



Maths

Oakhill Church School

Our curriculum is designed and built upon children’s prior knowledge, and we use quality first-hand experiences to help unlock children's curiosity and invest in their cultural understanding and capital. The curriculum makes links and connections to establish purposeful learning which is relevant now and for life in the future.

Mathematics is an integral part of every school curriculum. It teaches children how to make sense of the world around them through developing their ability to calculate, reason and solve problems. At Oakhill Church School, we work to ensure that all children have access to a Maths curriculum which prepares them for life-long learning, acquiring knowledge and skills to take with them. We believe that all children can achieve in Maths through determination and self-belief and we encourage a can-do attitude when attempting new challenges.

Teaching and Learning at Oakhill.....	2
EYFS Granular Steps.....	8
Calculation Policy – Progression of Calculation	18
White Rose Overviews	52
White Rose/National Curriculum – Progression of Skills	46



Teaching and Learning at Oakhill

Teacher Planning:

- Our aim is to promote confidence and competence in maths by creating a positive learning environment where the children are not afraid to make mistakes. We want our children to become fluent in solving calculations with the four rules of number and seek to provide them with a variety of strategies to enable them solve a range of problems. Children work to apply their learnt skills and knowledge to reason mathematically, looking for relationships and generalisations to follow a line of enquiry.
- Teachers plan progressive sequences of lessons following the White Rose Mathematics Curriculum Blocks. Teachers use the White Rose Maths Curriculum to plan lessons - this is a research-based scheme which incorporates the National Curriculum requirements for each year group. The Maths curriculum is taught in blocks throughout the year, allowing time to embed and broaden children's understanding of each area of Maths including number, calculation, fractions, geometry, measure and statistics. Children have regular opportunities to review their prior learning to commit the schemas to their long-term memory.
- All children access a daily maths lesson of 60 minutes.
- We actively plan for children to make connections in their learning, providing choice and challenge in enjoyable lessons to engage children to aspire and flourish in the learning process.
- Teachers follow our "Progression in Calculation" policy to develop our pupil's number fluency in a structured way across the Key Stages.

Lesson Design:

Small steps, and a style of teaching, whereby we adopt an 'I do/we do/you do' approach, are encouraged and supported and we ensure there is challenge for all children through our **Try it, Use it, Apply it** teaching sequence.

- **Try it** tasks aim to improve the children's fluency of the skill.
- **Use it** tasks challenge the children to draw on and apply the skills they have achieved in the 'Try it' tasks.
- **Apply it** tasks require the children to explain their understanding.

Teaching and Learning at Oakhill

Examples of Lesson Design

Try It

Work out the additions. Use the number lines to help you.

a) $0.3 + 0.2 = 0.5$

b) $0.1 + 0.4 = 0.5$

c) $0.2 + 0.1 + 0.2 = 0.5$

Use It

Use it

$$60 + 40 = 640$$

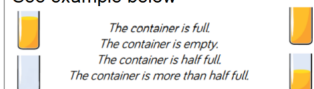
Correct the error

$$149 + 161 = 300$$

$$199 + 299 = 500 + 2$$

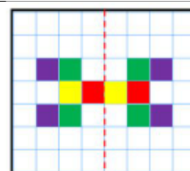
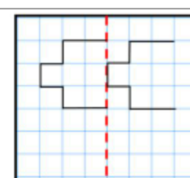
Use it Correct the error

Have a range of containers/images incorrectly labelled – ask the pupils to sort and add the correct labels. See example below



Use it

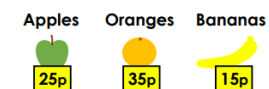
Correct the error



Apply It

Building Questions

Draw lines to join the blue information to matching the red question.



Raja buys three apples and three bananas.

How much change does he get?

Mo has £2.

How much does it cost him?

Ben has £2. He wants four oranges and three apples.

How many oranges can he afford?

Matt has £2. He wants four oranges and three bananas.

How much more money does he need?

Apply it Can you solve the rules?

Is it true or false that when you add a multiple of ten to another multiple of ten you will get an answer with more hundreds than you started with? Explain your answer by giving 3 or 4 examples to support whether you think it is true or false.



Teaching and Learning at Oakhill

Concrete, Pictorial, Abstract Approach:

Concrete	Pictorial	Abstract
		$3 + 2 = \boxed{5}$
KS1: Progressive Concrete, Pictorial, Abstract for Adding 2, 1-digit numbers		

- Children acquire a solid mathematical understanding through the use of concrete apparatus, pictorial representations and abstract or formal written methods to give them the best chances of mastering maths problems and use in real-life situations.

Developing Recall:

- In addition to planning derived from White Rose Maths, teachers develop number fluency by regularly recalling number bonds and times tables and giving opportunity to practice the skills of arithmetic.
- In KS1 number sense is used to develop recall, and it is continued to be used as an intervention strategy in KS2 where needed.
- In KS2, children will have daily arithmetic or multiplication number talk activities. Children are also encouraged to practise their times tables as part of their home learning.
- KS2 Number Talk sessions may involve Fluent in Five arithmetic questions (Third Space Learning) or questions from My Mini Maths (myminimaths.co.uk). Children also have include regular talk sessions for multiplication practice where they are able to discuss strategies for solving problems (including division facts).

Number Sense:

- Daily Number Talk sessions provide children with opportunities to improve oracy skills, as well as develop the ability to articulate, discuss and reason their mathematical thinking.
- We currently use Number Sense to help promote children's oracy skills and number fluency, particularly in EYFS and KS1.



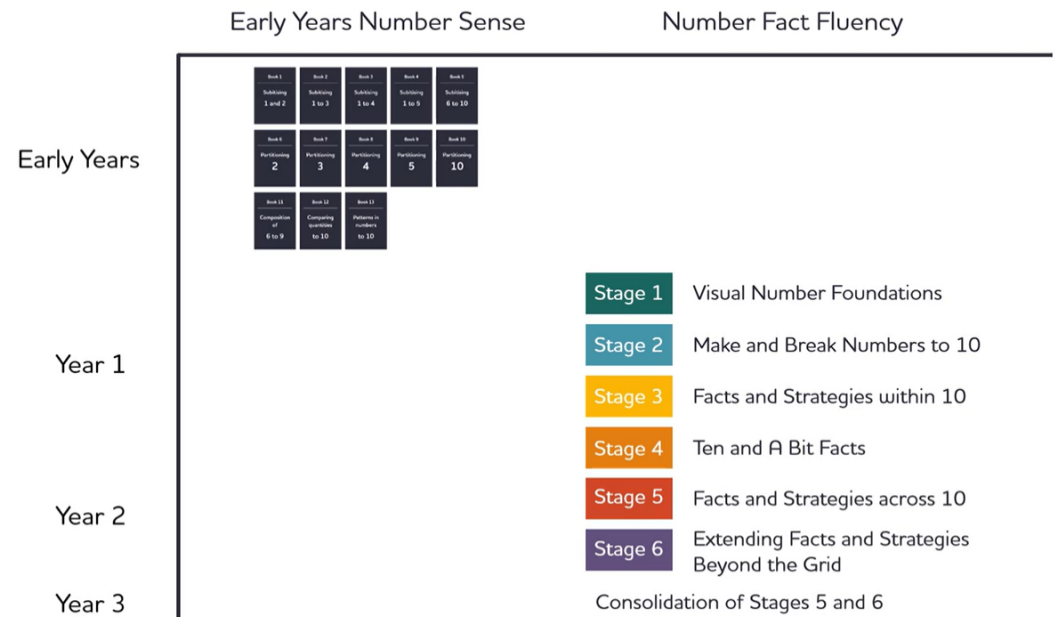
Teaching and Learning at Oakhill

7 key principles of the programme:

- Principle 1** Children benefit from moving beyond counting in ones to solve addition and subtraction facts. Not doing so is associated with low attainment.
- Principle 2** Systematic teaching of derived fact strategies is effective for all, including children identified as low attainers.
- Principle 3** Using a derived fact strategy approach is the best way to commit addition and subtraction facts to memory.
- Principle 4** We have an innate ability to process quantities visually. We can use this to support our learning of addition and subtraction facts.
- Principle 5** Developing an understanding of part whole relationships supports fluency in number facts.
- Principle 6** Teaching derived fact strategies leads not only to fluency in number facts, but also to an understanding of number relationships.
- Principle 7** The automatic retrieval of basic maths facts is critical to solving complex maths problems.

- The Number Sense Maths programmes are informed by research into how high and low attaining children develop number sense, and how they solve and learn addition and subtraction facts.
- In Key Stage 1, Number Sense is used alongside other approaches, such as: counting, times tables, arithmetic and reasoning questions.
- Some children in KS2 may also use Number Sense as an intervention to help improve their fluency and recall of number facts.
- Number Sense is designed to help develop children’s confidence and flexibility with number and fluency in addition and subtraction.

Number Sense Progression of Skills:





Teaching and Learning at Oakhill

Number Sense – EYFS:

- How number sense children’s mathematical learning in EYFS:

Book 1 Subitising 1 and 2	Book 2 Subitising 1 to 3	Book 3 Subitising 1 to 4	Book 4 Subitising 1 to 5	Book 5 Subitising 6 to 10
Book 6 Partitioning 2	Book 7 Partitioning 3	Book 8 Partitioning 4	Book 9 Partitioning 5	Book 10 Partitioning 10
Book 11 Composition of 6 to 9	Book 12 Comparing quantities to 10	Book 13 Patterns in numbers to 10		

01-17

Mathematics

Developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically. Children should be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers. By providing frequent and varied opportunities to build and apply this understanding - such as using manipulatives, including small pebbles and tens frames for organising counting - children will develop a secure base of knowledge and vocabulary from which mastery of mathematics is built. In addition, it is important that the curriculum includes rich opportunities for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures. It is important that children develop positive attitudes and interests in mathematics, look for patterns and relationships, spot connections, 'have a go', talk to adults and peers about what they have learned and what they would like to learn next.

Early Learning Goals

Number

Children at the expected level of development will:

- Have a deep understanding of number to 10, including the composition of each number;
- Subitise (recognise quantities without counting) up to 5
- Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.

Numerical Patterns

Children at the expected level of development will:

- Verbally count beyond 20, recognising the pattern of the counting system;
- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity;
- Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally



Teaching and Learning at Oakhill

KS2: Progressive Times Table Scheme (Ashley Down Schools Federation)

- In year 3-4, pupils rehearse their times tables daily using a systematic, whole school approach.
- This scheme is designed to break down the learning of times tables into systematic, manageable chunks. It recognises the importance of the commutative law, and the relationship with division facts.

Year 3			Year 4				
2 x	5 x	3 x	4 x	6 x	7 x	8 x	9 x
2 x 2							
3 x 2	3 x 5	3 x 3					
4 x 2	4 x 5	4 x 3	4 x 4				
5 x 2	5 x 5						
6 x 2	6 x 5	6 x 3	6 x 4	6 x 6			
7 x 2	7 x 5	7 x 3	7 x 4	7 x 6	7 x 7		
8 x 2	8 x 5	8 x 3	8 x 4	8 x 6	8 x 7	8 x 8	
9 x 2	9 x 5	9 x 3	9 x 4	9 x 6	9 x 7	9 x 8	9 x 9
8 facts	7 facts	6 facts	5 facts	4 facts	3 facts	2 facts	1 fact
By end of Y3: 21 facts learnt 15 facts still to learn			By end of Y4: 15 facts learnt to complete building blocks 21 more facts for times table check (see below)				



EYFS Granular Steps

Counting and Cardinality

The knowledge I am learning is:

- To understand that a cardinal value of a number refers to a quantity
- To be able to understand and talk about numerals and their meaning
- To understand and demonstrate the sequence of counting, tagging and knowing the last number represents the total quantity
- To understand and demonstrate conservation of number – things do not change when rearranged

	Step 1	Milestone (CP2)	Step 2	Step 3	Check Point (CP6)
Stage 2 (2-3)	<ul style="list-style-type: none"> • I am learning to count in sequence to three (ordinality) 	I can two specific numbers in sequence	<ul style="list-style-type: none"> • I am learning to recognise numeral one and say the number name • I am learning to count in sequence from 0 to 5 (ordinality) • I am learning to assign a number name to each object of up to two items in a set 	<ul style="list-style-type: none"> • I am learning to assign a number name to each object of up to three items in a set (stable order principle) • I am learning to recognise the numeral two and say the number name • I am learning to count in sequence backwards from 3 to 0 	<ul style="list-style-type: none"> • I can understand the cardinal value of up to three regular objects in a set and understand the last number represents the quantity • I can demonstrate my understanding of numerals one and two • I can count in sequence from 0-5
Stage 3 (3-4)	<ul style="list-style-type: none"> • I am learning to recognise the numeral 3 • I am learning to count backwards from 5 to 0 	<ul style="list-style-type: none"> • I can recognise numerals that are special to me • I can count backwards from 5 to 0 	<ul style="list-style-type: none"> • I am learning to assign a number name to each object of up to four items in a set regular or irregular 	<ul style="list-style-type: none"> • I am learning to assign a number name to each object of up to five items in a set regular or irregular • I am learning to count backwards from 10 to 0 	<ul style="list-style-type: none"> • I can count in sequence from 0-10 • I can demonstrate my understanding of numerals 1- 5



EYFS Granular Steps

	<ul style="list-style-type: none"> I am learning to count up to three actions and sounds 	<ul style="list-style-type: none"> I can tell you zero means nothing I can count up to three actions and sounds some of the time 	<ul style="list-style-type: none"> I am learning to count in sequence from 0 to 10 I am learning to recognise the numeral 4 and its number name I am learning to make mathematical marks to represent counting 	<ul style="list-style-type: none"> I am learning to form recognisable numerals I am learning to count up to 5 sounds and actions 	<ul style="list-style-type: none"> I understand the cardinal value of up to 5 items in a set I can tag and assign a number in sequence of up to five items in a regular and irregular set
Stage 4 (4-5)	<ul style="list-style-type: none"> I am learning to count from 0-20 I am learning to recognise and match numerals and quantity up to 6 I am learning to correctly form numerals 0-3 	<ul style="list-style-type: none"> I can verbally count from 0 – 20 I understand the cardinal value of up to 6 items in a set I can correctly form a number that is special to me 	<ul style="list-style-type: none"> I am learning to recognise and match numerals and quantity up to 10 I am learning to correctly form numerals 0 – 6 I am learning to count ten objects from a larger group 	<ul style="list-style-type: none"> I am learning to match numerals and quantity beyond 10 I am learning to correctly form numerals 0-10 I am learning to count ten objects and beyond from a larger group 	<ul style="list-style-type: none"> I can verbally count beyond 20, recognising the pattern of the counting system I can put numerals in order 1-10
Comparison The knowledge that I am learning is: <ul style="list-style-type: none"> To demonstrate and be able to explain my understanding of more, few and the same number (equal number of things in groups) To demonstrate my understanding of quantities by being able to explain and reason the relationship between counting numbers 0- 10 To demonstrate why a number is more or less than another number To explain how I know what 1 more or 1 less than a number is 					
	Step 1	Milestone (CP2)	Step 2	Step 3	Check Point (CP6)



EYFS Granular Steps

Stage 2 (2-3)	I am learning to understand the word more by adding objects or taking more turns in my play	I can demonstrate my understanding of more when offered food	I am learning to understand the word less by taking objects away in my play	<ul style="list-style-type: none"> I am learning to compare significant differences in quantities in my play I can compare amounts saying lots more, same 	<ul style="list-style-type: none"> I can demonstrate my understanding of more when there is a significant differences in quantity in a variety of situations I can demonstrate my understanding of the vocabulary more, less and fewer in my play
Stage 3 (3-4)	I am learning to be able to explain and reason why there is more and fewer (significant difference 30 trains compare to 5 trains)	I can demonstrate and explain my understanding of more and fewer	<ul style="list-style-type: none"> I am learning to explain and reason why there is more and fewer (small difference 5 and 10 trains) I am learning to notice when there is the same amount in a regular set 	<ul style="list-style-type: none"> I am learning to explain and reason when there is the same amount in an irregular set I am learning compare quantities in my play independently I can match objects in 2 groups to find out that they have an equal number of things 	<ul style="list-style-type: none"> I can explain and reason why there is more or fewer when comparing two groups of objects I can explain and reason why two groups of objects are the same
Stage 4 (4-5)	<ul style="list-style-type: none"> I am learning to use my knowledge of more and fewer to solve every day problems I am learning to make predictions 	<ul style="list-style-type: none"> I can predict in relation to heavy and light I can predict in relation to quantity 	<ul style="list-style-type: none"> I am learning to know the one more/one less relationship between numbers 1 to 5 	<ul style="list-style-type: none"> I am learning to compare numbers from 1-10 I am learning to answer the question how do you know? 	<ul style="list-style-type: none"> Compare quantities up to 10 in different contexts, recognising when one quantity is



EYFS Granular Steps

		<ul style="list-style-type: none"> I can predict in relation to measure I can predict in relation to time 	<ul style="list-style-type: none"> I am learning to make things equal for others 		<p>greater than, less than or the same as the other quantity;</p> <ul style="list-style-type: none"> I can say groups are equal by counting them I know what one more and 1 less than a number is, from 1 to 10
<p>Composition & Subitising</p> <p>The knowledge that I am learning is:</p> <ul style="list-style-type: none"> To understand that one number can be composed (made up) from two or more smaller numbers To subitise with my eyes without counting To understand pattern, doubles and equal groups To automatically recall number bonds up to 5, some number bonds up to 10 and some doubles 					
	Step 1	Milestone (CP2)	Step 2	Step 3	Check Point (CP6)
Stage 2 (2-3)	<ul style="list-style-type: none"> I am learning to subitize with my eyes (perceptual subitising) and recognise and represent the quantity of one I am learning to represent one on my fingers 	<ul style="list-style-type: none"> I can recognise a one dot pattern on a dice or domino I can demonstrate my understanding of one 	<ul style="list-style-type: none"> I am learning to subitise with my eyes (perceptual subitising) and recognise and represent the quantity of two I am learning to represent two on my fingers 	<ul style="list-style-type: none"> I am learning to subitize with my eyes (perceptual subitising) and recognise and represent the quantity of three I am learning to represent three on my fingers 	<ul style="list-style-type: none"> I can perceptually subitise of regular quantities of up to three
Stage 3 (3-4)	<ul style="list-style-type: none"> I am learning to recognise dice and dot patterns up to two 	<ul style="list-style-type: none"> I can recognise a two dot or dice pattern 	<ul style="list-style-type: none"> I am learning to recognise dice 	<ul style="list-style-type: none"> I am learning to recognise dice patterns of five 	<ul style="list-style-type: none"> I can explain what whole means



EYFS Granular Steps

	<ul style="list-style-type: none"> I am learning to represent one and two in a five frame I am learning to understand the numerals and what they mean for example the oneness of one and the twoness of two 	<ul style="list-style-type: none"> I can place counters in the five frame to demonstrate my understanding of one and two 	<p>patterns of three and four</p> <ul style="list-style-type: none"> I am learning to represent three, four and five in a five frame I am learning what whole means I am learning to understand the numerals and what they mean for example the threeness of three and fourness of four 	<ul style="list-style-type: none"> I am learning to explain the number of objects in a five frame and the number of spaces I can see I am learning to understand the numerals and what they mean for example the fiveness of five I am learning what part means 	<ul style="list-style-type: none"> I can subitise with my eye from 0 – 5
<p>Stage 4 (4-5)</p>	<ul style="list-style-type: none"> I am learning to recognise dice patterns of six I am learning to understand symbols and what they mean for example the fiveness of five I am learning to know that a number does not change if it is rearranged I am learning to know my number bonds to five I am learning to double numbers 1 to 3 	<ul style="list-style-type: none"> I can subitise with my eyes from 0-6 I can subitise with my eyes irregular dot patterns up to 6 I can double numbers 1 to 3 	<ul style="list-style-type: none"> I am learning to recognise a small amount of irregular arrangements without counting I am learning to recognise number patterns as part and whole (part whole) I am learning to know my number bonds to 10 I am learning to double numbers 1 to 5 I am learning to count in 2s to support doubling up to 10 	<ul style="list-style-type: none"> I am learning to be able to recognise and explain that numbers are made up of other number combinations (inverse operations) I am learning to recognise that numbers can be partitioned into different pairs of numbers I am learning to split even quantities into 2 equal groups I am learning to explore odd and even numbers I am learning to double all my numbers up to 10 	<ul style="list-style-type: none"> I can demonstrate a deep understanding of number to 10, including the composition of each number Subitise (recognise quantities without counting) up to 5; I can explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can



EYFS Granular Steps

<ul style="list-style-type: none"> I am learning to start to count in 2s (doubling 1 to 3) 					<ul style="list-style-type: none"> be distributed equally. I can automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts
<p>Pattern</p> <p>The knowledge that I am learning is:</p> <ul style="list-style-type: none"> To identify different structures in the 'unit of repeat,' to support mathematical relationships To predict, construct and explain patterns 					
	Step 1	Milestone (CP2)	Step 2	Step 3	Milestone (CP6)
Stage 2 (2-3)	<ul style="list-style-type: none"> I am learning to join in with actions and sounds relating to stories and nursery rhymes I am learning to understand what is happening now and what will happen next 	<ul style="list-style-type: none"> I can join in the actions with one favourite rhyme I can understand now and next 	<ul style="list-style-type: none"> I am learning to line up or arrange object of importance to me I am learning to anticipate the key events in my day 	<ul style="list-style-type: none"> I am learning to fully participate and predict all aspects of my routine 	<ul style="list-style-type: none"> I can predict what comes next in my routine



EYFS Granular Steps

Stage 3 (3-4)	<ul style="list-style-type: none"> I am learning to recognise objects that have the same characteristics 	<ul style="list-style-type: none"> I can recognise when objects are identical I can demonstrate or describe why objects have the same characteristics 	<ul style="list-style-type: none"> I am to follow and AB pattern 	<ul style="list-style-type: none"> I am learning to create an AB pattern 	<ul style="list-style-type: none"> I can recognise simple patterns I have made such as an AB pattern
Stage 4 (4-5)	<ul style="list-style-type: none"> I am learning to identify the unit of repeat I am learning to spot an error in an AB pattern I am learning to copy and make my own AB pattern independently 	<ul style="list-style-type: none"> I can identify the unit of repeat I can spot an error in an AB pattern and tell you why 	<ul style="list-style-type: none"> I am learning to copy and create independently an ABB pattern I am learning to spot an error in an ABB pattern 	<ul style="list-style-type: none"> I am learning to copy and create independently an ABBC pattern I am learning to spot and error in and ABBC pattern I am learning to make a pattern with a border or a circle 	<ul style="list-style-type: none"> I can spot patterns in my environment and explain why they are a pattern I can predict whether a pattern can keep going I can construct my own pattern

Shape, Space and Spatial awareness

The knowledge that I am learning is:

- To describe and understand the properties of 2D and 3D shapes
- To understand what happens when shapes combine or move with other shapes
- To understand and recognise patterns using shapes

	Step 1	Milestone (CP2)	Step 2	Step 3	Milestone (CP6)
Stage 2 (2-3)	<ul style="list-style-type: none"> I am learning to successfully fit 3D shapes into the right holes in a shape sorter 	<ul style="list-style-type: none"> I can navigate myself around familiar spaces well I can use positional language up and 	<ul style="list-style-type: none"> I am learning to play with shapes and make arrangements I am learning to use and respond to 	<ul style="list-style-type: none"> I am learning to show an interest in shape by sustained construction play and talk about the arrangement 	<ul style="list-style-type: none"> I can show an interest in shapes in the environment I can build with shapes



EYFS Granular Steps

	<ul style="list-style-type: none"> I am learning to use and respond to positional language up and down 	<p>down to communicate my needs</p>	<p>positional language on top and under</p>	<ul style="list-style-type: none"> I am learning to use and respond to positional language next to 	
<p>Stage 3 (3-4)</p>	<ul style="list-style-type: none"> I am learning to recognise a triangle and circle I am learning to respond to positional language such as in front, behind and beside 	<ul style="list-style-type: none"> I can demonstrate my understanding of positional language I can spontaneously recognise, triangles and circled in my environment 	<ul style="list-style-type: none"> I am learning to recognise different sizes of circles and triangles. I can make patterns using circles and triangles I am learning to create enclosure with loose parts and construction 	<ul style="list-style-type: none"> I am learning to recognise and explain 3D shapes such as a sphere, cube and cuboid. I am learning the directions, forward and backwards, above and below 	<ul style="list-style-type: none"> I can recognise 2D shapes in the environment I can recognise some simple 3D shapes and build with cubes and cuboids I can follow and give directions – forwards, backwards, above and below
<p>Stage 4 (4-5)</p>	<ul style="list-style-type: none"> I am learning to select and use a variety of shapes to combine them for a particular task I can sort and match 2D shapes – circle, square, triangle, rectangle I can make patterns using triangles, circles, squares and rectangles 	<ul style="list-style-type: none"> I can make patterns and represent my ideas using circles and triangles I can match and sort 2D shapes 	<ul style="list-style-type: none"> I am learning to follow a map I am learning to visualise and rotate shapes I am learning to complete a more complex puzzle I am learning to sort and match 3D shapes – cube, cuboid, pyramid, cone 	<ul style="list-style-type: none"> I am learning to combine shapes of different sizes to make other shapes I am learning to sort two different puzzles and put the puzzles back together I am learning to follow directions from an adult I am learning to follow a set of instructions to complete a model using a combination of 3D shapes 	<ul style="list-style-type: none"> I can name 2D and 3D shapes I can combine shapes to make other shapes and patterns I can follow a map and directions from an adult I can find shapes in other shapes

Measure

The knowledge that I am learning is:

- To compare length, height, volume, capacity and weight



EYFS Granular Steps

- To use the language of time (days of the week, times of the day, ordering events)
- To recognise 1p coins up to 10p

	Step 1	Milestone (CP2)	Step 2	Step 3	Milestone (CP6)
Stage 2 (2-3)	<ul style="list-style-type: none"> • I am learning to demonstrate my understanding of the concept big and small 	<ul style="list-style-type: none"> • I can say the word big and demonstrate my understanding 	<ul style="list-style-type: none"> • I am learning to recognise when a container is full • I am learning to demonstrate when something feels heavy 	<ul style="list-style-type: none"> • I am learning to compare heavy and light • I am learning to compare between empty and full • I am learning to describe my construction using vocabulary such as short, long, tall and small 	<ul style="list-style-type: none"> • I can tell you which object is heavy and which is light • I can tell you when a container is empty or full • I can compare between different sizes
Stage 3 (3-4)	<ul style="list-style-type: none"> • I am learning to compare objects using the correct language • I am learning to understand now, next and then 	<ul style="list-style-type: none"> • I can demonstrate my understanding of now, next and then • I can use my mathematical vocabulary to compare size, weight and length 	<ul style="list-style-type: none"> • I am learning to create recognise short and tall in everyday routines • I am learning to talk about length and width • I am learning to know the key times of the day • I am learning to shop with objects through play 	<ul style="list-style-type: none"> • I am learning to construct items that are the same size or weight • I am learning to categories objects in order of size or weight of at least two items • I am learning to understand what watches and clocks are used for and recognise morning and afternoon 	<ul style="list-style-type: none"> • I can order objects by weight or size • I can explain and compare objects • I can talk about what makes an object the same • I can shop using the language of money
Stage 4 (4-5)	<ul style="list-style-type: none"> • I am learning to organise a sequence of three events • I am learning to compare the size or 	<ul style="list-style-type: none"> • I can organise a sequence of three events • I can shop using resources that 	<ul style="list-style-type: none"> • I am learning to compare distance • I am learning to use scales as a measure of heavy and light using cubes 	<ul style="list-style-type: none"> • I am learning to order the sequence of the day using time related vocabulary • I am learning to estimate and predict the comparison 	<ul style="list-style-type: none"> • I can use my prediction skills to estimate which is heavier, lighter, taller, shorter, wider, longer,



EYFS Granular Steps

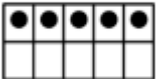
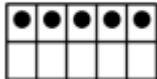
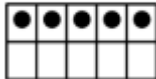
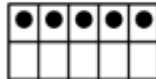
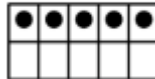
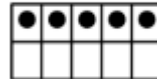
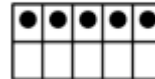
	<p>weight of more than three items</p> <ul style="list-style-type: none"> I can use marks to represent my findings I can shop using tens frames, numicon, up to 3p 	<p>combine and represent up to 3p</p> <ul style="list-style-type: none"> I can find items that weigh and measure the same and communicate my understanding 	<ul style="list-style-type: none"> I am learning to measure one minute I can shop using numicon 'one' shapes/tens frames for amounts up to 5 matching pennies 	<p>between two objects or two amounts</p> <ul style="list-style-type: none"> I am learning to read the visual timetable and understand times of the day (e.g. bedtime, lunchtime) I can shop using numicon 'ones' shapes/tens frames up to 10 matching pennies 	<p>fuller, emptier, more, less</p> <ul style="list-style-type: none"> I can talk about time specific events I can shop with 1p pieces I can order 2 items by weight or capacity or by length or weight
--	--	---	---	--	---



Calculation Policy - Progression of Calculation

Progression of Concrete Manipulatives Used

**These are examples of manipulatives that may be used to support learning.*

EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Real-life objects	Real-life objects	Real-life objects	Real-life objects	Real-life objects	Real-life objects	Real-life objects
0-9 digit cards	0-9 digit cards	0-9 digit cards	0-9 digit cards	0-9 digit cards	0-9 digit cards	0-9 digit cards
Number track to 10	Number tract to 20	Number line to 100	Number line to 100	Number line including negative numbers	Number line including negative numbers	Number line including negative numbers
Numbered counting stick	Counting stick	Counting stick	Counting stick	Counting stick	Counting stick	Counting stick
Bead Strings	Bead Strings	Bead Strings	Bead Strings	Bead Strings	Bead Strings	Bead Strings
Tens frame 	Tens frame 	Tens frame 	Tens frame 	Tens frame 	Tens frame 	Tens frame 
	Place value charts – Tens and ones	Place value charts – Hundreds, tens and ones	Place value charts – Thousands, hundreds, tens and ones	Place value charts – Ten thousands, thousands, hundreds, tens, ones and tenths	Place value charts to a million and three decimal places	Place value charts to 10 million and three decimal places
	100 square	100 square	100 square	100 square	100 square	100 square



Calculation Policy - Progression of Calculation

Interlocking cubes - Use one colour to represent one amount	Interlocking cubes - Use one colour to represent one amount	Dienes	Dienes	Dienes	Dienes	Dienes
	Place value counters	Place value counters	Place value counters	Place value counters	Place value counters	Place value counters
	Place value arrow cards – tens and ones	Place value arrow cards – tens and ones	Place value arrow cards – H, T, O	Place value arrow cards – Th, H, T, O	Place value arrow cards	Place value arrow cards
Part-part-whole mat	Part-part-whole model	Part-part-whole model	Part-part-whole model	Part-part-whole model	Part-part-whole model	Part-part-whole model
Bar model with real life objects	Bar model with real life objects/pictorial objects/representative objects e.g. counters	Bar model with counters /Dienes progressing to numbers	Bar model with numbers	Bar model with numbers	Bar model with numbers	Bar model with numbers
Numicon shapes	Numicon shapes	Numicon shapes	Numicon shapes	Numicon shapes	Numicon shapes	Numicon shapes
Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount
	Coins and notes	Coins and notes	Coins and notes	Coins and notes	Coins and notes	Coins and notes



Calculation Policy - Progression of Calculation

Progression in the Teaching of Counting in EYFS

End of year counting expectations

- count reliably to 20
- count reliably up to 10 everyday objects
- estimate a number of objects then check by counting
- use ordinal numbers in context e.g. first, second, third
- count in twos, fives and tens
- order numbers 1-20
- say 1 more/ 1 less than a given number to 20

Pre-counting The key focus in pre-counting is an understanding of the concepts more, less and the same and an appreciation of how these are related. Children at this stage develop these concepts by comparison and no counting is involved.

Pre-counting ideas

Provide children with opportunities to sort groups of objects explicitly using the language of more and less. Which group of apples has the most? Which group of apples has the least?



Ordering

Count by reciting the number names in order forwards and backwards from any starting point.

Ordering ideas

Provide children with opportunities to count orally on a daily basis. Rote count so that children are able to understand number order and can hear the rhythm and pattern. Use a drum or clap to keep the beat.

One to one correspondence

One number word has to be matched to each and every object. Lack of coordination is a source of potential error – it helps if children move the objects as they count, use large rhythmic movements, or clap as they count


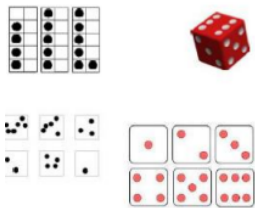


One to one correspondence ideas

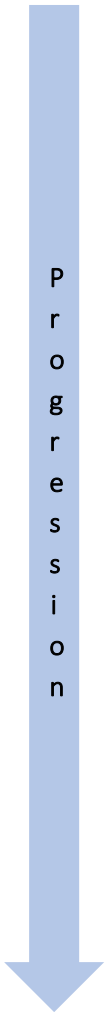
Play counting games together moving along a track, play games involving amounts such as knocking down skittles. Use traditional counting songs throughout the day ensuring children have the visual/kinesthetic resources e.g. 5 little ducks, 10 green bottles





Calculation Policy - Progression of Calculation

<p>Cardinality (Knowing the final number counted is the total number of objects)</p> <p>Count out a number of objects from a larger collection. Know the number they stop counting at will give the total number of objects.</p>	<p>Cardinal counting ideas</p> <p>How many bananas are in my fruit bowl? Allow children to physically handle the fruit. Provide children with objects to point to and move as they count and say the numbers</p> 
<p>Subitising (recognise small numbers without counting them) Children need to recognize small amounts without counting them e.g. dot patterns on dice, dots on tens frames, dominoes and playing cards as well as small groups of randomly arranged shapes stuck on cards.</p>	<p>Subitising ideas</p> <p>Provide children with opportunities to count by recognising amounts</p> 
<p>Abstraction</p> <p>You can count anything – visible objects, hidden objects, imaginary objects, sounds etc. Children find it harder to count things they cannot move (because the objects are fixed), touch (they are at a distance), see that move around. Children also find it difficult to count a mix of different objects, or similar objects of very different sizes.</p>	<p>Abstraction ideas</p> <p>How many pigs are in this picture? Provide children with a variety of objects to count</p> 
<p>Conservation of number</p> <p>Ultimately children need to realise that when objects are rearranged the number of them stays the same.</p>	<p>Conservation of number</p> <p>The amount is 'five' and doesn't change.</p> 





Calculation Policy - Progression of Calculation

Addition - EYFS

EYFS Early Learning Goals:

- Have a deep understanding of number to 10, including the composition of each number
- Subitise (recognise quantities without counting) up to 5
- Verbally count beyond 20, recognising the pattern of the counting system
- Automatically recall (without reference to rhymes, counting or other aids) number bonds to 5 and some number bonds to 10, including double facts
- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity
- (Solve real world mathematical problems with numbers up to 10)
- Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.

Concrete (Build it)

Adding more using real objects– stories using first, then, now.

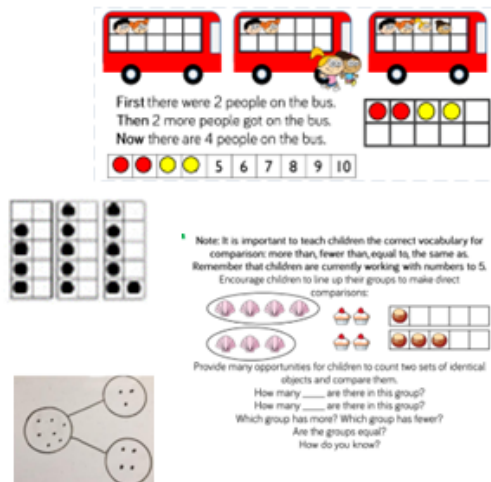


Show me 5 fingers. Now show me 2 more. How many fingers now? How do you know there are 7? Did you count them all, 1,2,3,4,5,6,7?

Is there another way to count them? We know we have 5 on this hand. Can we count on? 6, 7?

Pictorial (Draw it)

Using number tracks to count on



Abstract (See it)

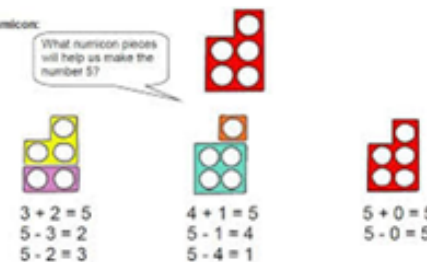
Adding to 5 and 10

Show the children a part-whole model with either one of the parts or the whole missing.



Numicon:

What Numicon pieces will help us make the number 5?





Calculation Policy - Progression of Calculation

<u>Key Vocabulary</u>	<u>Sentence/Question Stems</u>
<p>first-then-now, more, add, addition, makes, total, altogether, equals, balances, how many more to make? number sentence</p>	<p>How many ___ are there in this group?</p> <p>Which group has more?</p> <p>Are the groups equal?</p> <p>How do you know?</p> <p>First there were..., then ... more came, now there are ...</p>

Addition – KS1

Addition – KS1	
<p>NC Learning Objectives - end of Year 1:</p> <ul style="list-style-type: none"> • Read, write and interpret mathematical statements involving addition (+) and equals (=) signs. • Represent and use number bonds within 20 • Add one-digit and two-digit numbers to 20, including zero • Solve one-step problems that involve addition and subtraction, using concrete objects and [pictorial representations • Solve missing number problems 	<p>NC Learning Objectives - end of Year 2:</p> <ul style="list-style-type: none"> • Solve problems with addition using concrete objects and pictorial representation, including those involving numbers, quantities and measures, applying increasing knowledge of mental and written methods • Recall and use addition facts to 20 fluently, and derive and use related facts to 100 • Add numbers using concrete objects, pictorial representations, and mentally, including two-digit number and ones; a two-digit number and tens; two two-digit numbers; adding three one-digit numbers • Show that addition of two numbers can be done in any order (commutative) • number and ones; a two-digit number and tens; two two-digit numbers; adding three one-digit numbers



Calculation Policy - Progression of Calculation

Concrete	Pictorial	Abstract
<p>Adding single digit numbers</p> <p>Making 10</p> <p>Making patterns</p> <p>Bar model with place value counters</p> <p>20 = 1 + 19 2 + 18 3 + 17</p> <p>36 + 25, exchanging 1s</p> <p>41 + 8, no exchange</p>	<p>• Add 1's</p> <p>Create sentences based on the picture.</p> <p>Example There are 4 children playing in a park. One more child joins them so there will be 5 children playing together.</p> <p>Complete the part-whole models by drawing counters and then writing the numerals.</p> <p>Bar models</p> <p>Adding 10s and 1s with no exchange</p> <p>with exchange</p>	<p>Complete the part-whole model and the number sentence.</p> <p>Bar Modelling</p> <p>Complete the part-whole model</p> <p>Partitioning and combining</p> <p>35 + 37 = 72</p>
<p>Key Vocabulary</p> <p>number sentence, calculation, add, addition, total, altogether, plus, more, equals, whole, parts, fact family, increase, commutative, partition, combine, one-digit, two-digit, three-digit, exchange, regroup, base 10, tens, ones, number bonds/pairs, check, symbols, missing number</p>		<p>Sentence/Question Stems</p> <p>What is the part?</p> <p>What is the whole?</p> <p>If ? is the whole, then ? is the part and ? is the part.</p>

Addition – LKS2

NC Learning Objectives - end of Year 3:

- Add numbers mentally including: a three-digit number and ones; a three-digit number and tens; a three-digit number and hundreds
- Add numbers with up to three digits, using formal written methods of columnar

NC Learning Objectives - end of Year 4:

- Add numbers with up to four digits using the formal written methods of columnar addition where appropriate
- Estimate and use inverse operations to check answers to a



Calculation Policy - Progression of Calculation

addition

- Estimate the answer to a calculation and use inverse operations to check answers
- Solve problems, using number facts, place value and more complex addition

calculation

- Solve addition two-step problems in contexts, deciding which operations and methods to use and why

Concrete

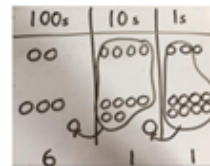
We can use Base 10 to solve $245 + 7$

Place value counters

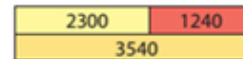
Use counters and a place value grid to calculate $3,242 + 2,213$

Pictorial

Adding two 3 digit numbers with and without exchange



- Adding 4 digit numbers with one exchange



$$\square + \square = \square$$

$$\square + \square = \square$$

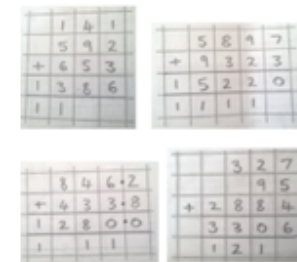
Complete the bar models.



Abstract

Formal written methods, column addition

Carrying the ten and hundred below the equals line



$$\begin{array}{r} 243 \\ +368 \\ \hline 611 \\ 11 \end{array}$$

Work out the missing numbers.

	Th	H	T	O
	4	—	6	—
+	2	5	—	1
	—	7	8	9

Key Vocabulary

add, addition, altogether, total, calculate, exchange, calculation, increase, 100 more, column addition, digit, mental method, formal method, written method, estimate, boundary, adjust, combine, rounding, commutativity, decimal addition

Sentence/Question Stems

Can we make an exchange? Why? How many ones altogether? How many ones do we exchange for one ten?

Which columns are affected if there are more than 10 tens?



Calculation Policy - Progression of Calculation

Addition – UKS2

NC Learning Objectives - end of Year 5:

- Add whole numbers with more than four digits, including using formal written methods of columnar addition
- Add numbers mentally with increasingly large numbers
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- Solve addition multi-step problems in contexts, deciding which operations and methods to use
- Add decimals up to three places

NC Learning Objectives - end of Year 6:

- Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

Concrete

A range of concrete apparatus always available to support fluency, reasoning and problem solving (enabling children to show how). E.g place value counters, dienes, multi-link, multiplication grids etc.

$104,328 + 61,731 = 166,059$

Use the place value grid to answer $0.453 + 0.664$

Ones	Tenths	Hundredths	Thousandths
	4	5	3
	6	6	4

Pictorial

Alli had £10. He bought a DVD for £6.70 and a CD for £2.90. How much money did he have left?

£10		
£6.70	?	£2.90

Write four number facts that this bar diagram shows.

38	95	57
----	----	----

+ =
 + =



Complete the number sentences.

- ▶ $0.2 + 0.06 + 0.009 = \underline{\quad}$
- ▶ $0.4 + \underline{\quad} + 0.001 = 0.451$
- ▶ $\underline{\quad} = 0.006 + 0.1 + 0.03$
- ▶ $0.6 + 0.003 = \underline{\quad}$

Abstract

Using place value knowledge to line digits up accurately

Always carrying below the

Calculate.

equals line

?	4	?	3	?
+	2	?	5	?

7	8	5	2	9

3	4	6	2	1
+	2	5	7	3

$67,832 + 5,258$

1	9	7	1	6
+	1	3	9	9

1	1	3	7	0

1	6	4	0	6
+	2	8	6	2

1	1	9	1	3

	4	2	6	0
+		3	0	2

	4	5	6	2



Calculation Policy - Progression of Calculation

<p>Key Vocabulary</p> <p>calculate, calculation, total, sum, commutative, commutativity, exchange, inverse, mental method, column method, written, method, formal method, integers, known facts, rounding, exact answer, approximate answer, order, operation, brackets</p>	<p>Sentence/Question Stems</p> <p>What happens when there is more than 9 in a place value column? Can we use the inverse to find missing digits? Is column always the best method? When should we use mental methods?</p>
--	--

Subtraction - EYFS

EYFS Early Learning Goals

- Have a deep understanding of number to 10, including the composition of each number
- Subitise (recognise quantities without counting) up to 5
- Verbally count beyond 20, recognising the pattern of the counting system
- Automatically recall (without reference to rhymes, counting or other aids) number bonds to 5 (including subtraction facts) and some number bonds to 10, including double facts
- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity

Concrete (Build it)

Pictorial (Draw it)

Abstract (See it)



Calculation Policy - Progression of Calculation

<p>Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used).</p> <p>$4 - 3 = 1$</p>	<p>Using number tracks (and drawings) to take away</p> <p>Use first, then now to tell simple maths stories to practise taking away in familiar contexts.</p> <p>First there were 5 people on the bus. Then 2 people got off the bus. Now there are 3 people on the bus.</p>	<p>Subtraction using part part whole</p> <p>Show the children a part-whole model with either one of the parts or the whole missing.</p>
<p>Key Vocabulary</p> <p>First-then-now, take away, how many are left? How many have gone? Less, fewer, difference between, equals, balances, number sentence, subtract, subtraction, double, whole, parts</p>	<p>Sentence/Question Stems</p> <p>First there were..... Then Left. Now there are.....</p>	

Subtraction – KS1

NC Learning Objectives - end of Year 1:

- Read, write and interpret mathematical statements involving subtraction (-) and equals (=) signs
- Represent and use number bonds and related subtraction facts within 20

NC Learning Objectives - end of Year 2:

- Read, write and interpret mathematical statements involving subtraction (-) and equals (=) signs
- Represent and use number bonds and related subtraction facts within 20



Calculation Policy - Progression of Calculation

- Subtract one-digit and two-digit numbers to 20, including 0
- Solve one step problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems

- Subtract one-digit and two-digit numbers to 20, including 0
- Solve one step problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems

Concrete	Pictorial	Abstract
<p>Use concrete objects to check and prove whether the calculations are correct.</p> <p>$8 - 1 =$</p> <p>Calculate the difference between 8 and 5.</p> <p>Column method using base 10.</p> <p>Take 16 away from 34</p>	<p>Use counters to show how many are left – subtract 1s</p> <p>How many ice creams do not have flakes?</p> <p>$6 - 2 =$</p> <p>Complete the number sentence.</p> <p>Find the difference bar models</p> <p>Drawing representations of base 10</p> <p>e.g. $63 - 32 = 31$</p> <p>Subtracting 2-digit numbers by partitioning</p> <p>Use the number line to subtract 12 from 51</p>	<p>At first there were 10 bananas. 7 of them were eaten. How many bananas are left?</p> <p>Use counters/cubes to help you solve and complete:</p> <p>$\square - \square = \square$</p> <p>$17 - 4 = \square$ $17 - 3 = \square$ $3 = \square - 4$ $\square = 17 - 3$</p> <p>Find the difference between 8 and 5.</p> <p>8 - 5, the difference is \square</p> <p>Children to explore why $9 - 6 = 8 - 5 = 7 - 4$ have the same difference.</p> <p>$14 - 5 = 9$</p> <p>$14 - 4 = 10$ $10 - 1 = 9$</p> <p>$72 - 35 = 37$</p>
<p>Key Vocabulary How many more? How many left? Leave, less, fewer, minus, subtract, subtraction, difference, count up, count back, equals, partition, exchange, check, inverse</p>	<p>Sentence/Question Stems At first there were....., thenwent away. Now there are left.</p>	



Calculation Policy - Progression of Calculation

Subtraction – LKS2

NC Learning Objectives - end of Year 3:

- Subtract numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three digit number and hundreds
- Subtract numbers with up to three digits, using formal written methods of columnar subtraction
- Estimate the answer to a calculation and use Inverse operations to check answers
- Solve problems, including missing number problems, using number facts, place value and more

NC Learning Objectives - end of Year 4:

- Subtract numbers with up to four digits using the formal written methods of columnar subtraction where appropriate
- Estimate and use inverse operations to check answers to a calculation
- Solve subtraction two-step problems in contexts, deciding which operations and methods to use

Concrete

Pictorial

Abstract



Calculation Policy - Progression of Calculation

Subtract with no exchange

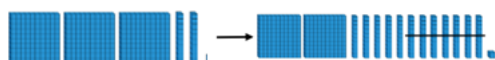
Th	H	T	O
●●●	●●●	●●●	●●●
●●●	●●●	●●●	●●●

Subtract using an exchange

$$321 - 4$$



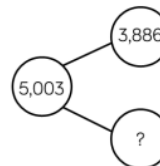
$$321 - 70 = 251$$



4357-2735

Thousands	Hundreds	Tens	Ones
●●●	●●●	●●●	●●●
●●●	●●●	●●●	●●●

3,465	
2,980	?



Represent the base 10 pictorially, remembering to show the exchange.

10s	1s
1111	●●●●
1	5

Represent the place value counters pictorially; remembering to show what has been exchanged.

100s	10s	1s
●●	●●●●	●●●●●●
1	4	6

48
- 7
41

6843	5748
- 4721	- 397
2222	5351

8923	4325
- 756	- 2876
8167	1449

Formal column method. Children must understand that when they have exchanged the 10 they still have 41 because $41 = 30 + 11$.

3 41
- 26
15

Formal column method. Children must understand what has happened when they have crossed out digits.

² 34
- 88
6

Key Vocabulary

Subtract, subtraction, exchange, column subtraction, find the missing digit, inverse, decrease, number sentence, calculation, calculate, estimate, mental method, formal method, fact family, adjust, empty box, decimal subtraction

Sentence/Question Stems

- Do you need to make both numbers when you are subtracting? Why?
- Why is it important to subtract the smallest place value column first?
- Does it matter which number goes on top?
- Does it matter if the numbers don't have the same number of digits?



Calculation Policy - Progression of Calculation

Subtraction – UKS2

NC Learning Objectives - end of Year 5:

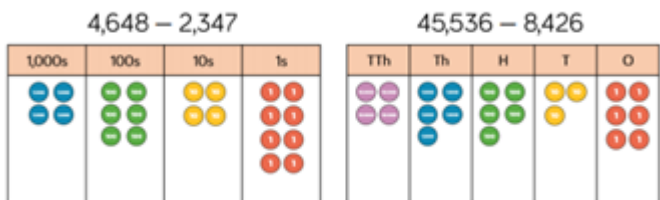
- Subtract whole numbers with more than four digits, including using formal written methods (columnar subtraction)
- Subtract numbers mentally with increasingly large numbers
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- Solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why

NC Learning Objectives - end of Year 6:

- Solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why

Concrete

A range of concrete apparatus always available to support fluency, reasoning and problem solving (enabling children to show how). E.g place value counters, dienes, multi-link etc.



Pictorial

Subtraction with and without exchange using pictorial representations of place value counters



Subtraction using part part whole and bar models

Abstract

Subtraction with multiple exchanges



$$834,501 - 299,999$$



Calculation Policy - Progression of Calculation

--	--	--

Key Vocabulary

Exchange, inverse, missing digits, most effective calculation strategy, column method, mental method, integer, order, operation, brackets, approximate

Sentence/Question Stems

- Why is it important to subtract the smallest place value column first?
- Does it matter which number goes on top?
- Does it matter if the numbers don't have the same number of digits?
- What happens if there is more than 9 in a place value column?
- Is column method always the best method? When should we use mental methods?



Calculation Policy - Progression of Calculation

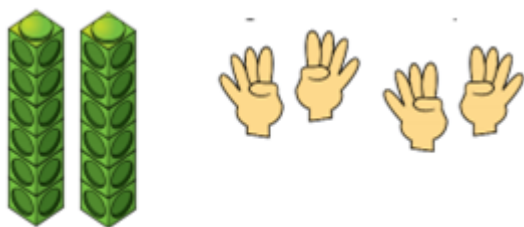
Multiplication – EYFS

EYFS Early Learning Goals

- Have a deep understanding of number to 10, including the composition of each number
- Subitise (recognise quantities without counting) up to 5
- Explore and represent patterns within numbers to 10, including evens and odds and double facts
- Automatically recall (without reference to rhymes, counting or other aids) double facts
- (Solve problems including doubling)

Concrete

Building doubles using real objects and practical equipment

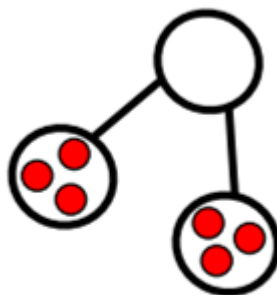


Odd and even – grouping in pairs



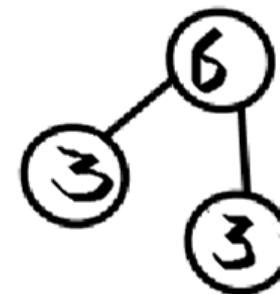
Pictorial

Doubling



Abstract

Using digits to represent doubling in the part part whole model



Key Vocabulary Double, doubling, sets of, groups of, lots of, equal, pairs, odd, even, number patterns, objects, count in 2s/5s/10s

Sentence/Question Stems Double ___ is ___



Calculation Policy - Progression of Calculation

Multiplication – KS1

NC Learning Objectives - end of Year 1:

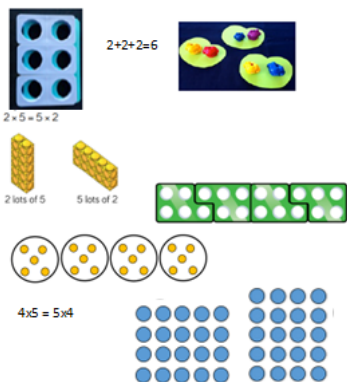
Solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

NC Learning Objectives - end of Year 2:

- Recall and use multiplication facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- Calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (\times) and equals (=) signs
- Show that multiplication of two numbers can be done in any order (commutative)
- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts

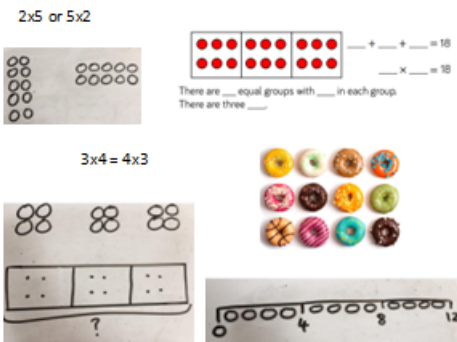
Concrete

Multiplication through arrays/repeated addition



Pictorial

Multiplication through arrays/repeated addition



Bar model to show repeated addition



Abstract

Writing calculations using \times and $=$ symbols

$$5 + 5 + 5 + 5 = 20$$

$$4 \times 5 = 20$$

$$5 \times 4 = 20$$

Addition	Multiplication	Story
$10 + 10 + 10$		
	6×5	

Use $<$, $>$ or $=$ to make the statements correct.

$$2 \times 5 \bigcirc 5 \times 2$$

$$3 \times 2 \bigcirc 4 \times 5$$

$$10 \times 5 \bigcirc 5 \times 5$$



Calculation Policy - Progression of Calculation

<p>Key Vocabulary</p> <p>Multiplication, multiply, multiplied by, lots of, groups of, repeated addition, multiplication, represent, column, row, equal, twice, array, multiple, count up, times table, row, column, fact family, odd, even, multiplication fact, multiplication table, repeated addition, commutative</p>	<p>Sentence/Question Stems</p> <p>There are _____ equal groups with _____ in each group.</p>
--	---

Multiplication – LKS1

<p>NC Learning Objectives - end of Year 3:</p> <ul style="list-style-type: none"> Recall and use multiplication facts for the 3, 4 and 8 multiplication tables Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods Solve problems, including missing number problems, involving multiplication, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects. 	<p>NC Learning Objectives - end of Year 4:</p> <ul style="list-style-type: none"> Recall multiplication facts for multiplication tables up to 12×12 Use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1; multiplying together three numbers Recognise and use factor pairs and commutativity in mental calculations Multiply two-digit and three-digit numbers by a one-digit number using formal written layout Solve problems involving multiplying, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.
---	--

Concrete	Pictorial	Abstract
<p>Matching multiplication to concrete representation</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>4×4</p> <p>4×6</p> <p>8×4</p> </div> </div>	<p>Using the bar model</p>	<p>Using repeated addition to multiply</p> <p>___ + ___ + ___ + ___ + ___ = ___</p> <p>___ \times ___ = ___</p>

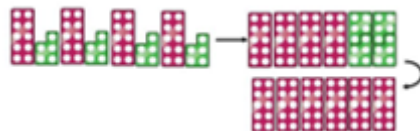


Calculation Policy - Progression of Calculation

Using resources e.g. place value counters to

multiply

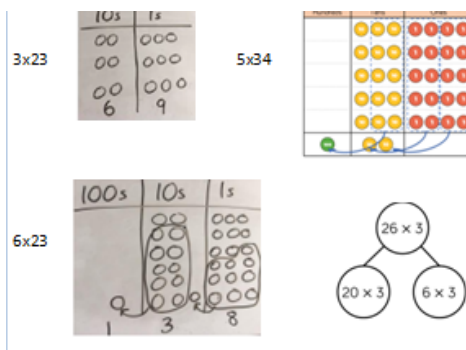
e.g. 4×15



3×23



Representations of place value counters for multiplication without and with exchange (linked to formal written method)



$$3 \times 8 = \square$$

$$6 \times \square = 24$$

$$\square \times 8 = 48$$

$$\begin{aligned} 26 \times 4 &= (20 + 6) \times 4 \\ &= (20 \times 4) + (6 \times 4) \\ &= 80 + 24 \\ &= 104 \end{aligned}$$

$$4 \times 15$$

Formal written methods

$$\begin{array}{r} 23 \\ \times 3 \\ \hline 69 \end{array}$$

$$\begin{array}{r} 6 \times 23 = \\ 23 \\ \times 6 \\ \hline 138 \\ 11 \end{array}$$

24×6 becomes

$$\begin{array}{r} 24 \\ \times 6 \\ \hline 144 \\ 2 \end{array}$$

Answer: 144

Key Vocabulary

Multiply, multiplied by, times tables facts, fact family, equal groups, lots of, groups, partitioning, multiply, multiples, factor, factor pairs, product, grid, compact method, short multiplication, distributive law (e.g. 64×5 can be solved as $(60 \times 5) + (4 \times 5)$), commutativity.

Sentence/Question Stems

How does addition link to multiplication?

How does partitioning help you multiply a 2 digit number by a 1 digit number?

How does the written method match the concrete representation?



Calculation Policy - Progression of Calculation

Multiplication – UKS1

NC Learning Objectives - end of Year 5:

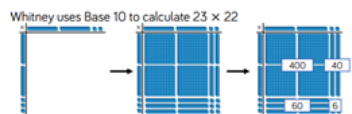
- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.
- Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers; Establish whether a number up to 100 is prime and recall prime numbers up to 19
- Multiply numbers mentally drawing upon known facts;
- Multiply whole numbers and those involving decimals by 10, 100 and 1000
- Recognise and use square numbers and cube numbers, and notation for squared and cubed
- Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- Solve problems involving multiplication including using their knowledge of factors and multiples, squares and cubes; involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign; involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

NC Learning Objectives - end of Year 6:

- Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- Perform mental calculations, including with mixed operations and large numbers; Identify common factors, common multiples and prime numbers Use their knowledge of the order of operations to carry out calculations involving the four operations
- Solve problems involving addition, subtraction, multiplication and division.
- Use estimation to check answers to calculations and determine, in the context of the problem, an appropriate degree of accuracy

Concrete

Using base 10 or place value counters to multiply 2 digit by 2 digit numbers



Rosie adapts the Base 10 method to calculate 44×32

x	40	4
30	1,200	120
2	80	8

Pictorial

Multiply on place value grid using counters (when multiplying by 10, 100)

HTh	TTh	Th	H	T	O
			●	●●	●●●

Abstract

Formal multiplication methods

		2	3	
x		1	4	
		9	2	
	2	3	0	

(23×4)
(23×10)

		3	2	5	0
x				2	6
	1	9	5	0	0
	6	5	0	0	0
	8	4	5	0	0

($3,250 \times 6$)
($3,250 \times 20$)

		3	4	2
x				3
	.	1	0	2
				6
				1



Calculation Policy - Progression of Calculation

<div style="border: 1px solid black; width: 60px; height: 30px; margin: 20px auto; text-align: center; line-height: 30px;">3.42 x 3</div>	<p>Multiplication with place value counters linked to formal method</p> <p>Annie earns £1,325 per week. How much would he earn in 4 weeks?</p> <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>Thousands</th> <th>Hundreds</th> <th>Tens</th> <th>Ones</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>3</td> <td>2</td> <td>5</td> </tr> <tr> <td>x</td> <td></td> <td></td> <td>4</td> </tr> <tr> <td colspan="4" style="border-top: 1px solid black;"></td> </tr> </tbody> </table> $ \begin{array}{r} 378 \times 4 \\ \times \quad 300 \quad 70 \quad 8 \\ \hline 4 \quad \boxed{1200} \quad \boxed{280} \quad \boxed{32} = 1512 \end{array} $	Thousands	Hundreds	Tens	Ones	1	3	2	5	x			4					
Thousands	Hundreds	Tens	Ones															
1	3	2	5															
x			4															
<p>Key Vocabulary</p> <p>Multiplying, partition, exchange, zero, prime number, multiple, common factor, common multiple, square number, prime number, composite number, cube number, squared, cubed, long multiplication, expanded method.</p>		<p>Sentence/Question Stems</p> <p>What is important to remember as we begin to multiply the tens number? Can the inverse operation be used? How could you draw the problem? What can we exchange if the product is 42 ones?</p>																



Calculation Policy - Progression of Calculation

Division – EYFS

EYFS Early Learning Goals:

- Have a deep understanding of number to 10, including the composition of each number
- Subitise (recognise quantities without counting) up to 5
- Explore and represent patterns within numbers to 10, including evens and odds, double facts and how quantities can be shared equally
- Automatically recall (without reference to rhymes, counting or other aids) double facts
- Solve problems including halving and sharing

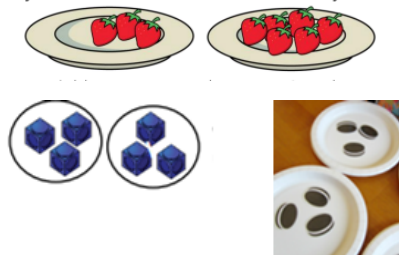
Concrete

Pictorial

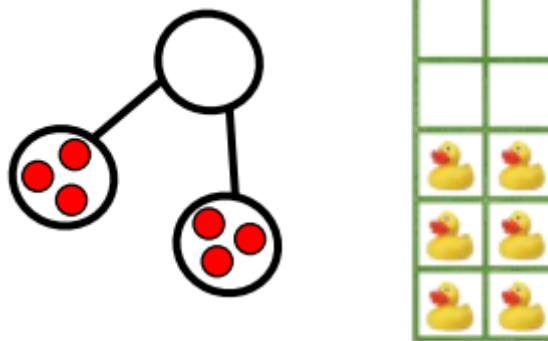
Abstract

Halving with real objects

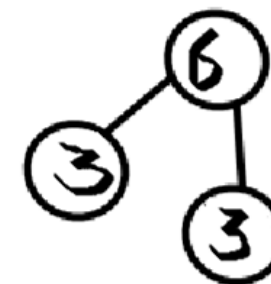
Show the children a bowl of strawberries. Explain that you are going to share them into 2 equal groups so there will be half for you and half for your friend. Put a handful straight onto each plate without counting – make sure that one plate has much more strawberries than the other. Ask the children if that is fair. Prompt them to show you how to share the strawberries fairly.



Halving



Using digits to represent the part part whole model



Key Vocabulary

Half, halving, half of, share between, sharing, equal, equal groups, sets, count in 2s/5s/10s

Sentence/Question Stems

I have ____ . If I share them equally between 2 there are ____ each.

Half of ____ is ____.

The groups are equal because...



Calculation Policy - Progression of Calculation

Division – KS1

NC Learning Objectives - end of Year 1:

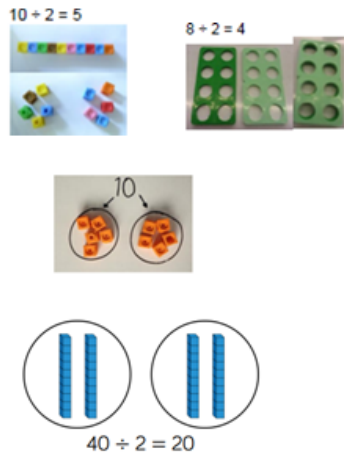
Solve one-step problems involving division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

NC Learning Objectives - end of Year 2:

- Recall and use division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- Calculate mathematical statements for division within the multiplication tables and write them using the division (\div) and equals ($=$) signs
- Show that division of one number by another cannot be done in any order
- Solve problems involving division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts

Concrete

Sharing using real objects

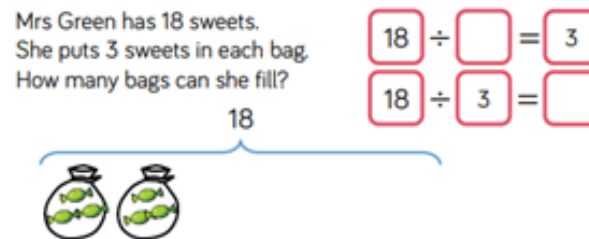


Pictorial

Bar models to divide




Solving problems using the inverse and pictorial representations



Abstract

Solve problems using the inverse/ write using \div and $=$ signs

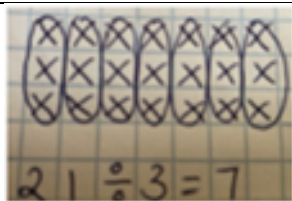
Complete the stem sentences.


 I have ___ cubes altogether.
 There are ___ in each group.
 There are ___ groups.

$\square \div \square = \square$
 $\square \times \square = \square$



Calculation Policy - Progression of Calculation



Key Vocabulary

Equal groups, sharing objects, divide, division, dividing, grouping, share into, unequal, equal, inverse, divided by, divided into, left, left over, repeated subtraction, array, row, column, fact family

Sentence/Question Stems

_____ has been shared equally into _____ equal groups. I have _____ in each group.
 _____ groups of _____ make _____.

Division – LKS2

NC Learning Objectives - end of Year 3:

- Recall division facts for the 3, 4 and 8 multiplication tables
- Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- Solve problems, including missing number problems, involving division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

NC Learning Objectives - end of Year 4:

- Recall division facts for multiplication tables up to 12×12
- Use place value, known and derived facts to divide mentally, including dividing by 1
- Recognise and use factor pairs and commutativity in mental calculations
- Solve problems involving division, including positive integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

Concrete

Pictorial

Abstract






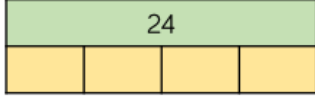
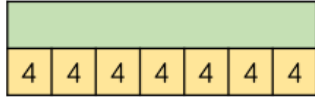
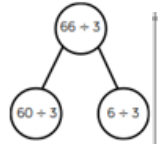
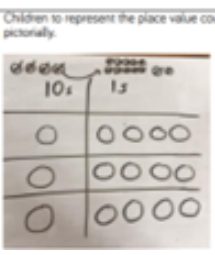



Using objects to represent numbers

Using bar models

Writing number sentences to describe fact families



Calculation Policy - Progression of Calculation

<p>Circle the buttons in groups of 4.</p>  <p>Can you also split the buttons into 4 equal groups? How is this the same? How is it different?</p> <p>There are 12 pieces of fruit. They are shared equally between 3 bowls. How many pieces of fruit are in each bowl? Use cubes/counters to represent fruit and share between 3 circles.</p>  <p>Using base 10/place value counters</p> <p>Use place value counters to show the steps to divide 30 by 10</p>  <p>Can you use the same steps to divide a 3-digit number like 210 by 10?</p>  <p>Use Base 10 to divide 140 by 10 Explain what you have done.</p> 	<p>Complete the bar models and the calculations.</p>  $24 \div 4 = \underline{\quad}$  $\underline{\quad} \div 4 = \underline{\quad}$ <p>Using place value grid and part part whole model</p> <p>Eva uses a place value grid and part-whole model to solve $66 \div 3$</p> <table border="1" data-bbox="795 694 1041 821"> <thead> <tr> <th colspan="2">Tens</th> <th colspan="2">Ones</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>10</td> <td>1</td> <td>1</td> </tr> <tr> <td>10</td> <td>10</td> <td>1</td> <td>1</td> </tr> <tr> <td>10</td> <td>10</td> <td>1</td> <td>1</td> </tr> </tbody> </table>  	Tens		Ones		10	10	1	1	10	10	1	1	10	10	1	1	<p>Complete the fact family.</p>  $\underline{\quad} \times \underline{\quad} = \underline{\quad}$ $\underline{\quad} \times \underline{\quad} = \underline{\quad}$ $\underline{\quad} \div \underline{\quad} = \underline{\quad}$ $\underline{\quad} \div \underline{\quad} = \underline{\quad}$ <p>Complete the sentences.</p> <p>There are $\underline{\quad}$ lots of $\underline{\quad}$.</p> $\underline{\quad} \times \underline{\quad} = \underline{\quad}$ $\underline{\quad} \div \underline{\quad} = \underline{\quad}$  <p>There are $\underline{\quad}$ lots of $\underline{\quad}$.</p> $\underline{\quad} \times \underline{\quad} = \underline{\quad}$ $\underline{\quad} \div \underline{\quad} = \underline{\quad}$  <p>What's the same about each question? What's different?</p> <hr/> <p>Children to be able to make sense of the place value counters and write calculations to show the process.</p> $42 \div 3$ $42 = 30 + 12$ $30 \div 3 = 10$ $12 \div 3 = 4$ $10 + 4 = 14$
Tens		Ones																
10	10	1	1															
10	10	1	1															
10	10	1	1															
<p>Key Vocabulary</p> <p>Quotient (quantity produced by the division of 2 numbers), inverse, sharing, grouping, partition, remainder, repeated subtraction, inverse operation, factors</p>	<p>Sentence/Question Stems</p> <p>Can you use concrete or pictorial representations to help you?</p> <p>Can you write a number sentence to show this?</p> <p>What is the difference between sharing and grouping?</p> <p>There are $\underline{\quad}$ lots of $\underline{\quad}$ in $\underline{\quad}$.</p>																	



Calculation Policy - Progression of Calculation

Division – UKS2

NC Learning Objectives - end of Year 5:

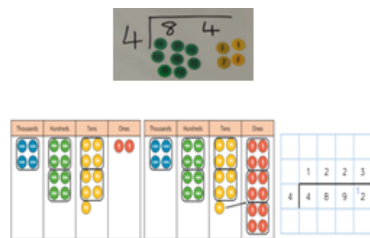
- Divide numbers mentally drawing upon known facts
- Divide whole numbers and those involving decimals by 10, 100 and 1000
- Divide numbers up to 4 digits by a 1-digit number using the formal written method of short division and interpret remainders appropriately for the context
- Solve problems involving division including using their knowledge of factors and multiples, square and cubes; involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign; involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

NC Learning Objectives - end of Year 6:

- Divide numbers up to 4 digits by a 2-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- Divide numbers up to 4 digits by a 2-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- Perform mental calculations, including with mixed operations and large numbers; Identify common factors, common multiples and prime numbers
- Use their knowledge of the order of operations to carry out calculations involving the four operations
- Solve problems involving addition, subtraction, multiplication and division.
- Use estimation to check answers to calculations and determine, in the context of the problem, an appropriate degree of accuracy

Concrete

Use place value counters



Pictorial

Using a place value grid

HTh	TTh	Th	H	T	O
	●	● ●	● ● ●		

What number is represented in the place value grid?
 Divide the number by 100
 Which direction do the counters move?
 How many columns do they move? How do you know how many columns to move?
 What number do we have now?

Abstract

Using short division

Calculate using short division.

$5725 \div 3 = 1908$	$31938 \div 14 = 2281$
----------------------	------------------------

$954 \div 6 = 159$

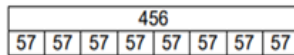
$6138 \div 9 = 682$



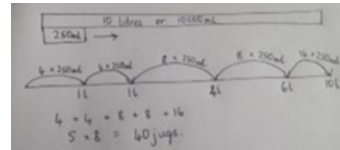
Calculation Policy - Progression of Calculation



Using a bar model



$$57 \times 8 = 456$$



1	3	3
4	5	3
		2

Using long division
(including remainders)

		0	3	6
1	2	4	3	2
-		3	6	
			7	2
-			7	2
				0

		2	4	r	1	2
1	5	3	7	2		
-		3	0	0		
			7	2		
-			6	0		
				1	2	

- 1 x 15 = 15
- 2 x 15 = 30
- 3 x 15 = 45
- 4 x 15 = 60
- 5 x 15 = 75
- 10 x 15 = 150

Key Vocabulary

Dividend (starting number), divisor (number you are dividing by), short division, multiples, inverse, compact short, divisibility, brackets, balance, order of operations

Sentence/Question Stems

Can you list multiples of (the divisor)?

In the hundreds, how many groups of are in ...?

Is the remainder smaller than the divisor?

Why is the context of the question important when deciding how to round the remainders after a division?



White Rose Overviews

Year 1:

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn term	Number Place value (within 10) VIEW					Number Addition and subtraction (within 10) VIEW					Geometry Shape VIEW	Consolidation
Spring term	Number Place value (within 20) VIEW		Number Addition and subtraction (within 20) VIEW			Number Place value (within 50) VIEW		Measurement Length and height VIEW		Measurement Mass and volume VIEW		
Summer term	Number Multiplication and division VIEW			Number Fractions VIEW		Geometry Position and direction VIEW	Number Place value (within 100) VIEW		Measurement Money VIEW	Measurement Time VIEW		Consolidation



White Rose Overviews

Year 2:

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn term	Number Place value VIEW				Number Addition and subtraction VIEW				Geometry Shape VIEW			
Spring term	Measurement Money VIEW	Number Multiplication and division VIEW				Measurement Length and height VIEW	Measurement Mass, capacity and temperature VIEW					
Summer term	Number Fractions VIEW			Measurement Time VIEW		Statistics VIEW		Geometry Position and direction VIEW		Consolidation		



White Rose Overviews

Year 3:

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn term	Number Place value VIEW		Number Addition and subtraction VIEW				Number Multiplication and division A VIEW					
Spring term	Number Multiplication and division B VIEW		Measurement Length and perimeter VIEW		Number Fractions A VIEW		Measurement Mass and capacity VIEW					
Summer term	Number Fractions B VIEW	Measurement Money VIEW	Measurement Time VIEW		Geometry Shape VIEW		Statistics VIEW		Consolidation			



White Rose Overviews

Year 4:

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn term	Number Place value VIEW			Number Addition and subtraction VIEW			Measurement Area VIEW	Number Multiplication and division A VIEW			Consolidation	
Spring term	Number Multiplication and division B VIEW		Measurement Length and perimeter VIEW		Number Fractions VIEW			Number Decimals A VIEW				
Summer term	Number Decimals B	Measurement Money	Measurement Time		Consolidation	Geometry Shape		Statistics	Geometry Position and direction			



White Rose Overviews

Year 5:

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn term	Number Place value VIEW		Number Addition and subtraction VIEW		Number Multiplication and division A VIEW			Number Fractions A VIEW				
Spring term	Number Multiplication and division B VIEW		Number Fractions B VIEW		Number Decimals and percentages VIEW			Measurement Perimeter and area VIEW		Statistics VIEW		
Summer term	Geometry Shape		Geometry Position and direction		Number Decimals			Number Negative numbers	Measurement Converting units		Measurement Volume	



White Rose Overviews

Year 6:

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn term	Number Place value VIEW	Number Addition, subtraction, multiplication and division VIEW				Number Fractions A VIEW		Number Fractions B VIEW		Measurement Converting units VIEW		
Spring term	Number Ratio VIEW	Number Algebra VIEW	Number Decimals VIEW	Number Fractions decimals and percentages VIEW	Measurement Area, perimeter and volume VIEW		Statistics VIEW					
Summer term	Geometry Shape	Geometry Position and direction		Themed projects, consolidation and problem solving								



White Rose/National Curriculum – Progression of Skills

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Place Value							
Place Value: Counting *	<p>Count objects, actions and sounds, up to 10 Subitise up to 10 using patterns- for example dots on dice, on tens frames, fingers</p> <p>Count beyond 10</p> <p><i>ELG: Have a deep understanding of number to 10, including the composition of each number ELG: Subitise (recognise quantities without counting) up to 5 ELG: Verbally count beyond 20, recognising the pattern of the counting system; *See Number Sense Progression EYFS</i></p>	<p>Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number.</p> <p>Count numbers to 100 in numerals: count in multiples of 2 5 and 10s</p> <p><i>*See Number Sense Progression</i></p>	<p>Count in steps of 2,3 an 5 from 0, and in 10s from and number, forward and backward.</p> <p><i>*See Number Sense Progression</i></p>	<p>Count from 0 in multiples of 4, 8, 50 and 100.</p> <p>Find 10 or 100 more or less than a given number</p>	<p>Count in multiples of 6, 7, 9, 25 and 1000.</p> <p>Count backwards through zero to include negative numbers</p>	<p>Count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000</p> <p>Count forwards and backwards with positive and negative whole numbers, including through zero</p>	



White Rose/National Curriculum – Progression of Skills

Place Value: Represent	<p>Link the number symbol (numeral) with its cardinal number value</p> <p><i>ELG: Explore and represent patterns within numbers up to 10, including evens and odds</i></p>	<p>Identify and represent numbers using objects and pictorial representations.</p> <p>Read and write numbers to 100 in numerals Read any write numbers from 1 to 20 in words and numerals</p>	<p>Read and write numbers to at least 100 in numerals and in words.</p> <p>Identify, represent and estimate numbers using different representations, including the number lin</p>	<p>identify, represent and estimate numbers using different representations</p> <p>Read and write numbers up to 1000 in numerals and words</p>	<p>identify, represent and estimate numbers using different representations</p> <p>Read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value</p>	<p>Read, write (order and compare) numbers to at least 1,000,000 and determine the value of each digit.</p> <p>Read Roman numerals to 1000 (M) and recognise years written in Roman numerals.</p>	<p>Read, write (order and compare) numbers to at least 10,000,000 and determine the value of each digit.</p>
-------------------------------	--	---	---	--	---	---	--



White Rose/National Curriculum – Progression of Skills

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Place Value: Use PV and compare</p>	<p>Compare numbers - Use vocabulary such as 'more than', 'less than', 'fewer', 'the same as', 'equal to' understand the 'one more than or one less than' relationship between consecutive numbers</p> <p><i>ELG: Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity</i></p>	<p>Given a number, identify 1 more and 1 less.</p>	<p>Recognise the place value of each digit in a two digit number (tens and ones)</p> <p>Compare and order numbers from 0 up to 100; use <> and = signs</p>	<p>Recognise the place value of each digit in a three digit number (hundreds, tens and ones)</p> <p>Compare and order numbers up to 1000</p>	<p>Find 1000 more or less than a given number</p> <p>Recognise the place value of each digit in a four digit number (thousands, hundreds, tens and ones)</p> <p>Compare and order numbers beyond 1000</p>	<p>(Read, write), order and compare numbers to at least 1,000,000 and determine the value of each digit.</p>	<p>(Read, write), order and compare numbers to at least 10,000,000 and determine the value of each digit.</p>
---	--	--	--	--	---	--	---



White Rose/National Curriculum – Progression of Skills

Place Value: Problems and Rounding			Use place value and number facts to solve problems	Solve number problems and practical problems involving these ideas	<p>Round any number to the nearest 10, 100 or 1000.</p> <p>Solve number and practical problems that involve all of the above with increasingly large positive numbers</p>	<p>Interpret negative numbers in context.</p> <p>Round any number up to 1,000,000 to the nearest 10, 100, 1000, 10,000 and 100,000.</p> <p>Solve number problems and practical problems that involve all of the above</p>	<p>Round any whole number to a requires degree of accuracy.</p> <p>Use negative numbers in context, and calculate intervals across zero.</p> <p>Solve number problems that involve all of the above.</p>
	Addition and Subtraction						



White Rose/National Curriculum – Progression of Skills

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Addition and Subtraction: Recall, Represent, Use</p>	<p>Explore the composition of numbers to 10 automatically recall number bonds for numbers 0 to 5 and some to 10</p> <p><i>ELG: Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.</i></p>	<p>Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs.</p> <p>Represent and use number bonds and related subtraction facts within 20</p>	<p>Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100.</p> <p>Show that addition of two numbers can be done in any order (Commutative) and subtraction of one number from another cannot.</p> <p>Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems</p>	<p>Estimate the answer to a calculation and use inverse operations to check answers</p>	<p>Estimate and use inverse operations to check answers to a calculation</p>	<p>Use rounding to check answers to calculations and determine in the context of a problem levels of accuracy</p>	



White Rose/National Curriculum – Progression of Skills

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Addition and Subtraction: Calculations</p>		<p>Add and subtract one digit and two digit numbers to 20, including zero</p>	<p>Add and subtract numbers using concrete objects pictorial representations and mentally including: a two digit number and ones a two digit number and 10s two 2 digit numbers adding three one digit numbers</p>	<p>Add and subtract numbers mentally including: a 3 digit number and ones a 3 digit number and 10s a three digit number and hundreds</p> <p>Add and subtract numbers with up to three digits using formal written methods of columnar addition and subtraction</p>	<p>Add and subtract numbers with up to four digits using formal written methods of columnar addition and subtraction where appropriate.</p>	<p>Add and subtract whole numbers with more than 4 digits including using formal written methods (columnar addition and subtraction)</p> <p>Add and subtract numbers mentally with increasingly large numbers</p>	<p>Perform mental calculations, including with mixed operations and large numbers</p> <p>Use their knowledge of the order of operations to carry out calculations involving the four operations</p>



White Rose/National Curriculum – Progression of Skills

Addition and Subtraction: Solving Problems	Solve real world mathematical problems with numbers up to 10	Solve one step problems that involve addition and subtraction, using concrete objects and pictorial representations and missing number problems such as $7 = _ - 9$	Solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers quantities and measures applying their increasing knowledge of mental and written methods	Solve problems, including missing number problems, using number facts, place value and more complex addition and subtraction	Solve addition and subtraction two step problems in contexts, deciding which operations and methods to use and why.	Solve addition and subtraction multi step problems in contexts, deciding which operations and methods to use and why solve problems involving addition, subtraction, multiplication and division and a combination of these including understanding the meaning of the equals sign	Solve addition and subtraction multi step problems in contexts, deciding which operations and methods to use and why
	Multiplication and Division						



White Rose/National Curriculum – Progression of Skills

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Multiplication and Division: Recall, Represent, Use</p>	<p>Solve problems including doubling, halving and sharing</p> <p><i>ELG: Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally</i></p>	<p>Count in 2s, 5s and 10s up to 100</p>	<p>Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables including recognising odd and even numbers show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot</p>	<p>Recall and use multiplication and division facts for the three four and eight multiplication tables</p>	<p>Recall multiplication and division facts for multiplication tables up to 12×12</p> <p>Use place value known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together 3 numbers recognise and use factor pairs and commutativity mental calculations</p>	<p>Identify multiples and factors including finding all factor pairs of a number and common factors of 2 numbers</p> <p>Know and use vocabulary of prime numbers, prime factors and composite(non prime) numbers establish whether a number up to 100 is prime and recall prime numbers up to 19 recognise and use square numbers and cube numbers the notation for</p>	<p>Identify common factors, common multiples and prime numbers</p> <p>Use estimation to check to answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy</p>
--	---	--	--	--	---	---	--



White Rose/National Curriculum – Progression of Skills

						squared and cubed.	
--	--	--	--	--	--	--------------------	--



White Rose/National Curriculum – Progression of Skills

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Multiplication and Division: calculation</p>			<p>Calculate mathematical statements for multiplication and division within multiplication tables and write them using the multiplication division and equals signs</p>	<p>Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one digit numbers, using mental and progressing to formal written methods</p>	<p>Multiply two digit and three-digit numbers by a one digit number using formal written layout</p>	<p>Multiply numbers up to four digits by a one- or two-digit number using a formal written method including long multiplication for two digit numbers multiply and divide numbers mentally drawing upon known facts divide numbers up to four digits by a one digit number using formal written method of short division and interpret remainders appropriately for the context</p>	<p>Multiply multi digit numbers up to four digits by a two-digit whole number using the formal written method of long multiplication</p> <p>Divide numbers up to four digits by a two-digit whole number using the formal written method of long division and interpret remainders as whole number remainders, fractions or by rounding as appropriate for the context</p> <p>Divide numbers up to four digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context perform mental calculations including</p>



White Rose/National Curriculum – Progression of Skills

						Multiply and divide whole numbers and those involving decimals by 10,100 and 1000	with mixed operations and large numbers
Multiplication and Division: Solve Problems	Solve problems including doubling, halving and sharing	Solve one step problems involving multiplication and division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher	Solve problems involving multiplication and division using materials, arrays, repeated addition, mental methods, and multiplication and division facts including problems in contexts	Solve problems including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects	Solve problems involving multiplying and adding, including using the distributive law to multiply 2-digit numbers by 1 digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects	Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes solve problems involving multiplication and division, including scaling by simple fraction and problems involving simple rates	Solve problems involving addition subtraction multiplication and division



White Rose/National Curriculum – Progression of Skills

Multiplication and Division: Combined Operations						Solve problems involving addition subtraction multiplication and division and a combination of these, including understanding the meaning of the equals sign	Use their knowledge of the order of operations to carry out calculations involving the four operations
	Fractions, Decimals and Percentages						



White Rose/National Curriculum – Progression of Skills

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Fractions: Recognise and Write</p>		<p>Recognise, find and name a half as one of two equal parts of an object shape or quantity</p> <p>Recognise find and name a quarter as one of four equal parts of an object shape or quantity</p>	<p>Recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length shape set of objects or quantity</p>	<p>Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers in or quantity's by 10</p> <p>recognise find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators</p> <p>Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators</p>	<p>Count up and down in hundredths; recognise that hundredths arise when dividing an object by 100 and dividing tenths by 10</p>	<p>Identify name and write equivalent fractions of a given fraction, represented visually including tenths and hundredths</p> <p>Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements >1 as mixed number for example</p>	



White Rose/National Curriculum – Progression of Skills

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Fractions: compare</p>			<p>Recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$</p>	<p>Recognise and show using diagrams, equivalent fractions with small denominators</p> <p>Compare and order unit fractions, and fractions with the same denominators</p>	<p>Recognise and show using diagrams, families of common equivalent fractions</p>	<p>Compare and order fractions whose denominators are all multiples of the same number</p>	<p>Use common factors to simplify fractions; use common multiples to express fractions in the same denomination</p> <p>Compare and order fractions, including fractions > 1</p>
---	--	--	---	--	---	--	---



White Rose/National Curriculum – Progression of Skills

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Fractions: calculations</p>			<p>Write simple fractions for example $\frac{1}{2}$ of 6 = 3</p>	<p>Add and subtract fractions with the same denominator within one whole for example $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$</p>	<p>Add and subtract fractions with the same denominator</p>	<p>Add and subtract fractions with the same denominator and denominators that are multiples of the same number</p> <p>Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams</p>	<p>Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions</p> <p>Multiply simple pairs of proper fractions, writing the answer in its simplest form e.g. $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$</p> <p>Divide proper fractions by whole numbers e.g. $\frac{1}{3}$ divided by 2 = $\frac{1}{6}$</p>
--	--	--	---	---	---	---	---



White Rose/National Curriculum – Progression of Skills

Fractions: Solve Problems			Solve problems that involve all of the above	Solve problems involving increasingly hard fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number			
Decimals: Recognise and Write					Recognise and write decimal equivalents of any number of tenths or hundredths recognise and write decimal equivalent to $\frac{1}{4}$ $\frac{1}{2}$, $\frac{3}{4}$	Read and write decimal numbers as fractions for example $0.71 = \frac{71}{100}$ recognise and use thousandths and relate them to tenths hundredths and decimal equivalents	Identify the value of each digit in numbers given to three decimal places



White Rose/National Curriculum – Progression of Skills

Decimals: Compare					Round decimals with one decimal place to the nearest whole number compare numbers with the same number of decimal places up to two decimal places	Round decimals with two decimal places to the nearest whole number and to one decimal place Read, write, order and compare numbers with up to three decimal places	



White Rose/National Curriculum – Progression of Skills

Decimals: Calculations and Problems					<p>Find the effect of dividing a one- or two-digit number by 10 and 100 identifying the value of the digits in the answers as ones, tenths and hundredths</p>	<p>Solve problems involving number up to three decimal places</p>	<p>Multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places</p> <p>Multiply one-digit numbers with up to two decimal places by whole numbers</p> <p>Use written division methods in cases where the answer has up to two decimal places</p> <p>Solve problems which require answers to be rounded to specific degrees of accuracy</p>
--	--	--	--	--	---	---	--



White Rose/National Curriculum – Progression of Skills

Fractions, Decimals and Percentages					<p>Solve simple measure and money problems involving fractions and decimals to two decimal places</p>	<p>Recognise the percent symbol and understand that percent relates to number of parts per hundred and write percentages as a fraction with the denominator 100 and as a decimal</p> <p>Solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those fractions with the nominator of a multiple of 10 or 25</p>	<p>Associate a fraction with division and calculate decimal fraction equivalents for a simple fraction</p> <p>Recall and use equivalence is between simple fractions decimals and percentages including in different contexts</p>
--	--	--	--	--	---	--	---



White Rose/National Curriculum – Progression of Skills

Ratio and Proportion							
Ratio and Proportion							<p>Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts</p> <p>Solve problems involving the calculation of percentages and the use of percentages for comparison</p> <p>Solve problems involving similar shapes where the scale factor is known or can be found</p> <p>Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples</p>



White Rose/National Curriculum – Progression of Skills

<p>Algebra</p> <p>Note – although algebraic notation is not introduced until Y6, algebraic thinking starts much earlier as exemplified by the ‘missing number’ objectives from Y1/2/3</p>		<p>Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = - 9$</p>	<p>Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.</p>	<p>Solve problems, including missing number problems</p>			<p>Use simple formulae to generate and describe linear number sequences</p> <p>Express missing number problems algebraically</p> <p>find pairs of numbers that satisfy an equation with two unknowns</p> <p>enumerate possibilities of combinations of two variables</p>
<p>Measurement</p>							



White Rose/National Curriculum – Progression of Skills

Using Measures	<p>Compare length, weight and capacity by making predictions and using vocabulary ‘than’ [for example, “This is heavier than that.”]</p>	<p>Compare, describe and solve practical problems for: lengths and height, mass/weight, capacity and volume time measure and begin to record the following: <i>lengths and height mass/weight capacity /volume time (hours, minutes, seconds)</i></p>	<p>Choose and use appropriate standard units to estimate and measure length/ height in any direction, mass, temperature, capacity to the nearest appropriate unit</p> <p>Using rulers scales thermometers and measuring vessels compare and order length, mass, volume/ capacity and record the results using ></p>	<p>Measure, compare, add and subtract lengths (m/cm/mm); mass (kg,g); volume/capacity (l/ml)</p>	<p>Convert between different units of measure estimate compare and calculate different measures</p>	<p>Convert between different units of metric measure</p> <p>Understand and use approximate equivalence is between metric units and common imperial units such as inches, pounds and pints</p> <p>Use all four operations to solve problems involving measure using decimal notation including scaling</p>	<p>Solve problems involving the calculation and conversion of units of measure using decimal notation up to three decimal places</p> <p>Where appropriate use, read, write and convert between standard units converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit and vice versa using decimal notations up to three decimal places</p> <p>Convert between miles and kilometres</p>
----------------	--	---	--	--	---	---	--



White Rose/National Curriculum – Progression of Skills

Measurement: Money		Recognise and know the value of different denominations of coins and notes	<p>Recognise and use the symbols for pounds (£) and pence (p)</p> <p>Combine amounts to make a particular value find different combinations of coins that equal the same amount of money</p> <p>Solve simple problems in a practical context involving addition and subtraction of money of the same unit including giving change</p>	Add and subtract amount of money to give change using both pounds and pence in practical context	Estimate, compare and calculate different measures including money in pounds and pence	Use all four operations to solve problems involving measure for example money	



White Rose/National Curriculum – Progression of Skills

Measurement: Time		<p>Sequence events in chronological order using language for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening recognise and use language relating to dates, including days of the week, weeks, months and years tell time to the hour and half past the hour and draw hands on the clock face to show these times</p>	<p>Compare and sequence intervals of time tell and write the time to five minutes, including quarter past/to the hour and draw the hands on the clock face to show these times</p> <p>Know the number of minutes in an hour and the number of hours in a day</p>	<p>Tell and write the time from an analogue clock including using Roman numerals from I to XII and 12 hour and 24 hour clocks estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, am/pm, morning, afternoon, noon and midnight</p> <p>Know the number of seconds in a minute and the number of days in each month, year and leap year</p>	<p>Read write and convert time between analogue and digital 12 and 24 hour clocks solve problems involving converting from hours to minutes, minutes to seconds, years to months, weeks to days</p>	<p>Solve problems involving converting between units of time</p>	<p>Use read write and convert between standard units converting measurements of time from a smaller unit of measure to a larger unit and vice versa</p>
--------------------------	--	---	--	--	---	--	---



White Rose/National Curriculum – Progression of Skills

				compare durations of events for example to calculate the time taken by a particular event or task			
--	--	--	--	---	--	--	--



White Rose/National Curriculum – Progression of Skills

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Measurement: Perimeter, Area, Volume</p>				<p>Measure the perimeter of simple 2D shapes</p>	<p>Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres find the area of rectilinear shapes by counting squares</p>	<p>Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres</p> <p>Calculate and compare the area of rectangles including squares and including using standard units and estimate the area of irregular shapes estimate volume for example using one centimetre cubed blocks to build cuboids including cubes and capacity for</p>	<p>Recognise that shapes with the same area can have different perimeters and vice versa</p> <p>Recognise when it is possible to use formulae for area and volume of shapes calculate the area of parallelograms and triangles</p> <p>Calculate estimate and compare volume of cubes and cuboids using standard units including cubic centimetres and cubic metres and extending to other units</p>



White Rose/National Curriculum – Progression of Skills

						example using water	
Geometry							
Geometry: 2D shapes	Select, rotate and manipulate shapes in order to develop spatial reasoning skills compose and decompose shapes so that children recognise a shape can have other shapes within it, just as numbers can	Recognise and name, 2D shapes for example rectangles (including squares), circles and triangles	Identify and describe the properties of 2D shapes, including the number of sides and line of symmetry in a vertical line identify 2D shapes on the surface of 3D shapes) for example a circle on a cylinder and a triangle on a pyramid) compare and sort common 2D shapes and everyday objects	Draw 2D shapes	Compare and classify geometric shapes including quadrilaterals and triangles based on their properties and size identify lines of symmetry in 2D shapes presented on different orientations	Distinguish between regular and irregular polygons based on reasoning about equal sides and angles Use the properties of rectangles to juice related facts and find missing lengths and angles	Draw 2D shapes using given dimensions and angles compare and classify geometric shapes based on their properties and sizes Illustrate and name parts of circles including radius and diameter and circumference and know that the diameter is twice the radius



White Rose/National Curriculum – Progression of Skills

Geometry: 3D shapes	Select, rotate and manipulate shapes in order to develop spatial reasoning skills	Recognise and name common 3D shapes for example cuboids including cubes pyramids and spheres	Recognise and name common 3D shapes for example cuboids including cubes pyramids and spheres compare and sort common 3D shapes and everyday objects	Make 3D shapes using modelling materials recognise 3D shapes in different orientations and describe them		Identify 3D shapes including cubes and other cuboids from 2D representations	Recognise describe and build simple 3D shapes including making nets
----------------------------	---	--	---	--	--	--	---



White Rose/National Curriculum – Progression of Skills

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Geometry: Angles and Lines</p>				<p>Recognise angles as a property of shape or a description of a turn identify right angles</p> <p>Recognise that two right angles make half a turn three make $\frac{3}{4}$ of a turn and four a complete turn; identify whether angles are greater than or less than a right angle</p> <p>identify horizontal and vertical lines and pairs of perpendicular and parallel lines</p>	<p>Identify acute and obtuse angles and compare and order angles up to two right angles by size</p> <p>Identify lines of symmetry in 2D shapes represented in different orientations complete a simple symmetrical figure with respect to a specific line of symmetry</p>	<p>Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles draw given angles, and measure them in degrees</p> <p>Identify: angles at a point and one whole turn angles at a point on a straight line and half a turn other multiple of 90 degrees</p>	<p>Find unknown angles in any triangles, quadrilaterals and regular polygons</p> <p>Recognise angles where they meet at a point, on a straight line or are vertically opposite and find missing angles</p>



White Rose/National Curriculum – Progression of Skills

Geometry: Position and Direction	Continue, copy and create repeating patterns	Describe position direction and movement, including whole, half, quarter and three-quarter turns	Order and arrange combinations of mathematical objects in patterns and sequences Use mathematical vocabulary to describe position direction and movement including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three quarter turns clockwise and anticlockwise		Describe positions on a 2D grid as coordinates in the first quadrant Describe movements between positions as translations of a given unit to the left/ right and up/ down plot specified points and draw sides to give to complete a given Polygon	Identify describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed	Describe positions on the full coordinate grid all 4 quadrants Draw and translate simple shapes on the coordinate plane, and reflect them in the axes
	Statistics						



White Rose/National Curriculum – Progression of Skills

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Statistics: Present and Interpret</p>			<p>Interpret and construct simple pictograms, tally charts, block diagrams and simple tables</p>	<p>Interpret and present data using bar charts, pictograms and tables</p>	<p>Interpret and present discrete and continuous data using appropriate graphical methods including bar charts and time graphs</p>	<p>Complete read and interpret information in tables including timetables</p>	<p>Interpret and construct pie charts and line graphs and use these to solve problems</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Statistics: Solve Problems</p>			<p>Ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity</p> <p>Ask and answer questions about totalling and comparing categorical data</p>	<p>Solve one step and two step questions (for example How many more? How many fewer?) using information presented in scaled bar chart and pick to grammes and tables</p>	<p>Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs</p>	<p>Solve comparison, sum and difference problems using information presented in a line graph</p>	<p>Calculate and interpret the mean as an average</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Additional Notes:</p>	<ul style="list-style-type: none"> Objectives and skills are revisited several times throughout the year. Skills from previous year are also revisited. Real-life contexts are provided for children to make sense of their learning <i>e.g. combining decimals with units of measure.</i> See calculation and manipulatives progression document. Children have daily number talk sessions <i>e.g. Number Sense (KS1), multiplication and division facts and arithmetic skills (KS2)</i> 						



White Rose/National Curriculum – Progression of Skills