Homefield Church of England Primary School

Maths & Calculation Policy
2021

INTRODUCTION

This Maths and Calculation Policy has been produced in line with the 2014 National Curriculum for Mathematics to ensure consistency and progression in teaching throughout the school that is age appropriate. It aims to introduce children to the processes of calculation through practical, oral and mental activities. As children begin to understand the underlying ideas, they develop ways of recording to support their thinking and calculation methods, use particular methods that apply to special cases and learn to interpret and use signs and symbols involved. This policy shows the natural progression that a child should make in their mathematical education. Children should not progress onto the advanced stages of formal written methods until they have a secure conceptual understanding. By the end of Year 6, children should be able to choose the most appropriate approach to solve a problem: making a choice between using jottings (an extended written method), an efficient written method or a mental method.

Intent

Maths is a journey and long-term goal, achieved through exploration, clarification, practice and application over time. At each stage of learning, children should be able to demonstrate a deep, conceptual understanding of the topic and be able to build on this over time.

Our overall aims for when children leave Homefield, are:

- develop a positive attitude to mathematics as an interesting and attractive subject in which all children gain success and pleasure.
- have access to a high quality maths curriculum that is both challenging and enjoyable, and builds upon previous learning.
- be provided with a variety of mathematical opportunities, which will enable them to make the connections.
- ensuring children are confident mathematicians who are not afraid to take risks.
- develop an ability to express themselves fluently, to talk about the subject with assurance, using correct mathematical language and vocabulary.
- develop mathematical skills and knowledge and recall of basic facts and the four operations
- be able to use this knowledge and understanding to carry out calculations mentally
- make use of diagrams and informal notes to help record steps and part answers when using mental methods that generate more information than can be kept in their heads
- have an efficient, reliable written method of calculation for each operation that children can apply with confidence when undertaking calculations that they cannot carry out mentally.

Implementation

Our implementation is developed through secure understanding of the curriculum and subject area.

Planning

Maths is a core subject in the National Curriculum. At Homefield we use White Rose Small Steps and their resources to ensure curriculum coverage however teachers have access to a variety of websites and planning to support their planning process which enables them to find high quality Maths resources. Planning involves the use of our Cooperative Learning strategies which have a range of different learning CLIPS to support children with their mathematical fluency, mathematical language and to develop their confidence to reason and solve problems.

Planning is undertaken at three levels:

1. Long term: National Curriculum

The National Curriculum 2014 has 3 central aims:

- Become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately. In order to achieve this we need to provide opportunities for children to investigate numbers by counting, cardinality (how many there are in the group), comparison and composition. They need to practice decomposing and recomposing numbers, recalling number bonds and multiplication tables to improve mathematical fluency. From Years 1 – 6 children complete a daily 10 in 10. Children complete 10 arithmetic questions in 10 minutes; the questions are targeted and aim to plug gaps identified in weekly question level analysis complete by the class teacher.

- **Reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language. The conversations we have and questions we ask are key to developing reasoning skills. We can ask children to describe, explain, convince others, justify and prove to promote their reasoning skills. Adults can support children to develop reasoning by modelling, using mathematical language (also displayed in classrooms), using sentence stems, group work, Cooperative learning CLIPs and understanding how others work.

- 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. Activities should be provided where children can solve number problems, practical problems and missing number problems. Problem solving is not just about solving the problem, it is about how they solved the problem. What strategies and mathematical concepts did they use? All pupils should have the opportunity to apply their mathematics to solve problems. The use of mathematical language, modelling and the bar model can all help support children to develop their problem solving skills. Higher attaining children need to solve problems that require more demanding reasoning and problem solving skills rather than harder numbers. We must ensure that children have the opportunity to conjecture when problem solving. Problem solving is more than learning and following a procedure.

2. Medium term

The sequencing of teaching, whilst based on the White Rose planning, reflects the needs of the learners. Place value and arithmetic are given priority at the start of each academic year as these are the building blocks for mathematical learning.

3. Short term planning

Short term planning is carried out weekly by the class teacher supported by the use of many different websites and our Calculation Policy. These plans list the specific learning objectives and details of how the lessons are to be taught, including key vocabulary and resources required.

- Daily lessons include a clear lesson objective
- Daily lessons are taught using a variety of CLIPs (primarily Meet in the middle, Catch one partner and Boss and sectary) to support retrieval practice, development of mathematical language, table work, partner work which then leads to the confidence in individual work.

Concrete, pictorial and Abstract (CPA) approach

At Homefield Primary, we recognise that the **Concrete Pictorial Abstract (CPA)** approach is highly effective in the teaching of Maths to develop conceptual understanding. This approach will vary between year groups and the individual abilities of children within each class.

Objects, pictures, words, numbers and symbols are everywhere. By using the CPA approach, we incorporate all of these to help children explore and demonstrate mathematical ideas, enrich their learning experience and deepen understanding. Together, these elements help cement knowledge so pupils truly understand what they've learnt.

All pupils, when introduced to a key new concept, should have the opportunity to build competency in this topic by taking this approach. Pupils are encouraged to physically represent mathematical concepts. Objects and pictures are used to demonstrate and visualise abstract ideas, alongside numbers and symbols.

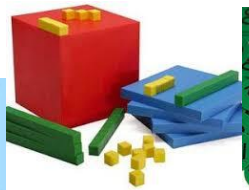
Concrete – The doing stage

There is a clear focus on the use of manipulatives and visual images to support understanding in every year group. Each new concept or calculation strategy will be introduced using appropriate manipulatives, giving the children a clear picture of the theoretical mathematics they are learning. It is important that children have access to a wide range of manipulatives in every year group and, consequently, we encourage children to be independent in their use of manipulatives throughout the school and access resources as they see fit. This is the foundation for conceptual understanding.

Concrete resources that may be found in classrooms will include:








These resources will vary depending on year group and individual needs.

Pictorial – The seeing stage

A child has sufficiently understood the hands-on experiences performed and can now relate them to representations, such as a diagram or a picture of the problem.

Abstract- The symbolic stage

A child is now capable of representing problems by using mathematical notation, for example 10 ÷ 2 = 5

Teaching

At least 3 lessons a week should start with a 10 in 10 (KS2) or a 5 in 5 (KS1) fluency test. The style of the 10 in 10/5 in 5 is very similar to that of the Statutory KS1 and KS2 arithmetic test. All 10 in 10s/5 in 5s are written by the class teacher to meet in needs of the children in their class. A QLA is taken once a week to identify any area of weakness.

We follow the White Rose long term plan to ensure coverage but supplement it with other resources (Deepening Understanding, Classroom Secrets, Maths No Problem, Target Maths, Teacher made resources, etc).

Cooperative learning CLIPs will be embedded into lessons to develop maths language, communication skills and an acknowledgement that peers working together is an effective way of building skills vital for work and throughout the future. Also it helps to build confidence before independent work is undertaken. Cooperative Learning also encourages deeper and critical thinking skills as the follow up questions we usually ask are how? and why? Each CLIP is designed to encourage certain elements of listening, speaking, questioning and response.
Whole class teaching starts with a CLIP. These are stuck into book were appropriate. These are the most common ones used within maths:

- Catch 1 Partner (C1P) is usually used as a starter to remind children to recap previous learning, to consolidate skills or for quick recall practice. Eg: EYFS can use C1P to recognise digits or subitize dots on a piece of paper, KS1 may look at place value within numbers, KS2 may look at fluency within the timetables. Catch 1 Partner is very flexible and can be used within all areas of the Mathematics Curriculum.
- Meet in the Middle (MIM) allows children to express and question each other in a timed situation so that they can explain how they solved a problem or answered a question. This helps to build children's fluency understanding and helps them with the reasoning behind why or how they got to a certain answer. This develops their confidence when working together before tackling questions and problems independently. Reasoning type problems are well suited for MIM activities as during the Word Round (WR) after the task, justifications and reasoning language can be used to develop conceptual understanding.
- Boss and Secretary (BS) allows for procedures to be practised in any topic. After teacher modelling, one child is "The Boss" and explains, without writing, how to solve a problem to the other child (Secretary) who writes down everything they say in the procedure. The Secretary can ask questions to check but it is not always necessary. They then swap. This is an excellent activity to complete with a partner before going onto independent activities. Children can then support each other to help build their confidence and understanding and ask necessary questions until they are confident to work. Boss and secretary can be used during any stage of the lesson (concrete, pictorial or abstract).

Assessment

1. Summative/reported - (EYFS, Yr 2, Yr 6)
2. Standardisation (Year 1 – 6) - Termly assessments for each year group (White Rose and NTS)
3. Diagnostic – through daily 10 in 10s
4. Formative – See Feedback Policy for daily formative assessment opportunities
5. CLIPs - Cooperative learning strategies support with in class assessment

All of the above will be monitored and discussed during pupil progress meetings and staff performance management.

Impact

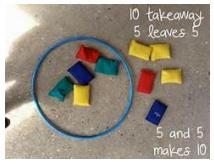
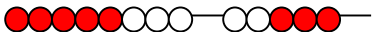
Pupils will leave us prepared for the next stage in their lives with:

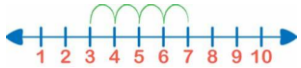
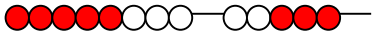
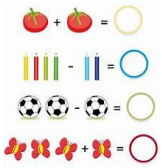
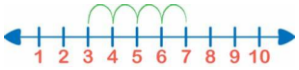
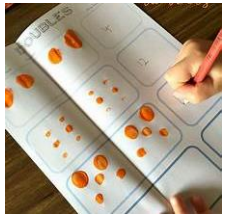
- Quick recall of facts and procedures
- The flexibility and fluidity to move between different contexts and representations of mathematics
- The ability to recognise relationships and make connections in mathematics
- Confidence and belief that they can achieve
- The knowledge that maths underpins most of our daily lives
- Skills and concepts that have been mastered
- Have a positive and inquisitive attitude to mathematics as an interesting and attractive subject in which all children gain success and pleasure.

A mathematical concept or skill has been mastered when a child can show it in multiple ways, using the mathematical language to explain their ideas, and can independently apply the concept to new problems in unfamiliar situations and this is the goal for our children.

These will be assessed through: assessment, pupil progress meetings, performance management, moderation and standardisation.

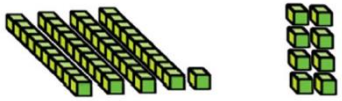
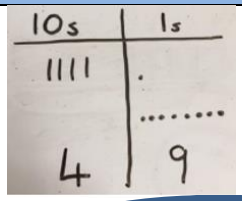
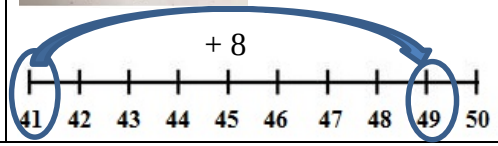
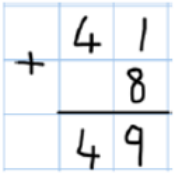
Calculation Policy

EYFS (Nursery & Reception)			
Addition	Subtraction	Multiplication	Division
Children are encouraged to gain a sense of the number system through the use of counting concrete objects.   They combine objects in practical ways and count all.  They understand addition as counting on and will count on in ones and	Children are encouraged to gain a sense of the number system through the use of counting concrete objects.   They understand subtraction as counting out.  They begin to count back in ones and twos using objects, cubes, bead string and number line. 	Children use concrete objects to make and count equal groups of objects.  They will count on in twos using a bead string and number line. They understand doubling as repeated addition. 2 + 2 = 4	Children use concrete objects to count and share equally into 2 groups. 6 cakes shared between 2 people each person gets 3 cakes. 6 ÷2 = 3   They count a set of objects and halve them by making two equal groups. They understand sharing and halving as dividing by 2.

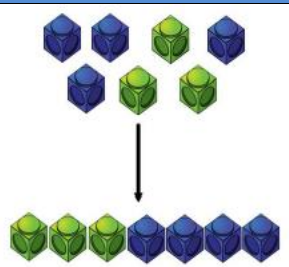
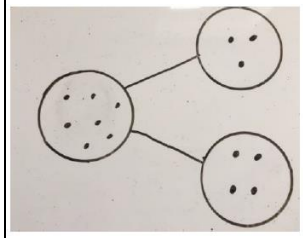
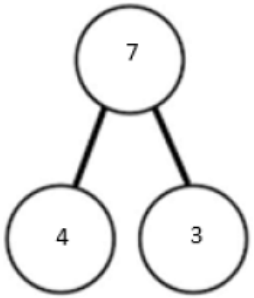
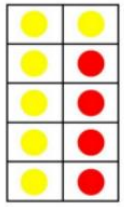
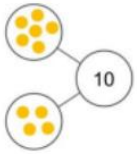
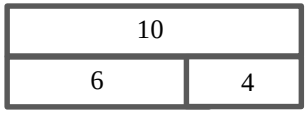
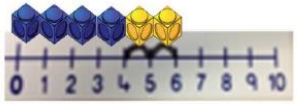
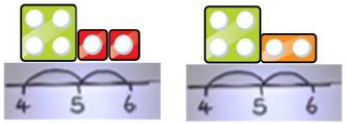
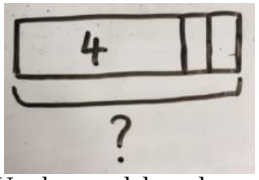
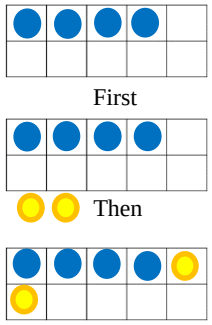
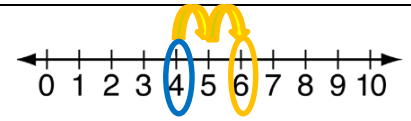
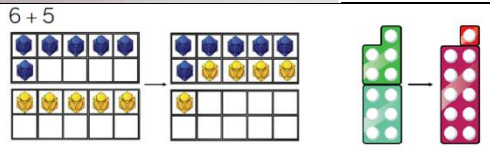
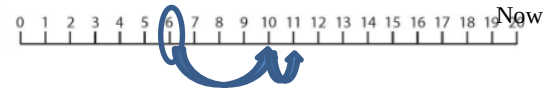
twos using objects, cubes, bead string and number line.  They use  concrete and pictorial representation to record their calculations. They begin to use + and =  They are encouraged to develop a mental picture of the number system in their heads to use for calculations. Higher attaining children may be able to represent their calculations using symbols and numbers within a written calculation.	 They use concrete and pictorial representation to record their calculations. They begin to use - and = They are encouraged to develop a mental picture of the number system in their heads to use for calculations. Higher attaining children may be able to represent their calculations using symbols and numbers within a written calculation.	They use concrete and pictorial representation to record their calculations. Higher attaining children may be able to represent their calculations using symbols and numbers within a written calculation. 	They will begin to use objects to make groups of 2 from a given amount. They use concrete and pictorial representation to record their calculations.  Higher attaining children may be able to represent their calculations using symbols and numbers within a written calculation.

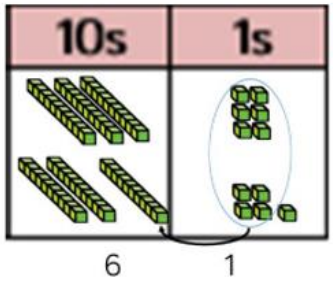
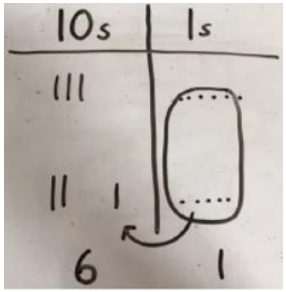
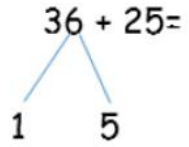
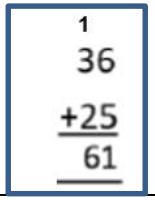
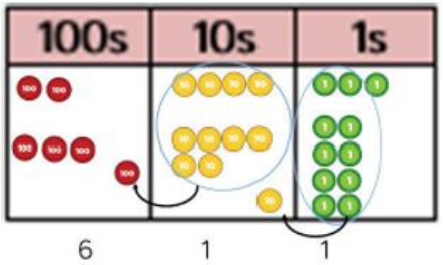
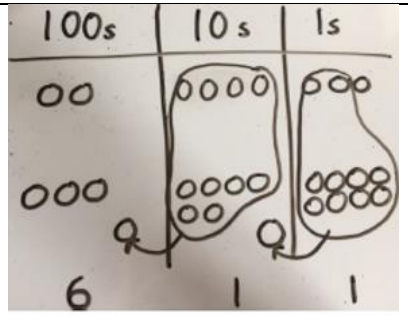
Calculation Policy

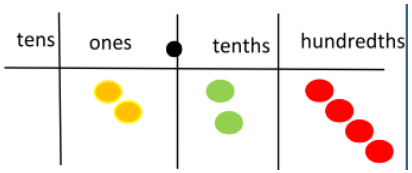
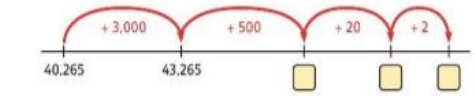
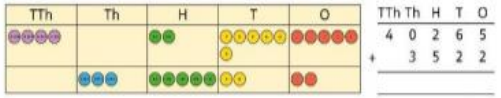
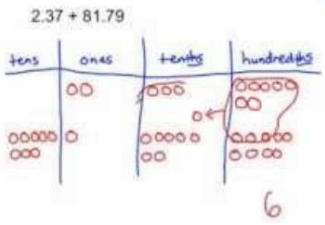
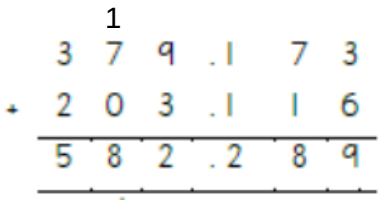
ADDITION – Lower KS2 (Years 3 & 4)

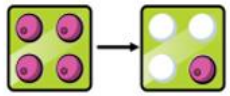
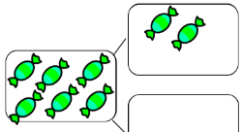
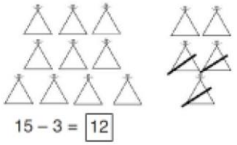
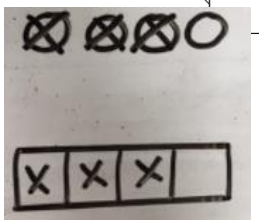
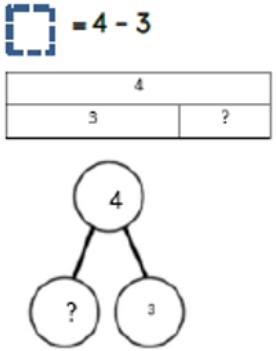
	Concrete	Pictorial	Abstract
TO + 0 (not crossing tens boundaries) Year 2 onwards	 Continue to develop understanding of portioning and place value through base 10, 10 frames, bead strings.	 	1 + 8 = 9 40 + 9 = 49 

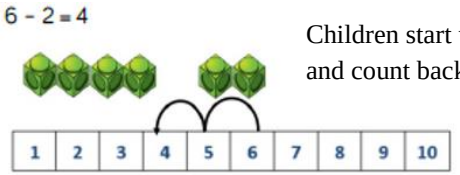
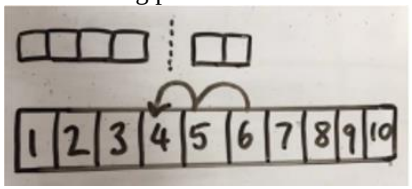
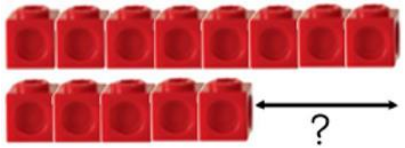
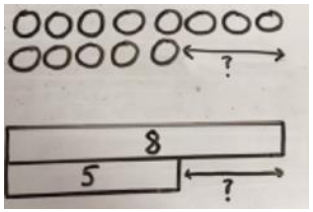
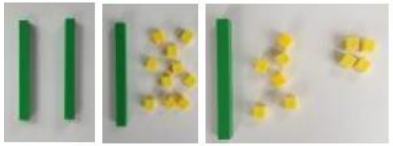
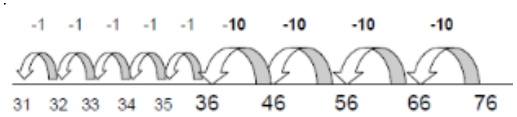
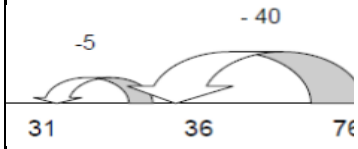
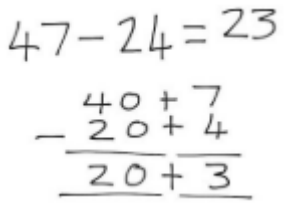
ADDITION – KS1 (Years 1 & 2)

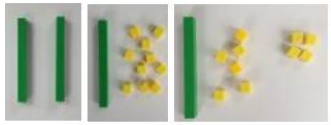
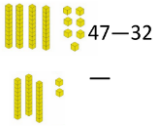
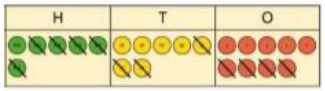
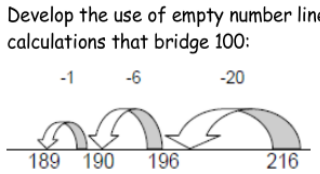
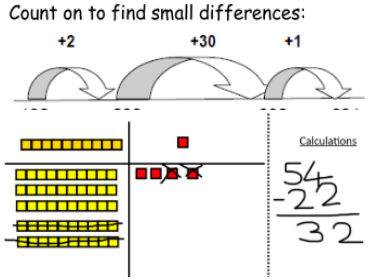
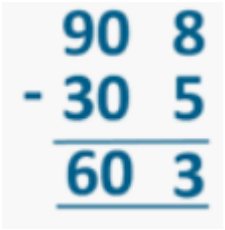
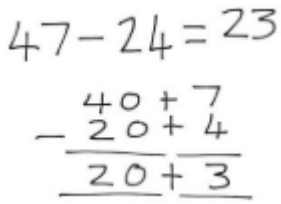
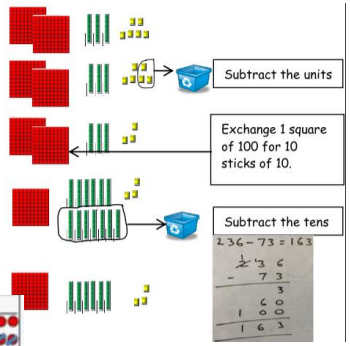
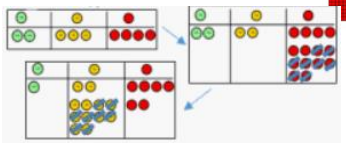
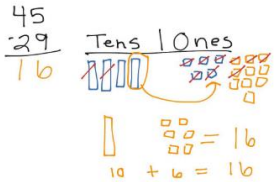
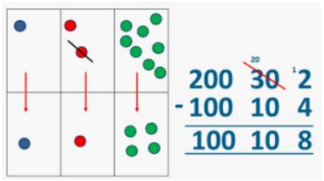
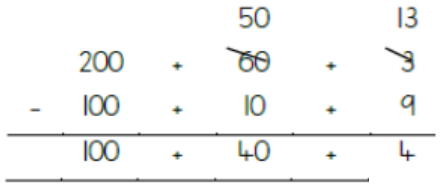
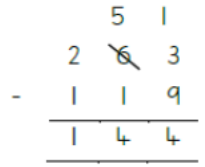
NC Objective	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part- whole mode	 Use cubes to add two numbers together as a group or in a bar. (Some children may still need to use real objects)	  Children to represent cubes using dots. They could put each part on a part whole model or bar model.	 4 + 3 = 7 4 is a part, 3 is a part, 7 is the whole.
Represent and use number bonds and related subtraction facts within 20	 6 + 4 = 10 4 + 6 = 10 10 – 4 = 6 10 – 6 = 4 (Some children may need to initially use real objects then move onto the representation, egg boxes may also be used to support this	 6 + 4 = 10 4 + 6 = 10 10 – 4 = 6 10 – 6 = 4	 6 + 4 = 10 4 + 6 = 10 10 – 4 = 6 10 – 6 = 4
Start at the bigger number and counting on	   Count on using cubes on a number line or Numicon. Bead strings are also useful	 Use bar models and tens frames to encourage children to count on rather than count all. 	 The abstract number line: What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2? 4 + 2
Regrouping to make 10 (The ‘Make 10’ strategy). An essential skill for column addition higher up the school.		 	Children to develop an understanding of equality $6 + \square = 11$ $6 + 5 = 5 + \square$ $6 + 5 = \square + 4$

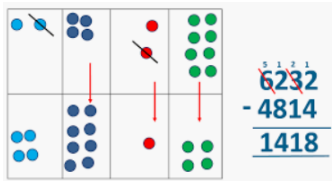
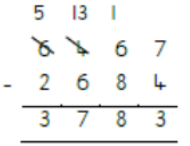
	TO + TO (example of crossing boundaries and exchanging)	36 + 25  We can exchange 10 ones for 1 ten	 Children represent the base 10 by drawing them.	Look at ways to make 10  30 + 20 = 50 5 + 5 = 10 50 + 10 + 1 = 61 Exchanges to be placed at the top of place value column 
	HTO + TO and larger.	 Further use of exchanging. Children should still be given opportunities to do the physical exchange using concrete resource to gain understanding  	 Children can draw the place value counters or base ten on a PV chart– circling when they make an exchange	1 1 243 +368 611 Initially, the abstract should be done along the pictorial to ensure understanding.
	ADDITION – Upper KS2 (Years 5 & 6)			

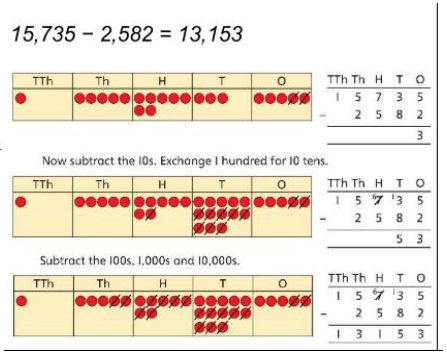
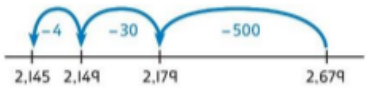
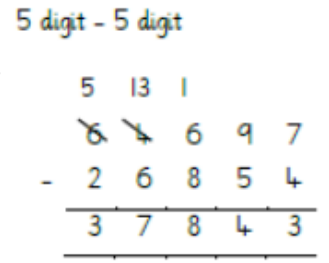
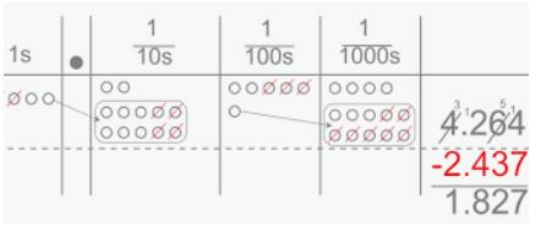
		Introduce decimal place value counters and model regrouping for addition. 	  Children will continue draw their representations showing where they have exchanged. Ensure children are exposed to numberline to aid mental arithmetic. 	Children will continue to develop their understanding of column method addition. Calculations will become larger and include decimal places. 

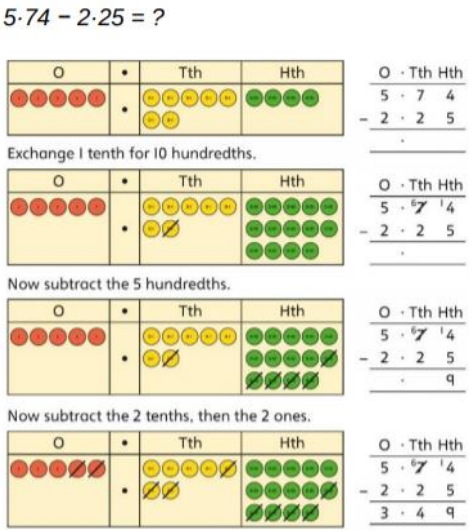
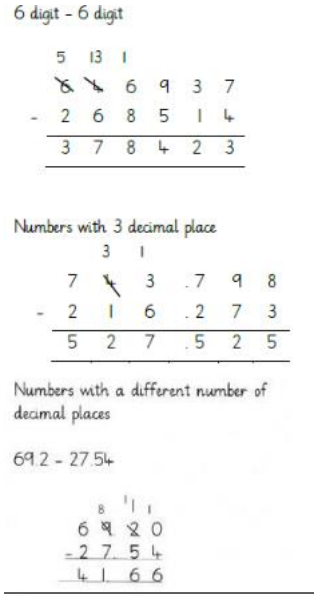
SUBTRACTION - KS1 (Years 1&2)			
	Concrete	Pictorial	Abstract
	Taking objects away Use part whole model, cubes and bead strings to subtract two numbers together by moving objects away from the group (tens frames, Numicon, cubes and other items such as bean bags could be used) 4 - 3 = 1    	Use jottings to represent numbers. Children will learn to cross out drawn objects to show what has been taken away. The bar model can also be used   	Children will record their calculation using a pictorial method along with a calculation using numbers and symbols. 4 – 3 +  They may use their fingers to support their mental methods 

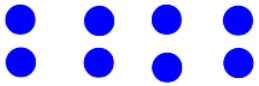
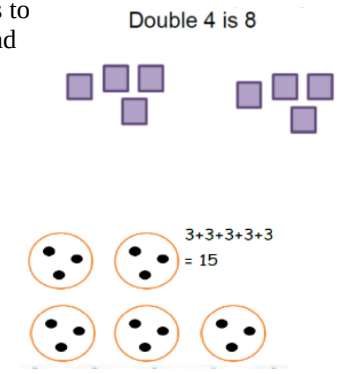
	Counting back (using number lines or number tracks)  Children start with 6 and count back 2.	Children will begin to draw their own number lines. Start at the larger number on the number line and count back in ones or in one jump to find the answer. Numbers will get progressively larger throughout the key stage. Children will be able to subtract tens and ones using an empty number line. Children will show their representations from the concrete method using pictures. 	Children will record their calculation using a pictorial method along with a calculation using numbers and symbols. Encourage children to use empty number lines 6 – 2 = 4  
	Finding the difference using cubes, Numicon, Cuisenaire rods and other objects. Calculate the difference between 8 and 5 	Children to draw the cubes/ other concrete materials which they have used or draw a bar model to illustrate what they need to calculate. 	Find the difference between 8 and 5 8 – 5, the difference between them is ☐ Children to explore why 9 – 6 = 8 – 5 = 7 – 4 have the same difference.
	Children will begin to use place value counters and dienes cubes to show how to exchange between units of number. They will be able to change 1 ten and exchange it for 10 ones. 	**Empty number line -**Use an empty number line to count back in tens and then ones.  When confident:  	**Partitioning method** Children will begin to use the partitioning method. Tens and ones will be subtracted to form partial sums and then these partial sums will be added together to find the total. 47 – 23 = 24 47 – 20 = 27 27 – 3 = 24

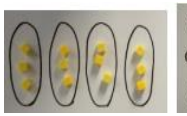
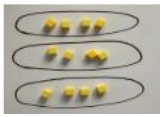
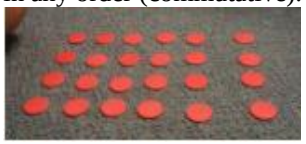
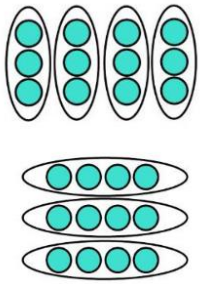
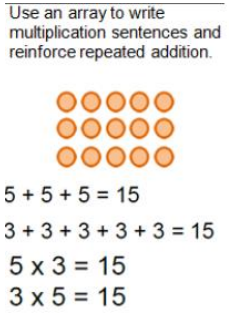
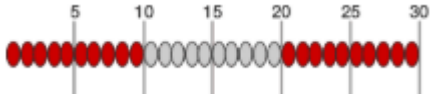
SUBTRACTION - Lower KS2 (Years 3 & 4)			
	Concrete	Pictorial	Abstract
	Children consolidate and use place value counters and dienes cubes to show how to exchange between units of number. They will be able to change 1 ten and exchange it for 10 ones.  They will be able to begin to lay this out like the column method and removing counters or cubes away to represent taking away.  	Consolidate their learning from KS1 by using an empty number line to calculate larger numbers.  Children will also be able to draw representations of dienes cubes and place value counters by crossing out the number being taken away. 	  Children to further secure their knowledge using the **partitioning method** but will start to lay their work out using the column method approach. Tens and ones will be subtracted to form partial sums and then these partial sums will be added together to find the total.
	Children begin to set out HTU - HTU using dienes cubes and place value counters (that cross the tens boundary) in columns and record as column subtraction with decomposition. Teach children how to exchange units of numbers.  	Children may draw dienes cubes or place value counters and cross off showing their understanding of taking away. They will need to represent any exchanging that takes place.  	**Partitioning method - with exchanging** Children will use the partitioning method to show exchanging.  Once confident, children can start to use the column method. 

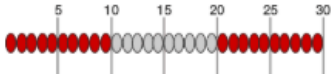
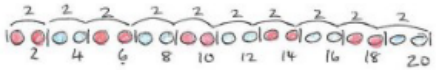
	Children continue to develop their confidence in using dienes cubes and place value counters to show decomposition using the column method. 	Children draw representations from concrete activities using dienes cubes and place value counters. 	**Column Method** Children continue to use column method to subtract larger numbers. 

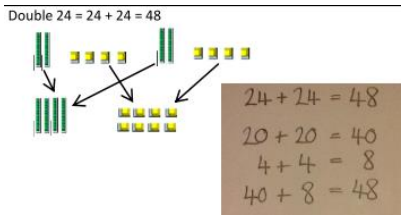
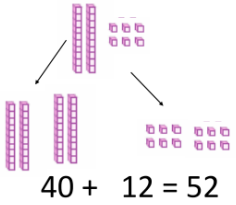
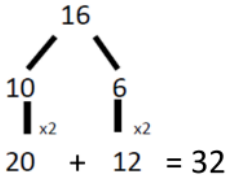
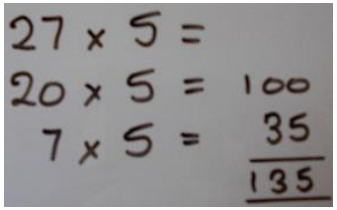
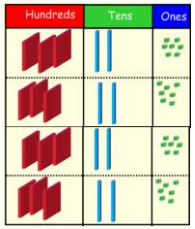
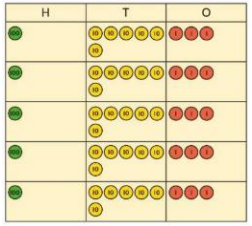
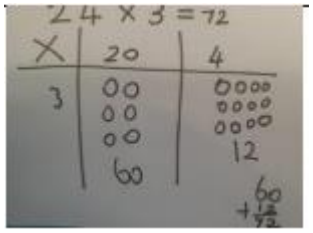
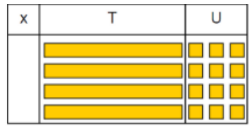
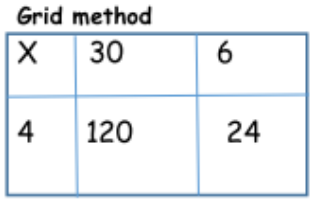
SUBTRACTION - Upper KS2 (Years 5 & 6)		
Concrete	Pictorial	Abstract
Please note: Concrete apparatus and pictorial representations should still be used to support children who may be struggling with abstract concepts. Concrete apparatus should be readily available for lower achieving children and these with SEND.	Children can draw using place value counters showing how exchanging takes place between the units of numbers.  Children also show subtraction on an empty number line using larger numbers. 	**Column Method** Children will continue to develop their understanding of column method subtraction. Calculations will become larger. 
Introduce decimal place value counters and model exchange	Children will draw their representations showing where they have exchanged. 	Children will continue to develop their understanding of column method subtraction. Calculations will become larger, include decimal places and require 0 to be added as a

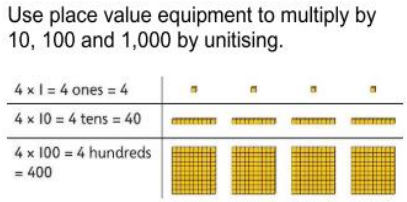
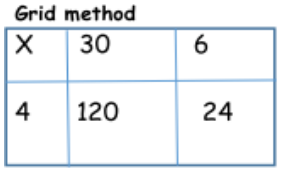
	for subtracting between units of numbers. 		placeholder. 

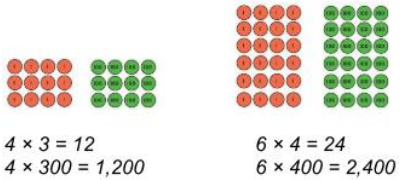
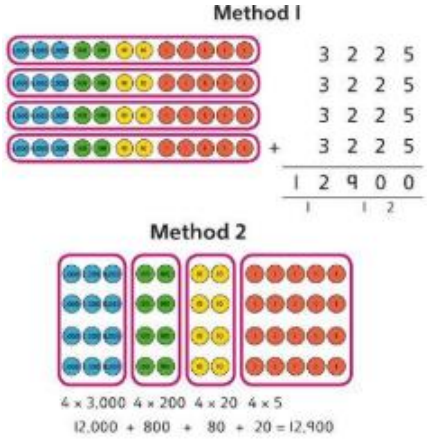
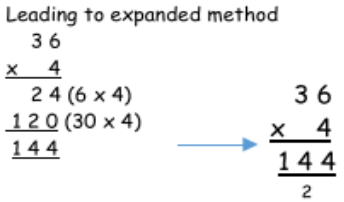
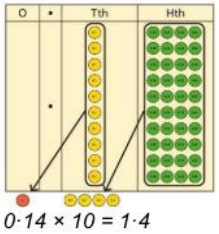
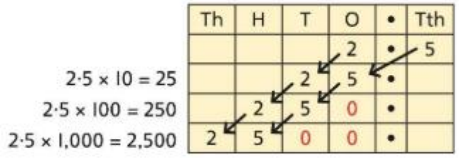
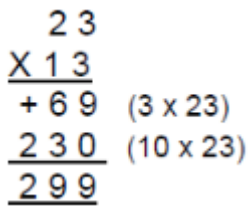
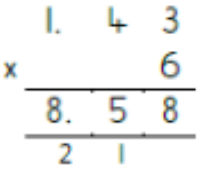
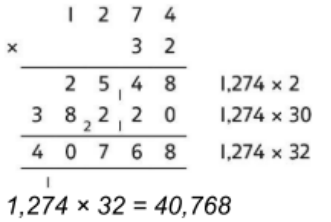
MULTIPLICATION - KS1 (Years 1&2)		
Concrete	Pictorial	Abstract
Repeated addition - Groups of multiple objects  Children will count groups of the same number of objects and add them together. The children learn about grouping in practical contexts and through pictorial representations.	Children draw representations to show counting in multiples and groups.  	Children show multiplication as repeated addition. Children may provide pictorial representations to support. 3 x 9 3 + 3 + 3 = 9

	Arrays Children will be able to represent a multiplication calculation using an array and write the multiplication symbol within a number sentence. Children will also understand that multiplication can be carried out in any order (commutative).     3 x 5 = 15 5 x 3 = 15	Children draw representations to show arrays. 	Children use arrays to show how to solve multiplication calculations. Children are able to show that multiplication can be done in any order (commutative). 3 x 5 = 15 5 x 3 = 15 Introduce x sign and record as number sentence 7 x 10 = 70 4 x 5 = 20  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
	Number line Children will understand the operation of multiplication as repeated addition on a blank number line and will use practical resources to support this. Count the groups as children are skip counting, children may use their fingers as they are skip counting.   5 10 15 20 25 30	Children will be able to use an empty number line to show multiplication as repeated addition. The use of beadsting concrete resources may be used to support conceptual understanding.    0 5 10 15	Children show multiplication as repeated addition. 5 + 5 + 5 = 15 Introduce x sign and record as number sentence 7 x 10 = 70 4 x 5 = 20

MULTIPLICATION - Lower KS2 (Years 3 & 4)		
Concrete	Pictorial	Abstract
Number line - Consolidation Children will understand the operation of multiplication as repeated addition on a blank number line and will use practical resources to support this. Count the groups as children are skip counting, children may use their fingers as they are skip counting.   5 10 15 20 25 30	Children will be able to use an empty number line to show multiplication as repeated addition. The use of beadsting concrete resources may be used to support conceptual understanding.    0 5 10 15	Children show multiplication as repeated addition. 5 + 5 + 5 = 15 Introduce x sign and record as number sentence 7 x 10 = 70 4 x 5 = 20

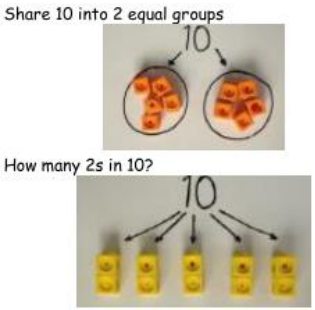
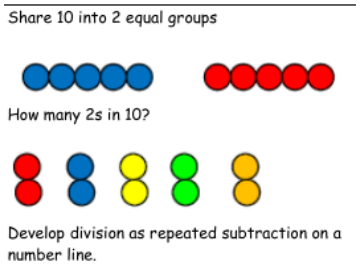
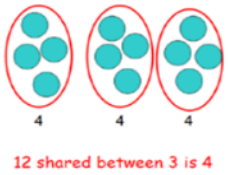
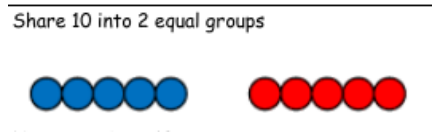
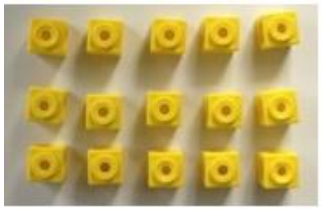
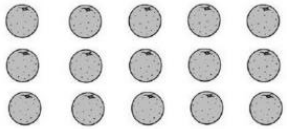
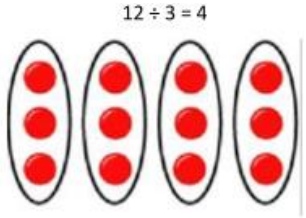
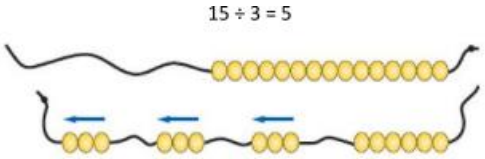
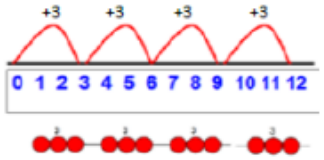
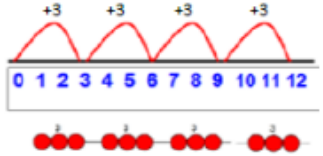
	Partitioning Children will learn to multiply ones and tens separately before recombing the numbers back together. They can use Dienes cube of place value counters to achieve this. 	Children can draw representations of the partitioning process to support their conceptual understanding. 	Partition a number and then multiply each part before recombining it back together.  
	Grid Method Show the links with arrays to first introduce the grid method. Move onto Dienes cubes to move towards a more compact method. Move on to place value counters to show how we are finding groups of a number. We are multiplying by 5 so we need 5 rows of that number.  	Pictorial representations can be made using their concrete manipulatives as visuals. They can draw the counters using colours to show different amounts or just use the circles in the different columns to show their thinking as shown.   13 x 4 = (10 x 4) + (3 x 4) = 40 + 12 = 52	Children should be able to draw the grid method for each multiplication. The grid method will be used to show how this relates to a formal written method. Grid method may then lead to the expanded method.  36 x 4 24 (6 x 4) 120 (30 x 4) 144

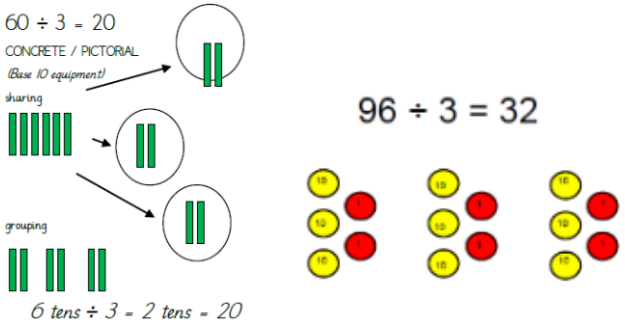
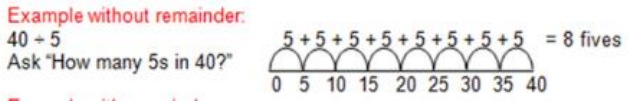
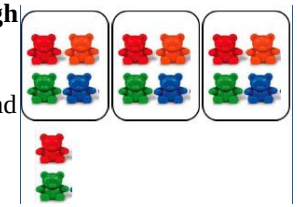
MULTIPLICATION - Upper KS2 (Years 5 & 6)		
Concrete	Pictorial	Abstract
Concrete materials may be needed to support children's conceptual understanding. Dienes cubes and place value counters will support. When multiplying by 10,100,1000 initial concrete resources will be used to support 	Use place value equipment to compare methods.	The **grid method** may be used to show how this relates to a formal written method. Grid method will lead onto **expanded method** and then onto the **compact short multiplication.** 

	understanding.  4 × 3 = 12 4 × 300 = 1,200 6 × 4 = 24 6 × 400 = 2,400	 	Use known facts and unitising to multiply. 5 × 4 = 20 5 × 40 = 200 5 × 400 = 2,000 5 × 4,000 − 20,000 5,000 × 4 = 20,000 
	When multiplying decimals by 10,100,1000 initial concrete resources will be used to support understanding to show how exchanging can take place.  0·14 × 10 = 1·4	This pictorial grid method will support children's understanding of multiplying by 10, 100, 1000.  	**Long multiplication** Children may wish to use 2 separate calculations to support their understanding. Reinforce language of place value when multiplying by multiples of 10. Extend to 3 or 4-digit numbers multiplied by a 2-digit number. 
	Please note: Concrete apparatus and pictorial representations should still be used to support children who may be struggling with abstract concepts. Concrete apparatus should be readily available for lower achieving children and these with SEND.	Please note: Concrete apparatus and pictorial representations should still be used to support children who may be struggling with abstract concepts. Concrete apparatus should be readily available for lower achieving children and these with SEND.	Use column multiplication, ensuring understanding of place value at each stage.   1,274 × 32 = 40,768

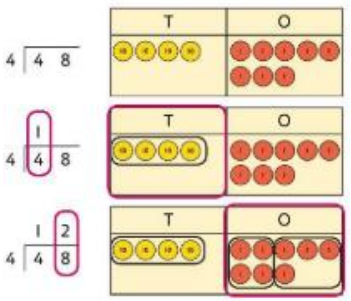
Calculation Policy

DIVISION - KS1 (Years 1&2)

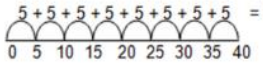
	Concrete	Pictorial	Abstract
Stage 1	**Sharing and Grouping** Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding. 	Use pictures to share objects. Use circles rather than dots to aid counting.  	Children will be able to represent a division calculation using a pictorial method and write the division within a number sentence. 10 ÷ 2 = 5 
	Arrays Link division to multiplication by creating an array and thinking about the number sentences that can be created.  Eg: 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15	Draw arrays to show how pictures are divided. 	Children will be able to represent a division calculation using an array and write the division within a number sentence 
	Repeated addition and subtraction Children will understand the operation and repeated addition or subtraction using bead strings and number lines. This will support the pictorial element. 	Children will understand the operation of division as grouping using repeated addition or subtraction on a prepared number line.  12 ÷ 3 = 4	Children will be able to represent a division calculation using a numberline and write the division within a number sentence.  12 ÷ 3 = 4

DIVISION - Lower KS2 (Years 3 & 4)			
	Concrete	Pictorial	Abstract
	Division with no remainders through sharing. Use concrete materials to share into groups. 	Consolidate learning from KS1 using diagrams of sharing and repeated subtraction and addition on a number line to make jumps  Concrete methods could be represented pictorially within books to show understanding.	How many groups of 6 in 24? 24 ÷ 6 = 4 Abstract methods may be supported with pictorial methods within the children's books.
	Division with remainder through sharing 14 ÷ 3 = Divide objects between groups and see how much is left over.  **Division no remainders - introduction to bus stop**	Students can continue to use drawn diagrams with circles to help them divide numbers into equal groups. Remainders will be seen by not fitting into a whole group. Draw dots and group them to divide an amount and clearly show a remainder. 	Children will begin to move onto division with remainders. A number sentence will support any abstract written calculation by using pictorial method to support.  **Short division** Children will begin to use the formal written method of division without remainders. This will only come after a clear concept is understood using manipulatives.

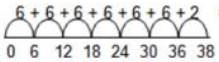
method Use place value equipment on a place value grid alongside short division.
The model uses grouping.

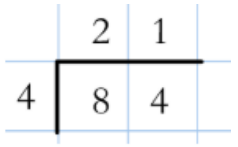


Example without remainder:
40 ÷ 5
Ask "How many 5s in 40?"



Example with remainder:
38 ÷ 6

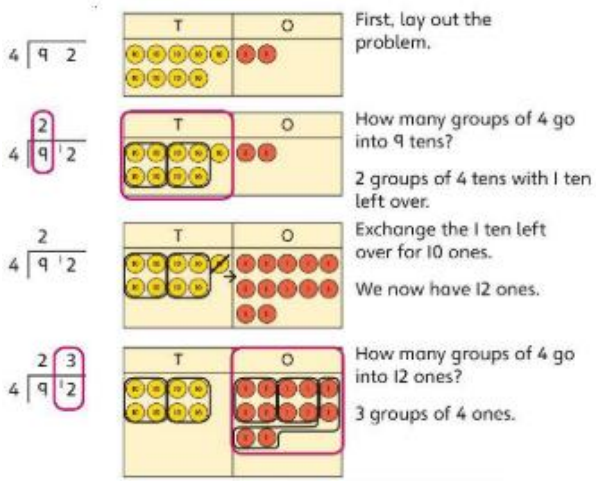




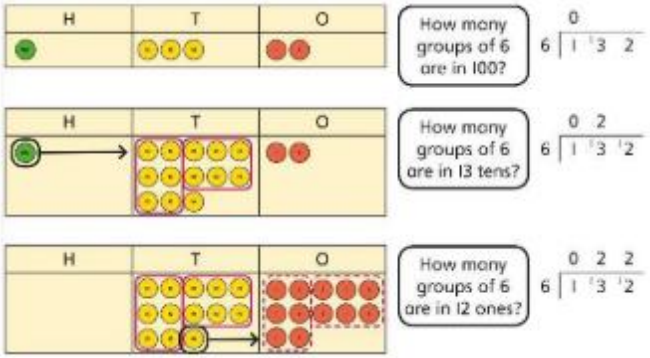
Dividing by 2,3,4, and 5

3

Division with remainders - Bus stop

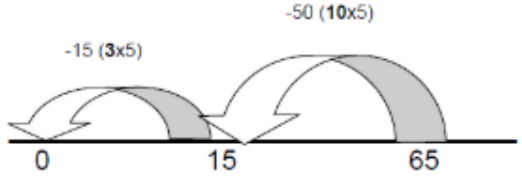


Pictorial representations can be used to support any concrete manipulatives.



Continue to use blank number lines as appropriate, using multiples of the divisor.

65 ÷ 5 = 13

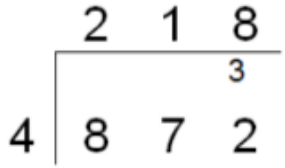


Chunking

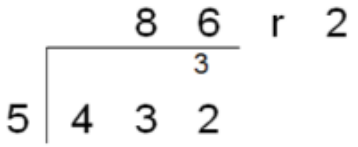
Chunking is repeated subtraction of the divisor and multiples of the divisor.

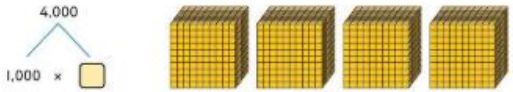
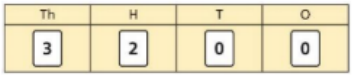
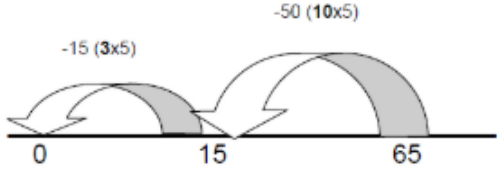
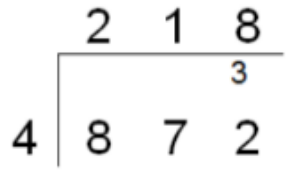
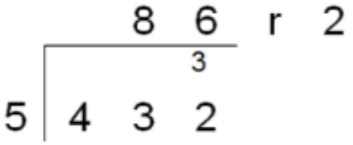
Short division (Bus Stop) Method for division

Begin with divisions that divide equally with no remainder.

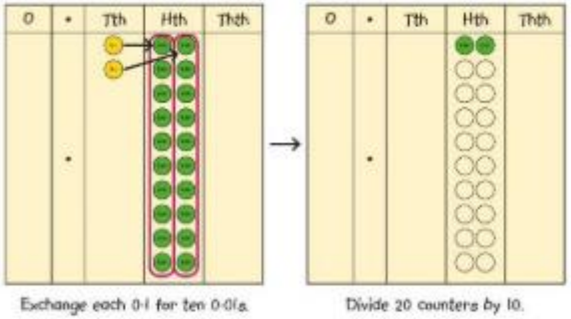


Move onto divisions with a remainder.



	Concrete	Pictorial	Abstract
	Dividing whole numbers by 10, 100 and 1,000 Use place value equipment to support unitising for division. *4,000 ÷ 1,000*  *4,000 is 4 thousands.* *4 × 1,000= 4,000* *So, 4,000 ÷ 1,000 = 4* Concrete and pictorial representations may still be required to support the formal method of division (Short Division) - Go back to LKS2 to consolidate learning.	Understand how and why the digits change on a place value grid when dividing by 10, 100 or 1,000.  *3,200 ÷ 100 = ?* *3,200 is 3 thousands and 2 hundreds.* *200 ÷ 100 = 2* *3,000 ÷ 100 = 30* *3,200 ÷ 100 = 32* *So, the digits will move two places to the right.* Continue to use blank number lines as appropriate, using multiples of the divisor. 65 ÷ 5 = 13  	**Chunking** Chunking is repeated subtraction of the divisor and multiples of the divisor. **Short Division Method for division** Begin with divisions that divide equally with no remainder.  Move onto divisions with a remainder. 

Dividing decimals by 10, 100 and 1,000
Use place value counters to represent dividing by 10, 100, 1000. Represent division using exchange on a place value grid.



0·2 is
2 tenths.
2 tenths is equivalent to 20 hundredths.
20 hundredths divided by 10 is 2 hundredths.

Represent division to show the relationship with multiplication. Understand the effect of dividing by 10, 100 and 1,000 on the digits on a place value grid.

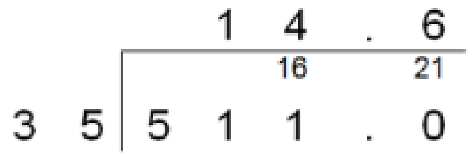
O	•	Tth	Hth	Thth
0	•	8	5	
0	•	0	8	5

$0 \cdot 85 \div 10 = 0 \cdot 085$

O	•	Tth	Hth	Thth
8	•	5		
0	•	0	8	5

$8 \cdot 5 \div 100 = 0 \cdot 085$

Finally move into decimal places to divide the total accurately using a formal method for division (Bus stop)



Dividing a 4-digit number by a 2- digit number
Calculations will start with tens and ones and move onto more advanced division calculations.