & CE Progression in Calculation Policy 2019

Division	Vocabulary	Concrete	Pictorial	Abstract
		Grouping – put counters into equal groups **Step 1**  **Step 2** 	**Grouping** – draw the concrete method. **Step 1**  **Step 2** 	**Abstract calculation** – record division using correct symbol. **Step 1**  **Step 2** 
		Grouping – group counters along a number line or number track. 	**Grouping** – repeated subtraction using counters/multilink along a number line 	**Grouping** – repeated subtraction along a number line (marked or empty). 
			Bar model – number of equal parts equaling a whole 	

IJS & CE Progression in Calculation Policy 2019

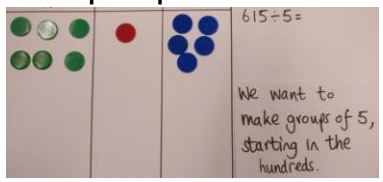
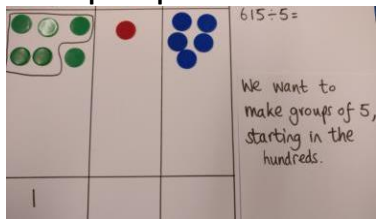
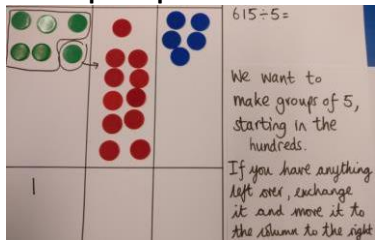
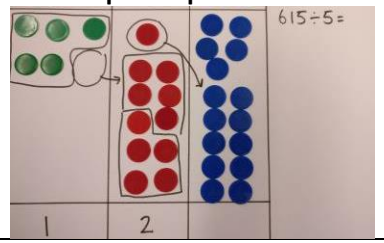
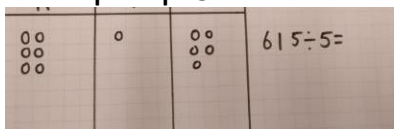
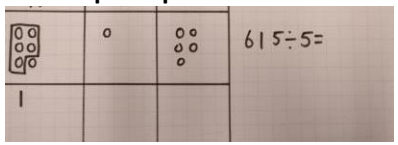
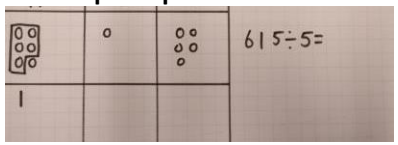
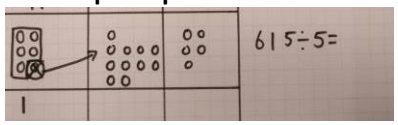
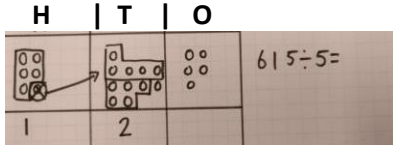
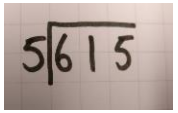
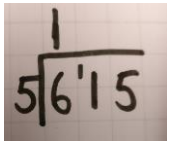
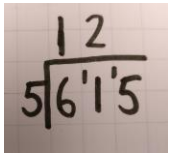
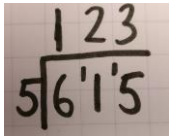
	Vocabulary	Concrete	Pictorial	Abstract
Division		**Grouping/sharing with remainder** – group or share counters as the question requires. **Step 1**  **Step 2**  	**Grouping/sharing with remainder** – draw concrete method.  	**Abstract calculation** – record operation in numbers alongside pictorial representation (if necessary).  **Abstract calculation** – use number facts to recognise when there will be a remainder – 13 ÷ 4, 13 isn't in the 4 times table so there will be a remainder. 12 x 4 = 3, so 13 ÷ 4 = 3r1

IJS & CE Progression in Calculation Policy 2019

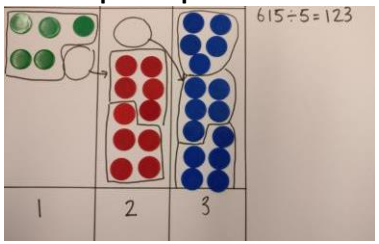
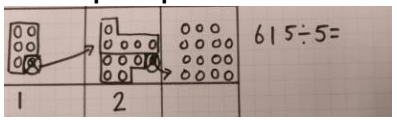
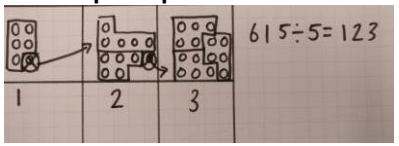
	Vocabulary	Concrete	Pictorial	Abstract
Division		**Place value counters** - 2-digit divided by 1-digit **Step 1** T | O  **Step 2** T | O  **Step 3** T | O  **Step 4** T | O 	**Place value counters** – 2-digit divided by 1-digit – draw the concrete method. **Step 1**  **Step 2**  **Step 3**  **Step 4** 	**2-digit divided by 1-digit** – partition and divide tens and ones separately. 

IJS & CE Progression in Calculation Policy 2019

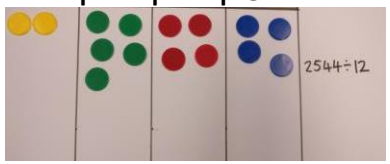
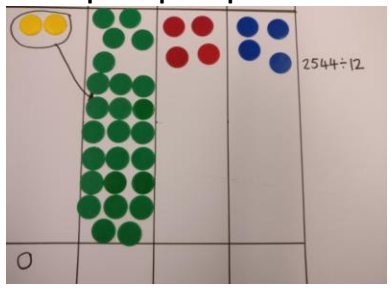
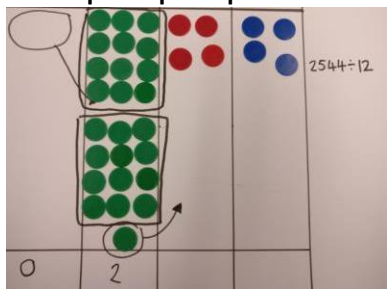
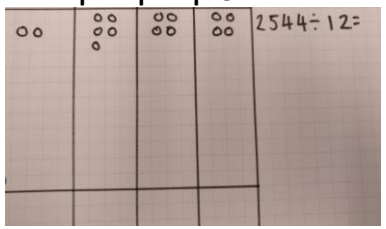
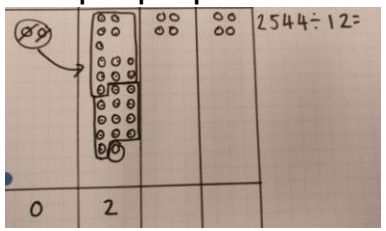
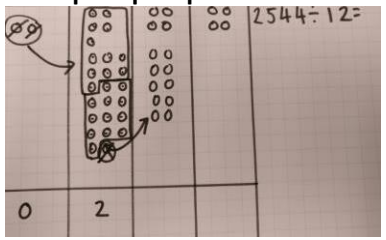
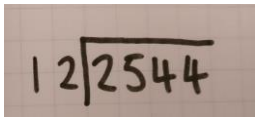
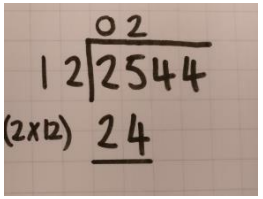
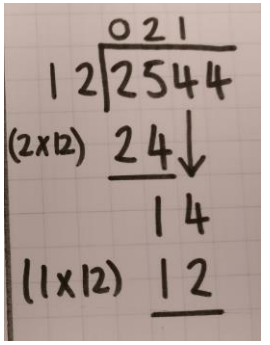
Division

Vocabulary	Concrete	Pictorial	Abstract
	Short division – use place value counters **Step 1** H | T | O  **Step 2** H | T | O  **Step 3** H | T | O  **Step 4** H | T | O 	**Short division** – draw the concrete method. **Step 1** H | T | O  **Step 2** H | T | O  **Step 3** H | T | O  **Step 4** H | T | O  **Step 5** H | T | O 	**Short division** – the formal written method. **Step 1**  **Step 2**  **Step 3**  **Step 4** 

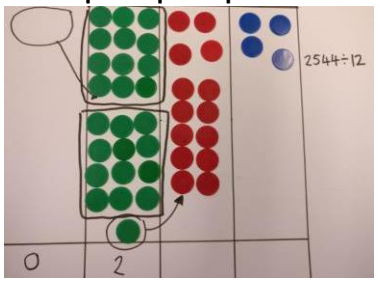
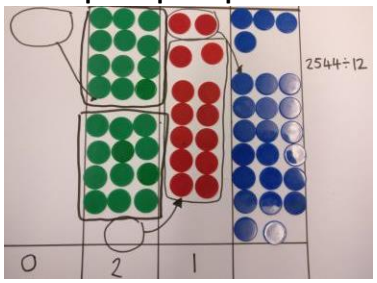
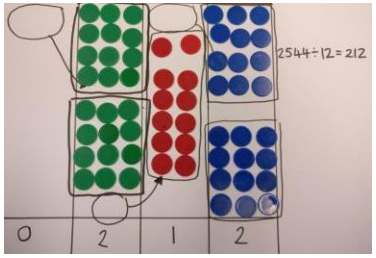
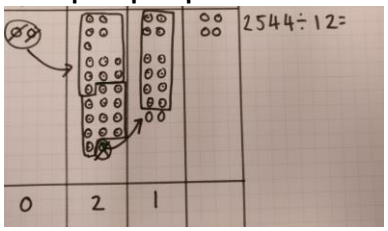
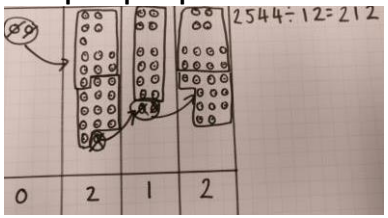
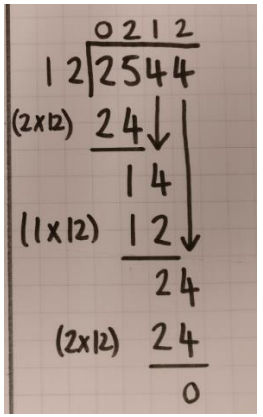
IJS & CE Progression in Calculation Policy 2019

	Vocabulary	Concrete	Pictorial	Abstract
Division		**Step 5** H | T | O 	**Step 6** H | T | O  **Step 7** H | T | O 	

IJS & CE Progression in Calculation Policy 2019

Division	Vocabulary	Concrete	Pictorial	Abstract
		Long division – use place value counters **Step 1** Th | H | T | O  **Step 2** Th | H | T | O  **Step 3** Th | H | T | O 	Long division – draw the concrete method. **Step 1** Th | H | T | O  **Step 2** Th | H | T | O  **Step 3** Th | H | T | O 	Long division – the formal written method. **Step 1**  **Step 2**  **Step 3** 

IJS & CE Progression in Calculation Policy 2019

	Vocabulary	Concrete	Pictorial	Abstract
Division		**Step 4** Th | H | T | O  **Step 5** Th | H | T | O  **Step 6**  	**Step 4** Th | H | T | O  **Step 5** Th | H | T | O  	**Step 4** 

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	Phase 1		Phase 2		Phase 3	
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Mental +/-	•add and subtract one-digit and two-digit numbers to 20, including zero	•add and subtract numbers using concrete objects, pictorial representations, and mentally, including: TO+O, TO+T, TO+TO and O+O+O •show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot	•add and subtract numbers mentally, including: HTO+O, HTO+T and HTO+H		•add and subtract numbers mentally with increasingly large numbers	•perform mental calculations, including with mixed operations and large numbers
Written +/-			•add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction	•add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate	•add and subtract whole numbers with more than 4 digits, including using formal written methods	
Mental (x/÷)		•calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs •show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot	•write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental methods	•use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers •recognise and use factor pairs and commutativity in mental calculations	•multiply and divide numbers mentally drawing upon known facts •multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	•perform mental calculations, including with mixed operations and large numbers
Written (x/÷)			•Progress to formal written methods calculations as above	•multiply two-digit and three-digit numbers by a one-digit number using formal written layout	•multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers •divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context	•multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication •divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context •divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to context

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