Frittenden Church of England Primary School

Maths Calculation Policy

Written by: S Hancock	February 2021
Agreed by governors:	
To be reviewed:	March 2024

Signed by Chair of Governors:	
Signed by Headteacher:	

Maths Calculation Policy

Intent

Introduction

The mathematics curriculum enables children to learn and build upon prior learning in a multitude of ways. Individual lessons use strategies that stimulate and inspire children; mathematical games, stories with an arithmetical focus; activities that involve movement (active learning) and references to real-world scenarios are some of the techniques that are used at Frittenden Primary School to provide children a motivating and engaging curriculum. As each lesson builds upon a previous step, learning points are constantly being referred to and used in subsequent sessions. This provides the opportunity for revision and applying skills continuously throughout the year.

Children enjoy maths –

'*I love maths because I can check my work myself using the inverse*.'
(Year 3)

I have loved maths lessons outdoors. We learnt about position of shapes after reflection or translation.'
(Year 5)

Pupils are able to demonstrate their perseverance and courage within the subject by approaching challenging problems with confidence and without fear of failure. Children should be taught to reference the word FAIL as First Attempt In Learning; children are encouraged to build upon mistakes; find, challenge and question errors which in turn leads to new learning opportunities. Children are never rebuked for mistakes; every effort is celebrated and treated as a learning opportunity. Teachers may even make their own 'mistakes', this provides an opportunity for children to witness first hand appropriate responses for dealing with such situations – even asking for assistance from the children in this example would be encouraged.

Our Christian values underpin all aspects of our teaching and learning. The high aspirations and expectations the teaching team have for the children ensure that no child is given a learning limit or ceiling and that every child is given the opportunity to 'shine'. As mentioned earlier, every effort and opportunity for praise should be celebrated. The school values are integrated into every maths lesson as follows:

Nurturing Perseverance - An increasing level of challenge is evident and appropriate for each child. Children approach mathematical work with confidence and a positive attitude.

Ambition - Children (and their teachers) want to succeed. 'Challenges' are attempted and never feared. There is an open dialogue between teacher and child evident within the classroom and also within exercise books. All children, regardless of their starting point or prior attainment are provided with opportunities that enable them to develop their mathematical thinking.

Responsible and Respectful - Responses from other children are encouraged and never ignored. All offers of input are celebrated and encouraged through talk partners.

Kindness - Children show respect to teachers and their peers. They work in groups to tackle problems, support each other and apply knowledge.

Our overall aims for the Maths curriculum at Frittenden Primary School are to:

- build a positive attitude and approach to mathematics; seen as an interesting and attractive subject inwhich all children gain success.
- Build upon prior knowledge and have access to a high-quality maths curriculum that is both challengingand enjoyable.
- Ensure children are provided with a variety of mathematical opportunities, which will enable them tomake the connections.
- ensure children are confident mathematicians who are not afraid to take risks and learn from mistakes.
- develop an ability to express themselves fluently, to talk about the subject with assurance, usingcorrect mathematical language and vocabulary.
- develop mathematical skills and knowledge and recall of basic facts and the four operations
- make use of diagrams, models and informal notes to help record steps and part answers.

Implementation

Planning

Maths is a core subject in the National Curriculum. Teachers have access to a variety of websites and planningto support their planning process which enables them to find high quality Maths resources. Planning involves the use of the White Rose small steps to ensure learning in cumulative and progressive. A variety of visual andpractical approaches support children with their mathematical fluency, vocabulary and the development of 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 arein the group), comparison and composition. They need to practice decomposing and recomposing numbers, recalling number bonds and multiplication tables to improve mathematical fluency.

- **Reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language. The conversations wehave 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), proving or disproving statements (developing reasoning skills), group work including cooperative learning and making personal notes and recordings.

- 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 useof 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.

2. Medium term

The sequencing of teaching reflects the needs of the learners. Place value and arithmetic are given priority atthe start of each academic year as these are the building blocks for mathematical learning. The small steps ensure that previous learning is built upon, this -along with ongoing formative assessment and analysis – enables the teacher to personalise learning and resources in response to the children's ability, starting pointand individual next steps.

3. Short term planning

Short term planning is carried out weekly by the class teacher supported by the use of the White Rose Premiumresources, Times Tables Rockstars, Mathletics and our Calculation Policy.

- Daily lessons include a clear lesson intention 'LT I can' and clear success criteria.
- Daily lessons are taught using a variety of approaches covering some (or all) of the CPA approach ineach lesson.
- Lessons begin with an arithmetic starter (using flashback 4 or last term, week, lesson, mistake) to buildupon arithmetical methods and encourages children to make links between learning.
- Teaching pedagogy is constructed to meet the needs of all learners and enhance knowledge retentionsuch as retrieval practice, group work, partner work, mathematical learning through stories and creating links in context.

Concrete, pictorial and Abstract (CPA) approach

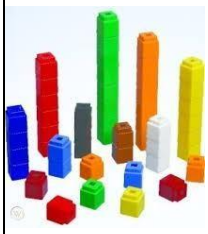
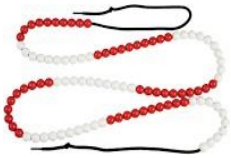
At Frittenden Primary School, we recognise that the **Concrete Pictorial Abstract (CPA)** approach is highly effective in the teaching of Maths to develop conceptual understanding. This approach will vary between yeargroups and the individual abilities of children within each class.

Objects, pictures, words, numbers and symbols are everywhere. The mastery approach incorporates 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 fluency 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 thechildren 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 torepresentations, 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

Assessment

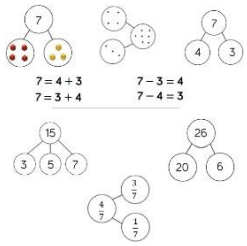
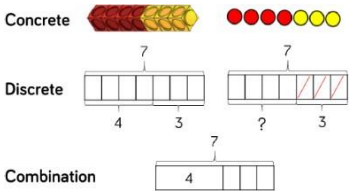
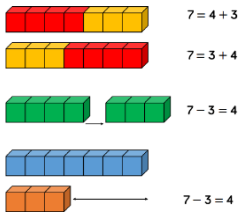
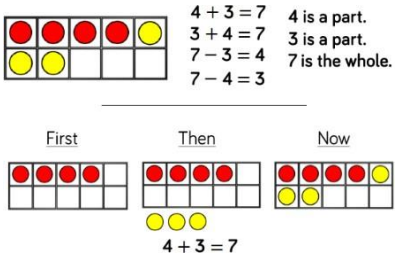
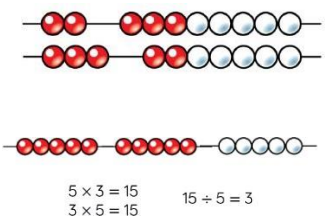
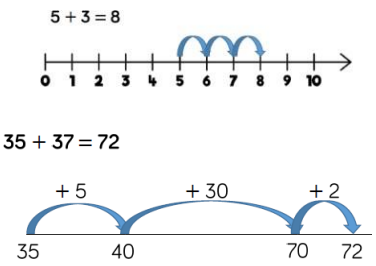
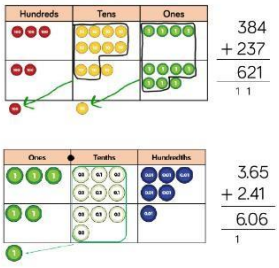
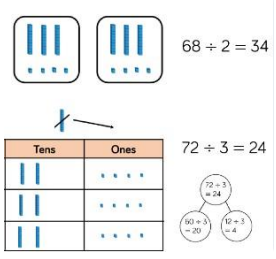
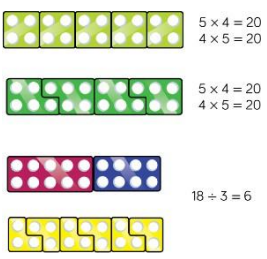
1. Summative/reported
2. Standardisation (Year 1 – 6) - Termly assessments for each year group (White Rose and Past SATspapers – Year 6)
3. Diagnostic – Pupil and cohort gap analysis. White Rose Block Pre Tests & End of Block Tests
4. Formative – See Feedback Policy for daily formative assessment opportunities

Assessment for learning approaches at different stages of the lesson.

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 whichall 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 inunfamiliar situations and this is the goal for our children.

Models and Images

The following models and images are used to support the teaching and learning of different concepts. They may be used by the teacher, child or more commonly by both to aid understanding of the various topics.

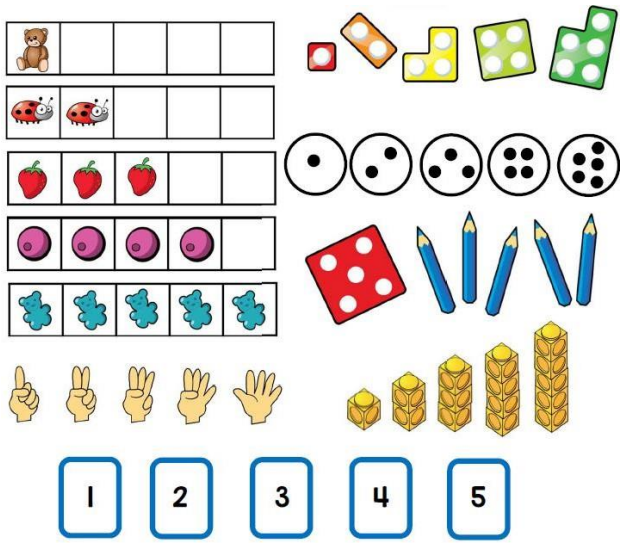
Part-Whole Model	Bar Model	Cubes
		
Ten Frames	**Bead Strings**	**Number lines and Tracks**
		
Place Value Charts	**Base 10 / Dienes**	**Number Shapes**
		

EYFS

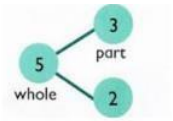
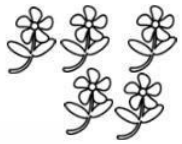
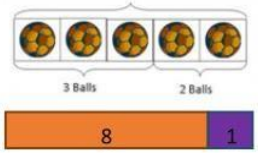
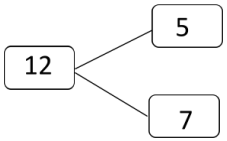
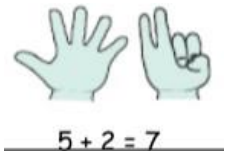
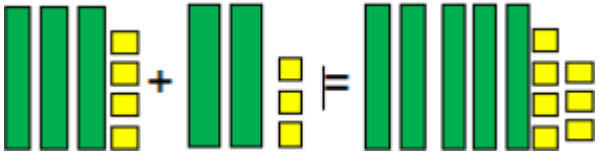
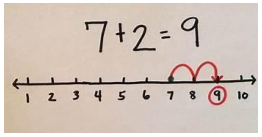
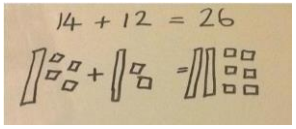
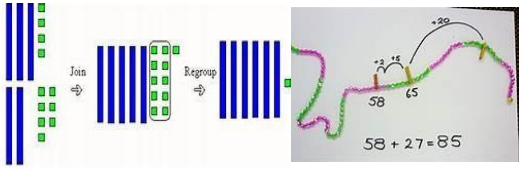
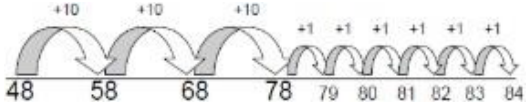
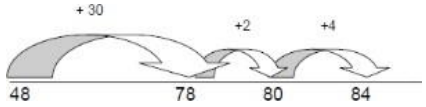
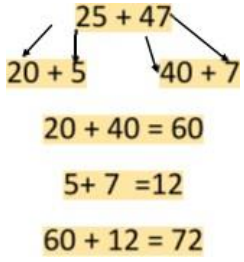
At Frittenden, we recognise the importance of ensuring children have a strong foundation of mathematical knowledge and this is developed from sesisons within the foundation stage. Modelling, repetition and exposure to a variety of scenarios involving number are central to introducing this strand. By the end of the year, children should be able to: verbally count to numbers beyond 20, compare quantities, sort and begin to recognise odds, evens and doubles, subitise and build automatic recall ofnumber bonds to 5 (some children to 10), include and recognise the use of '0' in language and representations.

The following five principles are key to children gaining a deep understanding of number.

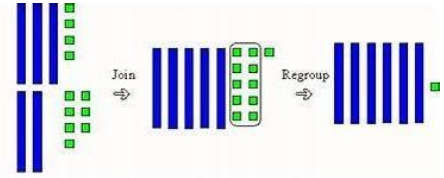
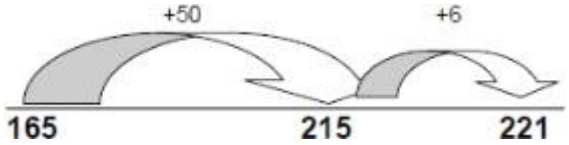
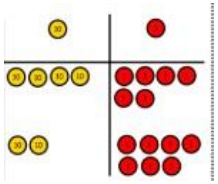
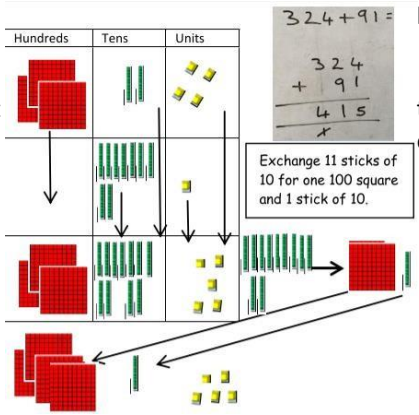
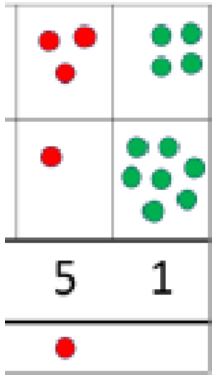
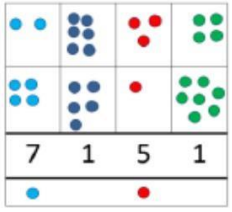
The one-one principle. This involves children assigningone number name to each object being counted.	**The stable-order principle.** Children understand that when counting, the numbers have to be in a certain order.	**The cardinal principle.** Children understand that the number name assigned to a group of objects is the total amount of objects within that group.	**The abstraction principle.** Children can understand that anything can be counted, including things that cannot be touched (sounds, movements etc)	**The order irrelevance principle.** This involves children understanding that the order we count a group of objects is irrelevant. The total will be the same.

	Concrete	Pictorial	Abstract
Stage 2			Although children are not expected to write numerals, these will be modelled, discussed and encouraged to form the digits 0 – 9. Informal jottings could be used to record their thinking.

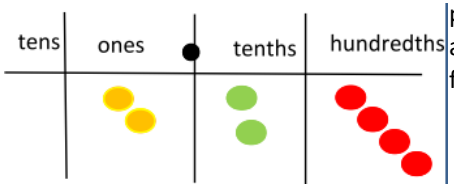
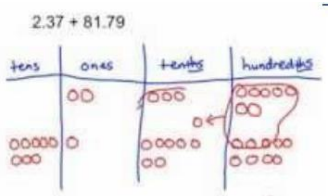
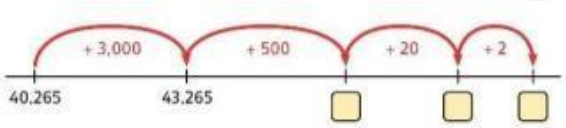
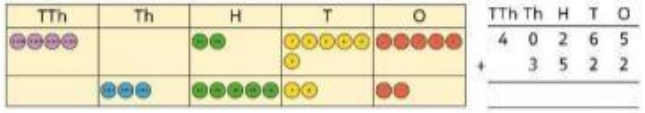
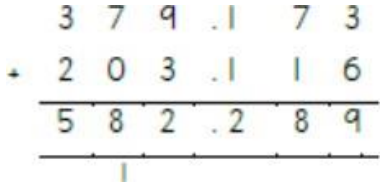
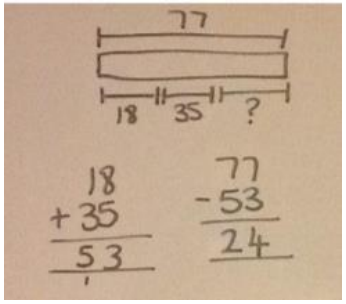
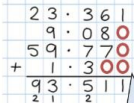
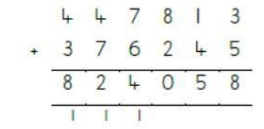
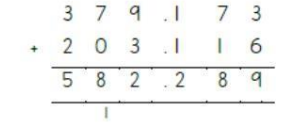
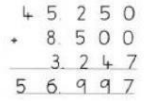
ADDITION - KS1 (Years 1&2)

	Concrete	Pictorial	Abstract
Stage 1	Use part part whole model, cubes and bead strings to addtwo numbers together as a group or in a bar.  	Use jottings to represent numbers.    Use pictures to add two num-bers together as a group or in a bar.	Children will record their calculation using a pictorial method along with a calculation using numbers and symbols. 11 + 4 = 15 They may use their fingers to support their mental methods  
Stage 2	**Grouping objects to add** Children will use dienes cubes to add larger numbers where regrouping is not required. They will also use a bead string to add larger numbers bycounting in tens and ones 	**Number line** Start at the larger number on the number line and count on in ones or in one jump to find the answer. Children will show their representations from the concrete method using pictures.   Numbers will get progressively larger throughout the key stage. Children will be able to add tens and ones using an empty number line.	Children will record their calculation using a pictorial method along with a calculation using numbers and symbols. 27 + 10 = 37 27 + 20 = 47 Children will begin to add multiples of tens. 27 + □ = 57
Stage 3	**Partitioning** Children will add larger numbers where they will need tojoin, regroup and count.  Children will also use bead strings to add numbers together using groups of tens andones to count on.	**Number line** Use an empty number line to count in tens and then ones.  When confident: 	**Partitioning** Children will begin to use the partitioning method. Tens and ones will be added to form partial calculations and then these will be added together to find the total. 

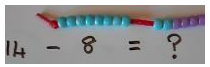
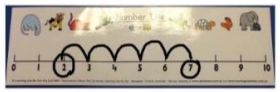
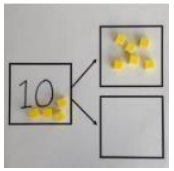
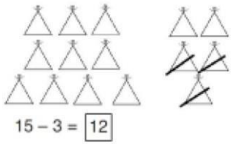
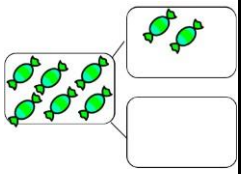
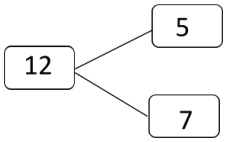
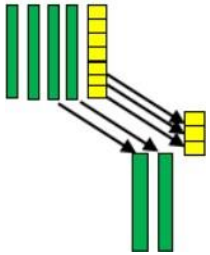
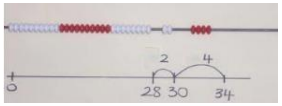
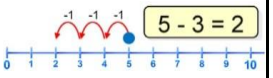
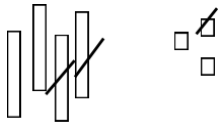
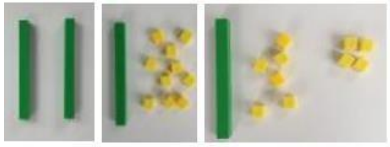
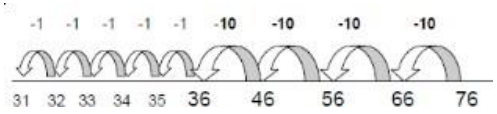
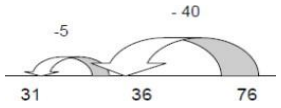
ADDITION - Lower KS2 (Years 3 & 4)

	Concrete	Pictorial	Abstract
Stage 1	Use dienes cubes to consolidate learning from KS1. Ensure children are confident at using these to join, regroup and count. This will support them moving onto the next stage of column addition. 	**Number line** Consolidate their learning from KS1 by using an empty number line to count larger numbers. 	**Partitioning** Children will consolidate using the partitioning method. The layout will begin to form a written method to support further progress onto the column method. Hundreds, Tens and ones will be added to form partial calculations and then these will be added together to find the total. 200 + 60 + 3 + 100 + 10 + 9 300 + 70 + 12 300 + 80 + 2
Stage 2	Introduce children to place value counters and dienes cubes. Use the column method layout to support their learning onto the abstract method.  	Children can draw a representation of the grid to further support their understanding, carrying the ten underneath the line. 	**Expanded column method - Formal method** Children to use the Expanded Column Method. Start by partitioning the numbers before the formal column to show the exchange. Once confident, they can move onto the column method in stage 3. 176 + 147 13 110 200 323 (7 + 6) (70 + 40) (100 + 100) 147 + 176 323
Stage 3	Children will add larger numbers where they will need to exchange place value counters or dienes cubes. 	Children can draw a representation of the grid using larger numbers. 	**Column method - Formal method** Column Method for addition to be used. 4478 + 3762 8240

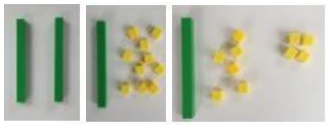
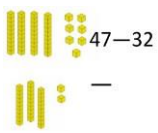
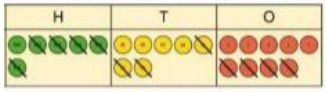
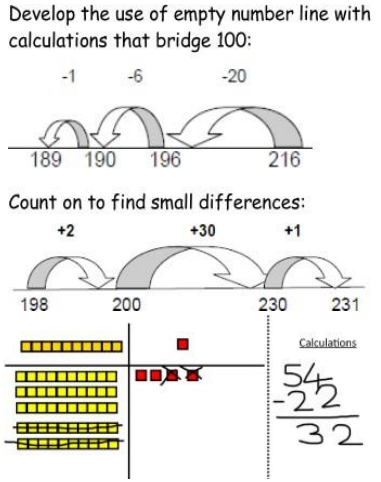
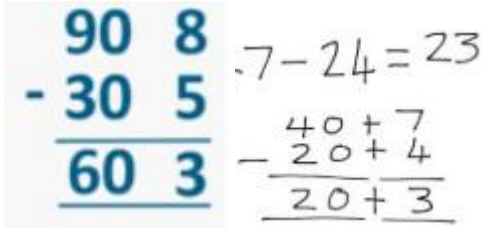
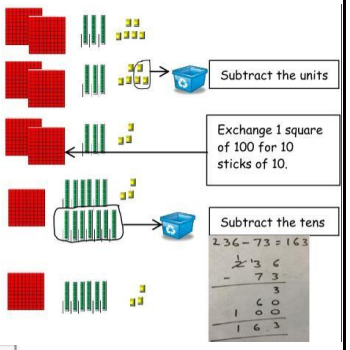
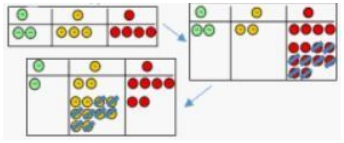
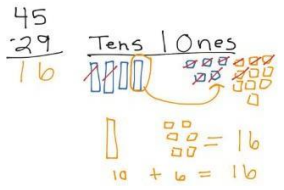
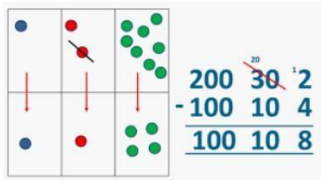
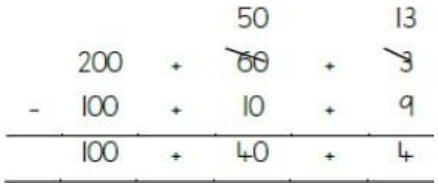
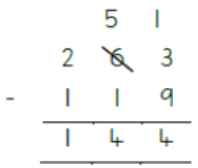
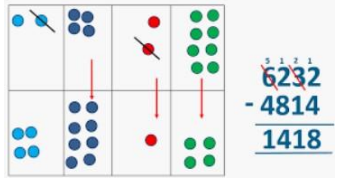
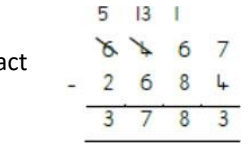
ADDITION - Upper KS2 (Years 5 & 6)

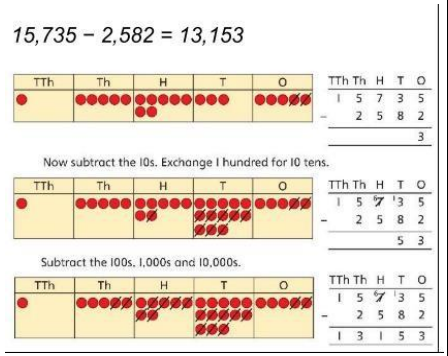
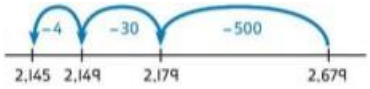
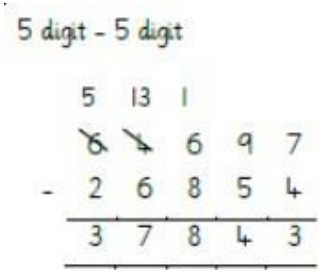
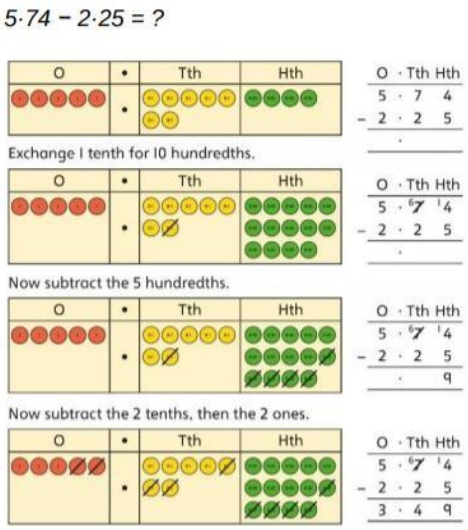
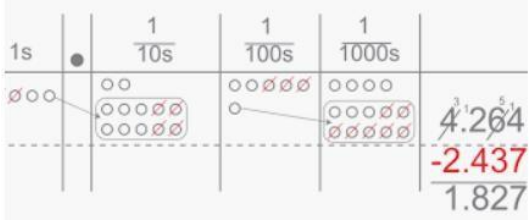
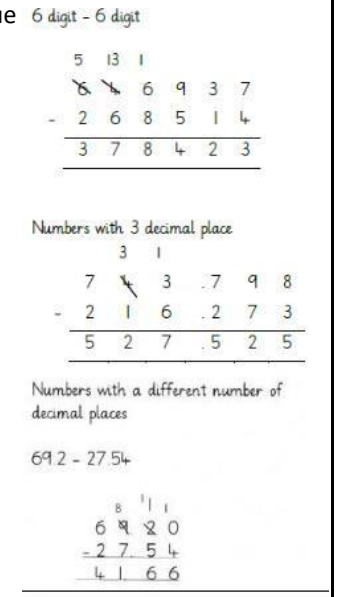
	Concrete	Pictorial	Abstract
Stage 1	Introduce decimal value counters model regrouping addition.  place and for	Children will draw their representations showing where they have regrouped.   	**Column method** Children will continue to develop their understanding of column method addition. Calculations will become larger and include decimal places. 
Stage 2	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 will begin to use the bar model when problem solving. Jottings and calculations should be recorded to show their processes. 	**Column method** Children to further develop their confidence using the column method. Larger numbers, decimal places and inserting zero for place holders when decimals are different. Insert zeros for place holders.  6 digit + 6 digit  Numbers with 3 decimal place  Numbers with a different number of decimal places 45.25 + 8.5 + 3.247 

SUBTRACTION - KS1 (Years 1&2)

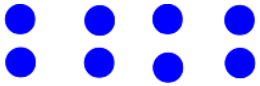
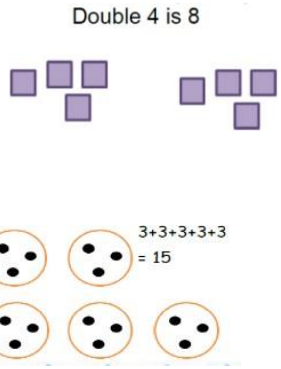
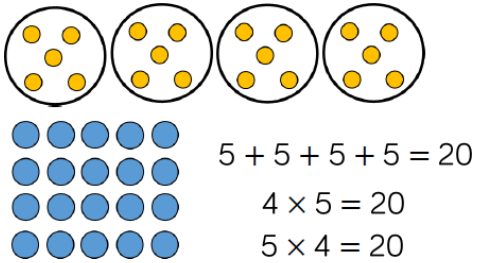
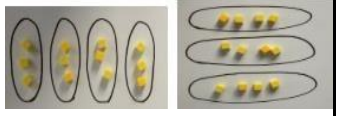
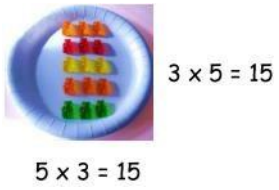
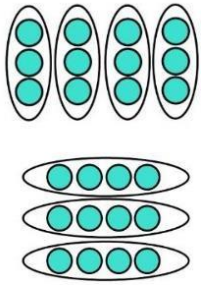
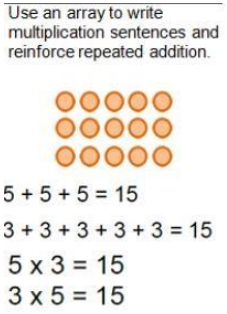
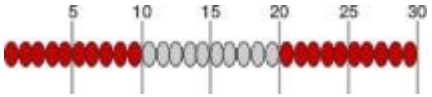
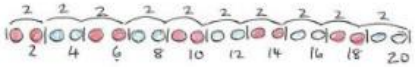
	Concrete	Pictorial	Abstract
Stage 1	**Taking objects away** Use part whole model, cubes and bead strings to subtract two numbers together by moving objects away from the group.     	Use jottings to represent numbers. Children will learn to cross out drawn objects to show what has been taken away.  	Children will record their calculation using a pictorial method along with a calculation using numbers and symbols.  11 - 4 = 7 They may use their fingers to support their mental methods 
Stage 2	Children will use dienes cubes to larger numbers where exchanging required. Children will lay out the number using the dienes cubes move the second number away to subtraction.  They will also use a bead string to subtract is not first and then show the numbers by counting in tens and add larger ones.  	**Number line** 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. 43—21 = 22	Children will record their calculation using a pictorial method along with a calculation using numbers and symbols. 25 - 12 = 13 Children will begin to subtract multiples of tens. 25 - 10 25 - 10 = 15
Stage 3	Children will begin to place value counters dienes cubes to show to exchange between of number. They will be to change 1 ten and exchange it for 10 ones.  use and how units able	**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 to form calculations. 47 – 23 = 24 47 – 20 = 27

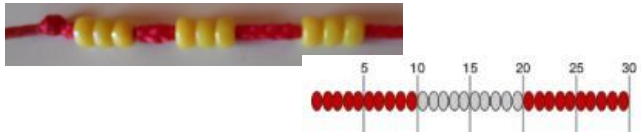
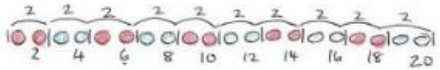
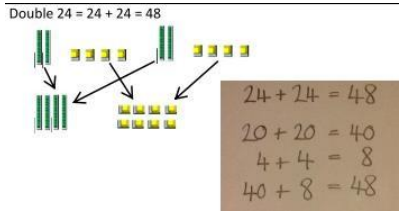
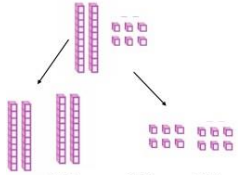
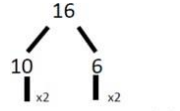
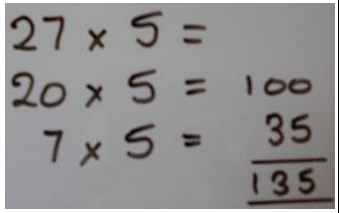
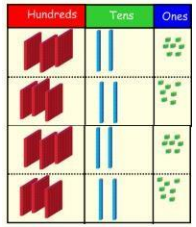
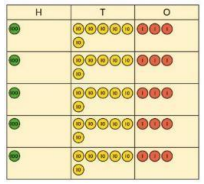
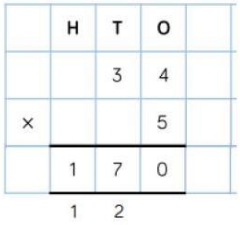
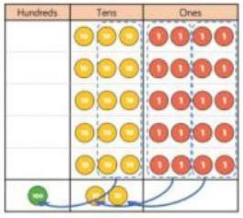
SUBTRACTION - Lower KS2 (Years 3 & 4)

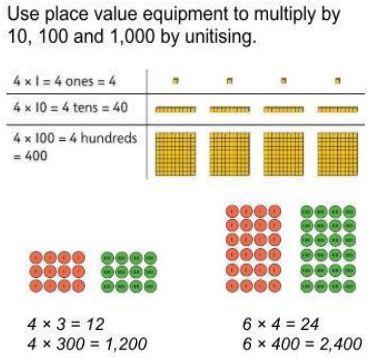
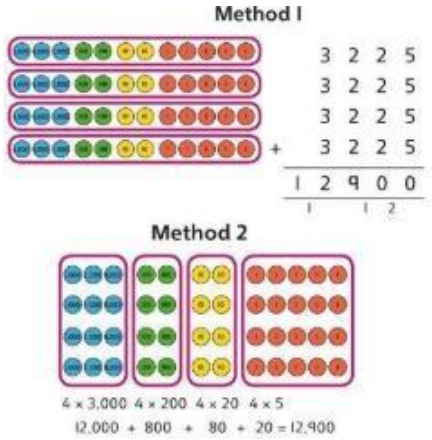
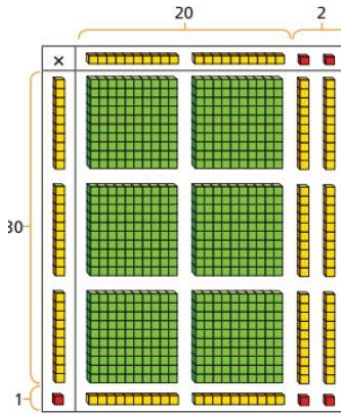
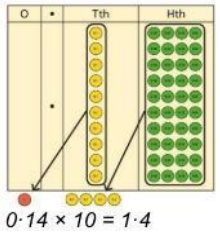
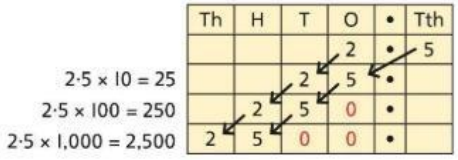
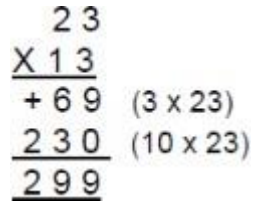
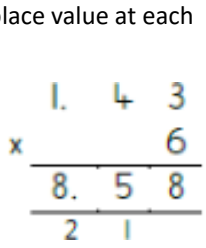
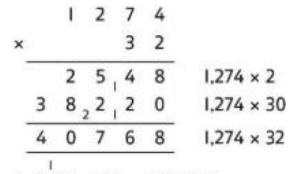
	Concrete	Pictorial	Abstract
Stage 1	Children consolidate and useplace value counters and dienes cubes to show how toexchange between units of number. They will be able to change 1 ten and exchange it for 10 ones.  They will be able to begin to lay this out like the column method and removing counters or cubes away to representtaking 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.
Stage 2	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. 
Stage 3	Children continue to develop their confidence in using dienes cubes andplace 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. 

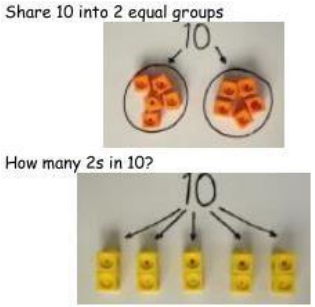
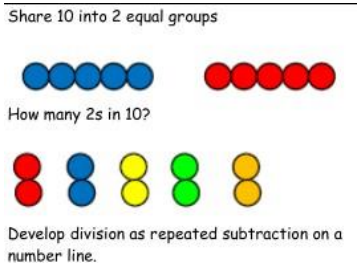
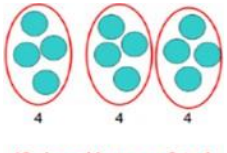
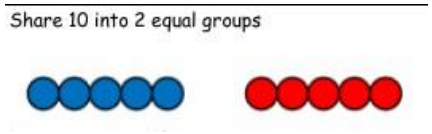
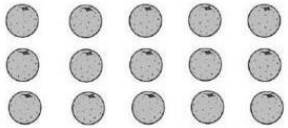
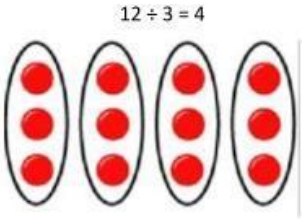
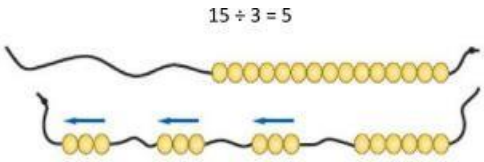
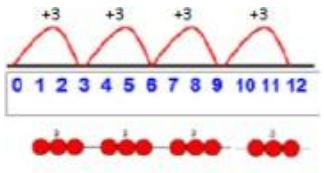
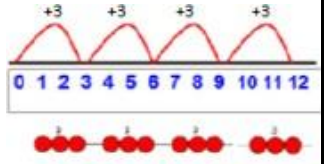
SUBTRACTION - Upper KS2 (Years 5 & 6)			
	Concrete	Pictorial	Abstract
Stage 1	Please note: Concrete apparatus and pictorial representations should still be used to support children who may be struggling with abstract concepts. Concrete apparatus should be readily available for lower achieving children 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. 
Stage 2	Introduce decimal place value counters and exchange for subtracting between units numbers.  of model	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 placeholder. 

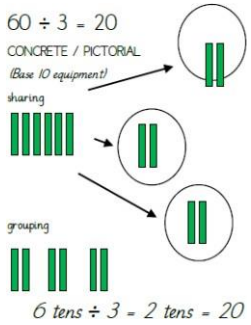
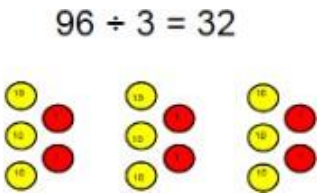
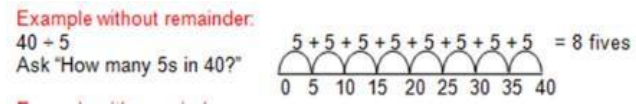
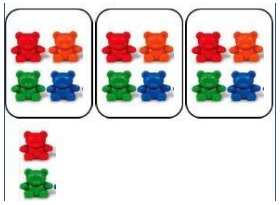
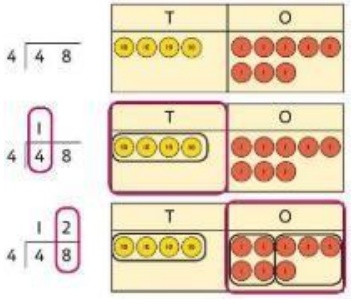
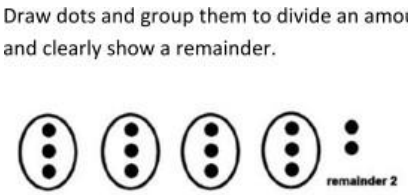
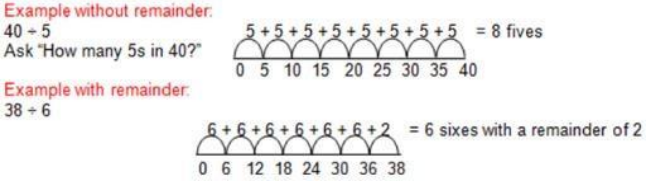
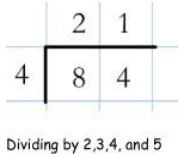
MULTIPLICATION - KS1 (Years 1&2)

	Concrete	Pictorial	Abstract
Stage 1	**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.  $5 + 5 + 5 + 5 = 20$ $4 \times 5 = 20$ $5 \times 4 = 20$
Stage 2	**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).   	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). $3 \times 5 = 15$ $5 \times 3 = 15$ Introduce x sign and record as number sentence $7 \times 10 = 70$ $4 \times 5 = 20$ 
Stage 3	**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. 	Children will be able to use an empty number line to show multiplication as repeated addition. The use of bead string concrete resources may be used to support conceptual understanding.   	Children show multiplication as repeated addition. $5 + 5 + 5 = 15$ Introduce x sign and record as number sentence $7 \times 10 = 70$ $4 \times 5 = 20$

MULTIPLICATION - Lower KS2 (Years 3 & 4)			
	Concrete	Pictorial	Abstract
Stage 1	**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 asthey are skip counting.  	Children will be able to use an empty number line to show multiplication as repeated addition. The use of bead string concrete resources may be used to support conceptual understanding.    	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
Stage 2	**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.  40 + 12 = 52	Partition a number and then multiply each part before recombining it back together.  
Stage 3	**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 weneed 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 calculations.   	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. Grid method X 30 6 4 120 24 36 x 4 24 (6 x 4) 120 (30 x 4) 144

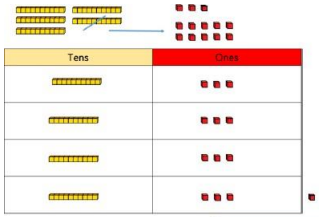
MULTIPLICATION - Upper KS2 (Years 5 & 6)			
	Concrete	Pictorial	Abstract
Stage 1	Concrete materials may be needed to support children's conceptual understanding. Dienes cubes and place value counters will support. When multiplying by 10,100,1000 initial concrete resources willbe used to support understanding. 	Use place value equipment to compare methods. 	The **grid method** will lead onto **expanded method** and then onto the **compact short multiplication.** Use known facts and unitising to multiply. 5 × 4 = 20 5 × 40 = 200 5 × 400 = 2,000 
Stage 2	When multiplying decimals by 10,100,1000 initial concrete resources will be used to supportunderstanding to show how exchanging can take place. 	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. 
Stage 3	Please note: Concrete apparatus and pictorial representations should still be used to support children who maybe 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.  

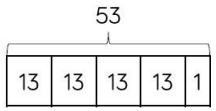
DIVISION - KS1 (Years 1&2)			
	Concrete	Pictorial	Abstract
Stage 1	**Sharing and Grouping** Divide quantities into equal groups. Use cubes, counters,objects or place value counters to aid understanding. 	Use pictures to share objects. Use circles rather than dots to aid counting.  Develop division as repeated subtraction on a number line.  12 shared between 3 is 4	Children will be able to represent a division calculation using a pictorial method and write the division within a number sentence. $10 \div 2 = 5$ 
Stage 2	**Arrays** Link division to multiplication by creating an array and thinking aboutthe 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 
Stage 3	**Repeated addition and subtraction** Children will understand the operation and repeated addition or subtraction using bead strings and numberlines. This will support the pictorialelement. 	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

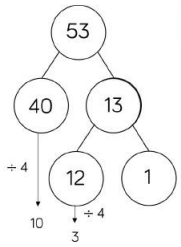
DIVISION - Lower KS2 (Years 3 & 4)			
	Concrete	Pictorial	Abstract
Stage 1	**Division with no remainders through sharing**.Use concrete materials to share into groups.  	Consolidate learning from KS1 using diagrams of sharing and repeated subtraction and addition on a number line to make jumps  Concrete 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.
Stage 2	**Division with remainder through sharing** 14 ÷ 3 = Divide objects between groupsand see how much is left over.  **Division no remainders - introduction to bus stop method** Use place value equipment on a placevalue grid alongside short division. The model uses grouping. 	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.  	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. 

Stage 3

Division with remainders - Bus stop

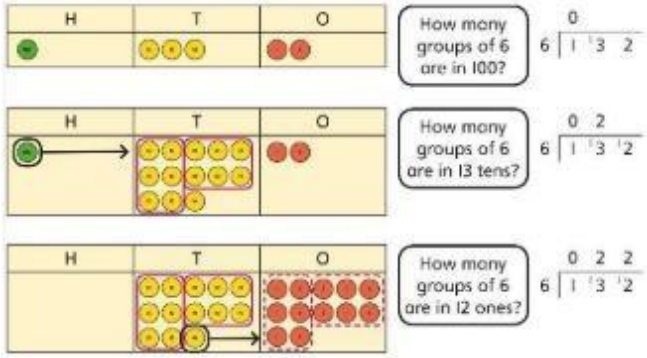






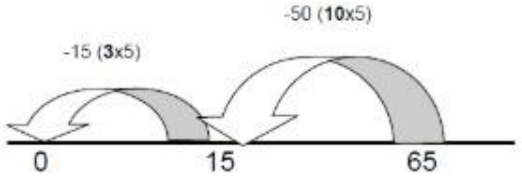
53 ÷ 4 = 13 r1

Pictorial representations can be used to support any concrete manipulatives.



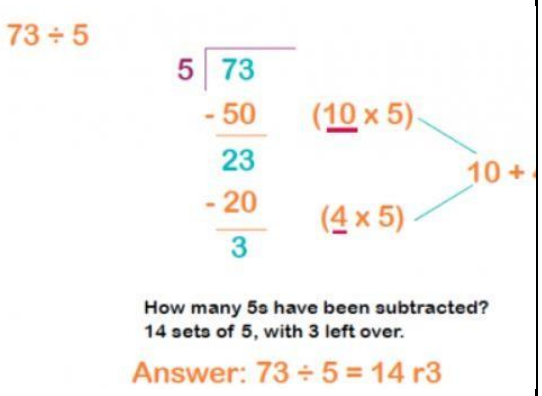
Continue to use blank number lines as appropriate, using multiples of the divisor.

65 ÷ 5 = 13



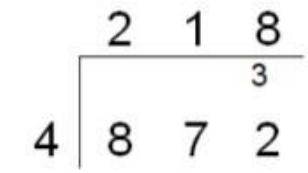
Chunking

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

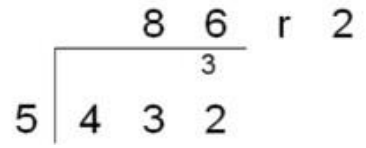


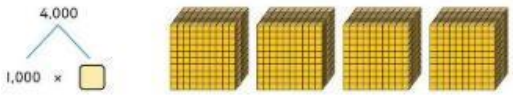
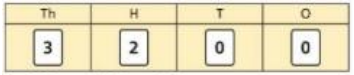
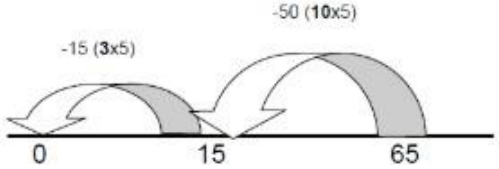
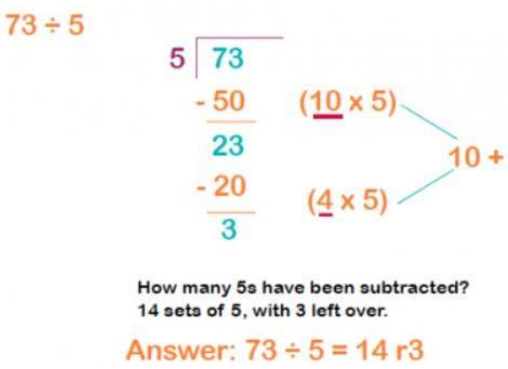
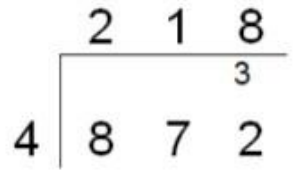
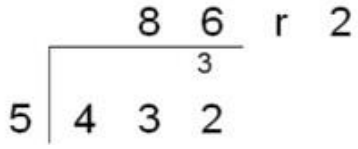
Bus Stop Method for division

Begin with divisions that divide equally with no remainder.



Move onto divisions with a remainder.

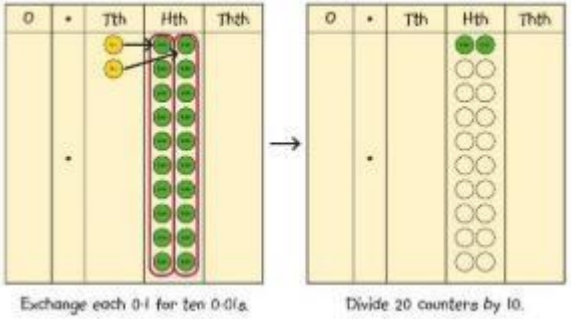


DIVISION - Upper KS2 (Years 5 & 6)			
	Concrete	Pictorial	Abstract
Stage 1	**Dividing whole numbers by 10, 100 and 1,000** Use place value equipment to support unitising fordivision. *4,000 ÷ 1,000*  *4,000 is 4 thousands.* *4 × 1,000= 4,000* *So, 4,000 ÷ 1,000 = 4* Concrete and pictorial representations may still be required to support the formal method of division (BusStop) - 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. **Bus Stop Method for division** Begin with divisions that divide equally with no remainder.  Move onto divisions with a remainder. 

Stage 2

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 valuegrid.



0·2 is 2 tenths.
2 tenths are 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

0·85 ÷ 10 = 0·085

O	•	Tth	Hth	Thth
8	•	5		
0	•	0	8	5

8·5 ÷ 100 = 0·085

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

```
        1  4  .  6
      ------------
3  5 | 5  1  1  .  0
        16    21
```

Stage 3

Long Division

Calculations will start with tens and ones and move onto more advanced division calculations.

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

Children will write out associated multiples to support withtheir calculations.

		0	3	6		12 × 1 = 12
1	2	4	3	2	(×30)	12 × 2 = 24
	−	3	6	0		12 × 3 = 36
			7	2		12 × 4 = 48
	−		7	2	(×6)	12 × 5 = 60
				0		12 × 6 = 72
						12 × 7 = 84
						12 × 8 = 96
						12 × 7 = 108
						12 × 10 = 120

432 ÷ 12 = 36

			2	4	$\frac{4}{5}$
1	5	3	7	2	
	−	3	0	0	
			7	2	
	−		6	0	
			1	2	

372 ÷ 15 = 24 $\frac{4}{5}$

With questions that end with a remainder, children will be taught to interpret this as either a fraction orrounded according to the context of the question.