

Maths & Calculation Policy



Our Lady and St. Oswald's Catholic Primary School

APPROVED BY GOVERNORS:
REVIEWED: January 2024

RESPONSIBLE PERSON: Maths Subject Lead

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 Our Lady & St Oswald's Catholic Primary School, 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, compact written method of calculation for each operation that children can apply with confidence when undertaking calculations that they cannot carry out mentally. They will do this by always asking themselves: Can I do this in my head? Can I do this in my head using drawings or jottings? Do I need to use a pencil and paper procedure of a formal written method?

Implementation

Concrete, pictorial and Abstract (CPA) approach

At Our Lady & St. Oswald's Catholic 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 year groups and the individual abilities of children within each class.

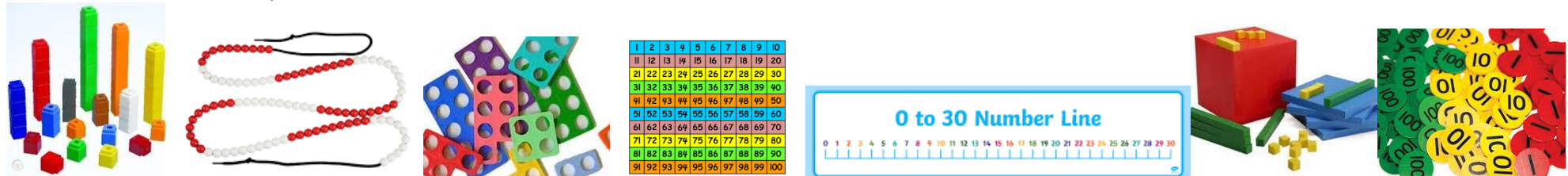
Objects, pictures, words, numbers and symbols are everywhere. The mastery approach incorporates all of these to help children explore and demonstrate mathematical ideas, enrich their learning experience and deepen understanding. Together, these elements help cement knowledge so pupils truly understand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

All pupils, when introduced to a key new concept, should have the opportunity to build 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 $10 \div 2 = 5$

Teaching

‘Quality first teaching’ linked to teaching standards:

All teachers:

1. ‘Know where their children are’ through the use of summative assessment, prior learning, assessment, maths talk
2. ‘Understand where their children need to be’ through a secure understanding of year group expectations and/or pre key stage expectations and ongoing, formative assessment
3. ‘Know how they are going to get them there’ through the use of a range of strategies to promote independence, mastery and high expectations of ALL.
4. Cooperative learning Steps will be embedded into lessons to develop Maths Talk 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 Step is designed to encourage certain elements of listening, speaking, questioning and response.

Impact

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

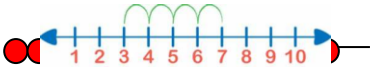
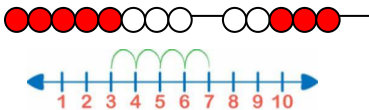
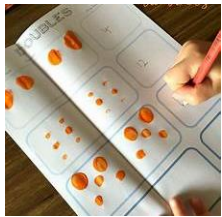
- Quick recall of facts and procedures
- The flexibility and fluidity to move between different contexts and representations of mathematics
- The ability to recognise relationships and make connections in mathematics
- Confidence and belief that they can achieve
- The knowledge that maths underpins most 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, tracking, pupil progress meetings, performance management, moderation and standardisation.

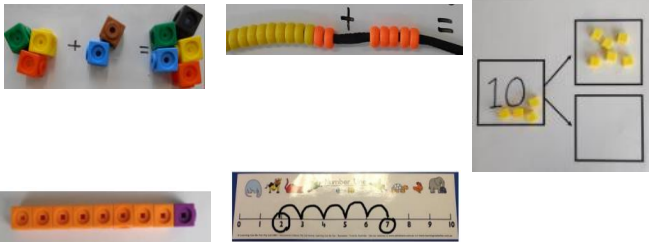
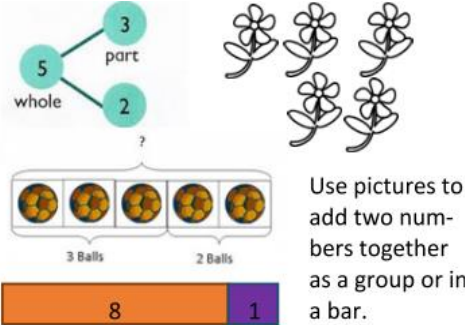
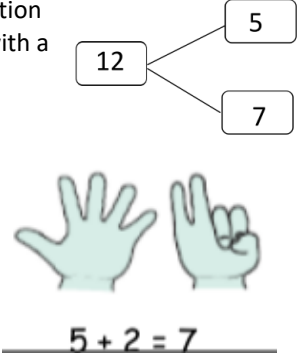
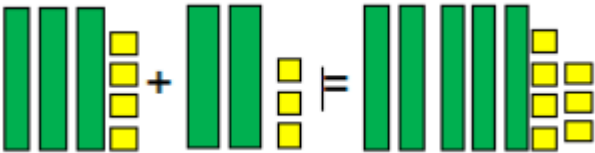
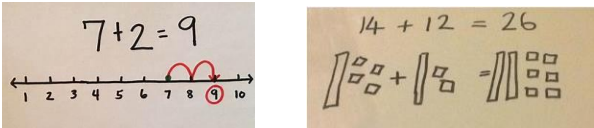
Calculation Policy

EYFS (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 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.	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.  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.	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. $2 + 2 = 4$ 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. 	Children use concrete objects to count and share equally into 2 groups. 6 cakes shared between 2 people each person gets 3 cakes. $6 \div 2 = 3$  They count a set of objects and halve them by making two equal groups. They understand sharing and halving as dividing by 2. 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.

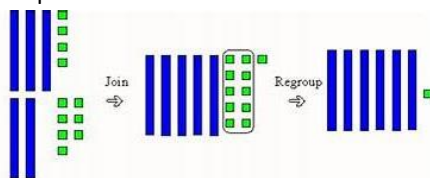
Calculation Policy

ADDITION - KS1 (Years 1&2)

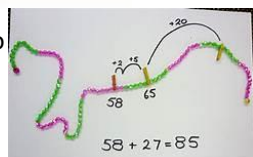
	Concrete	Pictorial	Abstract
B a s i c	Use part, part whole model, cubes and bead strings to add two numbers together as a group or in a bar. 	Use jottings to represent numbers.  Use pictures to add two numbers together as a group or in a bar.	Children will record their calculation using a pictorial method along with a calculation using numbers and symbols.  $11 + 4 = 15$ They may use their fingers to support their mental methods $5 + 2 = 7$
A d v a n c e d	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 by counting 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 keystage. 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. $27 + \square = 57$

Partitioning

Children will add larger numbers where they will need to join, regroup and count.

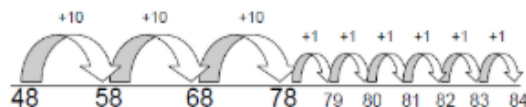


Children will also use bead strings to add numbers together using groups of tens and ones to count on.

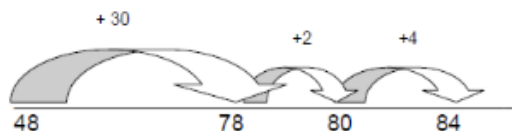


Number line

Use an empty number line to count in tens and then ones.



When confident:



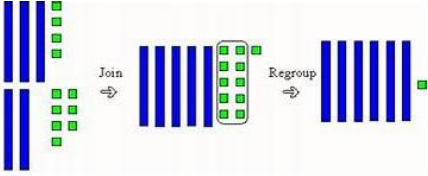
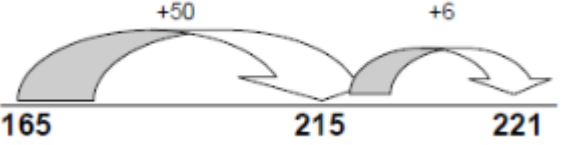
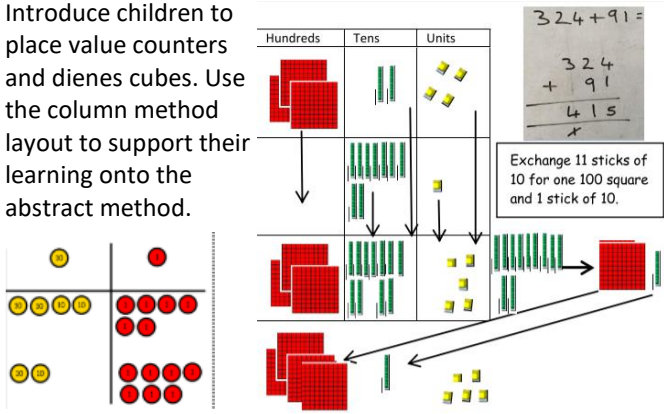
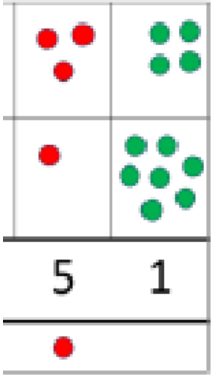
Partitioning

Children will begin to use the partitioning method. Tens and ones will be added to form partial sums and then these partial sums will be added together to find the total.

$$\begin{array}{r}
 25 + 47 \\
 \swarrow \quad \searrow \\
 20 + 5 \quad 40 + 7 \\
 20 + 40 = 60 \\
 5 + 7 = 12 \\
 60 + 12 = 72
 \end{array}$$

Calculation Policy

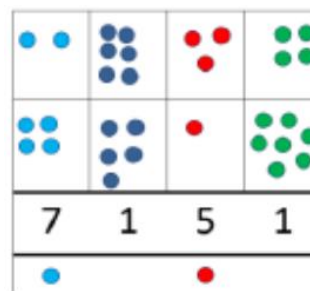
ADDITION - Lower KS2 (Years 3 & 4)

	Concrete	Pictorial	Abstract
B a s i c	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 sums and then these partial sums will be added together to find the total. $ \begin{array}{r} 200 + 60 + 3 \\ + 100 + 10 + 9 \\ \hline 300 + 70 + 12 \\ \hline 300 + 80 + 2 \end{array} $
A d v a n c e d	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. $ \begin{array}{r} 176 \\ + 147 \\ \hline 323 \end{array} $ (7 + 6) (70 + 40) (100 + 100) $ \begin{array}{r} 147 \\ + 176 \\ \hline 323 \end{array} $

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.



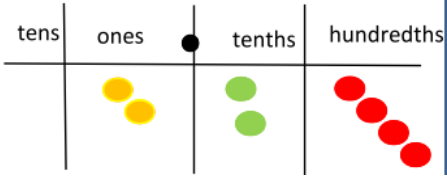
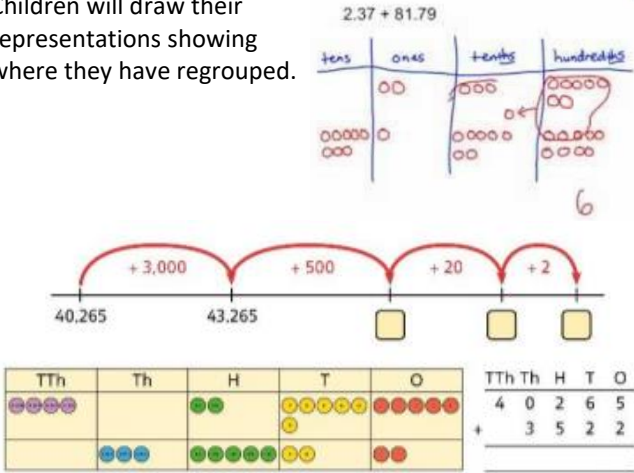
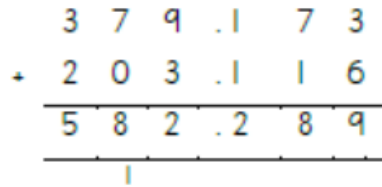
Column method - Formal method

Column Method for addition to be used.

$$\begin{array}{r}
 4478 \\
 + 3762 \\
 \hline
 8240 \\
 \hline
 111
 \end{array}$$

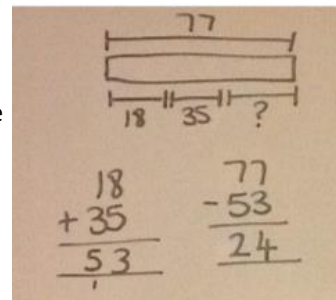
Calculation Policy

ADDITION - Upper KS2 (Years 5 & 6)

	Concrete	Pictorial	Abstract
B a s i c	Introduce decimal place value counters and model regrouping for addition. 	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. 

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.

6 digit + 6 digit

$$\begin{array}{r} 447813 \\ + 376245 \\ \hline 824058 \end{array}$$

Numbers with 3 decimal place

$$\begin{array}{r} 379.173 \\ + 203.116 \\ \hline 582.289 \end{array}$$

Numbers with a different number of decimal places

$$45.25 + 8.5 + 3.247$$

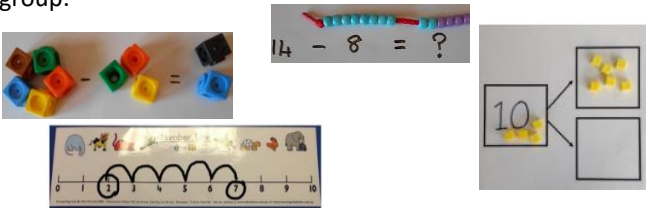
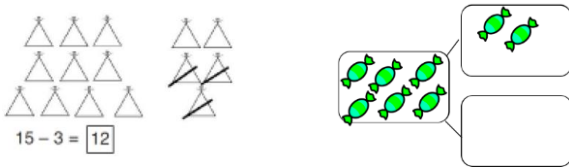
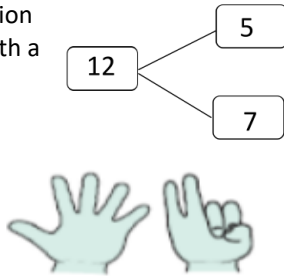
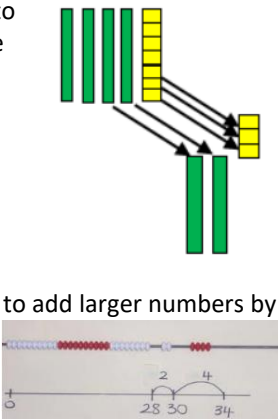
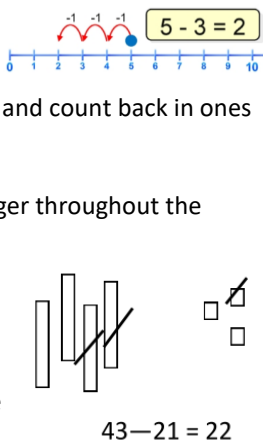
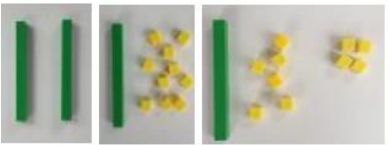
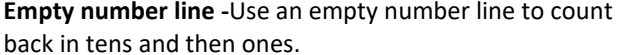
$$\begin{array}{r} 45.250 \\ + 8.500 \\ \hline 3.247 \\ \hline 56.997 \end{array}$$

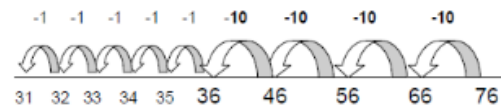
Insert zeros for place holders.

$$\begin{array}{r} 23.361 \\ 9.080 \\ + 1.300 \\ \hline 33.741 \end{array}$$

Calculation Policy

SUBTRACTION - KS1 (Years 1&2)

	Concrete	Pictorial	Abstract
B a s i c	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 
	Children will use dienes cubes to subtract larger numbers where exchanging is not required. Children will lay out the first number using the dienes cubes and then move the second number away to show the subtraction. They will also use a bead string to add larger numbers by counting in tens and 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 keystage. 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. $25 - 12 = 13$ Children will begin to subtract multiples of tens. $25 - 10$ $25 - 10 = 15$
	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. 	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. $47 - 23 = 24$



When confident:

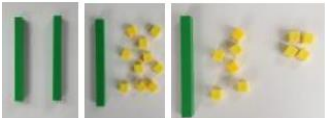
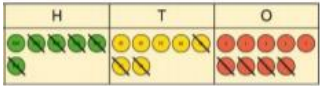
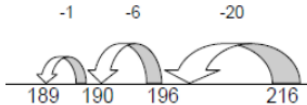
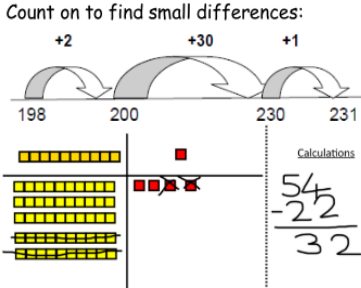
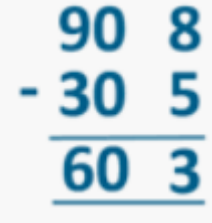
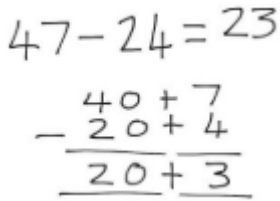
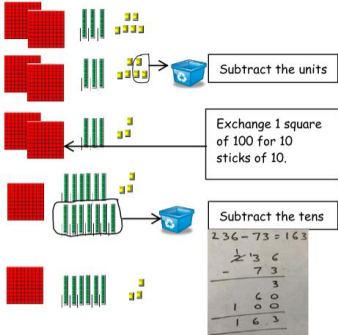
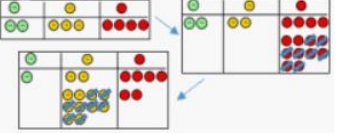
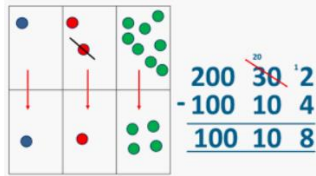
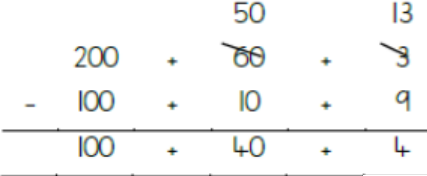
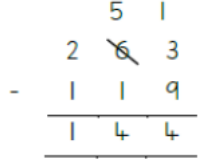
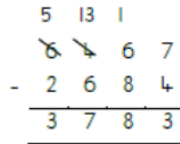
$$\begin{array}{r}
 \begin{array}{c} -5 \\ \overline{31} \end{array} \quad \begin{array}{c} -40 \\ 47 - 24 = 23 \end{array} \\
 \begin{array}{r}
 40 + 7 \\
 - 20 + 4 \\
 \hline
 20 + 3
 \end{array}
 \end{array}$$

$$47 - 20 = 27$$

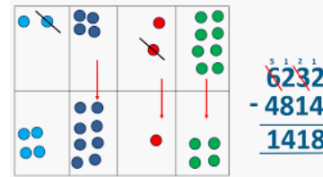
$$27 - 3 = 24$$

Calculation Policy

SUBTRACTION - Lower KS2 (Years 3 & 4)

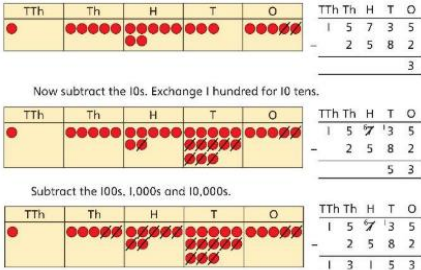
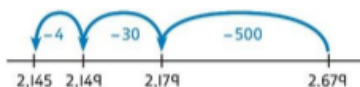
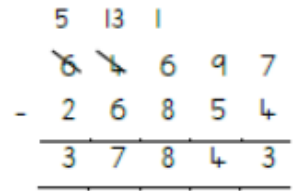
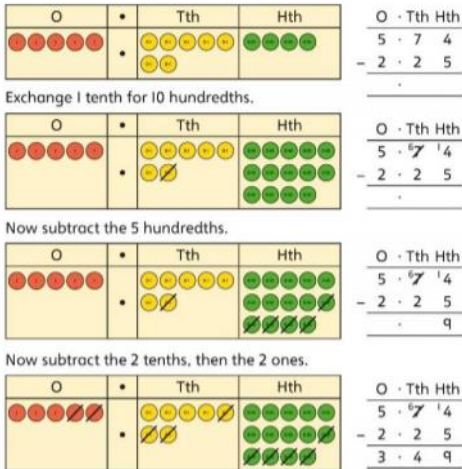
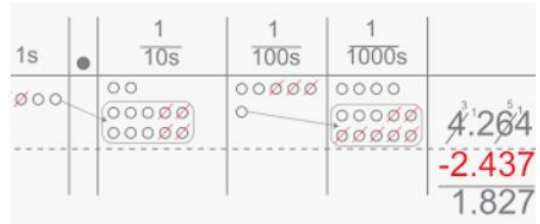
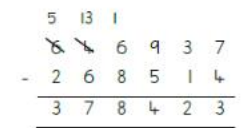
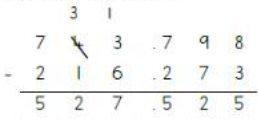
	Concrete	Pictorial	Abstract
B a s i c	Children consolidate and use place value counters and dienes cubes to show how to exchange between units of number. They will be able to change 1 ten and exchange it for 10 ones.  They will be able to begin to lay this out like the column method and removing counters or cubes away to represent taking away.  	Consolidate their learning from KS1 by using an empty number line to calculate larger numbers. Develop the use of empty number line with calculations that bridge 100:  Children will also be able to draw representations of dienes cubes and place value counters by crossing out the number being taken away. Count on to find small differences: 	  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.
A d v a n c e d	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. 
D e e p	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	Column Method Children continue to use column method to subtract larger numbers. 

using dienes cubes and
place value counters.



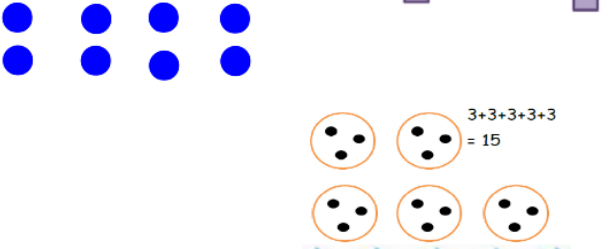
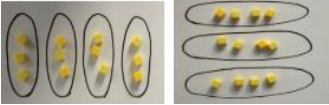
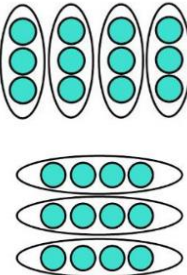
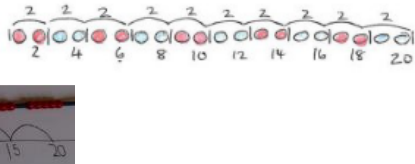
Calculation Policy

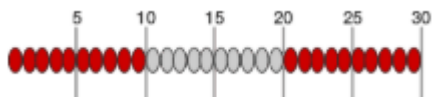
SUBTRACTION - Upper KS2 (Years 5 & 6)

	Concrete	Pictorial	Abstract
B a s i c	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. $15,735 - 2,582 = 13,153$  Now subtract the 10s. Exchange 1 hundred for 10 tens. Subtract the 100s, 1,000s and 10,000s. 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. 5 digit - 5 digit 
A d v a n c e d	Introduce decimal place value counters and model exchange for subtracting between units of numbers. $5.74 - 2.25 = ?$  Exchange 1 tenth for 10 hundredths. Now subtract the 5 hundredths. Now subtract the 2 tenths, then the 2 ones.	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. 6 digit - 6 digit  Numbers with 3 decimal place  Numbers with a different number of decimal places $69.2 - 27.54 = 41.66$ 

Calculation Policy

MULTIPLICATION - KS1 (Years 1&2)

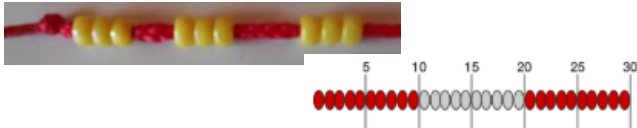
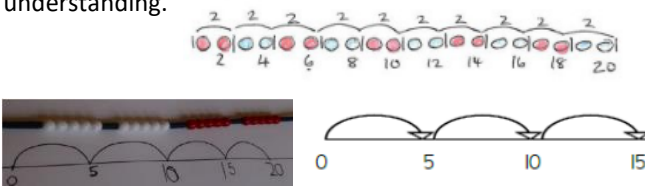
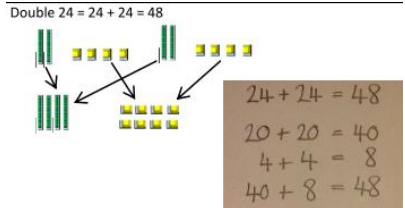
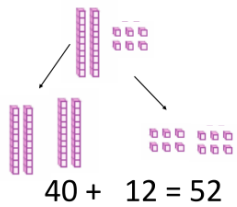
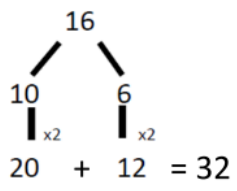
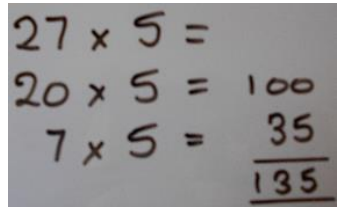
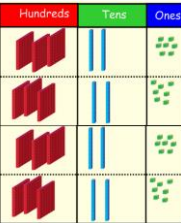
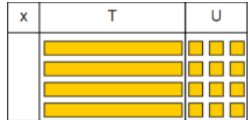
	Concrete	Pictorial	Abstract
B a s i c	Repeated addition - Groups of multiple objects Children will count groups of the same number of objects and add them together. The children learn about grouping in practical contexts and through pictorial representations. 	Children draw representations to show counting in multiples and groups. Double 4 is 8 	Children show multiplication as repeated addition. Children may provide pictorial representations to support. 3×9 $3 + 3 + 3 = 9$
S A d v a n c e d	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).   $3 \times 5 = 15$ $5 \times 3 = 15$	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). $3 \times 5 = 15$ $5 \times 3 = 15$ Introduce x sign and record as number sentence $7 \times 10 = 70$ $4 \times 5 = 20$ Use an array to write multiplication sentences and reinforce repeated addition.  $5 + 5 + 5 = 15$ $3 + 3 + 3 + 3 + 3 = 15$ $5 \times 3 = 15$ $3 \times 5 = 15$
D e e p	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 beadsting 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 $7 \times 10 = 70$



$$4 \times 5 = 20$$

Calculation Policy

MULTIPLICATION - Lower KS2 (Years 3 & 4)

	Concrete	Pictorial	Abstract
B a s i c	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. 	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. 	Children show multiplication as repeated addition. $5 + 5 + 5 = 15$ Introduce x sign and record as number sentence $7 \times 10 = 70$ $4 \times 5 = 20$
	Partitioning Children will learn to multiply ones and tens separately before recombining 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.  
D e e p	Grid Method Show the links with arrays to first introduce the grid method. Move onto Dienes cubes to move towards a more compact method. 	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. 	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

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.

H	T	O
●	●●●●●	●●●
●	●●●●●	●●●
●	●●●●●	●●●
●	●●●●●	●●●
●	●●●●●	●●●

lead to the expanded method.

$$\begin{array}{r}
 36 \\
 \times 4 \\
 \hline
 24 \text{ (} 6 \times 4 \text{)} \\
 \underline{120 \text{ (} 30 \times 4 \text{)}} \\
 144
 \end{array}$$

Calculation Policy

MULTIPLICATION - Upper KS2 (Years 5 & 6)

MULTIPLICATION - Upper KS2 (Years 5 & 6)																																	
	Concrete	Pictorial	Abstract																														
S B a s i c	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 understanding. Use place value equipment to multiply by 10, 100 and 1,000 by unitising. $4 \times 1 = 4 \text{ ones} = 4$ $4 \times 10 = 4 \text{ tens} = 40$ $4 \times 100 = 4 \text{ hundreds} = 400$ $4 \times 3 = 12$ $4 \times 300 = 1,200$ $6 \times 4 = 24$ $6 \times 400 = 2,400$	Use place value equipment to compare methods. Method 1 $\begin{array}{r} 3225 \\ 3225 \\ 3225 \\ 3225 \\ + 3225 \\ \hline 12900 \end{array}$ Method 2 $\begin{array}{r} 4 \times 3,000 = 12,000 \\ 4 \times 200 = 800 \\ 4 \times 20 = 80 \\ 4 \times 5 = 20 \\ \hline 12,000 + 800 + 80 + 20 = 12,900 \end{array}$	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. <table><tr><td>X</td><td>30</td><td>6</td></tr><tr><td>4</td><td>120</td><td>24</td></tr></table> Leading to expanded method $\begin{array}{r} 36 \\ \times 4 \\ \hline 24 \text{ (} 6 \times 4 \text{)} \\ 120 \text{ (} 30 \times 4 \text{)} \\ \hline 144 \end{array}$ $\begin{array}{r} 36 \\ \times 4 \\ \hline 144 \\ 2 \end{array}$ Use known facts and unitising to multiply. $5 \times 4 = 20$ $5 \times 40 = 200$ $5 \times 400 = 2,000$ $5 \times 4,000 = 20,000$ $5,000 \times 4 = 20,000$	X	30	6	4	120	24																								
	X	30	6																														
4	120	24																															
A d v a n c e d	When multiplying decimals by 10,100,1000 initial concrete resources will be used to support understanding to show how exchanging can take place. $0.14 \times 10 = 1.4$	This pictorial grid method will support children’s understanding of multiplying by 10, 100, 1000. $2.5 \times 10 = 25$ $2.5 \times 100 = 250$ $2.5 \times 1,000 = 2,500$ <table><tr><td>Th</td><td>H</td><td>T</td><td>O</td><td>.</td><td>Tth</td></tr><tr><td></td><td></td><td></td><td>2</td><td></td><td>5</td></tr><tr><td></td><td></td><td>2</td><td>5</td><td></td><td></td></tr><tr><td></td><td>2</td><td>5</td><td>0</td><td></td><td></td></tr><tr><td>2</td><td>5</td><td>0</td><td>0</td><td></td><td></td></tr></table>	Th	H	T	O	.	Tth				2		5			2	5				2	5	0			2	5	0	0			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. $\begin{array}{r} 23 \\ \times 13 \\ + 69 \text{ (} 3 \times 23 \text{)} \\ 230 \text{ (} 10 \times 23 \text{)} \\ \hline 299 \end{array}$
Th	H	T	O	.	Tth																												
			2		5																												
		2	5																														
	2	5	0																														
2	5	0	0																														

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.

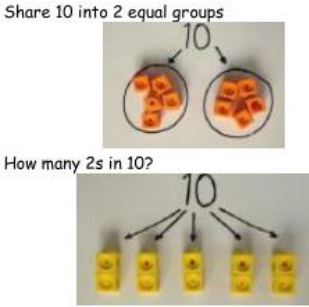
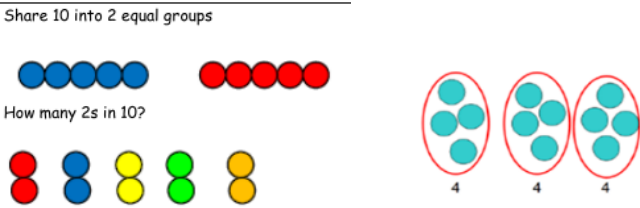
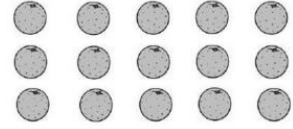
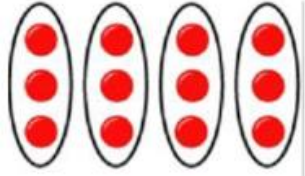
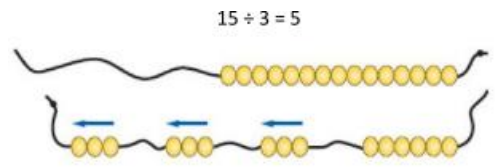
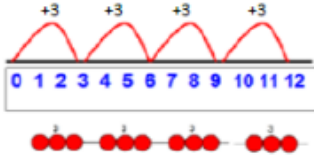
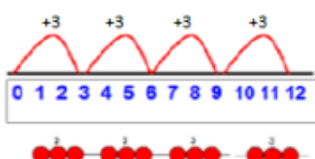
$$\begin{array}{r} 143 \\ \times 6 \\ \hline 858 \\ \hline 21 \end{array}$$

$$\begin{array}{r} 1274 \\ \times 32 \\ \hline 2548 \\ 38220 \\ \hline 40768 \end{array}$$

1,274 × 2
1,274 × 30
1,274 × 32 = 40,768

Calculation Policy

DIVISION - KS1 (Years 1&2)

	Concrete	Pictorial	Abstract
B a s i c	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. Share 10 into 2 equal groups  How many 2s in 10?  Develop division as repeated subtraction on a number line.	Children will be able to represent a division calculation using a pictorial method and write the division within a number sentence. $10 \div 2 = 5$ Share 10 into 2 equal groups 
A d v a n c e d	Arrays Link division to multiplication by creating an array and thinking about the number sentences that can be created.  Eg: $15 \div 3 = 5$ $5 \times 3 = 15$ $15 \div 5 = 3$ $3 \times 5 = 15$	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 $12 \div 3 = 4$ 
D e e p	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. $15 \div 3 = 5$ 	Children will understand the operation of division as grouping using repeated addition or subtraction on a prepared number line.  $12 \div 3 = 4$	Children will be able to represent a division calculation using a numberline and write the division within a number sentence.  $12 \div 3 = 4$

Calculation Policy

DIVISION - Lower KS2 (Years 3 & 4)

	Concrete	Pictorial	Abstract
B a s i c	Division with no remainders through sharing. Use concrete materials to share into groups. $60 \div 3 = 20$ CONCRETE / PICTORIAL (Base 10 equipment) sharing grouping $96 \div 3 = 32$ $6 \text{ tens} \div 3 = 2 \text{ tens} = 20$	Consolidate learning from KS1 using diagrams of sharing and repeated subtraction and addition on a number line to make jumps Example without remainder: $40 \div 5$ Ask "How many 5s in 40?" $5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 8 \text{ fives}$ Concrete methods could be represented pictorially within books to show understanding.	How many groups of 6 in 24? $24 \div 6 = 4$ Abstract methods may be supported with pictorial methods within the children's books.
	Division with remainder through sharing $14 \div 3 =$ Divide objects between groups and see how much is left over. Division no remainders - introduction to bus stop method Use place value equipment on a place value 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. Draw dots and group them to divide an amount and clearly show a remainder. Example without remainder: $40 \div 5$ Ask "How many 5s in 40?" Example with remainder: $38 \div 6$	Children will begin to move onto division with remainders. A number sentence will support any abstract written calculation by using pictorial method to support. $29 \div 8 = 3 \text{ REMAINDER } 5$ dividend divisor quotient remainder 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.

		<table><tr><td></td><td>2</td><td>1</td></tr><tr><td>4</td><td>8</td><td>4</td></tr></table> Dividing by 2,3,4, and 5		2	1	4	8	4
	2	1						
4	8	4						

Division with remainders - Bus stop

4 $\overline{) 92}$

First, lay out the problem.

How many groups of 4 go into 9 tens? 2 groups of 4 tens with 1 ten left over.

Exchange the 1 ten left over for 10 ones. We now have 12 ones.

How many groups of 4 go into 12 ones? 3 groups of 4 ones.

2 3
4 $\overline{) 92}$

Pictorial representations can be used to support any concrete manipulatives.

H T O

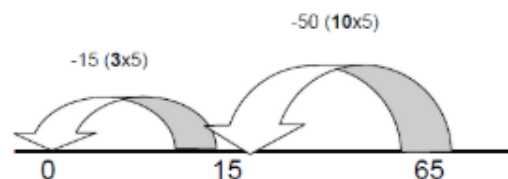
How many groups of 6 are in 100? 6 $\overline{) 100}$

How many groups of 6 are in 13 tens? 6 $\overline{) 130}$

How many groups of 6 are in 12 ones? 6 $\overline{) 120}$

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

$65 \div 5 = 13$



Chunking

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

$$73 \div 5$$

$$\begin{array}{r} 5 \overline{) 73} \\ - 50 \\ \hline 23 \\ - 20 \\ \hline 3 \end{array}$$

(10 x 5) 10 + 4 = 14
(4 x 5)

How many 5s have been subtracted?
14 sets of 5, with 3 left over.

Answer: $73 \div 5 = 14 \text{ r } 3$

Bus Stop Method for division

Begin with divisions that divide equally with no remainder.

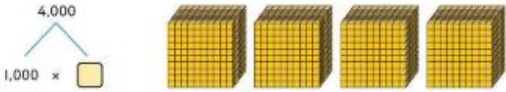
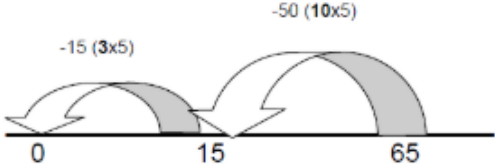
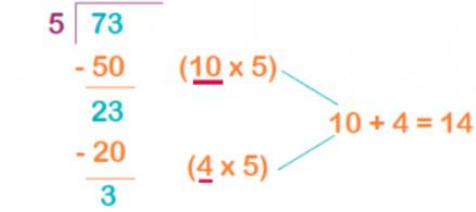
$$\begin{array}{r} 218 \\ 4 \overline{) 872} \\ \hline 3 \end{array}$$

Move onto divisions with a remainder.

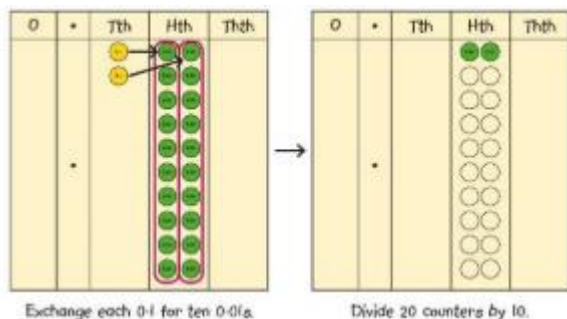
$$\begin{array}{r} 86 \text{ r } 2 \\ 5 \overline{) 432} \\ \hline 3 \end{array}$$

Calculation Policy

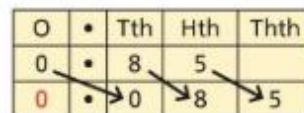
DIVISION - Upper KS2 (Years 5 & 6)

	Concrete	Pictorial	Abstract								
B a s i c	Dividing whole numbers by 10, 100 and 1,000 Use place value equipment to support unitising for division. $4,000 \div 1,000$  $4,000$ is 4 thousands. $4 \times 1,000 = 4,000$ So, $4,000 \div 1,000 = 4$ Concrete and pictorial representations may still be required to support the formal method of division (Bus Stop) - 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. <table border="1" data-bbox="857 406 1205 475"> <thead> <tr> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>2</td> <td>0</td> <td>0</td> </tr> </tbody> </table> $3,200 \div 100 = ?$ $3,200$ is 3 thousands and 2 hundreds. $200 \div 100 = 2$ $3,000 \div 100 = 30$ $3,200 \div 100 = 32$ So, the digits will move two places to the right. Continue to use blank number lines as appropriate, using multiples of the divisor. $65 \div 5 = 13$ 	Th	H	T	O	3	2	0	0	Chunking Chunking is repeated subtraction of the divisor and multiples of the divisor. $73 \div 5$  How many 5s have been subtracted? 14 sets of 5, with 3 left over. Answer: $73 \div 5 = 14 \text{ r}3$ Bus Stop Method for division
Th	H	T	O								
3	2	0	0								

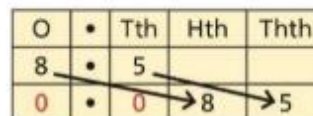
			Begin with divisions that divide equally with no remainder. $\begin{array}{r} 218 \\ 3 \overline{) 654} \end{array}$ Move onto divisions with a remainder. $\begin{array}{r} 86 \text{ r } 2 \\ 3 \overline{) 432} \end{array}$
Advanced	Dividing decimals by 10, 100 and 1,000 Use place value counters to represent dividing by 10, 100, 1000. Represent division using exchange on a place value grid.	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.	Finally move into decimal places to divide the total accurately using a formal method for division (Bus stop) $\begin{array}{r} 14.6 \\ 35 \overline{) 511.0} \end{array}$



0.2 is 2 tenths.
 2 tenths is equivalent to 20 hundredths.
 20 hundredths divided by 10 is 2 hundredths.



$$0.85 \div 10 = 0.085$$



$$8.5 \div 100 = 0.085$$

Long Division - Abstract Method

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

1. Divide.

$$\begin{array}{r} \text{t o} \\ 2 \overline{) 58} \end{array}$$

Two goes into 5 two times, or 5 tens $\div 2 = 2$ whole tens -- but there is a remainder!

2. Multiply & subtract.

$$\begin{array}{r} \text{t o} \\ 2 \overline{) 58} \\ - 4 \\ \hline 1 \end{array}$$

To find it, multiply $2 \times 2 = 4$, write that 4 under the five, and subtract to find the remainder of 1 ten.

3. Drop down the next digit.

$$\begin{array}{r} \text{t o} \\ 2 \overline{) 58} \\ - 4 \\ \hline 1 \end{array}$$

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.